ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

ANALYSIS OF PROJECT MANAGEMENT MATURITY LEVEL FOR SUGAR PLANT PROJECTS EXECUTION - THE CASE OF METALS AND ENGINEERING CORPORATION

BY

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ID/NO SGS/0246/2009A

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of St. Mary's University Thesis Writing Guideline and advisor Tiruneh Legesse (Asst. Professor). 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.

Kibrom Haile _____

Name Signature

St. Mary's University, Addis Ababa May, 2018

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Tiruneh Legesse (Ass. Professor) _____

Advisor Signature

St. Mary's University, Addis Ababa May, 2018

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ABSTRACT

The Ethiopia government is now implementing the second five years growth and transformation plan (GTP) which focus in construction of Mega Projects in different sectors. Such as sugar factories, Hydro Power plants, rail-way projects, and many others. METEC is one of a leading national engineering company playing a key role in construction of production facilities like sugar factory, fertilizer factory and hydro power plant projects. The objective of this research is then to assess how mature the Project Management practice of METEC is in executing the Sugar Plant Projects using a project management maturity model. Data have been collected from the Management and Employees of 'Omo kuraz one' and 'Beles' sugar projects as well as s from the head office. A descriptive research type was used to study the subject area and results of the study shows; the level of project management maturity of METEC has reached the third Level of progressive stages of the maturity ladder. The degree or level of the Company's Organizational project management maturity cannot be separated from that of its projects and therefore by implication the projects handled by METEC are also at Level three of project management maturity. In addition to the need to improve the level of project management maturity of METEC to the next level of maturities which are level 4 and 5, there are also some aspects of the project management knowledge areas lagging behind like Time Management, Cost Management and Risk Management which are still at are Level-2.

Key Words: Project Maturity, Integration Management, Scope Management, Time Management, Cost Management, Quality Management, Human Resource Management, Communication Management, Risk Management, Procurement Management

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Industrial organizations are implementing project management practices as a core competence and achieving organization's strategic goal. The discipline of project management is vast and focuses on the correlation between the organization's capability (in managing, programs, portfolios and projects) and its effectiveness in implementing strategy. It also provides organizations with knowledge, skills, tools and techniques to plan, execute and control projects. Therefore, successful project execution is vital for the sustainability of the organization and achieving corporate objectives.

Recently several project management initiatives have been developed to manage projects effectively. However, challenges still exist in developing capability to execute projects successfully. Project management maturity models are among the different initiatives which assess the maturity level of the performing project organizations and create a realistic roadmap for improvement and benchmarking.

Project management maturity Model (PMMM) is designed to provide a framework that an organization needs to progress and develop capability. Measuring the existing maturity level advances the organization in significant performance benefits. As in the research conducted by the Center for Business Practices (CBP) that organization improved by one step in the maturity level improves the customer satisfaction and execute projects effectively.

1.2. Background of the Organization

Metals and Engineering Corporation is state owned public Enterprise established by the council of regulation No 183/2011 with capital of Ten billion birr. METEC is the leading engineering companies with a multidisciplinary firm involved in energy, coal mining, manufacturing,

construction and agricultural sectors mainly in engineering design, fabrication, erection and construction works of mega projects.

The purpose of for which the corporation establish are;

1. To design, manufacture, erect, and commission manufacturing industry
2. To engage in maintenance and overhauling manufacturing industry
3. To manufacture industrial machinery, capital goods and industrial spare parts
4. To expand and enhance engineering and technology capability through creating partnership for integration and interfacing industrial resources.
5. To under tack production, manufacturing, overhauling and upgrading of weapons, Equipment and parts use full to defense and security forces for compact and war operations.
6. To build technological capability of country defense forces by identify existing and Potential needs and from through research and development.

1.3. Statement of the Problem

The Ethiopia government is now implementing the second five years growth and transformation plan (GTP) which focus in construction of Mega Projects in different sectors, such as sugar industry Development, Hydro Power plant, rail-way, and many others. METEC is one of a leading national engineering company plays a key role in construction of Production plant (like sugar factory, fertilizer factory) and Hydro power plant projects.

Project execution is core to company capacity building, technology transfer, profitability and stay as a best competitive in manufacturing company. So far, METEC is the main competitor in the Nation market even though, it has limited Technology transfer and marketing capabilities. However, the competition is becoming tough and challenging as new and international competitor companies (especially Asian Companies) are emerging into the market.

METEC is now handling several mega projects and still endeavoring project management processes and best practices to ensure successful delivery of projects. Currently, METEC is implementing project management approaches and training programs for project managers and

team members. Several initiatives have been implemented such as Quality Management System, Enterprise Resource Planning, Kaizen, Human Resource and working manuals. The company is wishing to enhance the project management capability as a starting point for their improvement initiative. As a result, assessing the current practices using maturity models should consider as first step for benchmarking the organization with other local and international companies and allows the company to define systematic roadmap for improving project management processes.

Some of the problems frequently raised by the Ethiopian sugar corporation officials regarding to the capabilities of project execution of METEC in reference to the sugar projects outsourced to them by the sugar corporation as presented in the public hearing arranged by parliament on 10 May 2016 are;

1. The projects outsourced to METEC are taking longer than the agreed up on time to complete the projects. As a result the sugar corporation is blaming METEC for failure to be able to deliver its promise to fulfill the local demand and earning hard currency by exporting the excess to the global market.
2. Sugar Corporation blames METEC for wasting of resources by overspending of the projects beyond what was planned.
3. The communications with the owner of the projects (Sugar Corporation) also seems full of misunderstanding and suspension. Especially as result of the fact that the officials of METEC are Military Generals, the owner corporation's officials are saying they are intimidated by the former when they deal with METEC in connection to the stated projects.

A lot is also said and heard about the missus of resources and corruption in the Sugar Corporation and related sugar projects. Finally, even though the objectives of this research is not to investigate the above mentioned problems by collecting directly related data with the issue raised, the research paper will shade light on the above issues indirectly by evaluation of the maturity of project management execution of METEC in the controversial sugar projects.

The research assesses how mature the Project Management practice of METEC is in executing the Sugar Plant Projects using a Project Management Maturity Model. The research attempted to scientifically confirm prevalence of above mentioned problems and identify additional problems.

1.4. Research Questions

The study attempted to assess the project management capability using a Project Management Maturity Model. The model is used as assessment tool to compare project execution capability with that of established best practices or against competitive organizations. In addition, measuring the current level of maturity provides a road map for improvement to the highest level of maturity. The study framed into five main research questions:-

1. Is there coordination among the various element of the project management activities and units?
2. Does the project plan include all the work required to complete the project timely and within the approved budget?
3. Is there a timely and appropriate; generation, collection, dissemination, storage, and ultimate disposition of project information?
4. Does the acquisition of goods and services as well as recruitment of human resources performed appropriately?
5. What are the major challenges in managing projects by METEC?

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of this research is to assess how mature the Project Management practice of METEC is in executing the Sugar Plant Projects using a project management maturity model.

1.5.2. Specific Objectives

The Specific Objectives of the Study are;

1. To assess the coordination among the various element of the project management activities and units in the company
2. To see how the project plan is prepared and assess whether it includes all the work required to complete the project timely and within the approved budget or not
3. To review the timeliness and appropriateness of; generating, collecting, disseminating, storage, and disposition of project information
4. To assess the appropriateness of the acquisition of goods and services as well as recruitment of human resources by the project
5. To identify the major challenges in project execution by METEC

1.6. Significance of the Study

The study has a potential for new approaches for improving the management of projects and implementing organizational change in METEC sugar plant project. More specifically, the study will help the sugar projects management team in particular focus on specific actions, desired attributes and requirements necessary to improve the organizational environment that favorably impact project management outcomes and encourage further research interest in aspect of an organization that influence project management maturity not covered in the study.

The study will further provide scope for improved definition of project management best practice in systems, structures and processes in an organizational context and through benchmarking, provide insight into organizational factors unique to sugar plant organizations that uniquely affected successful project Execution. The study would further create awareness on areas of project environment needing urgent attention.

1.7. Scope and Limitations of the Study

The study mainly focused on assessment of sugar plant project Execution management using project management maturity model thorough studies conducted to understand the general concept of maturity models and its application to METEC organization involved in the construction of 'Omo Kuraz One sugar factory' and 'Tana-Bales sugar factory' projects. In this study a five level maturity model was used to assess the project management knowledge areas and best practices.

1.8. Organization of the Study

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

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Theory and Practice of Project Management Maturity

Introduction

This chapter deals with Theories and Practices of Project Management Maturity with specific focus on the following issues:

1. The concepts of Project Management Maturity and importance of measuring maturity of Companies.
2. The Concept of Project Oriented Organizations (POO) and its strategic importance.
3. Different Project Management Maturity Models and their purposes.

2.1.1. Project and its Management

2.1.2.1 Project and its Management Definition

Many authors have defined a project in different ways emphasizing its different aspects. Stanleigh (2007) defines a project as: a temporary endeavor that has definite beginning and ending time undertaken the following specific cycle of Initiation, Definition, Planning, Execution and Closing to generate a unique product, service or result through novel organization and coordination of Human, Material and Financial Resources. Schwalbe (2007) defines a project as: Project is a finite endeavor having specific start and completion dates undertaken to create a unique product or service which brings about beneficial change or added value. Project has a defined scope, it is constrained by limited resource, and it involves many people with different skill and, usually progressively elaborated throughout its life cycle (Cleland & Ireland, 2002).

According to Chartered Institute of Building (2002), Project is the application and integration of modern management and project management Knowledge, Skills, Tools and Techniques to the overall planning, directing, coordinating, monitoring and controlling of all dimensions of a project from its inception to completion. Project management includes 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.

Project management deals mainly with coordinating resources and managing people and changes. It also includes: Identifying requirements, establishing clear and achievable objectives, balancing the challenging demands for Quality, Scope, Time and Cost; adapting specifications, plans, and approach to the different concerns and expectations of the various stakeholders (Project Management Institute, 2004).

According to PMI (2000), Project Management is: the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the use of processes such as: Initiation, Planning, Executing, Controlling, and Closing. The project team manages the work of projects, which typically involves Stakeholders with differing needs and expectations.

According to PMI (2004), there are nine core Knowledge Areas of project management. These are: Scope, Time, Cost, Risk, Quality, Human Resources, Communications, Procurement and Integration Management. In addition, there is also other industry specific Knowledge Areas that the Project Manager should consider in managing projects. For instances, PMI (2007) includes four additional important Knowledge Areas such as: Financial Management, Safety Management, and Environment Management and Claim management. Each knowledge area is composed of processes that are expected to be addressed to attain the objective of the Knowledge Areas (PMI, 2007).

2.1.2. Project Management and General Management

According to Carmichael (2004), the fundamental difference between Project Management and General Management stems 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 deals with management of operations which are ongoing and repetitive. Furthermore, Project activates changes continually as the project progresses through its various phases and terminate when the mission is accomplished; whereas operation activities sustain for a long period of time and continue assuming a broader outlook (PMI, 2004).

Despite the existence of fundamental difference between Project Management and General Management, both general management and project management share many things in common. Both share the same basic philosophies, both make and implement decisions, allocate resources, manage organizational interfaces, and provide leadership for the people who are involved in performing the work (Cleland & Ireland, 2002).

2.1.3. Project Management Applications

Using Project Management generally helps to clarify goals and identify problem areas and risks; to isolates activities and easily monitor outcomes. Furthermore, using PM improves accountability as works can be isolated and responsibilities can be assigned; it helps to focus on few specific and important tasks (PMI, 2004).

According to Cleland & Ireland (2002), Project management can best be applied when:

1. Resources are to be shared among many units;
2. Special attention or focus is to be given to important undertakings (example to focus attention on specific customers in specific market);
3. Integration of systems and subsystems is sought within independent units;
4. Dealing with ad-hoc, complex, unfamiliar, unique, or rare; activities, problems and opportunities;
5. Dealing with tasks that require pooling of many resources and capacities from diverse sources (example to give fast responses to new or unexpected events such as emergency response during disasters);
6. When it is desired to bring a wide range of experience and viewpoints into focus (example in research and product development or solving complex problems);
7. Dealing with an undertaking that require massive input of capital, technology, skills, and resources;
8. 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 and;
9. When there is a need to manage change.

2.1.4. Project Oriented Organizations (POO)

Project management methods have been extensively used by many public and private entities to solve their problems, manage scarce resources, and achieve important objectives (Andersen, 2008). Generally, Project Management is used extensively in some form within many organizations. There has not been identified profession or industry where project management practices will not work (Cleland & Ireland, 2002).

Anderson and Jessen (2003) argue that, today projects are seen as far more than merely solving technical problems. Projects are also avenues for mastering business and change. Graham and Englund (2004) also state, that many organizations are finding POO necessary to implement better Project Management practices. Gareis (1989) had long ago coined the concept of the Project-Oriented Organization (POO). The specific features of such an organization are identified in the way single projects are managed; as well as the manner in which management network of internal and external projects are executed and how they cultivate relationship between the Company and the implementation of Projects.

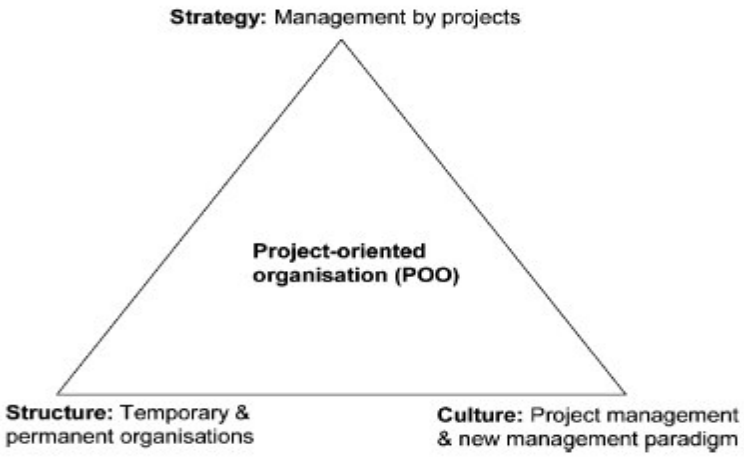
According to Gareis and Huemann (2000), in order for an organization to qualify as a Project-Oriented Organization (POO), it requires a significant maturity level in project management and Organization should have the following characteristics:

1. Defines "Management by Projects" as an organizational strategy;
2. Applies temporary organizations for the performance of complex processes;
3. Manages a project portfolio of different project types;
4. Has specific permanent organizations to provide integrative functions;
5. Applies a "New Management Paradigm" (lean management, total quality management (TQM), business process re-engineering and learning organization);
6. Has an explicit project management culture; and
7. Perceives itself as project-oriented.

Today, projects are seen as far more than solving of technical problems; they are also venues for mastering business and change (Andersen, 2003). Project-Oriented Companies consider projects not only as tools to perform business processes of medium and large scope but as a strategic option for the organizational design of the Company (Gareis & Huemann, 2000). Thus, it is

important that POO must consider projects as tools to perform complex processes and as strategic options for organizational design as indicated in Figure1.

Figure 2- 1: Strategy, Structure and Culture of the POO.



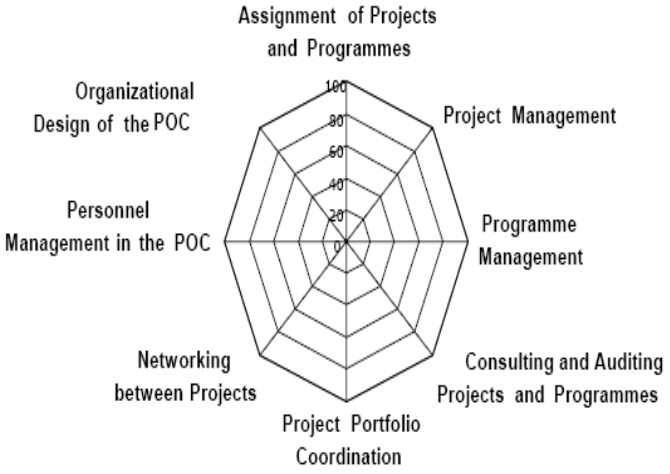
Source: Gareis and Huemann, (2000).

Project management is the core business process of the POO. The project management process starts with the formal project assignment and ends with the project acceptance by the project owner. The project management consists of the sub-processes such as project start, project co-ordination, project controlling, project discontinuity management and project close-down. The project management process is performed in addition to the contents related processes to achieve the project results (Gareis and Huemann, 2000).

They further argue about the aspects to consider in the project management process. These considerations are: the Project Objectives, Scope of work, Project Schedule and the Project Costs, as well as Project Organization, Project Culture, and Project Context (project environment relationships, project sustainability, correlation to company strategies and other projects, etc.). The achievable and deliverables of each project management sub-process can be compared with resource requirements for the performance of the project management sub-process.

According to Gareis and Huemann (2000), the Project-Oriented Organization is characterized by specific business processes. A process model of the POO can be visualized in a spider web as indicated below. The axes represent the specific processes of the POO.

Figure 2- 2: Specific Processes of the POO



Source: Gareis and Huemann (2000).

Hillson (2003) also notes that the value of a formal and structured approach to project management is becoming increasingly recognized as the discipline develops and more organizations begin to reap the benefits of proactive project based management. According to Gareis and Huemann (2000), "Management by Projects" is the organizational strategy of companies dealing with an increasingly complex business environment. This environment is affected by a number of forces originating from the project itself, the organization sponsoring the project, and organizations involved in project implementation, the sector or industry relevant to the service or product resulting from the project, forces from the country/economy and forces coming from the world environment on economics, politics and other social pressures.

By applying management by projects, Rwelamila (2007) argues that, the organization will be able to sail through the forces indicated above and pursue the following objectives:

1. Organizational differentiation and decentralization of management responsibility;
2. Quality planning, control and assurance by project team work and holistic project definitions;
3. Goal orientation and personnel development; and
4. Organization of organizational learning by projects.

Hence, In order to embrace PM good practices, the POO is characterized by the existence of an explicit PM culture, made up of a set of PM-related values, norms and procedures (Gareis and Huemann, 2000).

2.1.5. Project Management Maturity

2.1.5.1 Definitions and Concepts

There is no generally agreed definition of what a mature Project-Based Organization looks like. Different maturity models embody both different concepts and different suggestions as to the route to achieve maturity (Cooke-Davies, 2001). Jugdev and Thomas (2002) argue that, there is no one particular model which is universally accepted. Moreover, according to Ibbs and Kwak (2000), there are no universally accepted methodologies for impartially measuring project management practices.

However, Maturity as defined by Schleicher (1999) is, "full development or a perfected condition that connotes understanding or visibility as to why success occurs and ways to prevent common problems". Furthermore, Dinsmore (1998) defines project management maturity as: "*….a measure of an organization's effectiveness in the behaviors involved in delivering projects".*

Anderson and Jessen (2003) argue that if the concept of maturity is applied to an organization it might refer to a state where the organization is in a perfect condition to achieve its objectives. Project maturity would then mean that the organization is perfectly conditioned to deal effectively with its projects. They further state that in the real world it is impossible to find a fully matured organization; no one has reached the stage of maximum development and no one apparently ever will. Therefore, it makes sense to talk about a certain degree of maturity and make an effort to measure or characterize the maturity of the organization.

According to Anderson and Jessen (2003), measuring maturity will perhaps always be more subjective than objective. Some of the most important works on project maturity seems to focus primarily on what organizations and project people are doing operationally. Kerzner (2004) also emphasizes that, all organizations go through a maturity process. The maturity in project management is the development of systems and processes that are able to contribute to success.

Kerzner (2004) however, holds the view that these systems and processes do not necessarily guarantee success, rather they just increase the probability of success.

Dinsmore (1998) further argues that, a maturity assessment is a way of determining the extent to which the organization has incorporated project management into its way of working. The better the organization or department is at delivering projects, the higher its maturity will grow. Organizational maturity implies that capabilities must be grown over time. In terms of Project management, this is related to capabilities that can produce repeatable success in project management (Schlichter, 1999).

Project Management Maturity Models provide a systematic means to perform benchmarking and hence are adding considerable value to contemporary organizations. The Maturity Models provide an assessment framework that enables an organization to compare its project delivery with best practice or against competitors, ultimately defining a structured route to improvement (Project Management Institute, 2003).

According to Levin and Skulmoski (2002), Project management improvement does not happen overnight, and it cannot be implemented on a "fad of the week" basis. The results of a project management maturity assessment provide the opportunity to continually improve and develop an organization's competitive position and promote its business by projects.

According to Levin and Skulmoski (2000), the Maturity Models provide a framework to help enable organizations to increase their capability to deliver projects on schedule, within budget and according to the desired technical performance. Maturity Models provide a progressive standard to help organizations continue to improve their project management processes. An assessment of project management maturity collects evidence by evaluating an organization's performance against requirements (as set forth in the Maturity Model) and then making a judgment of whether a certain level of maturity has been achieved. By using a project management maturity model, you can "take the temperature" of your organization's project management efforts.

Levin and Skulmoski (2000) hold the view that a project management maturity assessment provides the basis for a larger, more significant initiative. It serves as the basis for guiding a subsequent project management improvement effort. The assessment provides a useful "road map" direction or "guide book" about what improvements should be tackled first.

Levin and Skulmoski (2000) further argue that, since the improvement program is tied to the assessment itself, the assessment findings help communicate the need for the changes to the rest of the organization and help to promote commitment for the improvement initiatives. Important improvement issues will not be ignored. It enables organizations to:

1. Become project-based with predictable results;
2. Identify strengths and weaknesses in project management;
3. Establish uniform principles and processes and integrate them throughout the organization;
4. Provide the organization with the necessary know-how to improve its competitive edge by implementing effective project management processes;
5. Establish a foundation for continued improvement in project management linked to the overall contributions and objectives of the business; and
6. Target those specific initiatives that provide the next foundational level in an organization's continued project management development;

Organizations can obtain different benefits from using particular Maturity Models (Peterson, 2000). The implication is that mature organizations are able to:

1. Manage all the projects undertaken by an organization effectively (Suares,1998);
2. Improve continually the performance of all projects undertaken by an organization (Peterson, 2000);
3. Improve dialogue between the project management community and an organization's top management (Peterson, 2000).
4. The organization is provided with project information from previous projects on which to evaluate project schedules and budgets, to ensure that these are realistic, and to review project performance (Office of Government Commerce, 2002);
5. Enables the organization to advance its strategic goals through the application of project management principles and practices. In other words, it bridges the gap between strategy and individual projects (Project Management Institute, 2003);and
6. As an organization grows in project management maturity, it obtains a better project management performance at a lower cost (Ibbs and Reginato, 2002).

According to the Office of Government Commerce (2003) the benefits that are to be expected from using the maturity models include:

1. Strengthens the link between strategic planning and execution so that project outcomes are predictable, reliable and consistent, and correlate with organizational success.
2. Places Best Practices and Capabilities within the context of not only Project Management, but also Program Management and Portfolio Management processes.
3. Provides the means to assess an organization's maturity relative to a body of identified Best Practices and Capabilities.
4. Provides a basis from which organizations can make improvements in project management maturity.
5. Provides guidance and flexibility in applying the model to each organization's unique set of needs.
6. Identifies the Best Practices which support the implementation of organizational strategy throughout successful projects.
7. The creation of an organization-wide ability for managing projects based on standard and defined project management processes that can be tailored to meet the specific needs of individual projects.

2.1.5.2 Project Management Maturity Models

There are numerous maturity models in use today. These models will illustrate that there are differences among companies in terms of their actual utilization of projects as a means to achieve objectives. However, many of these models are rather limited in scope (PMI, 2002).

The best-known maturity model was first created by the Software Engineering Institute (SEI), a federally funded research and development center sponsored by the US Department of Defense at Carnegie Mellon University. SEI's 'vision' was "The right software, delivered defect-free, on time and on cost, every time" and its role is to help organizations achieve this by providing both technical and management practice guidance (SEI, 2004). Although the Software Engineering Institute adapted its maturity model to assess software development processes, it seems to be useful for understanding any kind of process in any environment (Patterson, 1993).

Drawing heavily on the concept that every process has a natural *capability* that can be assessed using statistical process control, the original software model embodied a simple principle that if organizations wish to develop predictability and repeatability in their information systems production processes, then they need to develop a number of process areas, each of which consists of families of related processes (Cooke-Davies, 2004).

This chapter of the dissertation covers ten different maturity models which are widely used in modern project management practices. Some of these models are organizationally focused Maturity Models and the others are project based. These are:

1. Capability Maturity Model (CMM),
2. Organizational Project Management Maturity Model (OPM3),
3. Portfolio, Programme and Project Management Maturity Model (P3M3),
4. Project Management Maturity Model (PM3),
5. Project Management Process Maturity $(PM)^2$ Model,
6. Kerzner's PM Maturity Model,
7. MicroFrame's Maturity Mode,
8. PM Solutions Project Management Maturity Model,
9. The SPICE(Standardized Process Improvement for Construction Enterprises) Model, and
10. Construction Project Management Maturity Model (CPM3).

I. Capability Maturity Model (CMM)

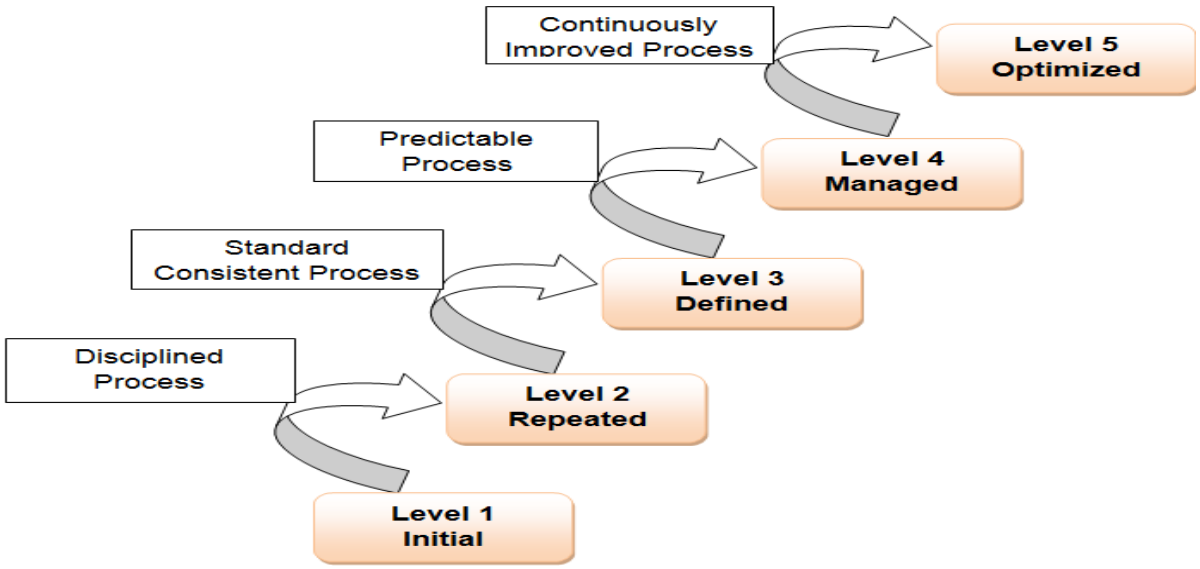
Capability maturity model is the first maturity model to be developed. The model was developed by the Software Engineering Institute (SEI) at Carnegie Mellon University. The model was primarily developed to evaluate software contractor`s capability for contract award and administration purpose. Later the model has been used by software developers as a guide for the improvement of their processes (Sarshar, *et al*., 1999).

The Software Engineering Institute (SEI) developed a framework of five stages of evolution in levels of capability called a Capability Maturity Model (SEI, 1993). SEI describes a model as a simplified representation of the world; its Capability Maturity Models (CMMs) contains the essential elements of effective processes for one or more bodies of knowledge (SEI, 2002). The following is characteristics of the five maturity levels as given by (Paulk, *et al*. 1993).

1. **Initial:** The software process is characterized as Ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort.
2. **Repeatable:** Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.
3. **Defined:** The software process for both management and engineering activities is documented, standardized, and integrated into a standard software process for the organization. All projects use an approved, tailored version of the organization's standard software process for developing and maintaining software.
4. **Managed:** Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled.
5. **Optimizing:** Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.

Paulk, *et al*. (1993) structured the internal architecture of the model along the lines illustrated in Figure 2 below. In this structure, each maturity level is composed of Key Process Areas. Each Process Area consists of a cluster of activities; when these activities are collectively executed they achieve the goals necessary for enhancing process capability. The Key Process Areas are the essential actions.

Figure 2- 3: CMM for Software Development.



Source: Paulk, *et al*. (1993).

Each Process Area is divided into five sections called Common Features. These Common Features specify the key practices that, when collectively addressed, accomplish the task of the Key Process Areas. These practices indicate whether the implementation or institutionalization of a Key Process Area has been effective, repeatable and lasting. CMM is a normative model yet has the flexibility to be customized. It is now clear that it is biased towards the software development process with limited applicability to project management in general (Paulk, *et al*, 1993).

II. Organizational Project Management Maturity Model (OPM3)

The Project Management Institute (2003) defines the Organizational Project Management Maturity as "The extent to which an organization practices organizational project management". For an organization wishes to initiate improvements, OPM3 is intended to help them determine what specific Capabilities they need to acquire to achieve the desired Best Practices, and in which order. So they can advance their agenda while conserving limited organizational resources (Fahrenkrog, *et al*., 2003).

According to PMI (2003), the OPM3 model was designed to achieve the following:

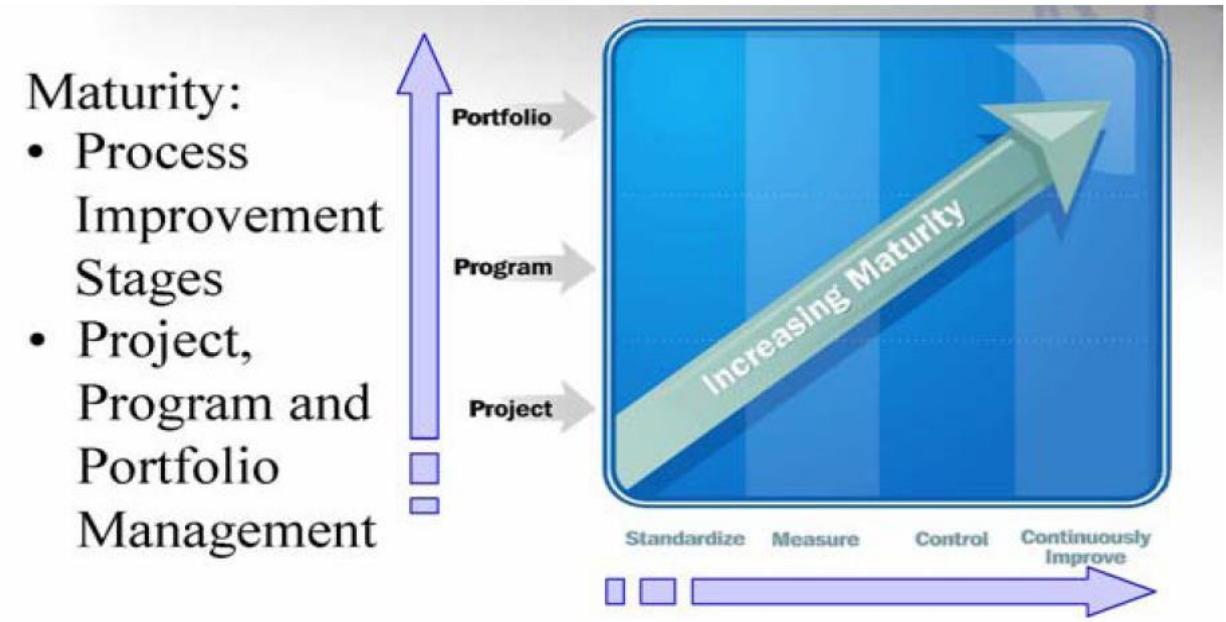
1. To help organizations assess and improve their project management capabilities as well as the capabilities necessary to achieve organizational strategies through projects;
2. To set the standard for excellence in Project, Program, and Portfolio management best practices; and
3. To explain the Capabilities necessary to achieve those Best Practices.

As with other PMI Standards, OPM3's intent is not to be prescriptive by telling the user what improvements to make or how to make them, rather the intent is simply to offer the standard as a basis for study and self-examination, and to enable an organization to make its own informed decisions regarding potential initiatives for change (PMI, 2003).

According to Project Management Institute (2003), the progression of increasing maturity designed into OPM3 consists of several dimensions, or different ways of looking at an organization's maturity. One dimension involves viewing best practices in terms of their association with the progressive stages of process improvement--from Standardized to Measure

to Control and to Continuously Improve. Another dimension involves the progression of best practices associated with each of the domains; first addressing Project Management, then Program Management, and finally, Portfolio Management. Each of these progressions is a continuum along which most organizations aspire to advance. Also, within these two dimensions are the progressions of incremental Capabilities leading to each best practice. This can be graphically described as shown in Figure 4 below:

Figure 2- 4: The Organizational Project Management Maturity Model (OPM3)



Source: PMI (2003).

Thus, multiple perspectives for assessing maturity allow flexibility in applying OPM3 to the unique needs of an organization. This approach also produces a more strong body of information than is possible with a simpler, linear system of levels, giving the organization greater detail in support of decisions and plans for improvement (PMI, 2003).

The OPM3 is comprised of three general elements as shown in Figure 4 and these are:

- ***Knowledge***, presenting the contents of the Standard;
- ***Assessment***, providing a method for comparison with the Standard; and
- ***Improvement,*** setting the stage for possible organizational changes.

Figure 2- 5: Three General Elements of the OPM3 Standard

Source: Project Management Institute (2003).

The OPM3 Knowledge foundation is the first part and is a perquisite for the other two elements. The Assessment needs to be done with the help of the tool that accompanies the Knowledge Foundation. The Knowledge Foundation contains the complete list of Best Practices. It also has the list of questions for Self-assessment (PMI, 2003).

In addition, OPM3 also categorizes the Capabilities in terms of their association with the five Project Management Process Groups [Initiating, Planning, Executing, Controlling, and Closing (IPECC)], permitting evaluation of a fourth dimension of maturity. Figure 7 shows the IPECC dimension – 5 Process Groups and Figure 7 show OPM3's multi-dimension level of maturity.

Moreover, OPM3 seeks to create a framework within which organizations can re-examine their pursuit of strategic objectives via Best Practices in organizational project management. This Standard is an initial statement on this Model, identifying and organizing a substantial number of generally accepted and proven project management practices, and providing a means to assess an organization's maturity against the Best Practices identified in this standard (PMI, 2003). Finally, with the result of such an assessment, an organization can decide whether to plan for improvements and how to approach these improvements to increase its maturity by developing more of the capabilities identified by the Standard.

III. Portfolio, Programme and Project Management Maturity Model

P3M3 originated as an enhancement to the Office of Government Commerce's (OGC's) Project Management Maturity Model, which in turn was based on the process maturity framework that evolved into the Capability Maturity Model (CMM). This was a descriptive reference model to provide organizations with more effective guidance in establishing process improvement programmes. It could also be used as the foundation for systematically building a set of tools, including maturity questionnaires. P3M3 therefore followed the CMM structure, using a five-level maturity framework (Introduction and Guide to P3M3, 2010).

P3M3 is an overarching model containing three individual models:

1. Portfolio Management Maturity Model (PfM3)
2. Programme Management Maturity Model (PgM3)
3. Project Management Maturity Model (PjM3)

Although connected, there are no interdependencies between these Models, which allows for independent assessment in any of the specific disciplines. For example, an organization's programme management capabilities may be more evolved than its project management capabilities, so the project management model can be used as a stand-alone tool when looking to improve that area (Introduction and Guide to P3M3, 2010).

P3M3 uses five-level maturity frameworks. These are:

Level 1 – Awareness of process,

Level 2 – Repeatable process,

Level 3 – defined process,

Level 4 – managed process, and

Level 5 – optimized process.

According to Introduction and Guide to P3M3 (2010), P3M3 focuses on the following seven Process Perspectives, which exist in all three models and can be assessed at all five Maturity Levels.

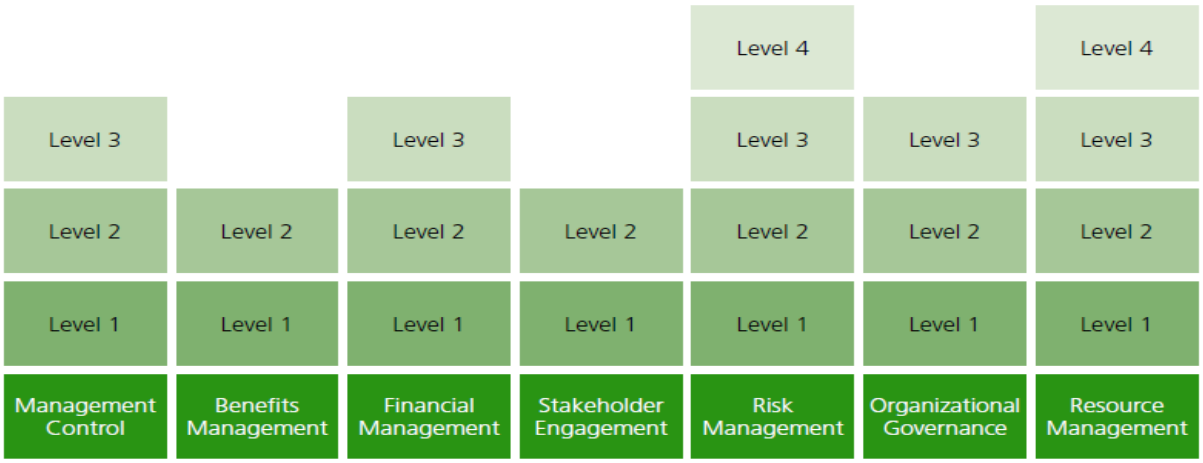
1. Management Control ;
2. Benefits Management ;
3. Financial Management ;

4. Stakeholder Engagement ;
5. Risk Management ;
6. Organizational Governance; and
7. Resource Management.

The flexibility of P3M3 allows organizations to review all seven Process Perspectives across all three Models – Portfolio, Programme and Project management – but they can also review just one (or several) of the Process Perspectives, whether across all three models or across only one or two of them. This can be useful to gain a better understanding of an organization's overall effectiveness.

Most organizations have strengths in some areas but not in others. P3M3 is designed to acknowledge these strengths as well as highlighting weaknesses. The Figure below illustrates how an organization might be viewed from the Process Perspectives (Introduction and Guide to P3M3, 2010).

Figure 2- 6: Process Perspectives of P3M3.



Source: Introduction and Guide to P3M3 (2010).

There are a number of reasons why organizations might choose P3M3 model to use a maturity model to assess their current performance such as:

1. Justifying investment in portfolio, programme or project management improvements;
2. Gaining recognition of service quality in order to support proposal; and

3. Gaining a better understanding of their strengths and weaknesses in order to enable improvement to happen.

To gain the maximum benefit from using P3M3, performance improvement should be seen as a long-term process although it is possible to achieve short-term performance gains by using P3M3 to identify and correct performance weaknesses. Furthermore, some of the organizational benefits of using P3M3 as opposed to other maturity models are listed below (Introduction and Guide to P3M3,2010).

1. It acts as a health check of strengths and weaknesses judged against an objective standard, not just against other organizations;
2. It helps organizations to decide what level of performance capability they need to achieve in order to meet their business needs;
3. It focuses on the organization's maturity rather than specific initiatives (good results are possible even with low levels of maturity, so are not in themselves a reliable indicator);
4. It recognizes achievements from investment;
5. It justifies investment in portfolio, programme and project management infrastructure; and
6. It provides a roadmap for continual progression and improvement.

IV. Project Management Maturity Model (PM3)

According to Project Management Institute (2000), all the nine Project Management Knowledge Areas are included at each level in this model. It is a fairly close adaptation of the CMM. So it also has five levels and their definitions reflect the same types of goals as the CMM.

Figure 2- 7: Mapping of CMM to PMMM. Source: Crowford (2002).

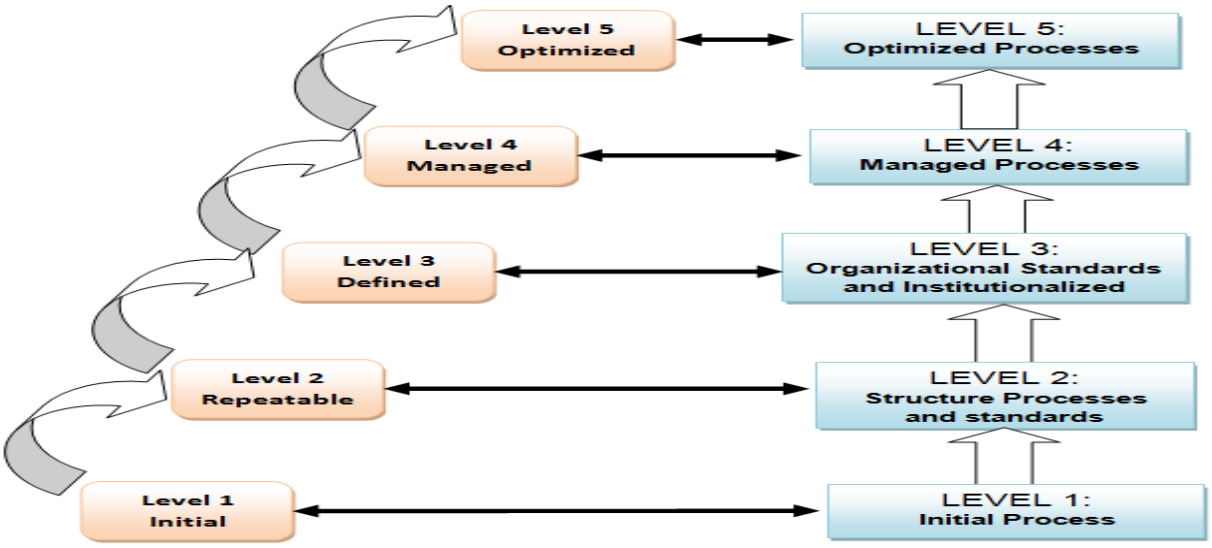


Table 2- 1: Definition of the Levels of PMMM.

LEVEL	NAME	CHARACTERISTICS
Level 1	Initial process	There are no established practices or standards and individual project managers are not held accountable by any specific standards. Documentation is loose and Ad Hoc.
Level 2	Structured process and Standards	Many project management processes exist in the organization but they are not considered an organizational standard. Documentation exists on these basic processes.
Level 3	Organizational Standards and institutionalized process	All project management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues.
Level 4	Managed process	Metric becomes the norm for managerial decision making. These help to make decisions based on past performance efficiency and prediction of future performance.
Level 5	Optimizing process	All processes are in place and are actively used to improve project management processes.

Source: Crowford (2002).

V. Project Management Process Maturity (PM) 2 Model

The (PM) ^{2} Model is developed by integrating previous maturity models that measure the PM levels of different companies and industries. The model becomes the basis to evaluate and

position an organization's current PM maturity level. It illustrates a series of steps to help an organization incrementally improve its overall PM effectiveness (Kwak & Ibbs, 2000).

The $(PM)^2$ Model breaks PM processes and practices into nine PM knowledge areas and five PM processes by adopting PMI's PMBOK. This allows an organization to determine the strengths and weaknesses of current PM practices and focus on the weak PM practices to achieve higher PM Maturity (Ibbs & Kwak, 2000). Each PM maturity level contains key PM processes, organizational characteristics, and focus areas (Kwak & Ibbs, 2000).

VI. Kerzner's Project Management Maturity Model

The model bears a number of similarities to CMM. It is a five level model with continuous improvement at the upper most level. However, this model allows for some degree of overlapping of the maturity levels. Even though overlapping does and can occur, the order in which maturity levels occurs dose not is change (Kerzner, 2004).

Like (PM)2 and CMM, Kerzner's Maturity Model defines five levels by which an organization is ranked from Insufficient project management processes to adequate project management processes leading to Continuous Improvement (Kerzner, 2004).

Kerzner has also described the characteristics of each level of maturity in detail and the roadblocks, `risks', and actions required completing at each level. In addition, an assessment instrument included for each maturity level Kerzner (2004).

According to Kerzner (2005), when an organization reaches Continuous Improvement level of maturity, it means it has institutionalized project management to the extent that its continuous process improvement cycle is self- sustaining. Table 4 provides summary of general description and main characteristics of the Model3.2.7 Micro Frame's Maturity Mode

Micro Frame Technologies, together with Project Management Technologies, have developed and made available on the Internet a Self-assessment tool for project management maturity. The Self-assessment tool comprises multiple-choice questions (Enterprise Planning Associates, 2000).

VII. PM Solutions Project Management Maturity Model

Similar to the (PM) 2 model, this model is developed by mirroring PMI‘s knowledge areas with that of CMM‘s five level maturity stage. The model examines an organization‘s PM implementation across the nine PM knowledge areas, which are in turn broken down in to components (Crawford, 2002).

According to Grant and Pennypacker (2006), the PM Solutions Project Management Maturity Model adopts two- dimensional (2-D) frame work. Both of the dimensions are based on accepted industry standards. The first dimension reflects the level of maturity. The second dimension depicts the key Knowledge Areas of project management addressed. This dimension adopts the structure of PMI`s nine Knowledge Areas. Each of the nine Knowledge Areas was further decomposed in to key components that provide for a more rigorous and specific capabilities. The Model has received widespread acceptance as a standard for process modeling and assessment of organizational maturity in several areas.

VIII. The SPICE Model

SPICE (Standardized Process Improvement for Construction Enterprises) is a research project that attempts to develop an incremental process improvement framework for the construction industry. The model is developed by adapting CMM‘s five maturity levels for project management in the construction industry (Sarshar, *et al*., 2000).The general description of the Five Maturity levels was provided by (Finnemore, *et al.*, 2000) and is summarized as follows:

Level-1 (Initial) - The processes at this level are characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on isolated effort. The construction process capability of level-1 organization is unpredictable because the process is not specified and is constantly changed or modified as the work progresses. Performance and success depend entirely on the capabilities of the individuals or teams, rather than that of the organization.

Level 2 (Repeatable) - At this level the focus is on establishing effective management processes within each construction project. At this level, basic project management processes are established and are repeatable. The necessary process discipline is in place. At this level there is a degree of project predictability. Policies and procedures for managing the major project are

established. Managers track quality and functionality as well as time and costs. Problems in meeting commitments are identified as they arise. Standards are defined and organizations ensure that they are faithfully followed.

Level 3 (Defined) - At this level the processes for all activities are documented, standardized, and integrated into the organization. All projects use an approved, tailored version of the organization‘s standard process. At level 3, both management and engineering activities are documented, standardized and integrated into the organization.

Level 4 (Managed) - At this level, detailed measurement of the processes and product quality are collected. Both processes and products are quantitatively understood and controlled. Productivity and quality are measured for important construction process activities across all projects as part of an organizational measurement program. Projects gain control by narrowing the variations in their process performance.

Level 5 (Optimizing) - At this level, continuous process improvement is enabled by using feedback from the processes to pilot innovative ideas and technologies.

Like CMM, each maturity level in the SPICE model has a set of key processes to be performed at each level. To achieve each level of maturity, an organization must perform all these key processes adequately. The key processes are developed based on CMM‘s key processes areas. SPICE‘s Level 1 has no key processes and organizations at this level have little process focus. Level 1 organization must focus on implementing Level 2 key processes. Level 2 key processes are: Scope of Work Management, Project Planning, Project Tracking and Monitoring, Sub-contract Management, Project Change Management, Risk Management and Project Team Co-ordination. The key process areas for the other maturity level are yet to be developed (Sarshar, *et al*., 2000).

The development of SPICE‘s process improvement for level 2 has already been completed and tested in real life projects. The result of a number of real life case studies showed that SPICE is effective and beneficial in identifying organizational improvements. Similar work was also done to adopt six key processes from CMM for Level 3. However, unlike that of Level 2 processes the test on field projects could not validate Level 3 processes. Thus, the characteristics of Levels 3, 4 and 5 in the SPICE model presented above were based on solely adaptation of CMM (Sarshar, *et al*., 2000).

IX. Construction Project Management Maturity Model (CPM3)

The model defines a total of six processes groups. These are Tendering, Planning, Executing, Controlling, Closing and Integration as the Key processes of construction project management. The model‘s description of the maturity levels is very close to that of CMM. To measure the maturity, the model identified a total of 30 key processes for the six process group (Yimam, 2010).

According to Yimam (2010), the key process areas of the model are considered to be critical for the success of construction project. The model appears to be primarily designed to help determination of the overall level of maturity of construction project management by establishing relationship between maturity of each key practice and the score of each practice (i.e. its weight) as determined by perceived contribution to success of construction project.

According to Fengyong & Renhui (2007), the maturity levels allow to measure the current status of the capability of construction project management. The five levels to describe the capability of project management for construction enterprises are as follows:

Level 1 (initial): The construction enterprise realizes the importance of project management, but has no relevant documented standards, experiments and corresponding organizations. The status of project planning and controlling is chaotic and the success of project relies on some particular individuals. Most problems are managerial, not technical.

Level 2 (repeatable): The enterprise realizes the necessary of defining and developing the generic processes, project management techniques are introduced, allowing controlling projects. The enterprise can manage situations based on previous experiences. New situations, which the enterprise have no previous experiences, or adopting a new technology of construction, etc. may create risks.

Level 3 (complete organized): In this stage the enterprise has set complete organization standards and systems and the organization improves its performance by defining and documenting the processes and making them understood. Defined processes empower individuals that have to perform the work.

Level 4 (quantitatively managed): Each activity in a construction project management can be quantitatively measured. The principle of statistical process control is applied. Quality of products and processes can be explained with statistical terminology. The project is well-controlled life cycling.

Level 5 (optimizing): Based on level 4, each process in the project can be optimized to satisfy the goals of project. The enterprise can continually improve processes.

Moreover, Fengyong & Renhui (2007) state that the CPM3 includes the following elements:

1. **Key process areas.** In order to achieve the capability of each level, the organization of construction project management needs to implement a set of activity clusters called key process areas. The whole process of construction project classified into 6 key process areas. Thus, for different construction enterprises, different maturity level can have the same key process area, only the standards required in a key process area are different.
2. **Goals.** In order to evaluate the standard of a key process in a construction enterprise, the enterprise should set a set of proper goals**.**
3. **Key practices.** Goals within each key process area are achieved by implementing a set of related activities called key practices.
4. **Common features**. In each key process area key practices are organized in classes which address implementation of the key process areas and aim to indicate the key process area is effective, repeatable or lasting.

2.2. Research Conceptual 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). 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)].

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.

2.2.1. Maturity

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, Chrissis, & Weber, 1993)

Organizational Maturity is "the extent to which an organization has explicitly and consistently deployed processes that are documented, managed, measured, controlled, and continually improved." [(CMMI Product Team, 2002, p. 582).cited by (Cooke- Davies, 2005)]

"..... (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". (PM Solutions, 2008)

"Maturity is the level of sophistication that indicates organization‟s current project management practices and processes".

"The degree to which an organization practices project management measured by the ability of an organization to successfully initiate, plan, execute, monitor and control individual projects." (Project Management Institute (PMI), 2003).

What is common in most of the above definitions is the idea of consistent and repeated practice, measurement and improvement or advancement. According to (Paulk etal, 1993), as an organization matures, the predictability, effectiveness, and control of an organization's processes are expected to improve. "Maturity in project management is a never-ending journey, with a never-ending cycle of bench- marking and continuous improvement (Kerzner, 2001). "As an organization gains in (project management) process maturity, it institutionalizes its project management process via policies, standards, and organizational structures.

Institutionalization (demands) building infrastructure and a corporate culture that supports the methods, practices, and procedures of the organization so that they endure after those who originally defined them have gone" (Paulk etal,1993).The more mature an organization's practices are, the more likely the organization meets its project goals successfully." (PM Solutions, 2008).

According to (Chrissis, Konrad, & Shrum, 2003), a matured process is well understood throughout a mature organization; usually through documentation and training, and the process is continually being monitored and improved by its users. The capability of a mature process is known. Process maturity implies that the productivity and quality resulting from an organization's use of the process can be improved over time through consistent gains in the discipline achieved by using its process .A mature organization has an organization-wide ability for managing initiatives based on standardized and defined management processes. In such organizations, activities are carried out according to defined processes and plans. Roles and responsibilities are well defined and understood.

Such organizations have also an objective way of measuring performance and quality; and the necessary information and database for doing that [(Office of Government Commerce (OGC)) (Supic, 2005)]. "In general, in a matured organization, a disciplined process is consistently followed because all of the participants understand the value of doing so, and the necessary infrastructure exists to support the process" (Sarshar, et al., 2000).

An immature organization on the other hand is an organization that does not have or use consistent and defined processes in management of its projects (Sarshar, et al., 2000).

“An organization that is immature in project management may occasionally deliver individual (projects) that produce excellent results. However, in such cases managers are more likely to be working reactively, focusing on solving immediate issues, rather than proactively acting. In addition, schedules and budgets are likely to be exceeded and if deadlines are imposed, the quality of deliverables is likely to be compromised in order to meet the schedule. In an immature organization, repeatable processes and results depend entirely on the availability of specific individuals with a proven track record.” (Office of Government Commerce (OGC)).

“As maturity increases, the variability of actual results around targeted results decreases. For instance, in an immature organization delivery dates for projects of similar size are unpredictable and vary widely. However, similar projects in a matured organization are expected to be delivered within a much smaller range. This narrowed variation occurs at the highest maturity levels because virtually all projects are performing within controlled parameters approaching the organization's process capability” (Paulk etal,1993).

Attaining maturity would not necessarily guarantee that a project would be successful. However, it could increase a project's chances of being successful. It should be noted that the processes of attaining maturity is not a one-time event that is accomplished by declaring a methodology and structure, nor it is a quick fix for immediate tactical problems rather, it is a consciously planned and properly managed continuous improvement effort [(Supic, 2005), (Kaya & Iyigun, 2001), (Saiedia & Kuzara, 1995)].

2.2.2. Maturity Models

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, & Shrum, 2003), (Paulk etal, 1993)]. Further, Maturity models differ from one another in the concepts they embody and

the suggestions they make as to how the path to maturity looks like. Moreover, different maturity models for

PM may define maturity differently and measure different things to determine maturity (Man, 2007).As (Paulk etal, 1993) puts clearly "(Maturity models) are not silver bullets and do not address all of the issues that are important for successful projects. The models are developed only to provide an orderly and disciplined framework within which to address (certain) management and engineering process issues".

The majority of maturity models generally consist of description of maturity levels, model of Processes to be assessed, Assessment tools and a model that guides the improvement path to the next level of maturity. Maturity models contain behaviors or best practices that successful projects have demonstrated. Hence, they generally, show what organizations need to do without mentioning the how or who. As (Supic, 2005) puts, "A generic goal of project management maturity models is to create strategic plan for moving project management forward"

The majority of maturity models have adapted the CMM"s five levels of maturity stage beginning from lower level of maturity, initial (Level 1), to the highest level of maturity, continuous improvement(level-5). According to (Chrissis, Konrad, & Shrum, 2003) the commonly used concept of five stages or maturity levels goes back to Crosby in Quality Is Free, which described a five-level scale with "world-class" as level 5.

Attaining a higher level of maturity is an effort that requires significant investment and the commitment of senior management. Not every organization is expected to reach the highest maturity level; rather each organization should decide a level that would be optimal for its context and aim for attaining that [(Office of Government Commerce (OGC)), (Crawford, 2002)]. According to (Crawford, 2002) , striving to increase maturity level just for the sake of reaching a higher level is unwise (investment) and use of a tool.

Maturity assessment should be done to help the business- not for its own sake. Generally, to derive the benefits of maturity , organizations should: exert continuous and consistent effort , have strong executive management support for the process ,emphasis on project management best practices ,set reasonable goals, implement changes step by step, conduct project

management training , create opportunity for sharing knowledge across the organization and always target incremental improvement. According to (Crawford, 2002), many organizations can achieve significant benefits by reaching (level-2) repeatable/ managed level maturity. It should be noted that, achieving a higher maturity level does not mean that the organization should always use sophisticated tools and methodologies. Rather, the organization can and should still be able to use tools and methods that are typical of lower level depending on the complexity and nature of each project. A higher maturity level mean only the organization has the capability to selectively choose and apply the proper PM processes, practices and tools (Kwak & Ibbs, 2002). Applications of Maturity Models

Maturity models are not meant to provide a quick fix for projects in trouble. Rather, they are primarily used internally by organizations to guide their effort of improving their project management capability [(Office of Government Commerce (OGC)), (Supic, 2005), (Saiedia & Kuzara, 1995)].This is achieved through assessment of the organization‟s PM processes to find out strengths, weaknesses 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 metric (baseline) against which progress in improvement and its effectiveness is compared (Kawak, Young Hoon, 1997). Maturity models can also be used by external procuring organizations as an evaluation tool to assess the capability of providers (contractors) and their risk profile (Saiedia & Kuzara, 1995). The use of maturity model helps organizations gain competitive edge by enabling them delivers predictable results and quality products [(Jugdev & Thomas, 2002)].

Successful use and the resulting benefit from the use of such models have been reported by many researchers in the field. For example, (Sarshar, et al., 2000) reported 16 an average of 35% productivity improvements and a return on investment (ROI) from 5:1 to 7.7:1. 16 citing (Herbsleb et al. 1994)

Like many other management tools the use of maturity models have some drawbacks. (Saiedia & Kuzara, 1995) has cited that in those models such as CMM that adopt Key process areas (KPA) ,adoptions of such KPA delays useful process improvement activities which are not part of a given Maturity level; as they cannot account for parallel, interdependent, and continuous

improvement of all KPA activities. Further, the use of standard methodologies and adherence to process may affect the manner in which a company interacts with its customers and affect its flexibility. Generally, as well summarized by [(Crawford, 2002)] and others "Maturity models are used in setting direction, prioritizing actions, and beginning cultural change rather than mare understanding (or determination of) the current level at which an organization is performing. maturity models provide baseline for measuring improvement, documents the need for change, provide common language, shared vision, fosters a culture of excellence, and sets the stage for organizational change, provide frame work for prioritizing improvement action".

2.2.3. Maturity Assessment Process

Maturity assessment generally can be conducted either by the organization‟s 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.

PM maturity assessments are typically divided into two key assessment processes: audit and self-assessment. Audits collect and compare data against a reference standard, evaluating the degree to which the criteria have been fulfilled, whereas self-assessments are designed to evaluate the strengths, weaknesses, and opportunities for improvement against a number of dimensions. Audits are primarily designed to support an external driver of compliance, whereas self-assessments are typically more internally focused on improvement" (Mullay, 2006).

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design and Approach

The research design that was used for the study is a descriptive research type. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts and describes the data collection (Glass & Hopkins, 19984). Descriptive study can be either qualitative or quantitative. Descriptive studies, primarily concerned with finding out "what is", and what is not can be applied to investigate the stated research questions in the statement of the problem so that the project maturity level of METEC can be evaluated using the project maturity model.

A structured Questionnaire was used to collect data from sugar plant project execution management as well as employees of METEC. In calculating Maturity of project execution knowledge Areas, all variables under each of the knowledge will be given equal weight. Then, investigation of Maturity level of METEC and rating of the relative Importance levels of Knowledge Areas for prioritizing improvement initiatives was conducted. In addition, few questions was added to evaluate the respondents' overall assessment of the project execution practice of METEC and prevailing gaps in the maturity level of project management.

3.2 Population and Sampling techniques of the Study

3.2.1 Population and Sample Size

The population of this study is all Management and Employees of Omo Kuraz one and Tana-Beles sugar projects as well as people involved in the planning and execution of these projects from the head office. The sample size selected form top management of the projects is the total population 12 (all of them were included). But, the sample size for the employees in the different levels of managerial and supervisory level was selected randomly. The details of selection looks like the following; From middle level (21 middle level managers were selected out of a population of 42); From low level (20 low level managers were selected out of a population of

126); and from employees (only 20 employees were selected from the population of more than 4,400 employees) based on their relevance for the research and their involvement in project execution. The sample size is considered appropriate since the top level managers and middle level managers are involved in the overall project management and low level managers and employees are only added in order to collect additional information from non-managers.

3.2.2 Sampling Technique

The sampling technique to select the respondents except the top management of the project (since all of them are included), was a disproportionate Stratified sampling. This sampling technique is commonly used method that is superior to random sampling because it reduces sampling error (Patton, 1990). A stratum is a subset of the population that shares at least one common characteristic. The relevant stratum in this regard is the level of the managerial positions of the respondents. All levels of managerial position will represent in the sample. But emphasis is given to the top level managers and middle level managers because of their involvement in project execution give them a better understanding of the maturity levels. Low level managers and employees are only added in order to collect additional information from non-managers.

3.3 Types of Data and Tools/Instrument of data collection

The source of information is generally classified as both primary and secondary sources. The primary data was collected through interviews and questionnaire from employees and management of METEC sugar projects. The secondary data was also collected from the books, records, reports, minutes and documents related to the execution of the sugar projects with special attention to Omo Kuraz and Beles sugar Factory projects. The collected data were evaluated with criteria used to evaluate the maturity of project execution based on the project maturity model.

3.4 Procedures of Data Collection

The data which is used in this research was collected using structured quaternaries and an interview for the primary data and referring manual books for the secondary data. The

quaternaries were prepare in English and used to collect the required data. In addition primary data was obtained through personal interviews with the top level management to collect more information on the subject.

3.5 Methods of Data Analysis

The analysis of the data followed the descriptive methods of data analysis. Frequency distribution of all variables has checked for outliers, missing data, and entry errors. Summary statistics, including the computation of means, ranges, standard deviations, frequency counts, and percentages of all demographic and project maturity level data evaluation was performed. And the discussions were made using tables, charts, and graphs to analyze the actual practice observed from the responses collected using questionnaires and secondary sources. The results of the survey were compared with the criteria of project maturity model. And recommendations are forward for the identified gaps. All collected data was recorded and analyzed with the Statistical package for the social science (SPSS).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results/Findings of the Study

This chapter presents the results of the data obtained from respondents regarding the Project Management Maturity of Sugar Plant Project Execution – The Case of METEC. In the first part, the demographic profiles of the respondents will be explained. In the second part, the Project Management Maturity level of Sugar Plant Project Execution will be evaluated by analyzing the detail responses of the respondents in comparison with the Maturity Model. Then, average Project Management Maturity level of each knowledge area will be presented. Finally, relationship between perceived Importance and Maturity level of project management knowledge areas will be analyzed.

4.2 Demographic Characteristics of the Sample

Response Rate

The data have been collected from the Management and Employees of 'Omo Kuraz One' and 'Beles' sugar projects as well as people involved in the planning and execution of these projects from the head office. The questionnaires distributed to the top level managers was 12, to the Middle level managers 21, to the low level managers (Supervisor) 20, and 20 was distributed to employees. Out of 12 top-level management respondents, 11 have returned the questionnaire, and 19 out of 21 respondents of middle level management answered the questionnaire, 17 low level managers and 13 employees also responded to the questionnaires out of the distributed 20 each. As a result, the response rate of top level management is around 92%, middle level around 90%, low level managers and employees around 85% and 65% respectively. This shows that the response rate of the participants was very high.

Table 4 - 1: Response rate of the Participants

	Questionnaires Distributed	Questionnaires Returned	Percent
Top level Management	12	11	**92%**
Middle level Management	21	19	**90%**
Supervisor	20	17	**85%**
Staff	20	13	**65%**
Total	**73**	**60**	**83%**

Source: Own Survey, 2018

Gender

Almost all the respondents 59 out of 60 (98.3%) are Male, and only 1 (1.7%) is Female. This shows the participation of women is not good in the Sugar Plant Projects. (See Table)

Table 4 - 2: Gender of the Respondents

Gender

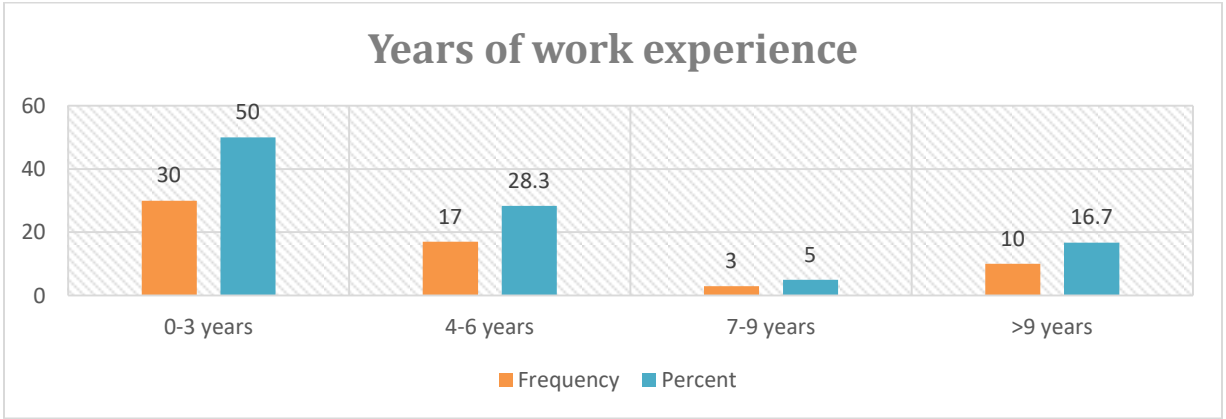
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Male**	59	98.3	98.3	98.3
	Female	1	1.7	1.7	100.0
	Total	**60**	**100.0**	**100.0**	

Source: Own Survey, 2018

Work Experience

As shown in Figure below, 30 of the respondents (50%) have a work experience of less than 3 years, 17 (28.3%) are with a work experience of 4 to 6 years, but a total of 13 respondents 22.7% have a work experience of more than 7 years. From this it is possible to assume that the significant number of the respondents may not be well informed about the company`s project management practices.

Figure 4 - 1: Respondents` service years in METEC



Managerial Positions of Respondents

Most of the respondents are working in different managerial positions. As it is shown in following table, 18.3% of the respondents are Top level Managers, 31.7% are Middle level Managers and 28.3 % are Supervisor. A total of 78.3% are holding different managerial positions but the remaining 21.7% of the respondents are non-management staffs. This implies that the selected respondents have got better opportunity to know more about project management practices of the Company.

Table 4 - 3: Respondents` Managerial Positions

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Top level Management	11	18.3	18.3	18.3
	Middle level Management	19	31.7	31.7	50.0
	Supervisor	17	28.3	28.3	78.3
	Staff	13	21.7	21.7	100.0
	Total	60	100.0	100.0	

Source: Own Survey, 2018

Academic Profiles

The majority of the respondent (71.7%, n=43) had earned their Bachelor's Degree and 15% of the respondent have master's degree. Only 13.3%, n=8 of the respondent are Diploma holders. This indicates that the respondents are well educated to understand questionnaires provided to them.

Table 4 - 4: Academic Profiles of the Respondents

Educational level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	8	13.3	13.3	13.3
	Bachelor Degree	43	71.7	71.7	85.0
	Master's Degree	9	15.0	15.0	100.0
	Total	60	100.0	100.0	

Source: Own Survey, 2018

4.3 Project Management Maturity of METEC.

Maturity is a comparative level of advancement an organization has achieved with regard to any given processes or set of activities. Organizations with more fully defined and actively used policies, standards, and practices are considered more mature (PM Solutions, 2008).

To evaluate the project management maturity level of METEC, judgment-based scoring system was used using the rating scale. In this part, we will evaluate the Maturity level of each knowledge area by analyzing the detail responses of the respondents in comparison with the Maturity Model. Then, the overall Average Project Management Maturity level will be evaluated.

4.3.1. Integration Management

Integration Management describes the processes required to ensure that various elements of the project are properly coordinated. It consists of plan development, plan execution, and integrated change control (PMI, 2004).

The respondents were requested to share their understanding about Integration management practice of METEC using eight variables. These variables measure the extent of the Company's Integration management practice. The response of respondents is shown in the following Table.

Table 4 - 5: Respondents response on Integration Management

No	Variables	Mean	Std. Deviation
1.1	Project constraints are clearly defined for each project.	3.17	1.11
1.2	Formal Organizational policies exist that include all required resource management and controls tools.	3.45	1.08
1.3	A project planning methodology is documented and strictly adhered to.	2.82	1.02
1.4	A project Management Information System (PMIS) is in place.	2.82	0.98
1.5	There is an overall change control processes.	2.90	1.05
1.6	A documented configuration management procedure is in place.	3.07	0.95
1.7	A Performance measurement criterion has been developed to establish how project progress will be determined and reported.	3.13	0.91
1.8	Project Progress Process is following as part of the project management continuous improvement process.	3.47	0.98
	Average maturity Level	**3.10**	**1.01**

As it can be seen from the above table and figure, the mean of the integration management area of knowledge is 3.1. This means, all project management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues.

However, project planning methodology documentation and strict adherence to it, Using project Management Information System consisting of the tools and techniques that can be used to gather, integrate, and disseminate the output of the Project management Processes, as well as the overall change control processes. To manage scope change, maintain performance measurement integrity. And implement approved changes that affect cost, risk, and staffing are at lower level from the other Integration management maturity criterion. Employees depend on informal practices to manage activities. Furthermore, within the Company there are limitations in project management plans that should be consistently developed, published and used. Project Management Information System (PMIS) that is used to gather, integrate, and disseminate the outputs of the project management processes is not yet established.

When we see the details of the responses, they are distributed in a normal distribution in similar way in all the areas of knowledge. The following graph shows distribution of responses in percent.

4.3.2. Scope Management

Scope Management is 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 project scope management process involves the processes: Identify Requirement, Define Scope, Create WBS (Work Breakdown Structure), Verify Scope, and Control Scope (PMI, 2004).

Different opinions of respondents about Scope management practice of METEC are collected using seven variables. These variables revealed the extent of Scope management practice of the Company. Some of the variables are Crating Scope statements for each project, Establishing change control processes and Communicating approved changes to all stockholders. As presented in Table below, the mean values of all variables are between 2.75 (Level-2) and 3.72 (Level-3). With plus or minus 1 as a standard deviation. More than half of the respondents (60%)

believed that Customers input are not always considered during Scope statements preparation and change control processes are not documented. As per the understanding of 23% of respondents, even approved changes are not well communicated to project team and customers; however, 42% said that the Management, the project Team and the Customer review projects development on a regular basis, but 23.4% have disagreed with this.

Scope management from METEC`s perspective is mainly about ensuring that all works the Company doing is what originally agreed on and covered by the contract documents. However, Scope Management maturity of the Company, 3.14 (62.8%), indicates that the maturity in this sub component could be considered at level - 3 (Organizational Standards and institutionalized process). Some Scope management practices are rarely or never applied. Approved changes to the Scope statement are not on time communicated to the project team and the customer as well, and documented change control process is not consistently implemented.

Table 4 - 6: Response about Scope Management practices of METEC.

No	Variables	Mean	Std. Deviation
2.1	A Project scope statement is created for every project.	3.72	1.15
2.2	Project Scope Statement are prepared with customer input throughout the development process	3.03	1.06
2.3	A Documented change Control Process in place for managing Change to the project Scope	2.75	0.91
2.4	All Project participants indorse the Scope Statement.	2.87	1.14
2.5	Approved changes to the scope statement are communicated to the project team and the client	3.37	1.01
2.6	The Management, the project team, and the client review all project progression on a regular basis.	3.23	0.91
2.7	A work Breakdown document (WBD) containing detailed description of the project's work is created for each project.	3.00	1.04
	Average maturity Level	**3.14**	**1.03**

4.3.3. Time Management

Project time management includes the processes required to ensure timely completion of a project. Project time management involves the processes: Define Activity, Sequence activities, Identify relationship among project activities, Estimate activity resource, Estimate activity Duration, Develop schedule and Control schedule (PMI, 2004). The respondents gave their opinion about Time management practice of METEC using eight variables which measure the extent of the Firms' time management practice. Understanding of respondents is shown in Table below.

Table 4 - 7: Response about Project time management practices of METEC

No	Variables	Mean	Std. Deviation
3.1	The project requirements (deliverables) are reflected in the project's work Breakdown Structure (WBS).	3.03	1.24
3.2	The project WBS and resource estimate are used to develop the project's baseline schedule.	3.00	1.14
3.3	All project assumptions are documented when developing the project schedule.	2.93	1.09
3.4	The project schedule identifies schedule constraints driven by the consumer, technology, suppliers, or management.	2.87	1.08
3.5	A critical path analysis is performed on the project schedule during each progress update cycle.	2.93	1.10
3.6	Project schedule are update on a regular basis against the baseline plan.	3.17	0.99
3.7	Resource –constrained and resource – leveled schedule are created and maintained	2.62	0.94
3.8	Schedules are optimized to conform to contract requirements.	2.98	0.97
	Average maturity Level	**2.94**	**1.07**

Mean values of all variables is 2.94, which means all activities related to Time management are still at Level -2 which means Many project time management processes exist in the organization but they are not considered an organizational standard. Documentation exists on these basic processes. From the component of the time management, the lowest ratings are given to component stating "the majority Resource –constrained and resource – leveled schedule are created and maintained" followed by "The project schedule identifies schedule constraints driven by the consumer, technology, suppliers, or management."

In addition the data collected confirmed that project schedules do not identify all constraints driven by the Customer, Technology, Suppliers, or Management. Moreover, resource-constrained and resource-leveled schedules are not regularly maintained. Only 5% of the respondents said that schedules are updated always on a regular basis.

Consequently, average Time Management maturity of the Company is 2.94. This score is equivalent to 59% of the overall total score of 5 points assigned as the maximum point achievable. This shows that Time Management maturity of METEC could be considered level -2. At this level, many project time management processes exist in the organization but they are not considered an organizational standard. Documentation exists on these basic processes. The construction process capability of level-2 organization is not fully predictable because the processes are not fully planned and are not constantly changed or modified as the work progresses. Performance depends on the capabilities of individuals since the time management practices are not considered an organizational standard.

4.3.4. Cost Management

Cost management includes the processes involved in estimating, budgeting and controlling costs so that the project can be completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control (PMI, 2004). As shown in Table below, Cost management practice of the Company is evaluated using nine variables. The respondents have different opinion about each question. The mean of the values is 2.68. This shows that Cost management maturity of the Company is at Level 2. About half of the respondents confirmed that all Cost management variables such as Cost center establishment, utilization of consistent financial standards and procedures and proper gathering of financial data for periodic reports are

not practiced in the Company. On average, less than 5% of respondents replied that these variables are always practices. Moreover, 50% replied that actual costs of projects are not tracked and reconciled with the original estimated costs. 80% replied that employees never received or rarely received training in financial standards and procedures. This area is also the lowest rated area of this group which is only 2.68. And 46.7% confirmed that Cost centers don't properly track actual expenditures against budget for specific line items.

Table 4 - 8: Response about Cost Management practices of METEC.

No	Variables	Mean	Std. Deviation
4.1	Cost centers are set-up to track actual project expenditures against budget for specific line items of the project schedule.	2.73	1.06
4.2	The project management environment has processes that support gathering of financial data for Periodic reports.	2.73	1.12
4.3	Project Financial Standards processes and procedures are documented and consistently followed.	2.83	1.03
4.4	Project team members receive training in financial standards and procedures.	1.97	1.01
4.5	Project budgets are based on resource estimates and the resource plan.	2.65	1.01
4.6	Actual cost are tracked and reconciled with the original estimated plan.	2.53	1.10
4.7	There is a consistent process documenting all estimates and cost assumptions.	2.70	0.96
4.8	A common list of cost categories exists for all project budgets	3.05	1.17
4.9	A common documented process is in place for completing all financial procedures required to close a project.	2.90	0.95
	Average maturity Level	**2.68**	**1.04**

Consequently, average Cost Management maturity of the Company is 2.68. This score is equivalent to 54% of the overall total score of 5 points assigned as the maximum point achievable. This shows that Cost Management maturity of METEC could be considered level–2. Thus, many of project Cost Management processes exist in the organization but they are not considered an organizational standard. Documentation exists on these basic processes. The project management environments do not have standardized processes that support gathering of financial data for periodic reports. In addition, cost centers are not fully efficient to track actual project expenditures against budget for specific line items of the project. Some project and

department Managers generally have little or no knowledge to control costs. Project team members do not receive training in financial standards and procedures.

4.3.5. Quality Management

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

Table 4 - 9: Quality Management Maturity Levels

No	*Variables*	*Mean*	*Std. Deviation*
5.1	A document procedure exists for creating and maintaining a project workbook.	3.03	1.10
5.2	Every project has Quality Assurance plan.	3.57	1.13
5.3	The project team reviews all of the processes and procedures that apply prior to the start of every project.	3.05	0.95
5.4	Common documented processes and procedure for technical performance, business performance, and quality, performance are applied to every project.	3.03	0.96
5.5	An initial review of the project plan, involving all participants, is conducted prior to creating a baseline project plan to ensure completeness and consistency.	2.98	0.89
5.6	On a regular basis, Variances are reviewed between the current progress status and project Quality against the baseline plan.	2.85	0.84
5.7	On a regular basis, project trend data are analyzed, based on metrics data	2.72	1.08
5.8	Quality Issues Resolution process for the project is established and followed.	3.18	0.95
5.9	Quality change control process for the project is established and followed.	3.25	0.95
	Average maturity Level	**3.07**	**0.98**

Mean values of quality management practice is 3.07. This means the organization is at level 3 in general. But, out of the nine variables 3 activates are still at level-2. On a regular basis, Variances are reviewed between the current progress status and project Quality against the baseline plan (2.85), and On a regular basis, project trend data are analyzed, based on metrics data (2.72), An initial review of the project plan, involving all participants, is conducted prior to creating a baseline project plan to ensure completeness and consistency (2.98)

Average Quality Management Maturity of METEC is 3.07 (Organizational Standards and institutionalized process). At this level, the Company begins using standard Quality management

processes. But the management is still localized to particular teams or areas. Quality variances between the current progresses against the quality baseline plan are regularly reviewed.

4.3.6. Human Resource Management

Human Resource Management includes the processes that organize, manage, and lead the project team. Project human resource management involves the processes: Develop Human Resource Plan, Acquire Project Team, Develop Project Team and Manage Project Team. Project Human Resource Management includes the processes of organizational planning, staff acquisition, and team development (PMI, 2004).

As indicated in the following tables and Figure, the respondents believed that Human resource Management maturity is Level-2 in aspects like; All project resource needs (such as hardware, software, and space) are clearly document (2.82), The training and developmental needs of all team members are documented (2.62), and A documented process is in place for recognizing outstanding commitments or performance on a project (2.97).

But the mean of Human resource management practices is 3.10 which means the organization is in level 3 in this area.

Table 4 - 10: Human Resource Management Maturity.

No	Variables	Mean	Std. Deviation
6.1	A Staffing plan is created and followed for every project.	3.43	1.03
6.2	Team members are selected to match roles and responsibilities, which are defined and documented.	3.37	0.94
6.3	All project resource needs (such as hardware, software, and space) are clearly document.	2.82	1.08
6.4	An organization structure is created each project.	3.38	1.14
6.5	Customer human Resource requirements for the project are planned and document.	3.17	1.04
6.6	Project skills and developmental needs of all team members are documented.	3.03	0.97
6.7	The training and developmental needs of all team members are documented.	2.62	1.08
6.8	A documented process is in place for recognizing outstanding commitments or performance on a project.	2.97	1.09
	Average maturity Level	**3.10**	**1.05**

However, the overall maturity Level, 3.10 with standard deviation of 1 shows that Human Resource Management Maturity of METEC could be considered to be Level - 3 (Organizational Standards and institutionalized process). It is possible to conclude that there are Human Resource management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. The responses of the participants in this sub component confirmed this fact.

- The Company lacks qualified project management professionals to carry out management responsibilities according to best practices.
- The project team is not consistently involved in project planning development process.
- Staffing plan is not consistently created and followed for each project. Some people are “accidentally” assigned to project manager position.

4.3.7. Communication Management

Project Communication Management includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information. Project communication management includes the processes: Identify Stakeholders, Plan communication, Distribute Information, Manage Stakeholder Expectations, and Report Performance (PMI, 2004).

Table 4 - 11: Response about Communication Management of METEC.

No	Variables	Mean	Std. Deviation
7.1	A Communication plan, documenting the required project communications, is created for each project and is followed by the project team.	3.30	0.94
7.2	A project Announcement is made to both the customer's organization and yours to increase project awareness.	3.37	1.03
7.3	After each formal meeting, minutes are prepared and distributed to all affected parties.	3.13	1.02
7.4	Project status reporting procedures are established and followed.	3.37	1.01
7.5	Project information is update and readily accessible to the organization at all times.	3.35	1.04
7.6	Variance analysis for schedule, budget, and effort is communicated on a regular basis.	2.85	0.97
7.7	Project status review meetings are held regularly with company leadership, the customer, and suppliers.	3.37	0.96
7.8	Project successes are documented for including into a close- Down Announcement and success story.	3.12	1.11
	Average maturity Level	**3.23**	**1.01**

The above tables and figures shows Communication Management Maturity assessment result of METEC. Therefore, on average 17% of the respondents said project information is not usually updated and readily accessible to the organization. In view of the fact that variance analysis for schedule and budget are not always communicated, and 79% of them believed project status review meetings are usually held with company Leadership, the Customer. Moreover, 100% of the respondents confirmed that after each formal meeting, minutes are not always prepared and distributed to all affected parties.

However, overall Communication Management maturity is found to be 3.23 (65%). This indicates that Communication Management Maturity of METEC could be considered to be level - 3 (Organizational Standards and institutionalized process). Common Communication weaknesses that are identified are:

- Internal cross team communication occurs through the top management Committee meetings, but People who are not part of these meetings do not get the required information.
- Project status reporting procedures are not consistently followed, Project information is not regularly updated and not readily accessible to the organization at any times.

4.3.8. 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. Risk management processes are: Plan Risk Management, Identify Risks, Perform Qualitative and Quantitative risk analysis, Plan risk Responses, Monitor and Control risks (PMI, 2004).

Average Risk management maturity value, 2.81 (56%), which is similar to Time and Cost managements. Risk Management Maturity could be considered to be level - 2 (Structured process and Standards). Hence, within the Company, Many project risk management processes exist but they are not considered an organizational standard.

Table 4 - 12: Risk Management Maturity Levels.

No	*Variables*	*Mean*	*Std. Deviation*
8.1	A high-level risk assessment is completed at the start of each project.	2.88	1.08
8.2	The high-level risks are rated as low, medium, and high probabilities.	2.92	1.00
8.3	Project risks are documented using a common format.	2.62	1.17
8.4	A risk assessment/ handling plan is created for projects.	2.67	1.07
8.5	Project risks are evaluated for priority, probability, and impact.	2.88	1.08
8.6	The method for managing each accepted risk is documented.	2.57	1.05
8.7	Action plans are created for risks to be mitigated or transferred.	2.88	0.98
8.8	Contingency schedule project status meetings include a review of a project's risks.	2.82	0.91
8.9	Regularly scheduled project status meetings including a review of a project's risks.	3.02	1.03
	Average maturity Level	**2.81**	**1.04**

Table 4 - 13: Risk Management Maturity Levels details

No	*Variables*	*Never*	*Sometimes*	*Usually*	*Frequently*	*Always*	*Total*
1	A high-level risk assessment is completed at the start of each project.	8	30	35	18	8	100
2	The high-level risks are rated as low, medium, and high probabilities.	8	23	42	22	5	100
3	Project risks are documented using a common format.	23	20	32	22	3	100
4	A risk assessment/ handling plan is created for projects.	15	30	32	20	3	100
5	Project risks are evaluated for priority, probability, and impact.	13	18	40	23	5	100
6	The method for managing each accepted risk is documented.	20	23	38	17	2	100
7	Action plans are created for risks to be mitigated or transferred.	10	18	50	17	5	100
8	Contingency schedule project status meetings include a review of a project's risks.	8	25	45	20	2	100
9	Regularly scheduled project status meetings including a review of a project's risks.	7	27	30	32	5	100

Therefore, within the Company risk management strategy is not well established. Risks are not consistently identified, documented or tracked. Project risks are not always evaluated for priority and probability. And action plans are not always produced for risks to be mitigated or transferred.

4.3.9. Procurement Management

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

Table 4 - 14: Response about Procurement Management practices of METEC.

No	Variables	Mean	Std. Deviation
9.1	A standard (agreement) that includes project management requirements is issued for project goods and services.	3.20	1.04
9.2	A procurement plan is in place that identifies what to procure and when is developed at the start of each project.	3.10	1.07
9.3	Project timing and requirements are clearly defined in a formal contract or agreement.	3.22	0.92
9.4	Contract Administration is an integral part of the project management.	3.33	1.02
9.5	A "make-buy'' analysis performed prior to the start of every project.	2.87	0.97
9.6	Procurements Management processes have been documented	3.23	1.06
9.7	All Procurements are identified with the specific plan	3.05	1.02
9.8	An evaluation process that meets specific criteria has been formalized to provide a consistent method for procurement proposal review and acceptance,	2.98	0.93
9.9	A contract change control process is in place.	2.93	0.99
9.10	A Contract close out process that records the evaluation of supplier performance in meeting their contact requirements is documented.	3.18	1.05
	Average maturity Level	**3.11**	**1.01**

The respondents were requested to share their opinion about Procurement management practice of METEC using ten variables. These variables evaluate the extent of the Company`s Procurement management practice in terms of Procurement plan preparation, Contract Administration practice, "make-buy" decision analysis, Procurement Management processes, Formal and consistent evaluation criteria development and utilization, and Contract change control process. The perception of respondents is shown in Tables and figure above.

Therefore, overall Procurement Management maturity of METEC is 3.11 (62%) this shows that the Maturity could be considered to be Level - 3 (Organizational Standards and institutionalized process). For this reason, Procurement Management practices are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues.

4.3.10. Overall Management Maturity Level of METEC

To determine project management maturity level of METEC, judgment-based scoring system was used using the following rating scale:

Level 1 Initial process
Level 2 Structured process and Standards
Level 3 Organizational Standards and institutionalized process
Level 4 Managed process
Level 5 Optimizing process

Numeric values assigned to each response to the questions were 1 to 5. The response values are added per knowledge area and average values are used to determine maturity level of each knowledge area. Maturity levels of the nine project management knowledge areas are evaluated using the following levels:

Score	*Maturity levels*	*Value*
Level 1	Initial process	**1.0 – 1.99**
Level 2	Structured process and Standards	**2.0 – 2.99**
Level 3	Organizational Standards and institutionalized process	**3.0 – 3.99**
Level 4	Managed process	**4.0 – 4.99**
Level 5	**Optimizing process**	**5.0**

As indicated in the following table, project management maturity levels of the nine knowledge areas are between 2.68 and 3.23. Time Management, Cost Management and Risk Management maturities are Level-2 (Structured process and Standards). Integration Management, Scope Management, Quality Management, Human Resource Management, Communication Management, and Procurement Management maturities reached the next maturity ladder, which is Level-3.

Table 4 - 15: Project Management Overall Maturities of Knowledge Areas.

No	Knowledge Areas	Average maturity Level	Std. Deviation
1	Integration Management	**3.10**	1.01
2	Scope Management	**3.14**	1.03
3	Time Management	**2.94**	1.07
4	Cost Management	**2.68**	1.04
5	Quality Management	**3.07**	0.98
6	Human Resource Management	**3.10**	1.05
7	Communication Management	**3.23**	1.01
8	Risk Management	**2.81**	1.04
9	Procurement Management	**3.11**	1.01
10	Average	**3.02**	1.03

Average maturity value of the nine project management knowledge areas is 3.02. This score is equivalent to 60% of the total score of 5 points assigned as the maximum point achievable. Hence, it is possible to conclude that project management maturity of the Company is **Level - 3** (Organizational Standards and institutionalized process). All project management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues.

4.4 Maturity and Importance level of PM Knowledge Areas

As shown in the following Figure, Quality management practice of METEC is relatively more matured (3.07 and 2.94), but its` Importance level (4.2) is less than Time management (4.5) and Cost management practices (4.32). The lower importance level of Quality management ranked by the respondents might be due to fact that, in the construction quality controlling and managing responsibilities are up on the Consulting firm.

Similarly, time management practice is considered by respondents the most important variable (4.5), nevertheless the maturity level is at the lowest rank, 2.94. Furthermore, Cost management is also considered as important variable (4.32) next to time management but its` maturity level is 2.68.

Table 4 - 16: Maturity and Importance levels of PM knowledge areas

No	Variables	Mean	Std. Deviation
10.1	Integration Management	4.1	0.8
10.2	Scope Management	3.8	0.9
10.3	Time Management	4.5	1.1
10.4	Cost Management	4.3	0.9
10.5	Quality Management	4.2	0.8
10.6	Human Resource Management	3.8	1.0
10.7	Communication Management	3.7	1.0
10.8	Risk Management	3.9	0.9
10.9	Procurement Management	3.9	0.9
	Average maturity Level	**4.0**	**0.9**

In general, importance levels and maturity levels correlation assessment result shows that knowledge areas that are considered to be more important are found to be less matured. Spearman‘s rank correlation coefficient -0.48 is found in this regard. This rank correlation coefficient between Importance level of knowledge areas and maturity level showed weak correlation between them.

4.5 Analyses and Summary

This chapter has presented research results of Project Management Maturity assessment of METEC. The perceptions of the Respondents reflected that overall project management Maturity level of the Company is level -3 (Organizational Standards and institutionalized process). Furthermore, detail analysis has been made for each knowledge area to determine the root cause/causes that contributed for the achieved maturity level. Comparison between different maturity levels and relative importance levels of knowledge areas are also analyzed and inverse relation was observed with weak correlation between them.

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

The result confirmed that the Company has not fulfilled the requirements of Level Four and is thus still at level Three. The probable reasons for this lower maturity situation is the misunderstanding of the nature of project-oriented approach, government institutions tend to manage projects on the basis of managing operations, which arises a great number of problems and the rupture with the approach. The Company has to fill the identified gaps that still exist at level three and thereafter it may strive to reach level four.

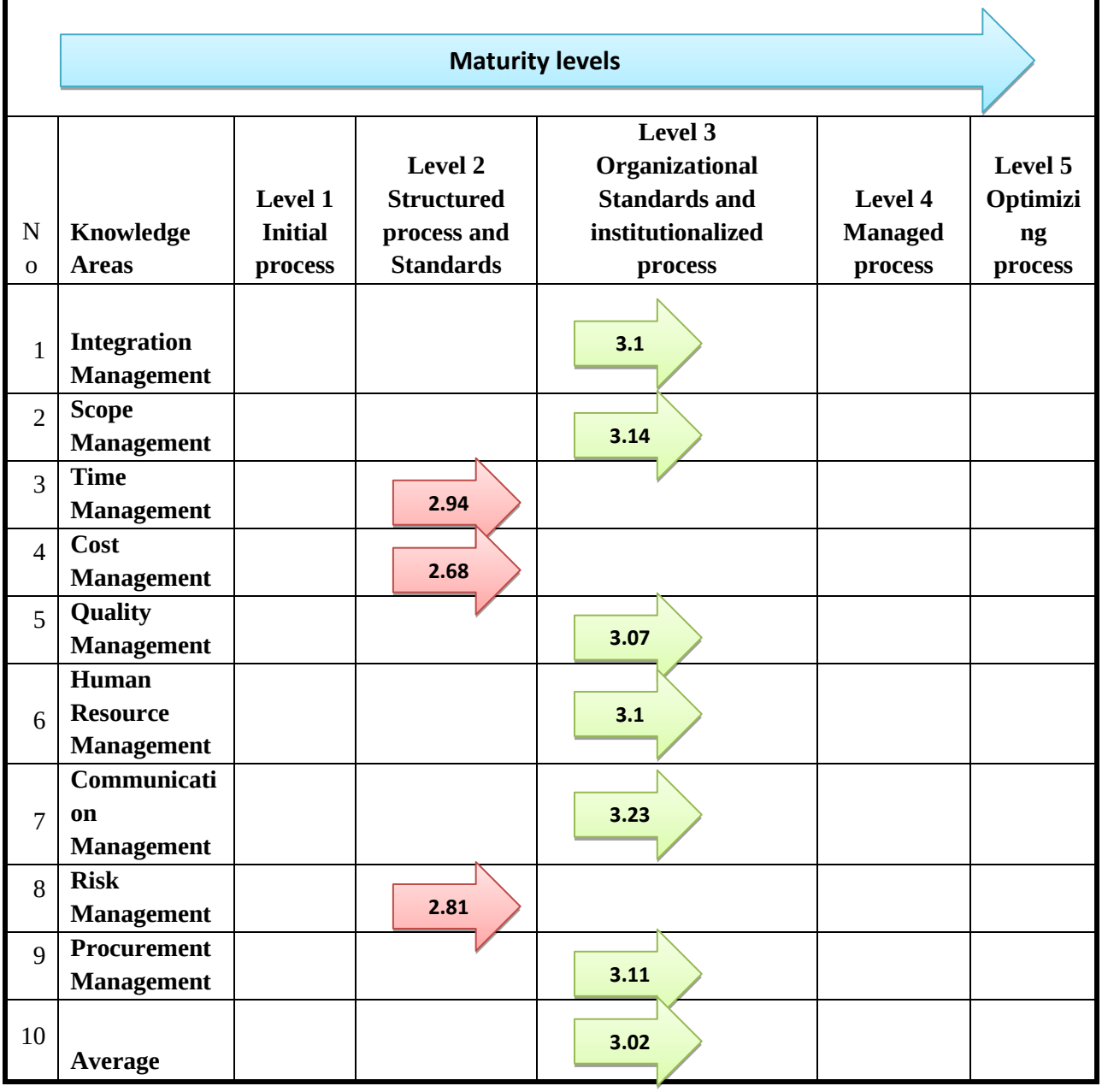
Summary and analysis of results of Surveys when related back to the research questions listed in Chapter one are the following:

- 73 questionnaires were distributed to the participants that are selected from the Management and Employees of ‘Omo’ and ‘Beles’ sugar projects as well as people involved in the planning and execution of these projects from the head office. The target

population of study was mainly Top Managers, Middle level managers, low level managers (Supervisor), and employees working in these projects are expected to possess the necessary skills about the topic under the study. Moreover, Quantitative methodology using survey design approach was utilized. It is primarily because surveys are preferable to demonstrate high validity and they have high reliability (Leedy & Ormond, 2005).

- Analysis of profiles of Respondents presented in Section 4.2 showed that, out of 73 participants, the majority (n=60, 92%) were responded, 98.3% respondents were male, 1.7% were female. The higher percentage of male participants might be due to the working environment and remoteness of the sugar projects. Moreover, 50% of the respondents were working in METEC for more than 3 years but the other 50% have less than 3 years of experience. Thus, it is possible to presume that half of respondents may not be well informed about the company`s project management practices.
- 85% of respondents` educational levels were first Degrees and above. These figures confirmed that the selected respondents were well educated to understand questionnaire given to them, and they have got better exposure to know more about project management practices.
- A judgment-based scoring system was used to determine the organization's present maturity level. The numeric values assigned to each response to the questionnaires were 1 to 5. These values were added per knowledge area and average values are used to determine the maturity levels of Knowledge areas. The averaged total scores of all the nine key knowledge areas are outlined.
- By mapping the maturity values of each knowledge areas along the two- dimensional (2-D) frame work of the selected Model, it is possible to link knowledge areas to the five quadrants where each quadrant represent specific maturity levels as shown in Figure below.

Table 4 -1 7: Mapping of Project Management Knowledge Areas.



- Maturity level of each knowledge area is found to be between the range of 2.68 and 3.23. Time Management, Cost Management and Risk Management maturities are Level-2 (Structured process and Standards). Integration Management, Scope Management, Quality Management, Human Resource Management, Communication Management, and Procurement Management maturities reached the next maturity ladder, which is Level-3.

- Furthermore, based on the detailed findings indicated in this Chapter, project management maturity results of each of the nine project management knowledge areas are investigated. The assessment results are briefly discussed below.

Integration Management

According to PMI (2004), integrated project management system facilitates the work for the management team and also establishes a certain level of professionalism in the organization. The mean of the integration management area of knowledge is 3.1. This means, all project management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues.

However, project planning methodology documentation and strict adherence to it, Using project Management Information System consisting of the tools and techniques that can be used to gather, integrate, and disseminate the output of the Project management Processes, as well as the overall change control processes. To manage scope change, maintain performance measurement integrity. And implement approved changes that affect cost, risk, and staffing are at lower level from the other Integration management maturity criterion. Employees depend on informal practices to manage activities. Furthermore, within the Company there are limitations in project management plans that should be consistently developed, published and used. Project Management Information System (PMIS) that is used to gather, integrate, and disseminate the outputs of the project management processes is not yet established.

According to Antvik & Sjöholm (2007), lack of integration management often causes delays, high costs and general execution problems in projects. The reasons for this poor performance in this sub-component are:

- The overall project management plans (project roadmaps) are not consistently developed or used,
- The planning processes are separately conducted by each project,
- Projects usually enter in to execution phase without proper understanding and development of a project plan, and
- There is no formal way to integrate various project activities and requirements.

Inappropriate integrated management system mostly affects coordination between different areas of the Management Team since all Managers use different methods based on their own experience. It also affects the ability for the Project Manager to control and monitor different areas of the project since there is no consistency in the management methods (Karlsson, 2011).

Project Scope Management

Scope Management is set of processes required to ensure that the project includes all the work required to complete the project successfully (PMI, 2004). The mean values of all variables are between 2.75 (Level-2) and 3.72 (Level-3). With plus or minus 1 as a standard deviation. Scope management from METEC`s perspective is mainly about ensuring that all works the Company doing is what originally agreed on and covered by the contract documents. However, Scope Management maturity of the Company, 3.14 (62.8%), indicates that the maturity in this sub component could be considered at level - 3 (Organizational Standards and institutionalized process). Some Scope management practices are rarely or never applied. Approved changes to the Scope statement are not on time communicated to the project team and the customer as well, and documented change control process is not consistently implemented.

Time Management

Mean values of all variables is 2.94, which means all activities related to Time management are still at Level -2 which means Many project time management processes exist in the organization but they are not considered an organizational standard. From the component of the time management, the lowest ratings are given to component stating "the majority Resource – constrained and resource – leveled schedule are created and maintained" followed by "The project schedule identifies schedule constraints driven by the consumer, technology, suppliers, or management."

In addition the data collected confirmed that project schedules do not identify all constraints driven by the Customer, Technology, Suppliers, or Management. Moreover, resource-constrained and resource-leveled schedules are not regularly maintained. Only 5% of the respondents said that schedules are updated always on a regular basis.

The construction process capability of level-2 organization is not fully predictable because the processes are not fully planned and are not constantly changed or modified as the work

progresses. Performance depends on the capabilities of individuals since the time management practices are not considered an organizational standard.

Cost Management

Cost management practice of the Company is evaluated using nine variables. The mean values is 2.68. This shows that Cost management maturity of the Company is at Level 2. About half of the respondents confirmed that all Cost management variables such as Cost center establishment, utilization of consistent financial standards and procedures and proper gathering of financial data for periodic reports are not practiced in the Company. Only less than 5% of respondents replied that these variables are always practices. Moreover, 50% replied that actual costs of projects are not tracked and reconciled with the original estimated costs. 80% replied that employees never received or rarely received training in financial standards and procedures. This area is also the lowest rated area of this group which is only 2.68. And 46.7% confirmed that Cost centers don't properly track actual expenditures against budget for specific line items.

Thus, many of project Cost Management processes exist in the organization but they are not considered an organizational standard. Documentation exists on these basic processes. The project management environments do not have standardized processes that support gathering of financial data for periodic reports. In addition, cost centers are not fully efficient to track actual project expenditures against budget for specific line items of the project. Some project and department Managers generally have little or no knowledge to control costs. Project team members do not receive training in financial standards and procedures.

Communication Management

Communication Management includes the processes required to ensure timely generation, collection, distribution, storage, retrieval, and ultimate disposition of project information (PMI, 2004). Communication Management Maturity assessment result of METEC is found to be 3.23 (65%). This indicates that Communication Management Maturity of METEC could be considered to be level -3 (Organizational Standards and institutionalized process). Common Communication weaknesses that are identified are:

- Internal cross team communication occurs through the top management Committee meetings, but People who are not part of these meetings do not get the required information.
- After each formal meeting, minutes are not always prepared and distributed to all affected parties.
- Project status reporting procedures are not consistently followed, Project information is not regularly updated and not readily accessible to the organization at any times.

Risk Management

Average Risk management maturity value, 2.81 (56%), which is similar to Time and Cost managements. Risk Management Maturity could be considered to be level - 2 (Structured process and Standards). Hence, within the Company, Many project risk management processes exist but they are not considered an organizational standard.

Therefore, within the Company, risk management strategy is not well established. Risks are not consistently identified, documented or tracked. Project risks are not always evaluated for priority and probability. And action plans are not always produced for risks to be mitigated or transferred.

Quality Management

Mean values of quality management practice is 3.07. This means the organization is at level 3 in general. But, out of the nine variables 3 activates are still at level-2. The areas are;

- Variances are not reviewed between the current progress status and project Quality against the baseline plan on a regular basis,
- On a regular basis, project trend data are not analyzed, based on metrics data,
- An initial review of the project plan, involving all participants, is not conducted prior to creating a baseline project plan to ensure completeness and consistency
- But the management is still localized to particular teams or areas.
- Quality variances between the current progresses against the quality baseline plan are not regularly reviewed.

Human Resource Management Maturity

The overall maturity Level, 3.10 with standard deviation of 1 shows that Human Resource Management Maturity of METEC could be considered to be Level - 3 (Organizational Standards and institutionalized process). It is possible to conclude that there are Human Resource management standards are in place and are organizational standards. Almost all projects use these standards with few exceptions. However, the responses of the participants in this sub component confirmed that;

- The Company lacks qualified project management professionals to carry out management responsibilities according to best practices.
- The project team is not consistently involved in project planning development process.
- Staffing plan is not consistently created and followed for each project. Some people are "accidentally" assigned to project manager position.
- All project resource needs (such as hardware, software, and space) are not clearly documented
- The training and developmental needs of all team members are not documented, and
- A documented process is not in place for recognizing outstanding commitments or performance on a project.

Procurement Management

The overall Procurement Management maturity of METEC is 3.11 (62%) this shows that the Maturity could be considered to be Level - 3 (Organizational Standards and institutionalized process). For this reason, Procurement Management practices are in place and are organizational standards. Almost all projects use these standards with few exceptions. Management is regularly involved in the input and approval of key decisions and issues. The problems identified in this area are;

- A "make-buy'' analysis is not performed prior to the start of every project.
- An evaluation process that meets specific criteria has not been formalized to provide a consistent method for procurement proposal review and acceptance,
- A contract change control process is not in place.

The current organizational project management maturity of METEC is Level three (Organizational Standards and institutionalized process). The next step in the path to higher degree of its organizational project management maturity is Level four.

When we compare the project management maturity of METEC with other company in Ethiopia, it is in a better level of maturity. According to the findings of Yimam (2010) which states that the projects handled by the Ethiopian Government's Public construction Company are at Level two of project management maturity. And there is no single contractor (Contractors in Ethiopia) which has attained the structured process and standards (Level-2) maturity stage. But, the project management maturity of METEC should not make the management of satisfied with what they have achieved rather they have to strive to reach the higher level of maturity Level 5 by continually improve the project management process of the company.

Based on the outcome of the assessment results, it is clear that there is a necessity for METEC to develop project management improvement plan that will assist to improve project management competences of the organization in accomplishing its objectives and to improve its involvement in mega projects in the country.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

The main objective of this research was to assess the Project Management Maturity level of METEC in Execution of Sugar Plant Project. Chapter four has presented the results and the detail findings of the survey. In this Chapter, Bearing this in mind, the project maturity level criteria in the literatures. Conclusion and recommendation will be forwarded.

5.1. Conclusion

From the analysis of the results of the study, it became evident that the research results suggest that the level of organizational project management maturity of METEC has reached the third Level of progressive stages of the maturity ladder. Project Management Maturity of METEC is found level -3 (Organizational Standards and institutionalized process) stage of Maturity ladder.

This strongly indicates that METEC does have formal project management Policies and Procedures but such processes are however inconsistently implemented. Project Management Process Standards are not sufficiently established and practiced. The result confirmed that the Company has not fulfilled the requirements of Level Four and is thus still at level Three. The Company has to fill the identified gaps that still exist at level three and thereafter it may strive to reach level four. The Company as a whole does possess some project management capabilities required for effective application of all the nine Project Management knowledge Areas in. but, the management should not be satisfied with what they have achieved rather they have to strive to reach the higher level of maturity Level 5 by continually improve the project management process of the company.

The degree or level of the Company's Organizational project management maturity cannot be separated from that of its projects and therefore by implication the projects handled by METEC are also at Level two of project management maturity.

Although the overall average maturity value showed Level three, the Company still lacks in some Knowledge Areas satisfactory support systems to fulfill the requirements of Level three. Thus, the Company has to fill the identified gaps that still exist at Level Three and thereafter it may strive to reach Level Four.

- Within the Company there are limitations in project management plans that should be consistently developed, published and used. Project Management Information System (PMIS) that is used to gather, integrate, and disseminate the outputs of the project management processes is not yet established. Lack of integration management often causes delays, high costs and general execution problems in projects.
- Some Scope management practices are rarely or never applied. Approved changes to the Scope statement are not on time communicated to the project team and the customer as well, and documented change control process is not consistently implemented.
- Project schedules do not identify all constraints driven by the Customer, Technology, Suppliers, or Management. Moreover, resource-constrained and resource-leveled schedules are not regularly maintained.
- Cost management variables such as Cost center establishment, utilization of consistent financial standards and procedures and proper gathering of financial data for periodic reports are not practiced in the Company.
- Actual costs of projects are not tracked and reconciled with the original estimated costs.
- Employees never received or rarely received training in financial standards and procedures.
- Cost centers don't properly track actual expenditures against budget for specific line items.
- The project management environments do not have standardized processes that support gathering of financial data for periodic reports. In addition, cost centers are not fully efficient to track actual project expenditures against budget for specific line items of the project.
- Some project and department Managers generally have little or no knowledge to control costs. Project team members do not receive training in financial standards and procedures.
- Internal cross team communication occurs through the top management Committee meetings, but People who are not part of these meetings do not get the required information.
- After each formal meeting, minutes are not always prepared and distributed to all affected parties.

- Project status reporting procedures are not consistently followed; Project information is not regularly updated and not readily accessible to the organization at any times.
- Risk management strategy is not well established. Risks are not consistently identified, documented or tracked. Project risks are not always evaluated for priority and probability. And action plans are not always produced for risks to be mitigated or transferred.
- On a regular basis, project trend data are not analyzed, based on metrics data,
- An initial review of the project plan, involving all participants, is not conducted prior to creating a baseline project plan to ensure completeness and consistency
- Quality variances between the current progresses against the quality baseline plan are not regularly reviewed.
- The Company lacks qualified project management professionals to carry out management responsibilities according to best practices.
- The project team is not consistently involved in project planning development process.
- Staffing plan is not consistently created and followed for each project. Some people are "accidentally" assigned to project manager position.
- All project resource needs (such as hardware, software, and space) are not clearly documented
- The training and developmental needs of all team members are not documented, and a documented process is not in place for recognizing outstanding commitments or performance on a project.
- A "make-buy'' analysis is not performed prior to the start of every project.
- An evaluation process that meets specific criteria has not been formalized to provide a consistent method for procurement proposal review and acceptance,
- A contract change control process is not in place.

5.2. Limitations of the Study

The limitations was limited project documentation in some aspects arising from poor document storage and traceability, limited access to some information on historical events, perceptions that the study may lead to a fault finding may also have caused inaccurate response arising from suspicion and or lack of understanding query contained in the questionnaire.

5.3. Recommendations

Effective use of project management techniques at the Company level is critical factor for achieving success in projects execution. The following recommendations are considered to be important and fundamental to help METEC to create an environment in which the Company can be more successful to improve its project management maturity level and be in line with the customer demand by giving timely response and complete solution.

- **Giving Strategic Emphasis for Projects**

Giving projects strategic emphasis is the first step towards creating an environment for successful project management practice. When department managers and project leaders understand organizational strategic emphasis, they will have clear channel for their action and be able to properly manage activities. Establishing a clear link between projects and organizational strategy also helps to develop inter project coordination. It is because People on projects are usually looking for strategic direction of the Company, particularly when setting detail project goals.

- **Avoid Traditional Planning**

It is recommended that the upper management need to understand the importance of systematic and appropriate planning and should allow enough time for it. Project planning process could begin with the upper manager's developing an initial deadline to share with the assigned project manager along with reasons for it and an explanation of how it was determined. Such type of approach could convince and open discussion with other project participants. Thus, Upper management of METEC needs to reconsider and change their traditional planning approach by the correct project planning process that can be consistently implemented.

- **Developing Core Teams**

Since developing a core team and making it work is essential to minimize project cycle time and avoid unnecessary delays, it is strongly recommended that the management should build capable core teams for projects by taking representatives from required functional departments. This team needs to be developed at the beginning of each project, and its members should perform most effectively when they stay with the project from the beginning to end. In addition, the management of METEC should establish a reward system by focusing what behavior or outcome will be assumed and rewarded.

- **Project Manager Development**

Moreover, the Company should establish criteria and standards for selecting and assigning project managers and should require that all project managers be trained and qualified in project management skills appropriate to projects. The management of the METEC, that is responsible for the selection and development of project managers, should avoid their attempt to appoint project managers accidentally. The management body should also design and implement project manager development process by applying the most appropriate mechanism or means such as training, internal and /or external conferences, mentoring and coaching programs etc.

- **Management Information System**

Developing effective information system across projects is critical to success of a project – based organization. Therefore, it is recommended that the upper mangers need to develop information systems that support successful project management and provide information across the organization as well as between its customers. In this regard, online technological capabilities are increasingly attractive and important.

- **Organizational Restructuring**

Organizational structure affects the workplace culture through controlling performance, satisfaction, coordinating and motivating employees to work together to accomplish company goals and objectives. The organizational structure that supports project management can be done by either redesigning the organization to emphasize projects or integrating projects into the organization objectives. An important function of upper management is supporting project teams by changing the structure of the organization to support project management. Hence it is strongly recommended that the management should redesign the structure of the Company as Fully Project oriented so as to give proper emphasis and full power for projects.

- **Changing to Project Oriented Organizational (POO) setting**

In today's business, to satisfy the ever changing demands of customers and cop with dynamic business environment, the traditional functional organization is no longer provide a good result rather Project –Oriented Organization (POO) is a better alternative to bring complete solution to the customer. To change to Project Oriented Organizational setting, the upper management of METEC should first understand the need for project management as well as the critical role they are expected to play in developing successful project management practices throughout the

organization. Moreover, the top management should give great emphasis to team building and they must work as a team themselves and work together with project managers, make consensus action, develop trust and open communication.

- **Providing Project Management Trainings**

Finally, the Ethiopian government has recently set out the second transformation and development plan to accelerate development of the country. Project is one of the key player for the growth of national economy. As the majority of projects in Ethiopia are development related, failures in projects will have a far-reaching effect beyond financial losses. It may result in a death, or delay in poverty reduction programs. Likewise, successes in projects in developing countries may mean a considerable contribution in improvement of the life of millions.

For this reason, Project Management capability is very important and urgent issue for Ethiopian economy. The Government, Policy Makers and Academicians should give strategic emphasis for project management competency development. Furthermore, other organizations assisting Ethiopia in its effort to reduce poverty and foster development program shall assist the project management sector by providing /sponsoring Project Management trainings for business Leaders, Contractor and related Stakeholders so that the sector build up efficient Project Management capability. This in turn will increase economic development of the country.

Necessary Further researches

This research has tried to assess project management maturity of METEC. If the Company acts upon the findings and recommendations of this research, it`s organizational project management performance would significantly be improved to the forth Level of the maturity ladder. Moreover, the investigation has provided benchmark data on the current status of the Industry`s Project Management practices that can be used for further improvement efforts. Nevertheless, this research is meant only a starting work towards a long journey to the development of Project Management practices in the Country as a whole and the company in particular. The study supposed that further works will address the details.

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APPENDIX

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Questionnaire for Employees and Management of Tana Bels and Kuraz-1 Sugar Plant Projects

Cover Letter

Dear Respondents:-

This Questionnaire is designed for Management and Employees of METEC projects on title; Analysis of project Management Maturity Model for Sugar Plant Project Execution-The Case of Metals and Engineering Corporation (METEC). The researcher is conducting this research paper in partial fulfillment of the requirements for the Master's Degree in General MBA from St. Merry University. The aim of this questioner is to assess the project management practice of METEC projects specially, the Sugar Plant Project Execution, in view of the Management Maturity Model. The information you provide in response to the items in the questioner will be used as part of the data needed for a study. Your opinion on whether the Project Management Practices are being applied in Metals and Engineering Corporation and to what extent? The importance of Project management knowledge areas for successful sugar plant projects management? Etc. The output of this research will help the organization in developing a frame work development and improvement of project Management in for future projects.

Your involvement is a great input to the quality of the research. Thus, you are kindly invited to fill out the questionnaire and return it to the researcher as soon as you can. I believe that you will be willing to participate in the study and your honest and thoughtful responses are priceless.

Thank you for your participation!

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Profiles of Respondents

Dear respondents, thank you for taking your time to answer these questions carefully. This will help me understand how Metals and Engineering Corporation (METEC) might improve current practices of managing projects. Please provide the requested information on the space provided.

General Information Questions:

1. Name of the person filling the questionnaire (optional)_____
2. Name of the project / Department / you are working in_____
3. Specify your gender.
    a) Male ☐
    b) Female ☐
4. What is your position in the Organization?
    a) Department manager ☐
    b) Division & Section Head. ☐
    c) Project Manager. ☐
    d) Other staff member ☐
5. Number of years you worked in the company
    a) 0-3 years. ☐
    b) 0-3 years. ☐
    c) 4-6 years. ☐
    d) 7-9 years. ☐
    e) >9 years. ☐
6. Have you received any project Management related training?
    a) Yes. ☐
    b) No. ☐

7. What is your Educational level?
    a) Diploma ☐
    b) First Degree / Bachelor ☐
    c) Second Degree / Masters level ☐
    d) If other specify _____
8. Have you participated in project Related works.
    a) Yes ☐
    b) No ☐
9. Do you believe that applying project management Knowledge for sugar plant project is necessary to ensure continued process improvement in Sugar plant projects?
    a) Yes ☐
    b) No ☐

Sugar Project Management Practices Survey Questionnaires

These questionnaires are intended to facilitate the researcher in assessing the Project Management Maturity Level of the sugar plant project Execution in METEC. It also encourages discussion of existing practices and processes within the company. Please Rate each of the following project management practice and mark **(√)** on the space provided as per the following definition:-

1. **=Never**
2. **=Sometimes**
3. **=Usually**
4. **=Frequently**
5. **=Always**

1. Integration Management

It describes the Processes required to ensure that the various element of the project are properly coordinated. It consists of project plan development, plan execution, and integrated change control.

ITEM	STATEMENT	1	2	3	4	5
1.1	Project constraints are clearly defined for each project.					
1.2	Formal Organizational policies exist that include all required resource management and controls tools.					
1.3	A project planning methodology is documented and strictly adhered to.					
1.4	A project Management Information System (PMIS) is in place.					
1.5	There is an overall change control processes.					
1.6	A documented configuration management procedure is in place.					
1.7	A Performance measurement criterion has been developed to establish how project progress will be determined and reported.					
1.8	Project Progress Process is following as part of the project management continuous improvement process.					

2. Scope Management

Describes the process required to ensure that the project includes all the work required, to complete the project successfully. It consists of initiation, scope planning scope definition scope verification, and scope change control.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
2.1	A Project scope statement is created for every project.					
2.2	Project Scope Statement are prepared with customer input throughout the development process					
2.3	A Documented change Control Process in place for managing Change to the project Scope					
2.4	All Project participants indorse the Scope Statement.					
2.5	Approved changes to the scope statement are communicated to the project team and the client					
2.6	The Management, the project team, and the client review all project progression on a regular basis.					
2.5	A work Breakdown document (WBD) containing detailed description of the project's work is created for each project.					

3. Time Management

Describes the process required to ensure timely completion of the project. It consists of activity definition, activity sequencing duration estimating. Schedule development, and schedule control.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
3.1	The project requirements (deliverables) are reflected in the project's work Breakdown Structure (WBS).					
3.2	The project WBS and resource estimate are used to develop the project's baseline schedule.					
3.3	All project assumptions are documented when developing the project schedule.					
3.4	The project schedule identifies schedule constraints driven by the consumer, technology, suppliers, or management.					
3.5	A critical path analysis is performed on the project schedule during each progress update cycle.					
3.6	Project schedule are update on a regular basis against the baseline plan.					
3.7	Resource –constrained and resource – leveled schedule are created and maintained					
3.8	Schedules are optimized to conform to contract requirements.					

4. Cost Management

Describes the processes required to ensure that the project is completed within the approved budget. It consists of resource planning. Cost estimating, cost budgeting, and cost control.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 Always

ITEM	STATEMENT	1	2	3	4	5
4.1	Cost centers are set-up to track actual project expenditures against budget for specific line items of the project schedule.					
4.2	The project management environment has processes that support gathering of financial data for Periodic reports.					
4.3	Project Financial Standards processes and procedures are documented and consistently followed.					
4.4	Project team members receive training in financial standards and procedures.					
4.5	Project budgets are based on resource estimates and the resource plan.					
4.6	Actual cost are tracked and reconciled with the original estimated plan.					
4.7	There is a consistent process documenting all estimates and cost assumptions.					
4.8	A common list of cost categories exists for all project budgets					
4.9	A common documented process is in place for completing all financial procedures required to close a project.					

5. Quality Management

Describes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of quality planning quality assurance, and quality control.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
5.1	A document procedure exists for creating and maintaining a project workbook.					
5.2	Every project has Quality Assurance plan.					
5.3	The project team reviews all of the processes and procedures that apply prior to the start of every project.					
5.4	Common documented processes and procedure for technical performance, business performance, and quality, performance are applied to every project.					
5.5	An initial review of the project plan, involving all participants, is conducted prior to creating a baseline project plan to ensure completeness and consistency.					
5.6	On a regular basis, Variances are reviewed between the current progress status and project Quality against the baseline plan.					
5.7	On a regular basis, project trend data are analyzed, based on metrics data					
5.8	Quality Issues Resolution process for the project is established and followed.					
5.9	Quality change control process for the project is established and followed.					

6. Human Resource Management

It describes the processes required to make the most effective use of the people involved with the project. It consists of organizational planning, staff acquisition, and team development.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
6.1	A Staffing plan is created and followed for every project.					
6.2	Team members are selected to match roles and responsibilities, which are defined and documented.					
6.3	All project resource needs (such as hardware, software, and space) are clearly document.					
6.4	An organization structure is created each project.					
6.5	Customer human Resource requirements for the project are planned and document.					
6.6	Project skills and developmental needs of all team members are documented.					
6.7	The training and developmental needs of all team members are documented.					
6.8	A documented process is in place for recognizing outstanding commitments or performance on a project.					

7. Communication Management

It describes the processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It consists of communications planning information distribution, performance reporting, and administrative closure.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
7.1	A Communication plan, documenting the required project communications, is created for each project and is followed by the project team.					
7.2	A project Announcement is made to both the customer's organization and yours to increase project awareness.					
7.3	After each formal meeting, minutes are prepared and distributed to all affected parties.					
7.4	Project status reporting procedures are established and followed.					
7.5	Project information is update and readily accessible to the organization at all times.					
7.6	Variance analysis for schedule, budget, and effort is communicated on a regular basis.					
7.7	Project status review meetings are held regularly with company leadership, the customer, and suppliers.					
7.8	Project successes are documented for including into a close- Down Announcement and success story.					

8. Risk Management

It describes the processes concerned with identifying analyzing, and responding to project risk. It consists of risk management planning, risk identification, risk analysis, risk response planning and risk monitoring and control.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
8.1	A high-level risk assessment is completed at the start of each project.					
8.2	The high-level risks are rated as low, medium, and high probabilities.					
8.3	Project risks are documented using a common format.					
8.4	A risk assessment/ handling plan is created for projects.					
8.5	Project risks are evaluated for priority, probability, and impact.					
8.6	The method for managing each accepted risk is documented.					
8.7	Action plans are created for risks to be mitigated or transferred.					
8.8	Contingency schedule project status meetings include a review of a project's risks.					
8.9	Regularly scheduled project status meetings including a review of a project's risks.					

9. Procurement Management

It describes the processes required to acquire goods and services from outside the performing organization. It consists of procurement planning, request planning, solicitation; source section, contract administration, and contract close out.

Level of Responses:

1 = Never 2 = Sometimes 3 = Usually 4 = Frequently 5 = Always

ITEM	STATEMENT	1	2	3	4	5
9.1	A standard (agreement) that includes project management requirements is issued for project goods and services.					
9.2	A procurement plan is in place that identifies what to procure and when is developed at the start of each project.					
9.3	Project timing and requirements are clearly defined in a formal contract or agreement.					
9.4	Contract Administration is an integral part of the project management.					
9.5	A "make-buy" analysis performed prior to the start of every project.					
9.6	Procurements Management processes have been documented					
9.7	All Procurements are identified with the specific plan					
9.8	An evaluation process that meets specific criteria has been formalized to provide a consistent method for procurement proposal review and acceptance,					
9.9	A contract change control process is in place.					
9.10	A Contract close out process that records the evaluation of supplier performance in meeting their contact requirements is documented.					

Project management Knowledge areas comparison questions

General Direction

Please compare the relative importance of each of the knowledge area considering their relative contribution for success of project Management practice in sugar plant project Execution in METEC. Please mark **(√)** using the following scale to give your option.

1 = much less important **2 = Less important** **3 = Equally important**

4= more important **5 = much more important**

Project management knowledge areas level of importance comparison

ITEM	Maturity Level knowledge Areas	Level of Importance				
		1	2	3	4	5
1	Integration Management					
2	Scope Management					
3	Time Management					
4	Cost Management					
5	Quality Management					
6	Human Resource Management					
7	Communication Management					
8	Risk Management					
9	Procurement Management					