



ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE

GRADUATE STUDIES
DEPARTMENT OF PROJECT MANAGEMENT

Assessment of Construction Project Planning Practices and their
Degree of Impact on Successful Project Completion
The Case of Defense Construction Enterprise

BY
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Award of Master of Arts Degree in Project Management

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THESIS TITLE

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DECLARATION

I, the undersigned, declare that this thesis entitled “assessment of construction project planning practices and their degree of impact on successful project completion the case of Defense Construction Enterprise” is my original work, prepared under the guidance of the research advisor. 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.

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Name

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ENDORSEMENT

This is to certify that this project work, “assessment of construction project planning practices and their degree of impact on successful project completion the case of Defense Construction Enterprise” undertaken by Rediet Ahmed for the partial fulfillment of the Requirements for the Award of Master of Arts Degree in Project Management, is an original work and not submitted earlier for any degree either at this University or any other University.

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LIST OF ACRONYMS & ABBREVIATIONS

BOQ-Bill of Quantity
CPM – Critical Path Method
CSF- Critical Success Factor
DCE- Defense Construction Enterprise
HR – Human Resource
HRM - Human Resource Management
LFA- Logical Framework Approach
MOWUD - Ministry of Works and Urban Development
PCA- Principal Component Analysis
PDRI- Project Definition Rating Index
PERT - Program Evaluation and Review Technique
PMBOK - Project Management Body of Knowledge
PMI – Project Management Institute
PMIS- Project management information system
PPA – Public Procurement Agency
RII- Relative Importance Index
SCC- Special Conditions of Contract
SPSS- Statistical Package for Social Science
WBS- Work Break Dawn Structure

ABSTRACT

The aim of this paper is to assess the construction project planning practices of Defense Construction Enterprise. As such, the study examines the planning practice; the first part exploring the underlying factors influencing them and the second part, examining the level of advancement of existing planning practices, simultaneously assessing their perceived degree of impact on successful project completion. In light of these, the research intended to discover the least advanced and yet the most impactful planning practices, requiring the enterprise's priority and mobilization of efforts for improvement. After a detailed literature review and desk study, 30 possible factors influential to project planning were identified and grouped into six major categories based on the nature of the factors. This was followed by determination of 13 general planning practices, nine of which are adopted from planning knowledge areas as per PMI (2008), and the remaining were included to put project management in the context of construction management. Subsequently, 42 specific planning practices were identified. All 30 factors and 42 planning practices were included in a three part questionnaire survey with an unstructured interview designed to supplement questionnaire results. As such, 41 questionnaire responses and 4 interviews were collected and conducted respectively, from enterprises' practitioners and senior planning engineers involved in 14 substantially completed projects undertaken by the enterprise in the last decade. Subsequently, the Relative Importance Index (RII) was used to rank levels of advancement, impact and criticality of practices, using SPSS software. The research found, amongst 30 factors; shortage of time for planning, unrealistic or short contract duration and giving no or little attention for identification & allocation of potential risks were the most influential factors affecting planning practices of the enterprise. Management and time related factors were generally found to have the highest influences. From the 42 planning practices; identification of major/special supply items especially shipped from overseas, inclusion of design changes in revised plans during execution phase and special consideration of critical items/materials requiring long-lead times, were the least advanced and simultaneously those having the greatest impacts on successful completion of projects. Relatively, it was found that procurement, scope and integration planning practices required the enterprise's utmost priority and mobilization of efforts for improvement.

Keywords: Construction, Planning, Advancement, Impact, Project Success.

CHAPTER-ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

A construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with specification and to stakeholders' satisfaction (Omran, 2012). Meeting business objectives and design requirements are additional parameters by which project success is measured (Alotaibi, 2019).

The UNDP –PME-HANDBOOK (2009) clearly depicts, to improve the chances of success, attention needs to be placed on some of the common areas of weakness in projects amongst which planning is included. Planning has remained central to management ever since it was listed as a managerial function (Hodgson, 2004; Mintzberg, 1975; Wren, 2002). In addition, Chan (1996) pointed out; accurate construction planning is a key determinant in ensuring the delivery of projects on schedule and within budget. To accomplish this goal, the project plan must accurately capture the stated requirements, map an appropriate technical work pathway to achieve those requirements, incorporate various necessary technical items into the plan to support the output, allocate required resources to work units, and integrate these together such that all necessary components are in synchronization (Deborah S.C. and Gary L. Richardson, 2013). The planning process consists of those processes performed to establish the total scope of the project effort, define and refine the objectives, and develop the course of action required to attain those objectives. These include, developing the project management plan and documents that will be used to carry out the project; such as, Schedule development, determining the budget, Work break down structure, developing the quality plan, the procurement plan, risk response plan, communication plan and human resource plan (PMI ,2008).

According to Kerzner (2003), the major responsibility of the project manager is planning. If project planning is performed correctly, then it is conceivable that the project manager will work himself out of a job because the project can run itself.

This rarely happens however. Few projects are ever completed without some conflict or trade-offs for the project manager to resolve. Project planning in many cases is not performed well in the construction industry, and, as a result, the sector suffers from poor or incomplete scope definition, frequently experiencing considerable changes that result in significant cost and schedule overruns.

1.2 STATEMENT OF THE PROBLEM

According to Yardley (2002), lack of effective planning process is the main reason for project failure in developing countries. Like that of other developing countries, the planning practices and process within Ethiopia are very poor. In the worst case scenarios, projects are executed without preparing a proper project plan. According to PMI (2001), the planning

processes is highly important, and project execution without proper development of a project plan often causes delays, high costs and general execution problems in the project. Without a good plan and cost estimate, resources cannot be managed or organized, risks cannot be mitigated, dates and budgets cannot be forecasted and effective reporting cannot take place, as a result projects will fail.

Such is the case with projects undertaken by DCE, where projects are prone to time lapses and cost overruns. Despite this however, sufficient study, focused purely on planning practices has not been undertaken to identify the underlying factors affecting planning practices and subsequently which area of project planning is truly lacking in the enterprise. The significance/level of influence/impact of these planning practices on project success, upon study of projects at least significantly complete, is not addressed. While studies like the works of Abebe (2015) aggregately study planning practices and conclude that a certain set of practices have high influences and are less advanced, none particularly determine their order of influence or advancement. These concepts, better examined by Gebregziabher (2016) however, are only limited to road construction projects and do not offer an analysis to explore and discover the extent of impact of identified poor planning practices on successful project completion; to determine the most critical planning practices. This is the research gap this study is designed to address.

Despite the success of Defense construction Enterprise (DCE in undertaking mega projects dispersed around the country, historical documents (progress reports) reveal that it has not completed a single project within the original contract time and/or costs.

In July of every year, DCE holds an annual project progress report meeting attended by project managers, department heads, senior engineers and key staff where it is concluded that project overrun has become the norm. In relation to planning, some of the observed problems amongst many include lack of details in work plans, lack of participation of important stakeholders in the planning process, inadequate planning skills, development of plans inconsiderate of project risks, absence of material procurement plans especially when procurement is from overseas, inadequacy of resource plans, absence of site safety plans and underestimating the use of planning software. But the fact a certain aspect of planning is deficient doesn't necessarily mean it poses the greatest impact on successful project completion. Hence it is important to study which of the above mentioned planning problems are the greatest threat for project success and hence require outmost attention. No previous research in the context of the entire construction industry in Ethiopia, let alone the enterprise, has tried to assess these relations between poor planning practices and extent of impact on project success. This marks the specific research gap of this study.

Abebe (2015), in his examination of planning practices of this same organization denotes that amongst the many reasons attributed to failure to complete projects as per original contract time and cost, lack of proper project planning is emphasized as a distinguished problem. This is

further deliberated in the works of Yeo (2002), Akintoye (2009) and Yadav (2014), who stress that planning and its management is a critical framework for completing any project successfully. This is again emphasized by Kerzner (2006), Zwikaël (2005) and Turner (1999) who remark the high importance of planning in determining project success. Thus using the aforementioned studies as stepping stones, it is imperative to study the critical aspects of planning in relation to its extent of impact on successful project completion, for the enterprise.

1.3 RESEARCH QUESTION

The study aims at examining the project planning practices of DCE and their criticality in obtaining successful project completion. This broad problem statement however, is broken down into the following basic research questions the paper will sequentially address.

- 1) What are the overall underlying factors influencing planning practices of the enterprise?
- 2) How advanced are the existing planning practices in projects undertaken by the enterprise?
- 3) Which planning practices have the highest impact on successful project completion and also are most critical, requiring the enterprises attention and action?

1.4 OBJECTIVES OF THE STUDY

General objective

The general objective of this paper is to study the practices of construction project planning in DCE and assess their degree of impact on successful project completion.

Specific objectives

- ✓ To determine the underlying factors influencing project planning practices of the enterprise.
- ✓ To determine which practices are more advanced than others.
- ✓ To determine the level of impact of each planning practice on successful project completion; so as to help the enterprise focus on those practices most deficient and simultaneously most determinant of success and thus critical for completion of project successfully.

1.5 SIGNIFICANCE OF THE STUDY

Perhaps the greatest benefiter from this paper are planning engineers and office engineering professionals engaged in planning. This is so because the research may garner them the much lacking support needed by top management, contract engineers, procurement departments, project construction engineering teams and office engineering teams, where planning is usually seen as an afterthought. Upon identification of extent of impact of planning practices on successful project completion, all bodies involved in project execution could

understand the weight and criticality of planning for project success, as opposed to treating it as a formality for commencement of project execution.

Secondly, monitoring and evaluation professionals are the indirect beneficiaries; where better planning practices via the recommendations through this paper, could aid in quality of monitoring progress.

The results of the study could aid top management and project managers in focusing their effort on areas of planning that are overlooked and yet have greatest ability to derail projects. It can aid project teams as a stepping stone to carryout project specific studies on the same topic. Furthermore, top management can devise planning strategies, policies and departments can establish planning manuals and procedures, where found absent or lacking.

1.6 SCOPE OF THE STUDY

The study includes only building projects within the enterprise, since the intensity and complexity of planning is different across sectors and sectors should not be merged together to reach valid conclusions. Additionally, due to DCE's large number of projects and geographical dispersion, the data collection for the research is limited to head office, Addis Ababa, Debrezeit, Bahrdar and Diredawa construction projects. Only planning related practices are assessed. Moreover, projects considered are more than 90% complete, to properly determine "degree of impact on completion" and only projects undertaken within the last 10 years are considered. This is to ease the burden of tracking down personnel on projects completed long ago, for ease of data collection. The sample respondents comprise only of managerial and professional engineers. This is to aid reliability of data collected.

1.7 LIMITATION

The quality of the study is limited on the E-questionnaire and interview opinions' and ideas' of the respondents. Additionally, though project planning deals with issues which deserve time series data collection, the data collection for this study includes the opinion of respondents, which is collected once. Major constraints were the non-availability of adequately published and documented data about planning practices specific to DCE and actually getting respondents to respond to questionnaires. Another limitation is that this paper considers successful project completion aggregately, with the internal understanding that it has time, quality and cost success parameters considered as a single unit and no separate assessment of each is made.

1.8 ORGANIZATION OF THE STUDY

This research paper is organized in to five chapters. The first chapter deals with the introduction part which encompasses the background of the study, the statement of the research problem, objectives of the study, significance of the study, scope of the study and limitations of the study.

The second chapter deals with the review of theoretical and empirical literature. Chapter three focused on the research methodology, data collection and procedures, sample and sampling techniques, whereas the fourth chapter presents the result analysis and discussion of the data. Finally, conclusions and recommendations were presented from the summary of the findings, under the fifth chapter.

CHAPTER-TWO

LITERATURE REVIEW

2.1. THEORETICAL REVIEW

Ethiopia, like all other developing countries in Africa, is attempting to expand its economy as much as possible and in as large a scale as possible. Projects are required to achieve the required development. As a result, the government is now working on a number of initiatives. The primary goal of programs is to assist with achieving the desired outcomes. It is important to provide proper project management in order to get the results that are desired from projects. Project management has some components where the project manager is also responsible for the project's successful completion. One of the project manager's key duties is to adequately plan and schedule the project, so preparing what is required for the project is the first activity to be accomplished, as it also decides whether the project can succeed or fail. As a result, project planning is critical to the successful completion of any project. The function of selecting organizational goals and defining the strategies, processes, and programs required to achieve them is best defined as planning. Setting a predetermined course of action within a forecast scenario can be defined as planning in a project setting (Kernzer, 2009). The key milestones are determined by the project's specifications.

The project manager is crucial to the completion of every project. The project manager should be active from the beginning to the end of the project. Project planning should be comprehensive, agile enough to manage specific tasks, disciplined by checks and controls, and able to consider multifunctional inputs. Successful project managers understand that project planning is an iterative process that must be carried out during the project's life cycle. One of the goals of project planning is to fully describe all required work (possibly by the creation of a written project plan) so that each project member can easily identify it. This is essential in a project setting because: If the job is well understood prior to being implemented, much of the work can be preplanned; if the task is not understood, more information is learned during the actual task execution, which leads to changes in resource allocations, schedules, and goals (Kernzer, 2009).

2.1.1 DEFINITION OF A PROJECT

Many writers and sources have described project in various ways, highlighting various facets of it. This paper summarizes such concepts and describes a project as: A temporary undertaking (with a specified beginning and end time) pursued following a particular period of Initiation, Specification, Planning, Execution, and Close out to produce a unique product, service, or result through novel organization and coordination of human, content, and financial capital (PMI, 1996). A project has a specified scope, is restricted by finite resources (time, budget), includes a

large number of individuals with varying levels of expertise, and is typically developed in stages over the course of its life cycle (Cleland & Ireland, 2002). It's a series of distinct, interconnected tasks with a single objective or intent that must be accomplished on schedule, on budget, and according to specifications. In general, a project is a one-of-a-kind, well-defined attempt to achieve specific outcomes in a specific time period, at a specific cost, in a multi-functional setting, and under particular supervision (Berry and Duhig, 1987).

A project is a short-term undertaking to develop a one-of-a-kind product or service. So, a project is an undertaking that is carried out to achieve something different that was not present before, something that is temporary or has a fixed time period and standard (PMI, 2000). A project is a well-organized undertaking aimed at achieving a particular, usually one-time target. It has a distinct beginning and end, as well as a distinct objective, and it is intricate and filled with numerous specifics (Bender, 2008). A project is a non-repetitive venture with a given beginning, middle, and end, and a simple and logical series of events with a beginning, middle, and end, with costs, resources, and quality criteria listed (Ricardo, 2008). Agreeably, the word "project" is a very vague term that is interpreted in a variety of ways by various academics. In this paper, a project is described as a temporary operation carried out to accomplish a specific goal within a set time frame, with a set quality, and within a set budget.

2.1.2 WHAT IS A SUCCESSFUL PROJECT COMPLETION?

The notion of project efficiency, according to Pinto and Slevin (1988), is one of the few concepts in the field of project management that is widely debated but seldom decided upon. According to Thomas (2008), determining project progress is not easy: "Examples abound where the project's initial goals were not fulfilled, but the client was extremely satisfied." Other cases exist where the project goals were fulfilled but the customer was dissatisfied with the outcome." Collyer and Warren (2009) use the example of the film Titanic, which was initially regarded as a late, over budget flop but went on to be a huge hit. The progress of the project has been evaluated in a number of ways. Although project success has traditionally been measured in terms of tangibles, new theory is that project success is better determined by the primary sponsor's decision. As Shenhar (1997) points out, determining performance is time-dependent: "If time passes, it becomes less important if the project has met its budget constraints." According to Shenhar (2001), there are four stages of project success:

1. Project efficiency
2. Impact on the customer
3. Business success
4. Preparing for the future

All four aspects mentioned above must be addressed in order for a project to be functional. It's unlikely to conclude the project was finished successfully if one of the goals was not met. One of the key factors for project planning is to identify the appropriate stakeholders, assess and identify the quality of the project's success, and learn lessons. As a result, project planning has a major impact on project performance.

2.1.3 DEFINITION OF PLANNING

Planning is a broad term that is described differently by various academics. However, there is a common thread running across all of the meanings. Planning is seen by many as a roadmap to practice and a way of determining a course of action. The following are some of the meanings offered by various academics. Planning is the systematic organization of the effort required to carry out entrepreneurial decisions with a view to the future. Furthermore, systematic planning allows for the coordination of predetermined objectives. Decisions focused on precedent are an alternative to systematic planning. This usually leads to reactive management, which includes crisis management, dispute resolution, and firefighting. To meet one's assigned duty, planning entails deciding what needs to be done, by whom, and when (Kernzer, 2009).

The most basic role of management is planning. It is described differently by different authorities. However, the following is a general concept of planning: "Planning is the method of agreeing in advance on the organization's short and long-term goals, as well as the courses of action for achieving them." The main goal of planning is to reduce the danger and challenges that can arise during future operations. Planning, in this context, can be described as the process of preparing for change and dealing with uncertainty by formulating strategies for achieving objectives. Anticipatory decision-making sets management objectives and determines how they can be achieved (Sridhar, 2009).

Planning is the cornerstone (primacy) of administration; it serves as the framework for all future management functions. It takes priority over other administrative duties such as organizing, staffing, directing, and overseeing since none of these can be carried out without a plan in place. It should be remembered, though, that management roles are intertwined in the sense that no one role can operate without the others (Charles, 2003). Planning entails determining goals, designing programs and courses of action to achieve them, developing schedules and timing of action, and assigning responsibility for their execution (Sridhar, 2009).

As a result, the word planning encompasses a broad definition that is interpreted differently by various academics. In this paper the term plan is therefore used as a representative of the following definition. Planning is the method of determining what is needed to accomplish a project successfully. Time, expense, efficiency, coordination, contract, stakeholder, human capital, scale, and acquisition of projects are all examples of planning.

2.1.4 DEFINITION OF A PROJECT PLAN

Many scholars and sources have described project planning in various ways, stressing various facets of it. This paper summarizes such concepts and describes project planning as the degree to which timetables, deadlines, workforce, supplies, and expenditure are defined or estimated for the project's commitment, time, cost, and staff resources (Slevin and Pinto, 1986).

For the case of projects, a project plan is a more descriptive concept. As mentioned in the concept of planning, a project plan is a method of achieving a goal. It serves as a blueprint or

road map for the project's implementation. The following are some of the scholars' perspectives on project plan. A project plan is a structured, accepted document that guides the implementation of a project. Since it includes all other concrete plans, the project plan is also known as an integrated management plan (PMI, 2009). The basis for effective project execution is project planning and management. Planning is a step in the project management process that necessitates the use of relevant and common documentation in order to construct a complete and well-organized project. To meet the project specifications, knowledge, expertise, equipment, and strategies are added to different project tasks. It's pointless to plan without managing. Different project management approaches have been commonly developed in fields such as planning and control in order to produce a viable project.

Various project management methodologies, success and failure, planning process, and other topics are discussed in this paper. The project plan is the most important aspect of project management. As a result, it's important for keeping track of the project's success. According to one remark (attributed to a pharmaceutical company's managing director), "we never seem to have time to schedule our projects, but we do have time to do them twice" (Turner, 2001).

Almost all programs, due to their limited term and often prioritized resource management, necessitate formal, detailed planning. Since each functional unit can create its own planning documents with little respect for other functional units, the planning activities must be integrated. The function of selecting organizational goals and defining the strategies, processes, and programs required to achieve them is best defined as planning. Establishing a predetermined course of action within a predetermined context may be defined as planning in a project setting (Kernzer, 2009).

Without adequate planning, initiatives can begin "behind the eight ball." Poor planning will result in project implementation without specified requirements, disillusionment, confusion, the quest for the guilty, the punishing of the innocent, and the recruitment of non-participants (Kernzer, 2009).

There are four primary motives for project planning: to remove or decrease complexity, to increase operational performance, to provide a deeper view of the goals, and to provide a foundation for tracking and controlling work. Planning is an ongoing process of making future-oriented entrepreneurial decisions and methodically planning the work required to carry them out. Furthermore, systematic planning allows for the coordination of predetermined objectives. Decisions focused on precedent are an alternative to systematic planning. This usually leads to reactive management, which includes crisis management, dispute resolution, and firefighting (Kernzer, 2009).

The structured paper that outlines the protocols to be followed during the project's implementation is the project plan. It serves as the basis for the whole process. It includes all information field plans, schedules, technical details, and so on (Ricardo, 2008).

2.1.5 OBJECTIVES OF PROJECT PLANNING

Many scholars and reference literatures have defined various goals of project planning in various ways, highlighting its various facets. The main goal of project planning and scheduling, according to the majority of the literature studied, is to schedule project tasks in order to complete the project on time, on budget, and with the least amount of risk. There are also secondary goals in project planning and scheduling, such as analyzing options, designing an optimum timetable, successfully using resources, communicating, optimizing estimation parameters, achieving successful project management, and allowing for quick revisions.

Lee (1998) identifies certain project development priorities in this sense and from a management viewpoint. They are: reducing the impact of uncertainties and risks; persuading individuals to execute sequential activities in order to maximize the use of available resources at all times; and providing the foundation for project control. Other objectives of project planning, according to Mawdesley (1997), include: providing a basis for estimating time and cost; predicting the timing of activities, their sequence, and the total construction period; providing a basis for claims evaluation, in particular extension of time entitlement calculations; and predicting the level of resources such as labor, staff, plant, and material; and to enable the safety, quality and environmental impact of the work to be properly considered.

According to PMI (2013), the primary goal of a project plan is to include specific project management guidelines and instruments. These guidelines and instruments are used to: Direct and Oversee Project Work: This is the process of directing and executing the work specified in the project schedule, as well as incorporating agreed improvements and providing overall project management to meet the project's goals. Directing and managing project work activities include performing activities to accomplish the objectives; create deliverables to meet the planned work; provide, train, and manage the team members assigned, obtain, manage, and use resources, implement the planned methods and standards, establish and manage communication channels, generate work performance data such as cost, schedule, technical and quality progress, and status to facilitate forecasting, manage risks and implement risk response activities, manage stakeholders and their engagement, and collect and document lessons learned.

Monitoring and controlling project work is the practice of monitoring, evaluating, and documenting progress in order to achieve the project plan's success goals. Monitoring and controlling a project entails comparing actual performance to the plan, assessing performance to see if any corrective or preventive actions are needed, and then recommending those actions as needed; identifying new risks and analyzing, tracking, and monitoring existing project risks to ensure risk response plans are followed; and providing in-depth analysis and reporting. Perform Integrated Change Control: this is the process of reviewing all change requests; approving

changes and managing changes to deliverables, organizational process assets, project documents, the project management plan and communicating their disposition.

2.1.6 SCOPES OF A PROJECT PLAN

Based on the form and quality of the operations we perform, there are several types of plans. In an organization or a specific entity, there might be long-term, short-term, and mid-term plans. So, when we say strategy, we're referring to the three big scopes mentioned below (Rosen, 1972). A way of categorizing proposals depending on the number of tasks covered is the scope/breadth factor. Some strategies are very broad and long-term, based on the most important corporate goals. Others describe how the organization can use its tools to accomplish these goals (Rosen, 1972). As a result, depending on their reach or depth, plans are divided into three groups. This includes Strategic plans, Tactical plans; and Operational plans.

2.1.7 THE PLANNING PROCESS

Planning is a method of doing things in a formal and empirical manner, as well as predicting the future. When planning a project, we must use a formal and scientific approach. Different researchers use various processes for planning. The planning process relates to the basic steps taken in developing organizational plans (Alexander, 2010). These include:

- a. Understanding the Existing Situation
- b. Forecasting
- c. Establishing Objectives/Goals
- d. Determine and Evaluate Alternative Plans (Course of Actions)
- e. Selecting the Plan (Course of Action) and Formulate Derivative Plans
- f. Implementing the Plan
- g. Controlling and Evaluating the Results

As a result, the planning processes mentioned above are the most widely used in any management framework.

2.1.8 PROJECT PLANNING IN ETHIOPIAN CONSTRUCTION INDUSTRY

Owing to a shortage of trained staff, Ethiopian contracts require contractors to provide and manage a program of work/plan. This plan is often performed using Gantt charts, and other technique/method ways of project scheduling such as the CPM and PERT are seldom used (Tsefahun, 2002). He also stated that contractors had insufficient experience with technology for planning, and that their use of computers is restricted to accounts, payroll scheduling, and word processing.

The government of Ethiopia has released three separate bidding papers in order to purchase public works: MOWUD in 1994, PPA in 2006, and PPA in 2011, which are revisions and replacements to one another. Those entire tender contracts include sections of general contract conditions that are in place for the administration of the country's public construction projects

contract until they are amended and have gone out of date. Furthermore, such general contract terms are mostly based on time planning as a planning requirement.

According to MOWUD (1994), the contractor is responsible for drafting and applying the plan within a specified time after the tender is accepted, but the consultant is responsible for the approval. It was also necessary that a plan display the course of operation for carrying out the works (if required), as well as include details on the arrangements and procedures used for the implementation of the works; and revise the plan at any time if real progress of the works does not adhere to the agreed schedule at the request of the consultant. As a result, MOWUD's (1994) planning clause is limited to time planning and ignores other basic project planning elements.

Similarly, PPA (2006) has approved the consultant's proposal and has provided planning to the contractor. Furthermore, it has been reduced to a time plan that can demonstrate the general procedures, schedules, order, and scheduling for all operations in the works. In relation to updating the plan, it is expected to show the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities, within the time interval specified in SCC. If the contractor fails to comply, it is likely to withdraw a portion of the contractor's salary until the revised plan has been submitted. PPA (2006) has a much improved provision than MOWUD (1994), but it still skips over other common project plan elements as well as subsidiary plans.

PPA (2011), on the other hand, views planning as a contractor's responsibility that must begin within the bid process in order to apply it with the technical proposal of bid as a preliminary plan that contains a declaration of work methods, facilities, manpower, mobilization and construction schedule, site organization, and any other necessary material. The contractor must also provide the consultant with a plan of implementation of the tasks, broken down by activity in months, and provide the order to carry out the works, the time limits under which submission and approval of the drawings are required, and an organization chart containing the names, qualifications, and experience of the people who will be doing the work. In addition, it has a clause for modifying the plan that is identical to PPA (2006). In general, this paper discusses planning in a more comprehensive manner than previous versions.

Even if all statutory clauses and contract terms, which have been used for the country's public construction projects for the past 22 years, do not cover all aspects of the project plan, they have seen improvements from time to time through revision.

2.1.9 WHO IS RESPONSIBLE TO PLAN THE CONSTRUCTION PROJECT?

Good practices became more relevant as project management progressed. Both successes and failures will teach us best practices. As a result, the best practices of the global construction industry related to good project planners and project managers as planners have been disused in this section.

Planning is a critical component of construction project management for the construction contractor, which starts with the selection of the job and continues during the construction process. As a result, project managers turn to the planner for guidance on upcoming work, such as forecasting future activities (what will happen and when?), measuring the construction process, and identifying possible construction problems/risks. Furthermore, comprehensive planning should be decentralized to those in charge of the project's implementation. (Ballard and Howell, 1998).

According to Kerzner (2009), the project manager's primary role in this case is planning. If project planning is done right, the project manager will be able to work himself out of a job and the project would run itself. In most situations, the project manager gives an overview or outline of the task to be done, but the line managers (the real experts) are in charge of the thorough planning. According to him, as the architect of the project plan, the project manager is responsible for providing details for the detail plan's base lines, such as mission definitions, major schedule deadlines, end-item consistency and efficiency criteria, and the framework for success evaluation. Both considerations, when correctly implemented, ensure that functional units recognize their roles in meeting project objectives, and that challenges are identified early enough for appropriate corrective steps and re-planning to be taken to avoid or address them.

Project managers, on the other hand, are in charge of project administration and defining the criteria as a planner. Part of project design is determining project administrative criteria. Executives must either collaborate with project managers at the start of the project or serve as support later. Inadequate project administrative coordination will result in a scenario that necessitates ongoing revisions to project policy and processes, a constant transfer of responsibility with needless turnover, and the need for workers to learn new skills and expertise (Kerzner, 2009).

Project success is often measured by the “actions” of the project manager and his team; and Kerzner (2009), identifies the fundamental planning lessons for management by combining their relevant actions, as follows:

- ✚ When starting off in project management, plan to go all the way
- ✚ Allow adequate time and effort for laying out the project groundwork and defining work by using work breakdown structure and network planning as an instrument

- ✚ Ensure that work packages are the proper size, manageable and realistic in terms of effort and time
- ✚ Establish and use planning and control systems as the focal point of project implementation that enable to know “where you’re going?” and “when you’ve gotten there?”.
- ✚ Be willing to re-plan and do so since the best-laid plans can often go astray and change is inevitable.
- ✚ Tie together responsibility, performance and rewards by means of management by objective that is a key to motivation and productivity.
- ✚ Long before the project ends, plan for its end.

In contrast, one of the most challenging tasks of project management in the project environment is to keep the planning on track; and in order to address this challenge, Kerzner (2009) designs techniques that will support project managers and/or project planners during planning activities, which are drawn from good experience in the global construction industry:

- ✚ Let functional managers (the people who must do the work) do their own planning.
- ✚ Establish goals before planning otherwise short-term thinking takes over.
- ✚ Set goals for planners to guard against unnecessary effort for payoff and the nonessentials.
- ✚ Stay flexible to use people-to-people contact and to stress fast response.
- ✚ Keep a balanced outlook by shunning overreaction and inflated pose for an upturn.
- ✚ Welcome top-management participation since they have the potential to make/break a plan, and
- ✚ may well be the single most important variable of the project.
- ✚ Beware of future spending plans so that to eliminate the tendency to underestimate.
- ✚ Test the assumptions behind the forecasts, and do not depend solely on one set of data.
- ✚ Don’t focus on today’s problems by trying to get away from crisis management and firefighting.

2.1.10 FACTORS AFFECTING ADVANCEMENT OF PLANNING PRACTICES

During the execution of planning and monitoring, the project manager and the project planning staff are often confronted with issues. Some researchers have identified major issues such as communication failure (Malliet, 2001), disinterest in project planning and control due to perceived low returns from implementation (Clarke, 1999 & Cox, 1993), lack of information input & feedback for planning and control due to its image as a "corporate reporting tool" (Clarke, 1999), and changes in project scope (Clarke, 1999).

Moreover, no matter how hard we try, planning is not perfect, and sometimes plans fail. Some typical reasons listed by Kerzner (2009) and Lewis (2005) include:

Time Related

1. Unrealistic or short contract duration
2. Unrealistic or short bid period (duration between date of invitation to bid and date of submission) and/or mobilization period (duration between site hand over and commencement date)
3. Shortage of time for planning or Short time to do the work (planning)

Management Related

1. Low level of project management knowledge, experience and practice of the practitioners in Ethiopia construction industry (i.e. on Contract administration, Project planning and Project monitoring capabilities)
2. Low level construction management capacity and maturity in Ethiopia construction industry
3. Unavailability or shortage of qualified or skilled professional planner in the country's industry

Information Related

1. Incomplete, unclear or inadequate details in drawing, specification and BOQ
2. Lack or unavailability of standards for resource output factors and crew formation in the company as well as in the country's industry
3. Lack or unavailability of reference documents related to earlier similar projects' plan, work procedure, success and failure
4. Lack or unavailability of practical standard and template in the company as well as in the country's industry for structuring activities in WBS

Skill, Knowledge and Attitude Related

1. Planners or project managers lack of or incomplete understanding on construction site processes and construction work procedures, and materials and other resources supply chain
2. Planners or project managers' lack of or incomplete skill to examine and formulate for task outputs and durations
3. Little or no involvement of the people who must do the work (such as construction engineers, site engineers, superintendents, etc) in the planning process.
4. Disinterest of planners, project managers and management of the company in project planning due to perceived poor returns from its implementation
5. Cultural and individual issues such as fire- fighting behavior, short term thinking, poor team work behavior
6. Planners or project managers lack of or incomplete planning skills in the areas of securing commitments, assuring measurable milestones, processing information, and facilitating top management involvement.

Planning Technique, Tools and Process Related

1. Planning in too little detail when designing and preparing WBS
2. Planning in too much detail when designing and preparing WBS
3. Giving no or little attention for detail of execution, technological implication of different construction techniques, and production capacity of machines and labors during planning
4. Giving no or little attention for estimation of activity cost and time during planning
5. Giving no or little attention for sequencing of tasks and their dependency, precedence, and lead and lag during planning
6. Giving no or little attention for working hour, overtime, holly days, non-working days and other related issues during planning
7. Giving no or little attention for short term and long term funding requirement during planning
8. Giving no or little attention for safety requirement during planning
9. Giving no or little attention for quality requirement during planning
10. Giving no or little attention for identification and allocation of potential risks during planning

Software Related

1. Lack of or little awareness on the use of planning software
2. Inadequate or little skill and knowledge of planners or project managers to operate and use planning software
3. Unavailability or shortage of computer as well as software (due to cost or other reasons)
4. Complexity and difficulty of planning software

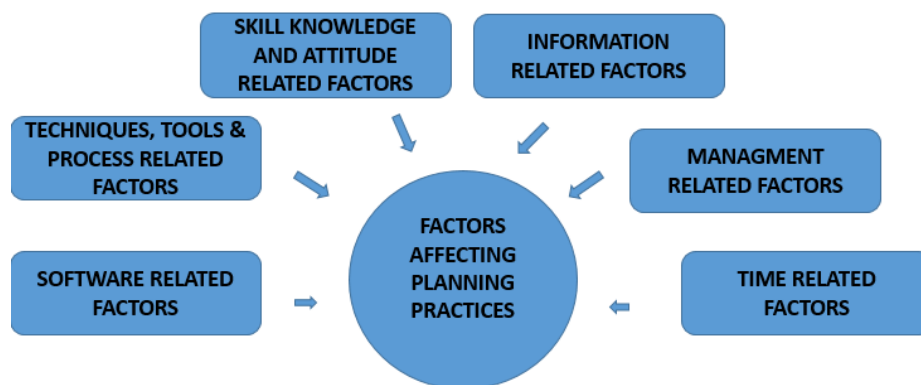


Figure 2.1: The conceptual model of all group of factors affecting the quality of planning process.

Source: (Kerzner, 2009, cited in Gebregziabher, 2016, p.30)

2.1.11 PROJECT PLANNING METHODOLOGY

We can't just sit down and write a project plan without using some kind of technique. A methodology is a method of preparing a project plan that is used to make the process easier. Every formal strategy used to direct the project team through the implementation of the plan is referred to as a project planning technique. It may be as basic as using regular types and templates or as complicated as running a sequence of simulations. Most organizing methodologies use a mix of hard and soft methods, such as project management software and facilitated startup meetings (PMI, 2009).

2.1.11.1 STAKEHOLDERS SKILL AND KNOWLEDGE

The participation of various project partners is one of the methods for preparing a sound project plan. It is possible to obtain a multitude of concepts and expertise as a result of doing so, which would aid in the planning of a solid project plan. Any stakeholder has expertise and experience that can help with the project plan development. The project management team must build a conducive atmosphere for stakeholders to participate effectively. It will depend on who contributes what and what they contribute (PMI, 2004).

2.1.11.2 PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

One of the methods and approaches used in project planning is the project management information system. It's a software program that's used for a variety of reasons in the project. It aids in the development of a sound and coherent strategy. PMIS assists project management with making less risky and expensive decisions. It assists them during the project's various stages. PMIS aids project management in the processes of project selection, planning, scheduling, and monitoring (Karim, 2011).

2.1.12 COMPONENTS OF A PROJECT PLAN

A project plan is a set of several detailed proposals. Described below, are the basic types of plans that need be implemented in construction project management.

2.1.12.1 PROJECT INTEGRATION PLAN

The procedures that must be followed to ensure that all project components are well coordinated, ensuring that the whole project benefits (Ricardo, 2008). The project integration plan aids in the coordination of the project's different components and is an integral aspect of the planning process. In the integration management process, prioritizing contrasting goals and options is critical. The aim of project plan creation is to construct a consistent, cohesive document that can be used to direct project implementation and control (Gupta, 2008). The project integration strategy explains how to unite the project's various components into a single body.

2.1.12.2 PROJECT SCOPE MANAGEMENT PLAN

It is a method of ensuring that the project contains all of the work that is needed and removes the work that is not required in order to effectively complete the project. Scope planning, scope definition, and produces are all part of this planning information field (PMI, 2004).

The first step in the planning process is to create a scope management plan. The scope management plan describes how the scope will be described, created, supervised, and validated as part of the project schedule. The method of identifying a scope baseline and establishing a work breakdown structure (WBS) is known as scope management planning. The scope plan includes the following elements (PMI, 2013):

- a) The project scope statement
- b) Work breakdown Structure (WBS)
- c) WBS dictionary

2.1.12.3 PROJECT TIME MANAGEMENT PLAN

If a project is finished on time and on budget, both the sponsor and the contractor would prosper. There should be a proper project time management plan in place in order to complete it. Project time management is the method of keeping track of and controlling the amount of time expended on a project (PMI, 2003).

The project schedule/time plan is a guide that includes clear baseline knowledge for project time management systems, as well as the methods and procedures that go along with them. A part of the project plan is the schedule/time plan. The following procedures and phases are typically included in the implementation of a project schedule/time plan (PMI, 2013):

- a) Define Activities
- b) Sequence activities
- c) Estimate Operation Resources
- d) Estimate Activity Durations
- e) Develop Scheduling

In most cases, the finalized and approved plan will serve as the baseline for project schedule/time management. As project operations are completed, the remainder of project time management effort will be spent on the monitoring process to ensure prompt execution of project activity.

2.1.12.4 PROJECT COST MANAGEMENT PLAN

The cost of a project is the most important consideration. Any project activity necessitates any investment of time and money. As a result, each activity's spending should be measured and calculated in order to decide the project's budget. The aim of a project cost management plan is to figure out how much money each operation would take. For the lifetime of the project, project

cost control is the method of reducing project costs while ensuring appropriate standards of quality and variety of deliverables. A comprehensive overview of client priorities, project specifications, quality standards, budget limitations, financing arrangement, test approval specifics, administrative targets, and the expected completion date are all examples of project knowledge that forms the basis of a progress reporting and cost control system (Parviz, 2002).

The primary concern in a project cost plan is the cost of services used to complete project operations. Early in the project planning phase, the cost control effort establishes the basis for each of the cost accounting procedures, ensuring effective and organized execution. The following method and measures are typically included in project cost planning (PMI, 2013):

- a) Estimate Costs
- b) Determine Budget

2.1.12.5 PROJECT QUALITY MANAGEMENT

The method of ensuring that all project practices required to design, plan, and execute a project are accurate and successful in terms of the objective's intent and results is known as quality management. Quality management is a never-ending mechanism that begins and concludes with the project plan. As a result, having a successful project plan is critical for any project because one of the signs of project failure is failing to finish the project within the specified quality.

2.1.12.6 PROJECT HUMAN RESOURCES MANAGEMENT PLAN

Humans manage projects. Any project can have a variety of resources, including both human and material. Any mission, regardless of the size or type of resources, cannot be completed without human experience and abilities. As a result, any initiative should have a well-prepared human resource management plan. HRM is critical in projects, and it differs from HRM in the general community due to the unique characteristics of projects and project-oriented organizations. Since tasks are by their very nature fleeting and one-of-a-kind, HRM differs and is more complex than the HR plan of a typical company. So there should be a well prepared project plan which is based on the type of the project.

If certain aspects of the human resource plan, such as the type and amount of human resources provided by time span, are completed during time planning, more data is needed to successfully handle human resources. As a result, human resource planning is a mechanism that identifies and offers project positions and duties, project organization maps, and a staffing strategy schedule, which has a timeline for hiring new employees. The outputs of the project human resource planning process include (PMI, 2013):

- a) Human resource plan
- b) Staffing management plans

2.1.12.7 PROJECT COMMUNICATIONS MANAGEMENT PLAN

A project communication plan is a mechanism that ensures that the necessary information is transmitted to the appropriate individual at the appropriate time. As a result, the negotiation mechanisms used represent the need to express a consistent view of both the project's purpose and the expected deliverables. A project communication plan outlines how information in the project is moved from one stage to another in depth. A well-thought-out communication plan is vital to any project's progress (Pitchard, 2004). Communication is required to connect the stages of a project as well as to promote advancement within each level.

2.1.12.8 PROJECT RISK MANAGEMENT PLAN

There are several types of risks and uncertainties in projects that can obstruct the achievement of the project's goal. As a result, this risk and uncertainty should be planned for, prior to the project's implementation. The key goals of project risk management, as part of the project management body of knowledge, are to increase the likelihood and effect of positive project events while decreasing the probability and impact of negative project events. Risk identification, qualitative and quantitative risk analysis, and risk management planning are all part of risk planning (PMI, 2004).

2.1.12.9 PROCUREMENT MANAGEMENT PLAN

Procurement management is one of the most important bodies of knowledge in project management, and it plays a significant role in assessing a project's progress. As a result, putting together a solid project procurement plan is critical. If well designed, it raises the likelihood of a project's success; if not, it could be one of the project's failure factors. Morris and Pinto (2007) described it as a collection of processes that connect suppliers, manufacturers, and customers along the supply chain, as well as the work practices, participants, organizations, and technologies that go along with them. The information fields of project management are summarized in the diagram below.

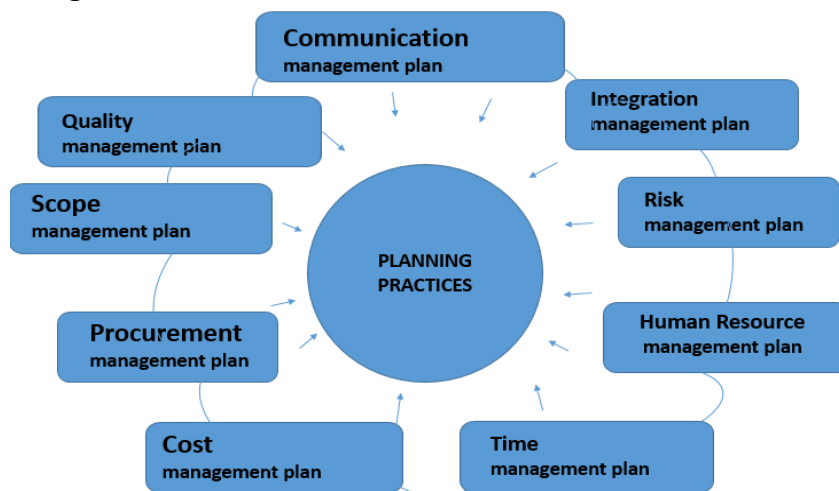


Figure 2.2: Project Planning Bodies of knowledge
Source: (Sisay, 2017, p.20),

As we can see from the above figure, each knowledge area involves planning. So a project plan is a combination or an aggregate of specific plans listed earlier on this paper.

2.1.13 PROJECT SUCCESS AND ITS FACTORS

Brown (2017) states, “A Project is considered to be successful if the goals are achieved”. At times you might reach your project goals but may fail to meet other criteria associated with successful project completion. Having an accomplished project manager is the first step to project success, but there are other major factors that contribute to the project’s outcome;

1. Intelligent People
2. Comprehensive Planning
3. Open Communication
4. Proper Risk Management
5. Strong Project Closure

2.1.14 THE STEPS TO ENSURE SUCCESSFUL PROJECT COMPLETION

A staggering amount of projects go over-budget or exceed deadlines. A closer look at these faulty projects will show that they failed on several fronts – from lack of professional planning to poor communication levels at all stages in the project (Smith, 2020). Consequently, some major steps to ensure successful project completion are determined;

Step 1: Study the project thoroughly

Step 2: Prepare a concrete project plan

Step 3: Daily monitoring of work assigned after project begins

Step 4: Keep the client informed on a predetermined basis

Step 5: Perform testing at regular intervals

Step 6: Final project delivery

However presented, successful project completion falls under three basic deliverables of any project; Time, Cost and Quality, also referred to as the iron triangle, where scope is also a basic parameter. Planning focused in these areas is likely to ensure project success (Bart,1993).

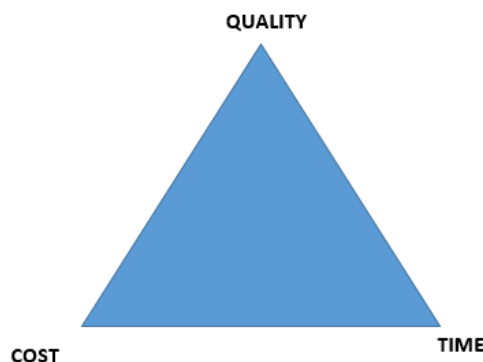


Figure 2.3The Iron Triangle
Source: (Bart,1993, p.47)

2.2 REVIEW OF EMPIRICAL STUDIES

2.2.1 THE LINK BETWEEN PLANNING & PROJECT SUCCESS: EMPIRICAL TESTIMONIES

Project management has a long history in the construction industry and there have been a number of studies on the relationship between planning and project success.

Hamilton and Gibson (1996) found that the top one third of projects from a planning completeness perspective had an 82% chance of meeting those goals, whereas only 66% of projects in the lower third did (a difference of 16%). Similar results are seen for schedule and design goals. Shehu and Akintoye (2009) found in a study of construction programs that effective planning had the highest criticality index of 0.870 of all the critical success factors (CSFs) studied.

The PDRI (Project Definition Rating Index) is a widely adopted method in the building industry used to measure project scope definition for completeness (Gibson & Gebken, 2003). No planning correlates to a PDRI score of 1000, whereas a score of 200 or less is good planning (Wang & Gibson, 2008). Effective pre-project planning using PDRI leads to improved performance in terms of cost, schedule, and operational characteristics (Gibson *et al.*, 2006).

In the construction industry, project success is closely linked to project efficiency so this can apply to efficiency and success (Collyer, 2010). Further, he notes “many owners face such uncertainty that they skip the entire planning process and move to project execution, or decide to delegate the pre-project planning process entirely to contractors, often with disastrous results.”

In reviewing these papers in the construction field, it is to be noted that the level of planning completeness is positively correlated with project success in the construction industry.

Thomas (2008) states, “the most effective team cannot overcome a poor project plan” and projects started down the wrong path can lead to the most spectacular project failures. Morris (1998) similarly argued that, “The decisions made at the early definition stages set the strategic framework.... get it wrong here and the project will be wrong for a long time”.

Blomquist *et al.* (2010) state “Plans are a cornerstone of any project; consequently, planning is a dominant activity within a project context.” This is a recurring theme: planning is inherently important to project success or one could argue project management would not exist.

Pinto and Prescott (1988) found that a schedule or plan had a correlation of 0.47 with project success, while detailed technical tasks had a correlation of 0.57 and mission definition a correlation of 0.70. Pinto and Prescott (1990) again found that planning factors dominate throughout the project life cycle. Planning was found to have the greatest impact on the following success factors: “Perceived value of the project” ($R^2=0.35$) and “Client satisfaction” ($R^2=0.39$). The coefficient of determination R^2 provides a measure of how well future outcomes are likely to be predicted by a model.

Shenhar (2001) notes better planning is the norm in high and super-high technology projects. This was found to apply consistently to the deliverables normally produced in the planning phase. Dvir and Lechler (2004) found quality of planning had a +0.35 impact on R^2 for efficiency and a +0.39 impact on R^2 for customer satisfaction.

Dvir *et al.* (2003), in a rigorous paper noted the correlation between aspects of the planning phase and project success. The planning procedures effort was found to be less important to project success than defining functional and technical requirements of the project. The correlation was 0.297 for functional requirements and 0.256 for technical requirements. Zwikael and Globerson (2006) noted the following “organizations, which scored the highest on project success, also obtained the highest score on quality of planning. “ One can thus generalize that planning is associated with project success; both project efficiency and overall project success.

What appears to be clear is that activities which we define as part of the planning phase, such as requirements definition, scope definition, and technical analyses are important to project success (Shenhar, 2002).

2.2.2 HOW MUCH TO PLAN

Surprisingly little research has been done on how much planning should be done in projects. Daly (1977) states that schedule planning should be 2%, specifications 10%, and final design 40%, of the total cost; however, not much design is done during execution. Similarly, Poston (1985) states that plans and requirements should be 6% of project cost, product design should be 16%, and detailed design 25%. Empirical guidance on how much time to plan has become less common over time. Whether this is because this guidance was found not to be effective, the diversity of technology projects increased, or it simply fell out of favor is not clear.

Chatzoglou and Macaulay (1996) outline a rule of thumb for planning effort: The three-times-programming rule and the life cycle stage model. “One estimates how long it would take to program the system and then multiply by three” to get the total. Software development testing is estimated to take roughly an equal amount of effort as development (Kaner *et al.*, 1999). This leaves one third of total effort for the planning phase and other miscellaneous tasks.

Nobelius and Trygg (2002) found front-end activities made up a least 20% of the project time. Similarly, Wideman (2000) states that the typical effort spent in the planning phase in construction projects is approximately 20% of the total work hours.

Choma and Bhat (2010) found “the projects with the worst results were those that were missing important planning components”. However, they also found “the projects in this sample that took longer in planning had the worst results”. Their analysis points to either that too much planning can be negative to project success or that a planning phase that lasts too long can be an indicator of a problem project.

The theoretical section of this paper demonstrates that project planning is a critical tool of project management. It is also impossible to execute plans effectively if they are not well developed, refined, and sequenced during the planning process. Empirical tests always back this up. The contribution of the PMBOK Guide's nine knowledge areas to project progress was investigated by Zwikael (2009). According to him, the planning process had the greatest effect on project progress in the information fields.

Munns and Bjeirmi (1996) make a related argument remarking that a project that is incomplete from the start cannot be rescued by successful execution. In reality, good implementation could be important only to the project management, while the project may be

seen as a disappointment by the rest of the company. Bad project priorities, poor technological infrastructure, and escalating costs and deadlines, according to Ewusi-Mensah (1997), are main factors leading to termination of projects. In a detailed planning process, these will usually be evaluated and discussed. According to Yeo (2002), project planning was ranked first among the issues of influence identified in the analysis of crucial failure factors.

Hamilton and Gibson (1996) found that increasing pre-project planning for building projects improved the chance of a project achieving financial targets in their *Journal of Management of Engineering* article; “Benchmarking pre-project-planning effort.” In an analysis of program management in the construction industry, Shehu and Akintoye (2009) discovered that successful planning was the number one critical success factor listed. Many of the Critical Success Factors (CSF) analyzed had a criticality index of 0.870, with effective planning having the highest. Similarly, Ngoc (2010) said that a well-defined project scope allows a project to be completed on schedule, on budget, and with the desired quality. As a result of the literature analysis, the project plan is a merger of detailed plans generated by each information field, all of which will contribute significantly to the project's progress.

According to Garg and Yadav (2014), project planning and management is a critical framework for completing any project successfully. With its methods and strategies, planning is critical for any project.

Yardley (2002) makes a related argument, stating that programs stall for a variety of reasons. One of the most common mistakes in projects is poor project planning. As a result, project planning activities should be strengthened and systematized to ensure that all projects succeed. According to a study by Yu-Ren and Edward (2008), inadequate project planning affects many developing countries around the world. One of the key causes for the poor performance of African projects has been described as a lack of coordination and execution (Moradat *et al.*, 2005). Each of the above mentioned studies substantiate the case that inadequate planning practices have an unintended negative impact on successful project completion.

2.2.3 PROJECT PLANNING PRACTICES: ETHIOPIAN CONTEXT

In the specific context of construction project planning practices within Ethiopia, several researches have been conducted at varying scope. Accordingly, in the next pages is an empirical review of these papers, with the aim of identifying the specific measurable components within the planning practices across different scopes and sectors of study. Further, a review of the underlying factors affecting effectiveness of the planning practices is addressed, where found clearly examined in some studies. As such, the most critical factors affecting planning practices and the most lacking practices across different case organizations and sectors is reviewed and compared with the aim of identifying the research gaps and what should be included in this research. In the latter pages of this empirical literature review, researches carried out examining each component planning practice are examined, where the research papers are obtained and applicable.

Sisay (2017) conducted a research with the objective to assess Project planning knowledge of professionals, the extent to which project management knowledge areas are practiced during the planning process of construction projects and identify the level of use of project management tools and techniques during planning stage of construction projects in the Oromia Housing and Urban Development Bureau, as a case organization to assess the project planning and its practice in the overall construction industry. As such he classified practices according to nine project planning knowledge areas widely applied as per PMI; risk, quality, communication, integration, scope, procurement, human resource, cost, time planning and additionally, project Management tools /techniques. Through the use of probability and nonprobability sampling techniques, 171 professional's consisting of professional staff members at Oromia Housing and Urban Development Bureau, 30 contractors and procurement endorsing committee members at Oromia Finance and Economic Development Bureau, Health Bureau and Urban Land Information System project office were included in the study.

Findings of the assessment suggest that, project planning and management knowledge is not sufficient enough in order to successfully manage construction projects and project planning practice in the organization when evaluated from the nine project management body of knowledge and thus found unsatisfactory. Specifically, project risk management planning, procurement planning, project quality planning and scheduling are not well considered. This is the case were only 14.8% of respondents agree that there is a procurement plan in the examined projects. Similarly, only 6.6% of respondents agree that there is a risk and quality management plan prepared during planning phase. Moreover, the study concludes, use of project management tools and techniques during project planning phase is limited to WBS and LFA, where other tools and techniques are not well known and utilized.

The title of the research maybe questionable in that it gives the notion planning practices are assessed in the entire Ethiopian construction Industry, whereas only projects undertaken by Oromia Housing And Urban Development Bureau are considered. Even so, the research's attempt at classifying and examining planning practices into knowledge areas is commendable to understand which area of planning specifically is lacking.

A narrower scope of study is conducted by Ali (2019), where he examines the planning practice of Addis Ababa housing projects in selected four sites, classifying them into the nine project planning knowledge areas as did Sisay(2017). The study employed survey in its descriptive research design where the target population was staff of the organization incorporating project team members and managers. Ali used stratified sampling, were of 133 questionnaires distributed, 123 were returned and analyzed. The research concludes from the analysis that the general project planning practice of the study organization is weak but the level of staff awareness regarding the presence of the project plan is good. The most widely used project planning tools were work break down structure, Gant chart and project management information system, although not to a satisfactory level. Accordingly, he identifies that only

9.8% of the respondents agree that there is a well prepared project risk management plan in the project. Only 12.2% of the respondents agreed that well established cost management plan is present. His work identifies that risk and cost are the most deficient planning knowledge areas, where procurement and human resource plans are comparatively well prepared, contradicting the results of Sisay(2017), where the most deficient planning practices were found on procurement and risk planning.

Another research by Gebregziabher (2016) was conducted to explore and to capture the existing project planning practice of local contractors for federal public road construction projects implemented in Ethiopia, in order to provide some understandings over the maturity level of the practice. What is most commendable about this research is that it tried to identify the major factors influencing the quality of road sector's project planning practice.

The research considered five planning areas;

1. general
2. schedule/time
3. resource
4. financial
5. risk, safety, quality, communication and procurement

These practice categories contained thirty activities of planning within each, in order to explore and rank the maturity by relative importance index (RII). On the other hand, the study identified thirty planning influencing factors identified and listed in six categories, based on extensive literature review, especially addressing the works of Kerzner (2009), also included in the theoretical part of this study.

1. Time related
2. management related
3. information related;
4. skill, knowledge and attitude related;
5. planning technique, tools and process related; and
6. software related

This is in order to rank their influence on the practice by principal component analysis (PCA) loading of the collected data.

Furthermore, connected to the factors, management related factors are found as the most dominant factor that affects quality and maturity of their projects planning process. With respect to this, low level construction management capacity of the construction industry, shortage of qualified or skilled planner, and low level of project management knowledge and experience/practice of practitioners are the main challenges as well as the most influential factors affecting the planning practice of federal public road construction projects in Ethiopia.

Results of Gebregziabher (2016) indicate that even if there is adequate awareness on the benefits, the maturity of project planning practices of local contractors in Ethiopian federal

public road construction projects resides at low level. Relatively, the practices of planning risk, safety, quality, communication and procurement (Value of 5 of 5) category are found to be the least matured practices. Contrarily, relatively the highest maturity level is found for their time planning practice (value of 1 of 5), were assessed and ranked according to degree of importance using Relative Importance Index (RII). This is in line with the findings of Sisay (2017) having found procurement practices the most deficient. But time planning results are contrary to Ali (2019) where only 62% of respondents disagreed that proper time planning was implemented.

The major credits of this paper include where that in addition to classifying planning practices into problems in knowledge areas as did Sisay (2017) and Ali (2019), which planning areas were the most deficient were examined and ranked using Relative Importance Index (RII). Also, factors affecting planning were identified and categorized as per Kerzner (2009), then ranked according to degree of importance using PCA loading. Finally, the paper's presentation of findings begins with a simple yet informative table; clearly summarizing the respondent values of variables under each planning knowledge area, followed by the variables RII value, their rank in their respective category (Schedule/ financial/risk etc.) then finally each variable's rank in the entire considered list of planning practices. This summary is later broken down into a discussion of findings for each knowledge area, supported by a graphical presentation of maturity levels of each planning knowledge area as well as ordinal scale results under each practice. Same it also true for presentation of findings of the factors affecting quality of planning.

Contrarily, the major shortcomings included; where the study centered around the entire road construction industry of Ethiopia, only 8 road construction companies were sampled. Additionally, despite the exhaustive list of factors affecting planning practices, it only considered 5 planning knowledge areas of PMI (2003) as opposed to its literature review, where all planning areas were addressed. Worse so, the knowledge areas; risk, safety, quality, communication and procurement were considered as one single construct despite having entirely separate contents.

At the very least, based on the conflicting results of which planning areas are most deficient, one can conclude that the areas of planning found lacking vary greatly on sector basis. The challenges, influences and impacts found in road sector as opposed to building sectors may vary. It may in fact be advantageous in considering them separately, as did Gebregziabher (2016), as the reliability of data may also be affected if the sectors are examined together.

This is in contrary to the work of Abebe (2015), where the planning practices of all construction works of DCE are assessed irrespective of sector, in conjunction with monitoring and evaluation phases. Through the analysis of 96 questionnaires and structured interviews, he examines which planning knowledge area is most deficient. Particularly, planning areas such as work plan/schedule, human resource plan, risk plan, procurement plan, equipment /machinery plan, safety plan, material plan and quality and payment plan development were considered. Consequently, the most inadequate practices were found in quality, safety, procurement and risk

planning. It is important to note that since Abebe's (2015) paper is carried out on the same case organization (DCE), a thorough examination of the pros and cons was deemed imperative. Accordingly, below is a list of the paper's credits and shortcomings.

The major credits of this paper included that the variables under each planning practice (knowledge area) were exhaustively listed out for assessment and further reinforced with interview questions. Further, the research included a large sample size of 96 respondents fulfilling sampling requirements. Moreover, the knowledge area "Resource planning" is decomposed into "Material", "human" and "Equipment" and supported by sufficient variables under each construct for analysis, which is not found on any of the other aforementioned researches. As the research context is the construction sector, the detail examination of these resources is fundamental.

Contrarily, the major shortcomings included that it failed to address all the planning knowledge areas and frankly, the purpose of including "payment plan" as a construct is neither clear nor supported in the literature review. Further, although quality, safety, procurement and risk planning practices from the planning knowledge areas were found problematic by the respondents, it is not known which planning knowledge area is the most lacking as it failed to rank the components of planning variables. Sadly, there is a major discrepancy in determination of the study population between what is narrated and values found on presented tables. This could have been easily avoided. Lastly, the paper's presentation of findings as compared to the works of Gebregziabher (2016), could have been supported by graphical presentation of at least the summaries. Further, the discussion part of the paper, where it relates findings to the theoretical literature, could have been better presented. This could have been accomplished by incorporating such discussions after each component knowledge area description of results of analysis. This would aid in easily following the research results in accordance with the discussions.

Having reviewed the pros and cons of the above empirical works, in the next section is a discussion of what this paper is deemed to include and exclude, in order to improve the quality of its content and acceptability of its results.

2.2.4 LESSONS LEARNT FROM REVIEW OF EMPIRICAL STUDIES

Based on the above empirical studies and the subsequent identified credits and shortcomings, the following measures are taken for this paper:

- ✚ All the project planning knowledge areas stated under PMI (2008) are considered, exhaustively listing variables under each knowledge area (construct). Additionally, safety planning as well as project Management tools and techniques is incorporated to cover all aspects of planning. However, careful choice of examined factors under each knowledge area is made, to avoid data collection problems associated with too many variables.
- ✚ In reference to the credits of the work of Gebregziabher (2016), ranking the 'degree of influence' in relation to underlying factors affecting planning practices is necessary to determine the most critical influencers. Again as did Gebregziabher (2016), ranking the

“degree of presence/advancement” of planning knowledge areas of the case organization is important to determine the most deficient practices.

- ✚ Further, an identification of the planning practices, as did Abebe (2015), is not enough for recommending improvements. Hence, the research is designed to go a step further and examine “degree of impact” of planning practices on successful completion of projects.
- ✚ Unlike the work of Abebe (2015), to avoid bias resulting from merging different sectors together, this research is limited to building construction sector of the case organization.
- ✚ In reference to the credits of the work of Abebe (2015), the planning knowledge area “resource planning” need be decomposed into “material”, “manpower” and “machinery” (the 3 Ms) planning areas and examined separately, to avoid misleading of results were the absence/ lack of a variable in one ‘M’ is attributed to all.
- ✚ In reference to the credits of the work of Gebregziabher (2016), presentation of findings begins with a summary, later broken down into specific planning knowledge areas and factors affecting planning, where the discussion in relation to each theoretical section of the literature review is found within each results section, for better follow up of the research.
- ✚ All the aforementioned studies included questionnaires with large number of questions and it’s frankly surprising that such large numbers of responses were obtained. To avoid problems with inadequate number and content of questionnaire response, such large number of questions need be avoided, as long as the study content data gathered is captured and not compromised.
- ✚ Avoidable contradictions between tabulated data and subsequent narration of findings should be avoided as is the case of Abebe (2015), where the reader cannot understand which population number is correct for sample determination.

2.3 CONCEPTUAL FRAMEWORK OF THE STUDY

Based on the theoretical and empirical literature review of the upcoming thesis, core contents of which are included in this proposal, the following general (Fig 2.4) and more detailed (Fig 2.5) conceptual framework are developed. The first figure demonstrates the proposed general contents of sequence of data analysis and subsequent presentation of findings. The second figure demonstrates all the planning knowledge areas assessed making a visible distinction between the independent and dependent variables.

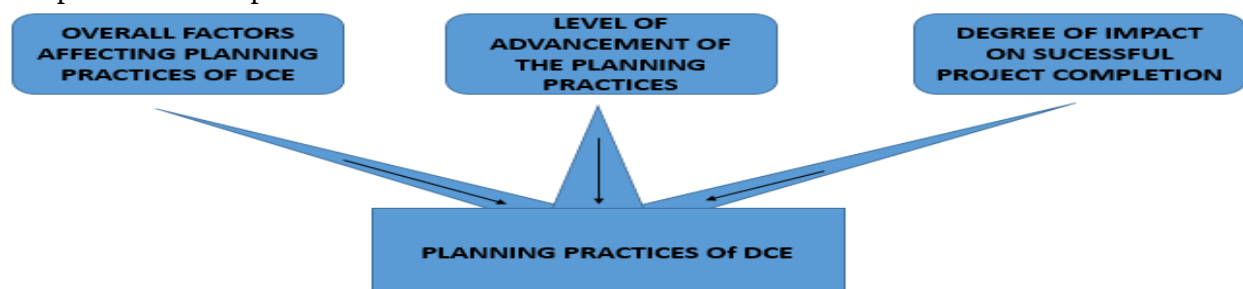


Figure 2.4: General conceptual framework

Source: Developed by researcher

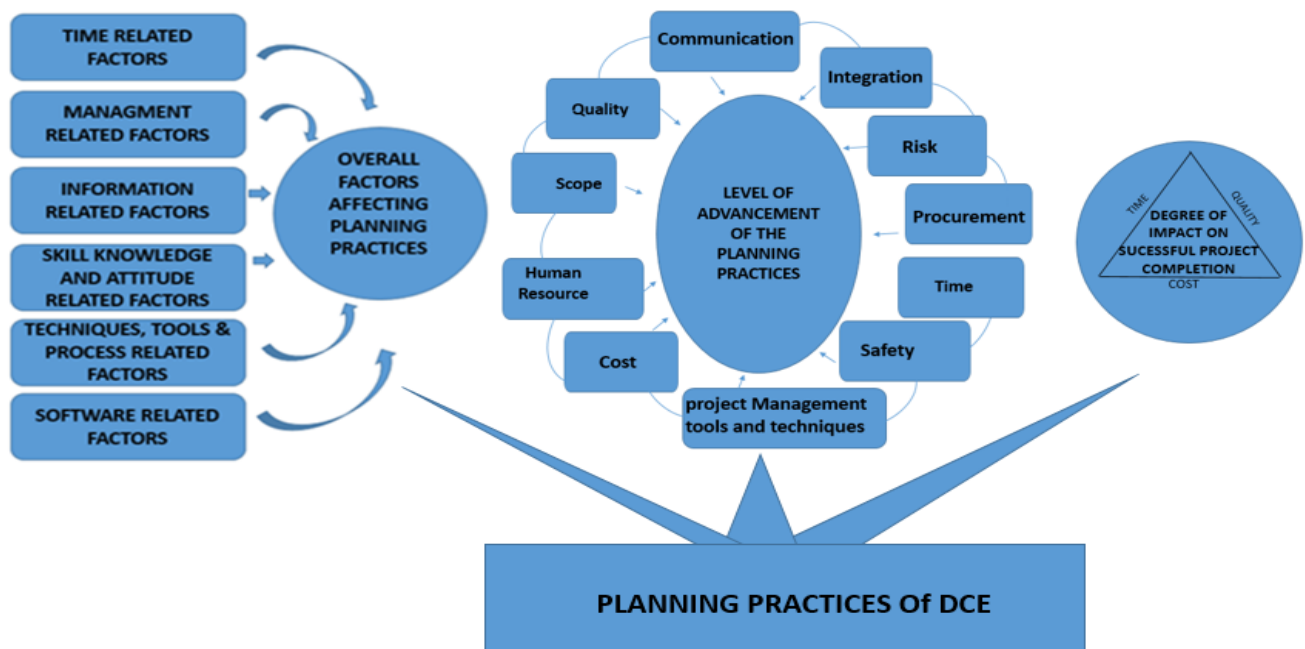


Figure 2.5: Detailed conceptual framework
Source: Developed by researcher

CHAPTER-THREE

RESEARCH METHODOLOGY

This section presents the methodologies implemented for the study during the process of collecting data both from desk review and field, analyzing and interpreting the collected data and information to answer the research questions. Facts and information were gathered based on research problem that was prompted mainly from observations and experience of the researcher. The collected information has included primary and secondary data sourced from the case organization.

3.1 RESEARHCH APPROACH

This study predominantly employed quantitative techniques. This is so because quantitative methods are mainly used for data collection techniques such as questionnaires or data analysis procedures such as graphs or statistics that generate or uses numerical data, as is intended with data collection, analysis and description of findings of this study. Although some elements of a qualitative research approach exemplified by the use of un-structured interviews, desk studies, description of interview results and correlation of findings with the literature review were employed, the research approach for this study is classified as quantitative.

3.2 RESEARCH DESIGN

The research employed exploratory methods because the study aims to explore levels of influence of underlying factors on planning practices of the enterprise, levels of advancement of existing planning practices and extent of impact of these planning practices on successful project completion. The terminologies “levels of influence”, “levels of advancement” and “extent of impact” indicate an investigative study and dictate the research should follow an exploratory design.

This paper employed survey strategy. According to Saunders (2009), survey research is a popular strategy most frequently used to answer who, what, where, how much and how many questions, also used for exploratory researches. Survey research allows the collection of a large amount of data efficiently from a substantial population. This strategy is frequently obtained by using a questionnaire administered to a sample, where data is consistent which allows for easy analysis. In addition, the survey strategy allows for the collection of quantitative data which can be analyzed quantitatively using descriptive statistics. The data collected using a survey strategy can be used to suggest possible reasons for specific relationships between perceived variables which was essential for this research.

This paper is also a cross-sectional study designed to examine planning practices, taking a cross-section of management staff and professional engineers, where data is collected once at a particular time (where there is no change and development over time).

3.3 DESCRIPTION OF STUDY AREA'S TARGET POPULATION

The study population at head office comprised of senior contract, planning, monitoring engineers of the contract and operations divisions, staff of procurement and human resource divisions and management staff. All projects meeting the criteria; building sector, more than 90% complete, undertaken at Addis Ababa, Debrezeit, Bahrdar and Diredawa within the last 10 years, were included as the population. Consequently, all project staff; project managers, senior team members of both construction and office engineering case teams, procurement and human resource officers' comprised the study population. The list of personnel and their qualifications were collected from head office's HR division. The table below is a summary of all projects, meeting the research scope requirements and as such included as target population.

Table 3.1: Building projects >90% completed within the last 10 years in study locations.

Item No.	Project Name	Project code	Progress to Completion
1	Janmeda peace keeping	11-01B	Completed
2	Bahirdar apartments	11-06B	Completed
3	INSA project Addis Ababa	11-08B	Completed
4	Janmeda staff college	11-09B	Completed
5	MOND head quarter	11-10B	>90% complete
6	Calibration center	12-02B	Completed
7	Lion Zoo	12-03B	Completed
8	Children and youth center	12-04B	>90% complete
9	Ras Hailu Swimming pool	12-05B	Completed
10	Debreziet Engineering College	13-02B	>90% complete
11	Bahirdar Referral hospital	13-04B	>90% complete
12	Shegole Apartment project	16-08B	>90% complete
13	Gofa Apartment project	16-09B	Completed
14	Dire Dawa Apartments	16-10B	>90% complete

Source: DCE Contract Division, Projects Database updated 2021.

NB: In the project code the first number indicates the year in E.C., the second indicates the number of projects started in that year and the alphabet represents the type of project (B=Building).

A review of the HR documents with respect to the projects listed above indicates that the total population of management staff and professional engineers (who directly participate/ed in the above projects), are as the table below.

Table 3.2: Scope Limited Total Population under Study

Strata	Head Office	Building project	Total Population
Management Staff (All case team leaders and core process heads)	12	24	36(34%)
Professional engineers	23	48	71(66%)
Total	35(32%)	72(68%)	107(100%)

Source: DCE Human Resource Division, April, 2021

3.4 RESEARCH PROCESS

Observations and results of previous studies have formed the ground for formulating the research problem and the research questions. Based on the formulated problem statement and research question, an extensive review of theoretical and empirical literatures on the subject was undertaken. Next, an investigation on the existing project planning practice of the case organization followed. The findings were compared, ie, whether the existing practice matches previous empirical literature, especially the works of Abebe (2015). Finally, based on the results, conclusions were drawn, aimed at answering the research questions and recommendations for improvement of the current practice were made. In general, the summarized procedures of the research methodology and processes, which are followed throughout the research, are illustrated in Figure 3.1.

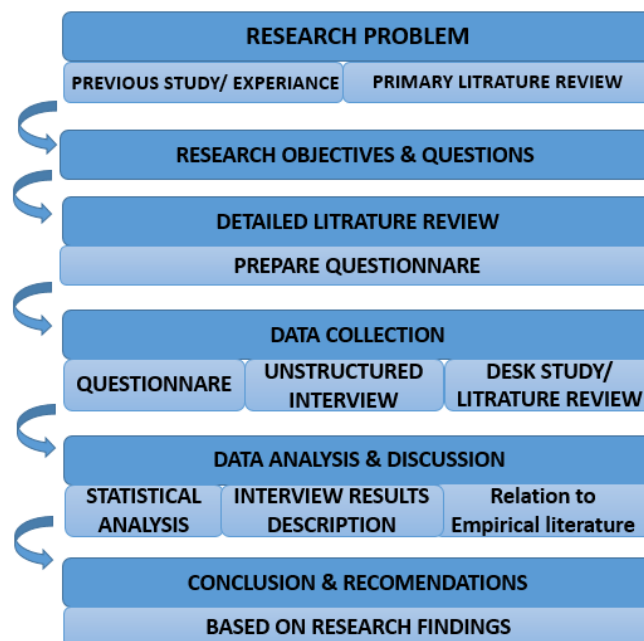


Figure 3.1: Research Process
Source: Developed by researcher

3.5 STUDY VARIABLES

One of the basic purposes of the undertaken desk study via literature review was to identify the study variables, where by an exhaustive list of general activities of planning practices and their possible overall underlying factors were identified to answer the research questions. Firstly however, an identification of the variables was essential in order to drive the content of questionnaires and interviews. Accordingly, the variables include:

- A. **Factors perceived to have an influence on planning practices:** These include a list of overall underlying factors affecting planning practices, that will be categorized under “Time”, “management” “Information” “skill”, “technique” or “software” related factors derived from the works of Kerzner (2009) and Lewis (2005), the details of which were discussed in the literature review. The authors exhaustively list out 30 factors affecting planning practices. These variables were presented as “Lack of”, “poor practice of” and “shortage of” “Too little of” etc. to portray and measure the extent of absence of each variable.
- B. **The planning practices:** These planning practices are determined and grouped as per planning knowledge areas of PMI (2008) and include;
 - 1. Project integration planning practices
 - 2. Project scope planning practices
 - 3. Project time planning practices
 - 4. Project cost planning practices
 - 5. Project quality planning practices
 - 6. Project manpower planning practices
 - 7. Project Equipment/ machinery planning practices
 - 8. Project material and planning practices
 - 9. Project communication planning practices
 - 10. Project risk planning practices
 - 11. Project procurement planning practices
 - 12. Project safety planning practices
 - 13. Project management tools and techniques

Nb: In relation to the lessons learnt from empirical literature review, resource planning practices are broken down into their component parts (Material, labor, equipment).

- C. **Successful project completion:** with respect to this study, considers quality, time and cost success not separately, but as one entity, as already mentioned in the limitations section.

3.6 SAMPLING TECHNIQUE/METHODS AND SAMPLE SIZE

Questionnaires:

According to human resource of the enterprise there are 12 management staff and 23 professional engineers at head office and a total of 24 management staff with 48 professional engineers involved in projects listed in table 3.

Management staff includes Building and Real Estate Development Construction Core Process team leaders, Resources Supply Support Process team leaders, Equipment Management And Maintenance Support Process team leaders at head office and procurement management case teams at project level. Professional engineers include Project M&E Team head, Cost Estimation Team head and team members at head office and the project manager, project office engineering case team, construction engineering case teams at project level.

In order to determine a sufficient sample size from the population, the study employed Phaniraj and Sreekuma's (2014) technique, with the below equation, in order to attain 95% confidence level. The minimum number of questionnaire respondents at head office and projects was hence calculated separately.

$$n = n' / [1 + (n'/N)]$$

Where;

✚ N = total number of population

✚ n = sample size from finite population

✚ n' = sample size from infinite population = S^2/V^2 ; where S^2 is the variance of the population elements and V is a standard error of sampling population. (Usually $S = 0.5$ and $V = 0.06$)

So, for 35 head office management staff and engineers

✚ $n = n' / [1 + (n'/N)]$

✚ $n' = S^2/V^2 = (0.5)^2/(0.06)^2 = 69.44$

✚ $N = 35$

✚ $n = 69.44 / [1 + (69.44 / 35)] = 23$

This means that 23 questionnaires should be distributed to head office management staff and engineers in order to achieve 95% confidence level

So, for 72 building project management staffs and professional engineers:

✚ $n = n' / [1 + (n'/N)]$

✚ $n' = S^2/V^2 = (0.5)^2/(0.06)^2 = 69.44$

✚ $N = 72$

✚ $n = 69.44 / [1 + (69.44 / 72)] = 35$

This means that 35 questionnaires should be distributed to building project management staffs (including procurement, office and construction engineering case teams) and professional engineers in order to achieve 95% confidence level.

Therefore, the total required sample size is: $23+35= 58$ respondents.

Strata	Head Office	Building project	Total Population
Management Staff (All case team leaders and core process heads)	12	24	36(34%)
Professional engineers	23	48	71(66%)
Total	35(32%)	72(68%)	107(100%)
Sample Size	23(40%)	35(60%)	58(100%)

Table 3.3: Sample frame and proportionate sampling

Source: DCE Human Resource Division, April, 2021

Some Remarks:-

- 1) Over the years, number of professional engineers within DCE has exponentially decreased, with a new strategy were most of the work is done by junior engineers. This is largely responsible for the relatively smaller number of professional engineer respondents.
- 2) As projects were executed at different times, most respondents were/are involved with more than one project.
- 3) No planning engineers or professional engineers involved in project planning are included in this sampling, as they are already included in the un-structured interviews.

Hence, aside from the scope limitations, the above reasons are behind the relatively overall smaller population and sample number.

Unstructured Interviews:

Solely based on ease of access, planning engineers located at head office or Addis Ababa projects were included in the interviews, with the purpose of supplementing questionnaire results. The interview is focused on only planning engineers as they are actually the professionals who do the work and their insights are deemed particularly beneficial. Based on human resource documents at DCE head office, there are 9 planning engineers located in Addis Ababa. However, three are not included in this study, as 1 is not a professional engineer and the other 2 have no relation to the 14 projects mentioned in table 3.3. Hence, 6 planning engineers; 2 at head office and 4 at projects were originally aimed to be interviewed. However, 2 of the remaining 6 were inaccessible and 4 candidates were actually interviewed.

3.7 DATA COLLECTION – SOURCE, TYPES, INSTRUMENTS

For conducting the study predominantly quantitative data is used, collected through a close ended questionnaire. Primary data was collected through an E-questionnaire, posted on

each projects internal communication Telegram group (because of project geographical dispersion) distinctly stating who was qualified to participate. A hardcopy of the questionnaire was presented to participants at head office and project sites at Addis Ababa. The questions were presented in three parts as: part one including respondent demographics, part two intended to address “factors affecting planning practices” and lastly, part three intended to address “existing planning practices” and “impact on successful project completion.”

Qualitative data included secondary data via desk study, collected from project progress reports, schedule sheets, payrolls, previous researches, enterprise project charters, procedures, manuals etc, with the purpose of determining those projects and qualifications that need be included in the study, as well as the actual questionnaire content and planning practices of the enterprise. Unstructured interviews, only include highlighted sections of the questionnaires deliberated to obtain insights of planning professionals.

3.8 DATA MEASUREMENT AND ANALYSIS

The data gathered through questionnaires was coded, entered into computer and analyzed and presented in the form of charts and tables by using SPSS Statics software version 22.

3.8.1 DETERMINATION OF OVERALL UNDERLYING FACTORS AFFECTING PLANNING PRACTICES

Data Measurement: In this research, ordinal scales were used to rate the data of overall underlying factors affecting planning practices of the case organization. In this instance, ordinal scale as shown in table 3.4, were used to measure “degree of influence/sway” of the 30 identified underlying factors influencing planning practices of the case organization, referring section 2.1.11.

Response	High	Medium	Low	Not at all
Item Interpretation	High Influence	Medium Influence	Low Influence	Not at all Influence
Scale	4	3	2	1

Table 3.4: Ordinal scale used for data measurement of factors “degree of influence/sway”

Source: Developed by the researcher

Data Analysis: After determination of frequencies and percentages of “degree of influence” of the 30 factors, the Relative Importance Index (RII) was used to determine respondents perception of “the most influential/ critical” factors affecting planning practices by determining the indexes and ranking them in descending order where high RII implies “high influencer” and low RII implies “low influencer”.

This method, as recommended by Cheung (2004), is a computation for assessing importance levels of measureable variables. This method is particularly chosen for this research, for its simplicity of calculation and interpretation, as it requires no complicated tests to be

performed beforehand. The formula below is used to compute RIIs of factors, with a slight modification to apply for 4point ordinal scales.

For a 4 point ordinal scale;

$$RII = \sum \frac{W}{A N} * 100$$

$$= \frac{4n_4 + 3n_3 + 2n_2 + 1n_1}{5 \times N}$$

$$(0 \leq RII \leq 1)$$

Where:

W= the weight given to each factor by the respondents and ranges from 1 to 4; such that 1 implies “Not at all” and 4 implies “High”.

A = is the highest weight, (4 in 4 point ordinal scale)

N = the total number of respondents

n= summation of responses for each W.

Accordingly, RIIs are interpreted as follows:

RII values	Importance level	
$0.7 \leq RII \leq 1$	High	H
$0.5 \leq RII \leq 0.7$	Medium	M
$0.2 \leq RII \leq 0.5$	low	L

Table 3.5 : Interpretation of RII values
Source: Cheung (2004)

3.8.2 ADVANCEMENT OF PLANNING PRACTICES

Data Measurement: Two address the second research question, likert scales were used to determine “degree of advancement”, where measurement was on a five point scale.

Response	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Item Interpretation	Very high Advancement	High Advancement	Advancement unknown	Low Advancement	Very low Advancement
Scale	5	4	3	2	1

Table 3.6: Likert scale used for data measurement of “degree of advancement” of planning practices.

Source: Developed by the researcher

Data Analysis: While simple statistical computations of percentages are used to address the presence of planning scenarios and practices, the Relative Importance Index was used to determine how advanced the planning practices were and subsequently rank the practices according to their “level of advancement”. Accordingly, higher ranks of RII are interpreted as higher levels of advancement and vice versa. An important declaration is that all questions state a negative statement, pertaining to presence of a negative practice and hence the notion that positive answers for likert scale are interpreted as lower advancement levels.

For a five point likert scale, the RII formula is modified as follows,

$$RII = \sum \frac{W}{A \cdot N} * 100$$

$$= \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5 \times N}$$

$$(0 \leq RII \leq 1)$$

Where:

W= the weight given to each factor by the respondents and ranges from 1 to 5; such that 1 implies “strongly agree” and 5 implies “strongly disagree”.

A = is the highest weight, (5 in 5 point ordinal scale)

N = the total number of respondents

n= summation of responses for each W.

3.8.3 DETERMINATION OF IMPACT ON SUCCESSFUL PROJECT COMPLETION

Data Measurement: The third research question; “impact of planning practices on successful project completion”, is measured using ordinal scales. This is where each of the variables under section 3.5B of this chapter are included in questionnaires with the aim of measuring their impacts on project success.

Response	High	Medium	Low	Not at all
Item	High Impact	Medium Impact	Low Impact	Not at all Impact
Scale	4	3	2	1

Table 3.7: Ordinal scale used for data measurement of “degree of impact” of planning practices.

Source: Developed by the researcher

Data Analysis: After the use of simple statistical analysis of frequency and percentage of respondents perception of “level of impact”, again the RIIs was used to rank responses in descending order of planning practices “most impacting successful project completion” to “least impacting”.

All questions within the questionnaires (part 2 and 3) are presented as problems to measure negative impact and influence. Note that, unstructured interview results were used to describe relationship (contrast/ reinforcements) of findings of the questionnaires.

3.9 RELIABILITY AND VALIDITY ANALYSIS

The consistency of attributes within the questionnaire in this study are checked by using Cronbach's alpha test as recommended by George and Mallery, (2003). The research employed this method simply for ease of use, as it's the most common method while its results are acceptable. This test is carried out separately for each part of the questionnaire responses, ie;

measuring “Factors affecting planning practices”, “Advancement of planning practices” and “Impact of practices on successful project completion”, as depicted below.

Cronbach's alpha can be written as a function of the number of test items and the average inter- correlation among the items. The formula for the standardized Cronbach's alpha is as shown below:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1) \cdot \bar{c}}$$

-Where N is equal to the number of items,

-C-bar is the average inter-item covariance among the items and V-bar equals the average variance.

A commonly accepted rule of thumb according to Saleh (2009) for describing internal consistency using Cronbach's alpha is as follows.

$0.9 \leq \alpha \leq 1.0$	Excellent
$0.8 \leq \alpha < 0.89$	Good
$0.7 \leq \alpha < 0.79$	Acceptable
$0.6 \leq \alpha < 0.69$	Questionable
$0.5 \leq \alpha < 0.59$	Poor
$0.0 \leq \alpha < 0.49$	Unacceptable

3.9.1 RELIABILITY OF THE DATA RELATED TO INFLUENTIAL FACTORS, ADVANCEMENT OF PLANNING PRACTICES AND THEIR DEGREE OF IMPACT ON SUCCESSFUL PROJECT COMPLETION

Table 3.8 below is a presentation of the SPSS test results for the reliability and internal consistency of:

1. The thirty factors perceived to influence planning,
2. The levels of advancement of the identified forty two planning practices,
3. The degree of impact of the forty two planning practices on successful project completion

Table 3.8Cronbach's alpha test for variables.

RELIABILITY STATISTICS			
NO.	DESCRIPTION	CRONBACH'S ALPHA	N
1	Factors Affecting Planning Practices	0.808	30
2	Advancements of Planning Practices	0.811	42
3	Impact on successful project completion	0.803	42

Source: Survey Data

In the above table, a consistency value greater than 0.8 is obtained for all variables, which is good. Hence, the questionnaire data is appropriate to analyze.

3.10 ETHICAL CONSIDERATIONS

The respondents in the study were guaranteed of privacy of the information they delivered. The respondents were not forced to write their names in the questionnaires or interviews. No respondent was obligated to partake except those that willingly agreed to participate in the study. The researcher upheld humbleness and directed the research with extreme morality avoiding misrepresentations and deceptive data handling. The researcher also tried to arrive at conclusions based on objective interpretations that are morally and blindly guided by the data collected. The analysis of data and interpretation of the results of data analysis were limited to what the data actually encompassed.

CHAPTER-FOUR

RESULTS AND DISCUSSION

This section is divided and presented in four parts where the first deals with respondent demographics, the second discusses the factors affecting/ influencing planning practices in order of their descending rank, the third is a presentation of the analysis on existing planning practices and finally, the forth focuses on the impacts of the planning practices (on part 3) on successful project completion.

A total of 58 questionnaires were distributed amongst head office and project engineers, project managers, case teams, senior procurement, monitoring and contract departments. Consequently, 41 responses (70.6% response rate) from a population of 107 individuals were obtained. Proportionally, the response rate at head office is greater than that at projects because most of the projects are located outside Addis Ababa and as such limitations from inaccessibility of respondents was encountered.

Unstructured interviews with 4 of the 9 planning engineers (considered are only those with official titles) were conducted. The nature of the interview was such that the interviewees were given the same questionnaires with the purpose of obtaining their insights about each of the statements as opposed to filling them out. Interviewees focused on the statements they deemed most critical and as such their responses were taken notes of. Accordingly, their responses are included as an elaborative supplement following the questionnaire analysis as depicted below.

4.1 RESPONDENT'S GENERAL INFORMATION

The first part of the questionnaire aimed to solicit the respondent demographics of professionals, where information on gender, educational qualification, work experience and job position. This is necessary to portray the personal and professional characteristics of respondents, aimed at answering “who exactly are these respondents?”. Accordingly, as per Figure 4.1 below, the number of male respondents to female is substantially higher.

Figure 4.1: Respondent's Gender

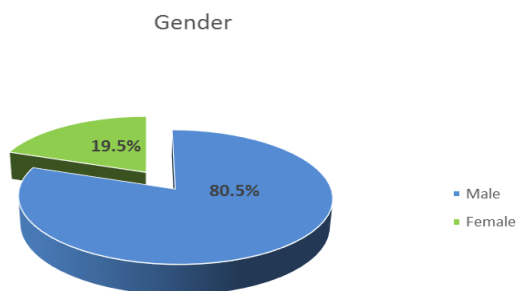
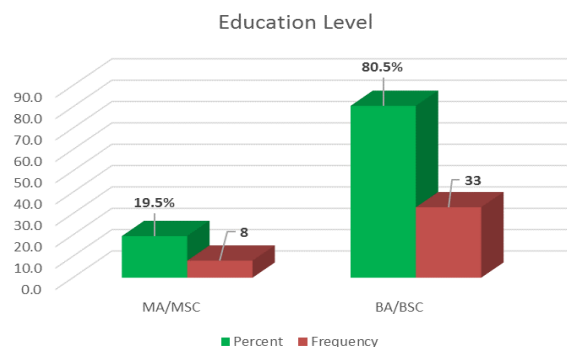


Figure 4.2: Respondent's Education



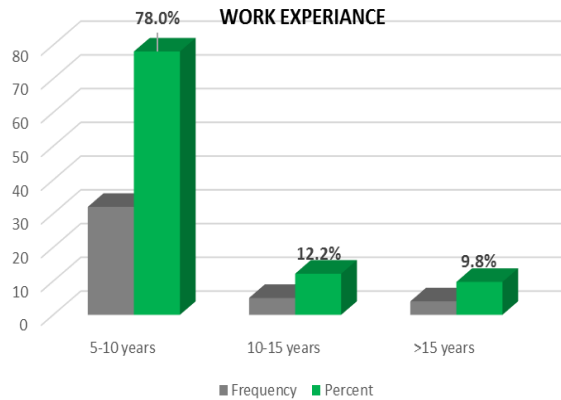


Figure 4.3: Respondent's Work Experience

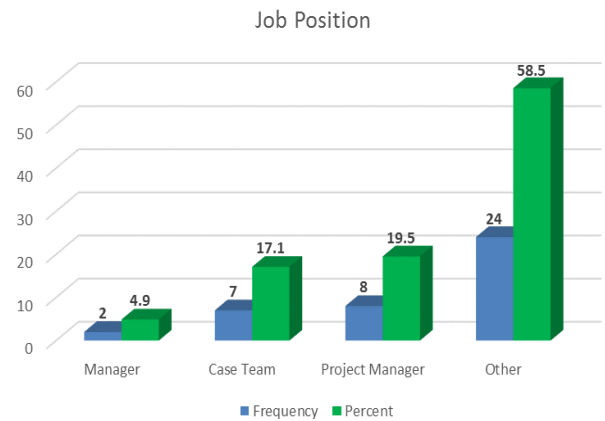


Figure 4.4: Respondent's Job Position

Source: Survey Data

According to the questionnaire responses, 80.5% of the respondents have a bachelor's degree while a much smaller 19.5% have a master's degree (Figure 4.4).

As presented in figure 4.3, most of the respondents have 5 to 10 years' experience and only 9.8% have above 15 years' experience. This is in line with the companies reformed organizational hiring policy, where most recruits are sought to have the minimum required experience fulfilling job requirements, with the most optimum pay for the purpose of decreasing company overhead costs.

On the other hand, only 8 project managers and 7 case team leaders were accessible for the survey. Managers include one operations manager and one construction coordinator. In reference to figure 4.4, the 58.5% of respondents job position labeled as "other" actually includes the list in the table below.

Specific Job Position	Frequency	Percent
M&E engineer	3	7.3%
Contract Engineer	3	7.3%
Claim engineer	2	4.9%
Procurement assistant	4	9.8%
Project office engineer	9	22.0%
Site Engineer	3	7.3%
Total	24	58.5%

Table 4.1: Specific Job Position

Source: Survey Data

4.2 UNDERLYING FACTORS INFLUENCING PLANNING PRACTICES

Table 4.2: Summary of Underlying Factors Influencing Planning Practices

Source: Survey Data

(T. Rank=Total Rank, C. Rank= Catagorical Rank)

No	Underlying Factors That Influence Planning Practices	RII	T.Rank	C.Rank
	Time Related Factors	0.685	2	
1	Unrealistic or short contract duration	0.741	2	2
2	Unrealistic or short bid period and/or mobilization period	0.561	26	3
3	Shortage of time for planning or Short time to do the work (planning)	0.751	1	1
	Management Related Factors	0.699	1	
4	Low level of project management knowledge/experience/practice in Ethiopia.	0.712	4	1
5	Low level construction management capacity/maturity in Ethiopia	0.702	5	2
6	Shortage of qualified, skilled & professional planner in the country	0.683	7	3
	Information Related Factors	0.623	4	
7	Incomplete, unclear or inadequate details in drawing, specification and BOQ	0.698	6	1
8	Lack or unavailability of standards for resource output factors and crew formation in the company as well as in the country's industry	0.663	13	2
9	Lack or unavailability of reference documents related to earlier similar projects' plan, work procedure, success and failure	0.580	24	3
10	Lack or unavailability of practical standard and template in the company as well as in the country's industry for structuring activities in WBS	0.551	27	4
	Skill, Knowledge, and Attitude Related	0.641	3	
11	Planner/project manager lack of or incomplete understanding on construction work processes & procedures, and resources supply chain	0.634	19	4
12	Planner/project manager incomplete skill to form task outputs and durations	0.620	20	5
13	Little/no involvement of the people who must do the work in planning process.	0.683	7	1
14	Disinterest of planner/project managers/of the company in project planning due to perceived poor returns from its implementation	0.663	13	2
15	Cultural and individual issues such as firefighting behavior, short term thinking, poor team work behavior, etc.	0.654	16	3
16	Planner/project manager incomplete planning skills in securing commitments	0.590	23	6
	Planning Techniques, Tools and Process Related	0.616	5	
17	Planning in too little detail when designing and preparing WBS	0.649	17	5
18	Planning in too much detail when designing and preparing WBS	0.576	25	8
19	Giving no or little attention for detail of execution, technological implication of different techniques, & production capacity of machines and labors	0.663	12	4
20	Giving no or little attention for estimation of activity cost and time	0.615	21	6
21	Give little attention for sequencing of tasks (dependency, precedence, lead/lag)	0.600	22	7
22	Giving little attention for working hour, overtime, holly days, non-working days	0.522	28	9
23	Giving no or little attention for short term and long term funding requirement	0.664	11	3
24	Giving no or little attention for safety requirement during planning	0.488	29	10
25	Giving no or little attention for quality requirement during planning	0.668	10	2
26	Giving no or little attention for identification & allocation of potential risks	0.712	3	1
	Software Related	0.612	6	
27	Lack of or little awareness on the use of planning software	0.639	18	3
28	Inadequate/little skill & knowledge of planner/project manager to use software	0.658	15	2
29	Unavailability or shortage of computer as well as software	0.478	30	4
30	Complexity and difficulty of planning software	0.674	9	1

The 30 factors affecting planning practices, exhaustively listed by Kerzner (2009) and discussed in Chapter 2 are used to develop the questionnaire. An analysis of the questionnaire is accordingly conducted to answer the 1st research question, “what are the underlying factors affecting the planning practices, which ones are most critical?”. An examination of the factors is done by computing the relative importance indexes (RII) using SPSS Version 22. Further, the total and categorical ranks are determined from the RII values indicating the most critical factors affecting planning practices of the case organization as presented in Table 4.2.

It is deduced from Table 4.2 that the most influential factor affecting advancement of the planning practices in DCE is “Shortage of time for planning ” with the highest RII value of 0.751. A close second is “Unrealistic or short contract duration” with an RII value of 0.741. The third, forth and fifth most influential factors affecting the company’s planning practices are “Giving no or little attention for identification & allocation of potential risks”, “Low level of project management knowledge/experience/practice in Ethiopia” and “Low level construction management capacity/maturity in Ethiopia” with respective RII values of 0.712, 0.712 and 0.702. This is in contrast to the works of Gebregziabher (2016), where the top five included “Low level construction management capacity/maturity in Ethiopia”, “Shortage of qualified, skilled & professional planner in the country”, “Low level of project management knowledge/experience/practice in Ethiopia”, “Lack or unavailability of practical standard and template in the company as well as in the country's industry” and “Lack or unavailability of reference documents related to earlier similar projects’ plan, work procedure, success and failure” in descending order.

Interview results correspond to the top 5 influential factors in table 4.2 were interviewees elaborate that “Unrealistic or short contract duration” is particularly a chronic factor in that the duration of contract is determined by consultants while preparing bid documents, with absolutely no preliminary planning. Bid engineers at DCE, like many other practitioners, are constrained to prepare time plans under these constraints which result in an unrealistic project master schedule even before the project begins.

Interviewees strongly remark that “Shortage of time for planning” is perhaps the most influential factor as “Everybody views planning as an afterthought required as a document for formality, needing head office’s approval for fulfilling budgetary requirements and project managers themselves sadly are obstacles as they view it as a one-day job. What kind of project schedule is prepared in a day?”

“Incomplete, unclear or inadequate details in drawing, specification and BOQ”, the sixth ranking factor is another critical factor where interviews elaborate that firstly, original master schedules are prepared without identification of shortcomings in drawings, specifications and BOQs, as contractors are required to submit master schedules in as short a time as possible after winning projects hence there is no time for checking. Secondly, ones projects begin and shortcomings are identified, it takes a minimum of two months until proper requirements like supplementary contracts and variations are approved. These revisions cannot be included in plans until approvals are made, resulting in difficulty preparing realistic plans and making it

difficult to properly track project progress. Ironically, once the appropriate approvals are made, the actual works would have been executed by then, and there is no point in planning the works for tracking and monitoring purpose.

All the six categories of factors have RII values close to one another were difference is observed only from the 2nd decimal onwards. This is an indication of how critical all the factors under each group are. Also note, all the RII values are >0.6 , were according to Akadiri(2011), this indicates high to medium importance of all factors.

In relation to the works of Gebregziabher (2016), where his research focuses on the overall planning practices of the entire construction industry, the 2nd, 3rd and 6th factors have identical ranks of 1st, 4th and 6th respectively. Contrarily, “Time Related” factors are the 2nd highest ranking influential factors affecting planning practices while his works rank it at 5th. In any case, all the factors RII values are closely packed that any difference observed to the works of Gebregziabher (2016), is relatively small and acceptable.

The summary on Table 4.2 illustrates that “Management Related” factors are the most influential factors affecting the existing planning practices in the enterprise. A close second are “Time Related” factors as already mentioned. The 3rd, 4th and 5th most influential factors are “Skill, Knowledge, and Attitude Related”, “Information Related” and “Planning Technique, Tool & Process Related” respectively. “Software Related” factors rank the last amongst the six categories.

4.2.1 TIME RELATED FACTORS

As mentioned above, this category of factors has been ranked in 2nd place from all the 6 category groups of factors that affect the existing planning practices of the case organization. It is apparent hence, that the factors listed under this group have significant aggregate effect on the existing planning practices of the case organization. A detailed interpretation of the results focusing on the listed 3 individual factors under “Time Related” category are analyzed and the RII of each individual factors are ranked within the group as well as within the entire list of factors. As such, Table 4.2 presents the RII and rank of each time related factors.

It can be deduced from table 4.2 that respondents perceive “Shortage of time to plan” as the most influential factor in this category affecting advancement in planning practices, where a record 87.8% of the respondents testify to this fact. With an RII value of 0.751, this factor ranks as the most determinant factor affecting planning practices. “Unrealistic/short contract duration”, has a total rank as well categorical rank of 2nd place, were 78% of respondents deem it as highly influential. Contrarily, “Unrealistic/short bid period”, with only 9.8% of respondent’s considering it as a highly influential factor, ranks a very low 26th place of all 30 factors and 3rd in category. These categorical ranks are in line with the work of Gebregziabher (2016), were PCA loadings indicate the same ranks of influence of time related factors.

4.2.2 MANAGEMENT RELATED FACTORS

Management related category includes three factors, where corresponding to the RII values, each of them are ranked within their cluster as well as a the whole factors. According to the result of RII computations, the aggregate influence of management related category of factors is ranked in 1st place from all six categories of factors that influence planning, with an RII of 0.699. Factors under this category are hence the 2nd most influential factors on the planning practices. In general, the RII values and rank of each management related factors are summarized in Table 4.2.

About 56% of the respondents suggest that “low level of project management knowledge and practice of the practitioners in Ethiopia construction industry” has a choke hold on advancement of planning practices. Accordingly, this factor has an overall rank of 4th and categorical rank of 1st place, with an RII of 0.712 . The 5th most influential factor of the 30 factors is perceived as “Low level construction management capacity/maturity in Ethiopia”, with an RII of 0.702 and ranks 2nd in category. “Shortage of qualified, skilled & professional planner in the country” is the 7th determinant factor with about 51% of the respondents placing it as highly influential. These three above mentioned management related factors attempt to convey the level of impact of the overall Ethiopian construction and project management capacity on the case organizations planning practices, which is held as the most responsible category of factors affecting planning practices of the case organization.

Interview results suggest the appropriateness that these group of factors are ranked highest influencers in that project management is a new field and its proper integration in the construction industry is yet to be witnessed. They express “even if there were qualified, skilled & professional planners, unless the overall maturity of construction and project management is ensured, the planner can only do so much.”

A particular interviewee elaborates “There is a major gap in the company in putting project management theory into practice despite the enterprise having its promising project managers schooled and attaining the appropriate degrees in project management. Construction Management is no better.”

Like this paper, the works of Gebregziabher (2016), rank management related factors as the most influential, the sub-list of factors ranking as the top 3 in the overall list of factors. In this study the factors rank as the top 10. However, this difference is expected as data analysis results indicate extremely close ranking of RII of factors.

4.2.3 INFORMATION RELATED FACTORS

This related category of factors includes four factors which are ranked within their group and overall factors, based on result of RII values. Results indicate that the relative influence of information related category of factors is at 4th place from the total of 6 categories of factors affecting the case organization’s planning practices, with average RII of 0.623. As such, the factors listed under this cluster have a moderately significant aggregate effect on the planning practices of the case organization.

Surface it to say “Incomplete, unclear or inadequate details in drawing, specification and BOQ” is a factor highly influencing the enterprise’s planning practices, about 58% of respondents perceive it as “highly influential”. Subsequently, this factor is rated as 6th most influential of all factors and 1st of its category, with an RII of 0.698. The works of Gebregziabher (2016) however rank it as the least influential of the 30 factors affecting planning practices which is contrary of the findings of this study. Interviewees explain that BOQ is a key input to planning as it encompasses the works to be done and without which a WBS cannot be developed. BOQs, derived from specifications and drawings, if incomplete, will result in an incomplete WBS and thus an unrealistic plan. “With so many design rectifications, additions and omissions that have a cost impact on the project, their timely incorporation into project plans is highly critical especially for tracking and monitoring the works”, describes an interviewee.

“Standards for resource output factors and crew formation in the company as well as in the country's industry” is the 13th most influential factor affecting planning practices and ranks 2nd most important in category, with an RII of 0.663. Only 12% of respondents perceive this factor as having low influence on planning practices, with the rest if the percentage share equally proportioned between respondents who perceive it as having high and medium influence.

Interview results indicate that the enterprise has historical data of actual crew formation and productivity output factors developed from experiences with past projects. Recently, projects are required to attach a resource utilization and output analysis sheet along with the monthly reports, for evaluation by monitoring personnel, to update this historical data. However these documents are mostly done with negligence and collection of the appropriate data is difficult. “Everyone forgets about it until someone remembers” an interviewee clarifies.

The 24th and 3rd most influential factor influencing planning practices in total rank and category respectively is “Lack or unavailability of reference documents related to earlier similar projects’ plan, work procedure, success and failure”, with 41% of respondents perceiving it as moderately influential. The works of Abebe (2015), in his examination of planning practices within this same case organization have already concluded that reference plans and work procedures exist. However, interview results indicate that while they are present, previous project plans are not well documented. There is a lack of lessons learnt document incorporating project success and failure. “The absence of these makes our job much harder” an interviewed planning engineer concludes.

Only 12% of respondents distinguish “Lack or unavailability of practical standard and template in the company as well as in the country's industry for structuring activities in WBS” as having high influence on planning practices. With a 4th categorical rank , 27th total rank and an RII of 0.551, this factor is one of the least influencers.

4.2.4 SKILL, KNOWLEDGE AND ATTITUDE RELATED FACTORS

This category are the inputs to management related factors. Under “skill, knowledge, and attitude” related category of factors, 6 factors are listed. Each of them is ranked based on result of the RII computations. According to the RII computations, this category of factors has the 3rd

rank from all categories of factors with RII of 0.641. As a collective cluster, the factors listed under this group are important influencers and they have significant effect on planning practices of the enterprise. The respective RII and rank of each of the factors in this category are summarized in Table 4.2.

“Little/no involvement of the people who must do the work in planning process” is a factor highly influencing the enterprise’s planning practices, were about 51% of respondents perceive it as “highly influential”. Subsequently, this factor is rated as 7th most influential of all factors and 1st of its category, with an RII of 0.683. In line with this, the works of Gebregziabher (2016) give it a similar rank. Interviewees explain, “This is a chronic problem in projects; construction case teams are reluctant to participate with the office case team despite their ultimate responsibility to do the actual works. They view it as an imposition where the office case teams ‘acts like the boss’ ”. Another interviewee further elaborates, “Project managers have in the past, made the construction case team responsible for the planning works, were the office engineering case team only overseas and participates. Sadly, almost every time, the construction case team under plans the works were most of the major works are back loaded. This is deliberately done to increase the percentage of works executed in relation to plans were in reality, the project is under performing.” This lack of foresight, reluctance and bureaucracy are the challenges of involving the people who must do the work.

“Disinterest of planner/project managers/ management of the company in project planning due to perceived poor returns from its implementation” is another 13th most influential factor affecting planning practices and ranks 2nd most important in category, with an RII of 0.663. Only 14% of respondents perceive this factor as having low influence on planning practices, with the rest if the percentage share proportioned between respondents who perceive it as having either high or medium influence. “Planning is not like payment preparation where its returns are observed as the contractor gets paid for the works executed. The returns of planning are more concerned with the cost avoided and the money saved from undergoing certain tasks in systematic sequences and times. Its impact is only understood in hindsight once the project has progressed drastically and where short term returns and goals are the focus, interest among management in particular is the lowest.”

The 16th and 3rd most influential factor influencing planning practices in total rank and category respectively is “Cultural and individual issues such as fire- fighting behavior, short term thinking, poor team work behavior”, with 44% of respondents perceiving it as highly influential with an RII of 0.654. These issues are closely related with interviewee opinions of the 1st and 2nd categorical ranking factors. This is in contrary to the works of Gebregziabher (2016) where its rank the least influential in its category.

With 63.4% of respondents distinguishing “Planner/project manager lack of or incomplete understanding on construction work processes & procedures, and resources supply chain” as having moderate influence on planning practices, it ranks as 4th in category and 19th in total rank with an RII of 0.634. “Planner/project manager lack of/incomplete skill to

examine/formulate for task outputs and durations” with an RII of 0.620 ranks 20th in total rank and 5th in its category, where percentage of respondents perceiving it as highly, moderately and least influential is more or less closely distributed. The least influential factor from this category is “Planner/project manager lack of/incomplete planning skills in securing commitments, assuring measurable milestones, processing information, and facilitating top management involvement” with about 41% of respondents perceiving it as only moderately influential, with an RII of 0.590 and ranks a low 23rd of all 30 factors. All in all, this category mostly includes factors moderately influential to planning practices.

4.2.5 PLANNING TECHNIQUES, TOOLS AND PROCESS RELATED FACTORS

Under “planning techniques, tools and process” related category, 10 factors are listed and each of them are ranked within their group and also within the whole cluster of factors. According to averaged RII values, the cumulative loading of planning techniques, tools and process related category of factors has been ranked in 5th from the six category groups of factors that affect planning with an RII of 0.616. As such, the factors listed under this group are only moderate to least influencers of the case organization’s planning practices. Similar to “skill, knowledge and attitude” related factors, the factors in this category are also the inputs to management related factors. The RII values and rank of each factors in this category are summarized in Table 4.2.

“Giving no or little attention for identification & allocation of potential risks” is one of the highest influential factors affecting the enterprise’s planning practices, were about 71% of respondents perceive it as “highly influential”. Subsequently, this factor is rated as 3rd most influential of all factors and 1st of its category, with an RII of 0.712. Similarly, the works of Gebregziabher (2016) give it a similar rank of 4th out of 30 factors. Interviewees explain, “There is no risk identification, analysis or response technique adopted. Planners encounter them especially when providing lead and lag times to tasks. Usually, if there is not enough information about the task, its scheduled ‘as-late-as-possible’. That is the extent of risk planning done. You identify and respond to risks while you schedule, with little or no brainstorming. Analysis and allocation of risks is only in theory.” The 2nd most influential factor affecting planning practices is “Giving no or little attention for quality requirement during planning” where 56% of respondents deem it as moderately influential and has a total rank of 10th most influential factor of the 30. The 11th and 3rd most influential factor influencing planning practices in total rank and category respectively is “Giving no or little attention for short term and long term funding requirement”, with 68% of respondents perceiving it as moderately influential with an RII of 0.664. Interviewees explain, “Work schedules are required to be prepared and approved much earlier than budget schedules while it should be the other way around. The result is that you end up with so many works planned to be executed without any budget. This may be due to lack of coordination with the finance team.” Despite the fact this factor has a low rank of 6th in the works of Gebregziabher (2016) in consideration of the overall industry, it is thus a highly influential factor for the company.

With 46.3% of respondents distinguishing “Giving no or little attention for detail of execution, technological implication of different techniques, & production capacity of machines and labors” as having high influence on planning practices, it ranks as 4th in category and 12th in total rank with an RII of 0.633. “Planning in too little detail when designing and preparing WBS” with an RII of 0.649 ranks 17th in total rank and 5th in its category, where only 17% respondents perceive it as having low importance and equally distributed among respondents perceiving it as highly and moderately influential. “Giving no or little attention for estimation of activity cost and time”, “Give little attention for sequencing of tasks”, Planning in too much detail when designing and preparing WBS” and “Giving little attention for working hour, overtime, holly days, non-working days” account for an RII of 0.615, 0.600, 0.576 and 0.522 respectively. Accordingly respective overall ranks of 21st, 22nd, 25th and 28th are obtained, representing one of the least influential factor groupings of all categories. Surprisingly, the least influential factor affecting planning practices from this category is “Giving no or little attention for safety requirement during planning” with about 56% of respondents perceiving it as least influential, with an RII of 0.488 and ranks a low 29th of all 30 factors. Here, a peculiar contradiction between questionnaire and interview results are observed. All four interviewees deem “This factor is critical in preparing safety plans which are little to nonexistent in the company”. One particular interviewee mentions, “DCE has one of the best safety records where its projects are concerned. Perhaps, respondents are confusing good safety records so far, with good safety planning, which is a whole other story.

4.2.6 SOFTWARE RELATED FACTORS

Under software related category of factors, four factors are listed and each of them is ranked in their group and also as part of the overall factors. According to the result of RII computations, this category is ranked at 6th place from all categories of factors that affect existing planning practices at the case organization, with an RII of 0.612. Hence, in aggregate, the factors listed under this group have the least significant influence planning practices in the enterprise. Interview results indicate that the lower influence of this category is due to the fact that the company mostly utilizes Excel as opposed to MS-Project and Primavera, as most planners are advanced in it. “Excel is the minimum required software for planners and although it’s not as sophisticated, it does the job. Recently however, DCE is attempting to employ MS-Project.” “Complexity and difficulty of planning software” only moderately influences the enterprise’s planning practices, were only 36.6% of respondents perceive it as “highly influential”. Subsequently, this factor is rated as 9th most influential of all factors and 1st of its category, with an RII of 0.674. Interviewees clarify, “Despite that there are several planning focused trainings for advanced software, they are given as a week-long crash course and are sadly not detailed enough to help aid planners improve their software skills.” “Inadequate/little skill & knowledge of planner/project manager to use software”, “Lack of or little awareness on the use of planning software” and “Unavailability or shortage of computer as well as software” account for an RII of 0.658, 0.639 and 0.478 respectively. Accordingly respective overall ranks of 15th, 18th and 30th are obtained.

4.3 ADVANCMENT OF PLANNING PRACTICES AND THERE DEGREE OF IMPACT ON SUCESSFUL PROJECT COMPLETION

No.	Description	Advancement of Practice (From least to most)		Degree Of Impact (From most to Least)		Difference of RII (y-x)	Criticality
		RII (x)	Total Rank	RII (y)	Total Rank		
1	Integration planning Practices	0.397	2	0.685	9	0.288	3
2	Scope planning Practices	0.415	5	0.759	2	0.345	2
3	Time planning Practices	0.699	11	0.696	3	-0.003	10
4	Cost planning Practices	0.413	4	0.691	4	0.278	5
5	Quality planning Practices	0.622	9	0.594	13	-0.028	11
6	Human resource planning Practices	0.600	8	0.688	7	0.088	8
7	Equipment planning Practices	0.533	7	0.662	11	0.128	7
8	Material planning Practices	0.405	3	0.686	8	0.281	4
9	Communication planning Practices	0.793	13	0.689	6	-0.104	13
10	Risk planning Practices	0.440	6	0.667	10	0.227	6
11	Procurement planning Practices	0.361	1	0.771	1	0.410	1
12	Safety planning Practices	0.624	10	0.690	5	0.066	9
13	Project Management tools & techniques	0.700	12	0.610	12	-0.090	12

Table 4.3: Summary of Criticality Rank of Planning Practices

Source: Survey Data

Above is a summary table supremely important to answer the 2nd and 3rd research questions of the study. While the details are discussed later, the basic information regarding those aggregate planning practices least advanced and yet most impacting successful project completion are ranked according to their criticality.

As such, Procurement planning practices, with an RII of 0.361 and 0.771, are respectively the least advanced and have the highest impact on successful project completion. The 2nd most critical practice is Scope planning which is the 5th least advanced and yet has the 2nd highest impact on successful project completion. At 3rd place, with an RII of 0.397, Integration planning Practices are the least advanced while an RII of 0.685 indicates they have the 9th highest impact on successful project completion. Likewise, material planning practices and Cost planning Practices are respectively the 4th and 5th most critical planning practices in the advancement vs. impact spectrum. Lastly, it can be interpreted that communication planning practices are the most advanced surpassing their level of impact on project success. An important observation is that both the advancement and impact RIIs are close in value to one another, indicating the overall criticality of all the 13 planning practices.

Table 4.4 : Summary of RII and rank of Advancement of Planning practices and their Impact on Successful Project Completion

Source: Survey Data

No	Description	Advancement of Practice (From least to most)			Degree Of Impact (From most to Least)			Criticality
		RII	Total Rank	Rank In Cat.	RII	Total Rank	Rank In Cat.	Total Rank
31	Integration planning Practices	0.397	2		0.685	9		3
a	key stakeholders active involvement in planning stage	0.424	17	3	0.722	19	2	13
b	Strong integration between project office engineering case team (planning) and construction case team	0.390	8	2	0.771	4	1	6
c	Top level management active involvement during project planning	0.376	5	1	0.561	37	3	23
32	Scope planning Practices	0.415	5		0.759	2		2
a	Well defined scope in the planning phase	0.454	21	2	0.751	11	3	14
b	Sufficient time for project design and quantity preparation/ development	0.463	23	3	0.756	10	2	16
c	Design changes during execution phase inclusion in revised plans	0.327	2	1	0.771	4	1	2
33	Time planning Practices	0.699	11		0.696	3		10
a	Written standards, guide lines and manuals & procedures for planning project works	0.902	42	4	0.638	33	4	42
b	Project activity determination in the planning phase	0.859	41	3	0.751	11	1	36
c	Project planning activities completion prior to project execution	0.420	15	1	0.648	32	3	21
d	The enterprise project schedule revision and updating of finish dates when time claims are approved	0.615	30	2	0.746	13	2	25
34	Cost planning Practices	0.413	4		0.691	4		5
a	Detailed cost estimation in the planning phase	0.454	21	3	0.737	16	1	18
b	Additional cost /variations/ due to change in scope, design inclusion in plans	0.385	7	1	0.600	36	3	22
c	Minimizing difference between estimated cost and contract amount /winning price	0.400	9	2	0.737	16	1	8
35	Quality planning Practices	0.622	9		0.594	13		11
a	Quality management policies procedures & guidelines	0.780	35	2	0.702	26	1	34
b	Project quality plan preparation	0.463	24	1	0.486	40	2	28

N o	Description	Advancement of Practice (From least to most)			Degree Of Impact (From most to Least)			Critic ality
		RII	Total Rank	Rank In Cat.	RII	Total Rank	Rank In Cat.	Total Rank
36	Human resource planning Practices	0.600	8		0.688	7		8
a	Incorporation of manpower plan in project plan	0.746	31	3	0.707	25	2	30
b	Detail skill requirement, Roles & Responsibilities of the position	0.795	38	4	0.649	29	4	38
c	Participation of human resource management team member's in project planning	0.444	20	2	0.678	28	3	20
d	Timely recruitment and selection of project team	0.415	13	1	0.717	23	1	12
37	Equipment planning Practices	0.533	7		0.662	11		7
a	Detail of what, how much and when equipment are needed.	0.780	36	3	0.712	24	2	33
b	Facilitating of equipment sharing among projects	0.420	14	2	0.722	19	1	11
c	Presence of an equipment maintenance plan	0.400	9	1	0.551	38	3	24
38	Material planning Practices	0.405	3		0.686	8		4
a	Detail plan to acquire and use project materials	0.507	27	3	0.530	39	3	27
b	Consideration of risks associated with material unavailability and cost increase	0.380	6	2	0.761	8	2	5
c	Special consideration of materials requiring long-lead time and critical items	0.327	3	1	0.766	7	1	3
39	Communication planning Practices	0.793	13		0.689	6		13
a	Establishment of communication plans and strategies during project planning process	0.766	32	1	0.683	27	2	35
b	Determination of communication channels during project planning process	0.790	37	2	0.629	34	3	39
c	Maintenance of On-going communication with project stakeholders	0.824	39	3	0.756	9	1	32
40	Risk planning Practices	0.440	6		0.667	10		6
a	Risk identification during the planning stage	0.493	26	4	0.785	2	1	15
b	Conducting risk analysis during the planning stage	0.424	16	2	0.746	13	2	10
c	Separate unit/person responsible for project risk management planning	0.415	12	1	0.420	42	4	29
d	Preparation of risk response in the planning stage	0.429	18	3	0.717	22	3	17

N o.	Description	Advancement of Practice (From least to most)			Degree Of Impact (From most to Least)			Critic ality
		RII	Total Rank	Rank In Cat.	RII	Total Rank	Rank In Cat.	Total Rank
41	Procurement planning Practices	0.361	1		0.771	1		1
a	Preparation of detailed procurement plan of goods and service needed for a project.	0.405	11	3	0.780	3	2	7
b	Major and/or special supply items (such as those required in large quantity / requiring special manufacturing/ shipped from overseas identification and special attention given	0.259	1	1	0.790	1	1	1
c	Awareness about the importance of project procurement plan	0.439	19	4	0.771	4	3	9
d	Revision of procurement plan with the revision of a project time plan.	0.341	4	2	0.741	15	4	4
42	Safety planning Practices	0.624	10		0.690	5		9
a	Safety plan preparation (determining safety standards and requirements and devising action plan)	0.473	25	1	0.732	18	1	19
b	Organizational policies, Procedures and guidelines for safety management	0.776	33	2	0.649	29	2	37
43	Project Management tools & techniques	0.700	12		0.610	12		12
a	Work break down structure (WBS) used for defining and planning projects	0.849	40	4	0.629	35	3	41
b	Effectively utilization of project scheduling tools such us; Gantt chart& network scheduling.	0.605	29	2	0.439	41	4	40
c	Use of project management software	0.571	28	1	0.649	29	2	26
d	Use of Project Cost Estimation techniques /Analogy estimate, parametric estimates, and/or expert opinion.	0.776	33	3	0.722	21	1	31

The results of this study provide insight of the Relative Importance Index and rank of the advancement and degree of impact of planning practices of the case organization. As such, Table 4.4 provides the details of its predecessor (table 4.3) and shows the RII, corresponding total and categorical ranking of the planning practices under each category.

Whereas interpretations have been made in table 4.3, in relation to determining which of the 13 aggregate practices have the least level of advancement and at the same time are the highest determinants of successful project completion, table 4.4, just as importantly, describes the specific categorical practices responsible for the observed advancement levels and degrees of impact, providing an indication of which practice specifically requires outmost attention.

Figure 4.5 on the other hand, is displayed to give an insight of the advancement vs. impact contrast of all aggregate practices. The closer the RIIs of the “advancement” and “degree of impact” are, as is the case with time planning practices, the greater the practice of planning activities that are determinant of successful project completion. Conversely, the wider their gap, as with integration, scope, cost, material, risk and procurement practices, the less the practice of planning activities that are determinant of successful project completion. In an instance where advancement of practice exceeds impact, as with communication, quality planning practices and “project management tools and techniques”, it means some aspect of the practice is overdone, more than that is required.

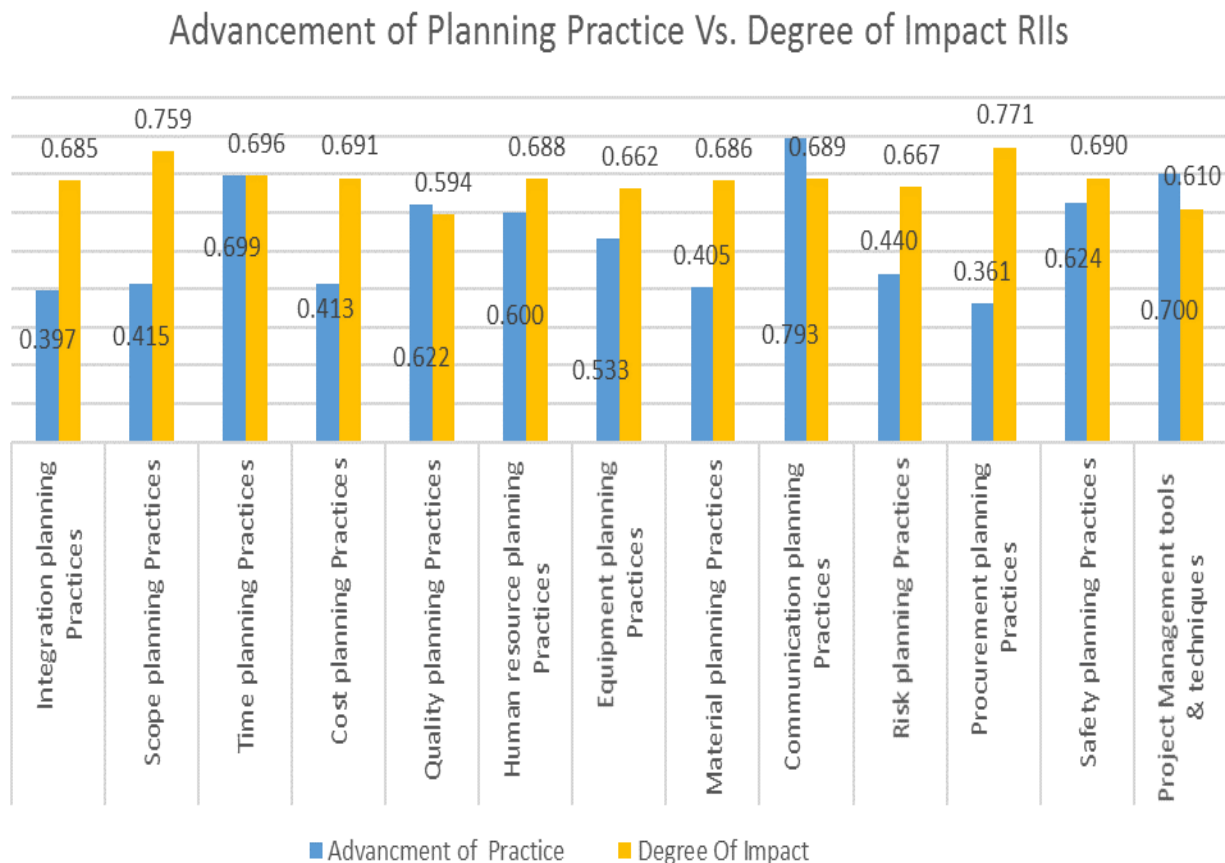


Figure 4.5: Summary RIIs of Advancement of Planning Practices Vs. Degree of Impact on Successful Project Completion

Source: Survey Data

4.3.1 ADVANCEMENT AND DEGREE OF IMPACT OF INTEGRATION PLANNING PRACTICES

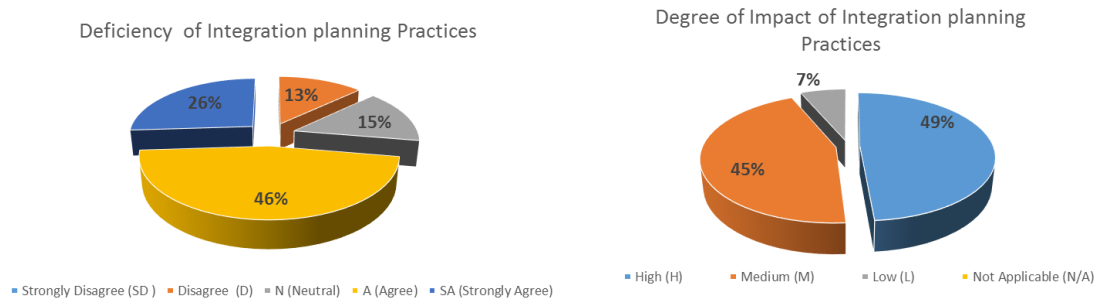


Figure 4.6: Respondent's opinion of Advancement of Integration Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.6, where the aggregate deficiency and impact of integration planning practices are assessed, 72% of respondents either agree or strongly agree that integration planning practices are poorly accomplished within the case organization. On the other hand, 49% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of Integration Planning Practices has been assessed, a detailed assessment of the underlying integration planning practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.424 indicates key stakeholders are not actively involved in the planning stage and thus it is one of the least advanced practices. This is true where about 56% of respondents either agree or strongly agree this practice is lacking. On the other hand, an RII of 0.722 indicates the high degree of impact of this practice on successful project completion, with 61% of respondents confirming to this effect.
- "Strong integration between project office engineering case team and construction case team" is another least advanced practice with an RII of 0.390 and roughly 84% of respondents affirming its inadequately practiced. This lack of integration between the two case teams, with an RII of 0.771 has a high degree of impact on successful project completion, where 85% of respondents testify so.
- With an RII of 0.376, roughly 75% of respondents believe top level management isn't actively involved in project planning and as such, is one of the least advanced practices in this category. On the other hand, with an RII of 0.561, 80.5% of respondents believe it has only a moderate impact on project success.

In reference to table 4.4, the greatest contrast is observed in the 2nd integration planning practice, where the lack of a strong integration between project office engineering case team and construction case team is ranked the 8th least advanced practice. Interview results corroborate this fact, elaborating, "There are even instances where a project manager doesn't really want a collaboration between the two case teams and wants distrust between the two. Project managers

use this as a control mechanism where one case team outs the other when there is a fault. Sadly, amidst this politics where the project manager wants to have his case teams in check, the work suffers.” Damagingly, this practice has the 4th highest degree of impact on completion of projects successfully.

In summary, Integration Planning practices are ranked the 2nd least advanced and the 9th most important practice impacting successful project completion. Accordingly, this planning practice is the 3rd most critical planning practice requiring the enterprises action.

4.3.2 ADVANCEMENT AND DEGREE OF IMPACT OF SCOPE PLANNING PRACTICES

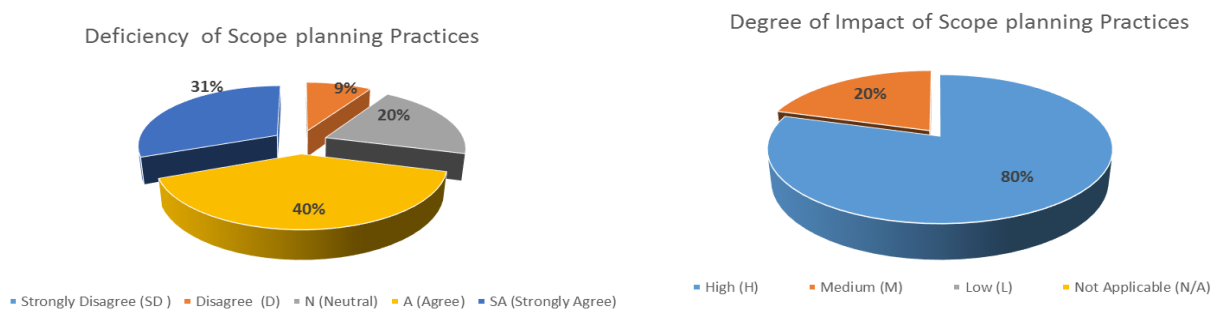


Figure 4.7: Respondent’s opinion of Advancement of Scope Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.7, where the aggregate deficiency and impact of scope planning practices are assessed, 71% of respondents either agree or strongly agree that scope planning practices are poorly accomplished within the case organization. On the other hand, 80% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of Scope Planning Practices has been assessed, a detailed assessment of the underlying scope planning practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.454 indicates absence of a well defined scope in the planning stage and thus it is one of the least advanced practices. This is true where about 55% of respondents either agree or strongly agree this practice is lacking. On the other hand, an RII of 0.751 indicates the high degree of impact of this practice on successful project completion, with 75% of respondents confirming to this effect.
- “Sufficient time for project design and quantity preparation/ development” is another least advanced practice with an RII of 0.463 and roughly 62% of respondents affirming its inadequately practiced. This lack of sufficient time for project design and quantity preparation, with an RII of 0.756 has a high degree of impact on successful project completion, where 78% of respondents testify so.
- With an RII of 0.327, roughly 91% of respondents believe design changes are not adequately included in revised plans and as such, is one of the least advanced practices in this

category. On the other hand, with an RII of 0.771, 85% of respondents believe it has one of the highest impacts on project success.

In reference to table 4.4, the greatest contrast is observed in the 3rd scope planning practice, where the lack of proper incorporation of design changes in revised plans is ranked the 2nd least advanced practice. Interview results corroborate this fact, elaborating, “Over the course of the execution phase of projects, multiple design changes and modifications are made. Unless the cost impact of these changes are 1st documented, they cannot be included in revised plans. These cost impacts take time to incorporate into contracts, by which point the work may have been executed without ever been included into plans. This is a huge problem in tracking projects.” Not so surprisingly, this specific practice has the 4th highest degree of impact on completion of projects successfully.

In summary, scope planning practices are ranked the 5th least advanced and the 2nd most important practice impacting successful project completion. Accordingly, this planning practice is the 2nd most critical planning practice requiring the enterprises action.

4.3.3 ADVANCEMENT AND DEGREE OF IMPACT OF TIME PLANNING PRACTICES

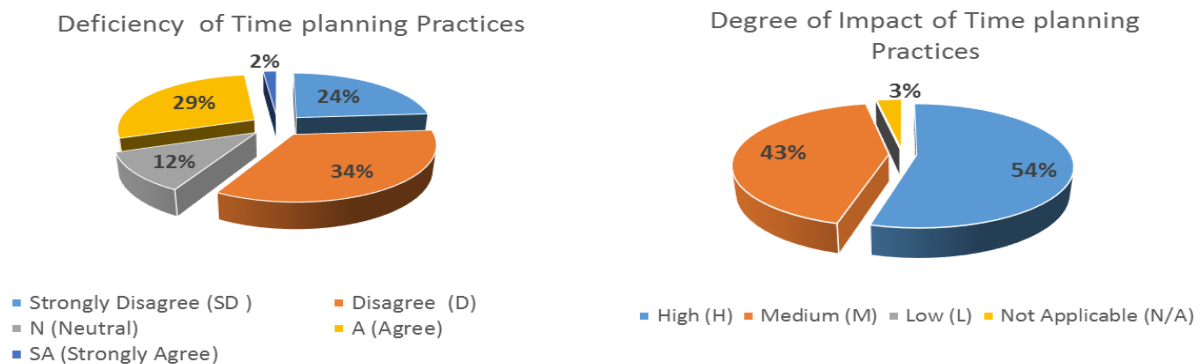


Figure 4.8: Respondent’s opinion of Advancement of Time Planning Practices and Degree of Impact on Successful Project completion

Source: Survey Data

According to figure 4.8, where the aggregate deficiency and impact of time planning practices are assessed, only 29% of respondents agree that time planning practices are poorly accomplished within the case organization. On the other hand, 54% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of time planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

a) An RII of 0.902 indicates high presence of written standards, guidelines, manuals & procedures and thus it is one of the more advanced practices. This is true where none of the respondents believe this practice is lacking. The works of Abebe present similar findings were

77% of respondents agree to this effect. On the other hand, it has an RII of 0.638 and 80% respondents believe it has a moderate impact on successful project completion.

b) “Project activity determination in the planning phase” is another advanced practice with an RII of 0.859 where none of respondents believe its inadequately practiced. This practice, with an RII of 0.751 has a high degree of impact on successful project completion, where roughly 75% of respondents testify so.

c) Contrarily, with a low RII of 0.420, roughly 75% of respondents believe project planning activities are not completed prior to project execution and as such, is one of the least advanced practices in this category. On the other hand, with an RII of 0.648, only 48% of respondents believe it has high impact on project success.

d) Only 39% of respondents agree schedules are not revised when time claims are approved. With an RII of 0.615, this is one of the better time planning practices observed. Just as importantly, 73% of respondents, with a high RII of 0.746 deem this practice as having a high impact on project success. This is in line with the findings of Abebe (2015) where most of the respondents agree there is a lack of preparation of detailed project plan as a whole.

In reference to table 4.4, the greatest contrast is observed in the 3rd time planning practice, where “Project planning activities completion prior to project execution” is ranked one of the least advanced practices. Surprisingly, as only the 32nd practice having a high impact on successful project completion, this factor is largely responsible for the overall lower criticality rank given on table 4.3. Interview results clarify that there is generally no particular necessity for planning activities to be completed prior to the execution phase, if the critical items have already been scheduled properly. Plans are revised every so often, that the details are expanded whenever execution is about to begin just for the next set of activities. Hence the lower advancement and impact of this practice.

In summary, with most of the time planning practices relatively better advanced, this planning practices is aggregately ranked the 11th least advanced and yet the 3rd most important practice impacting successful project completion. Accordingly, this planning practice is the 10th most critical planning practice requiring the enterprises action.

4.3.4 ADVANCEMENT AND DEGREE OF IMPACT OF COST PLANNING PRACTICES

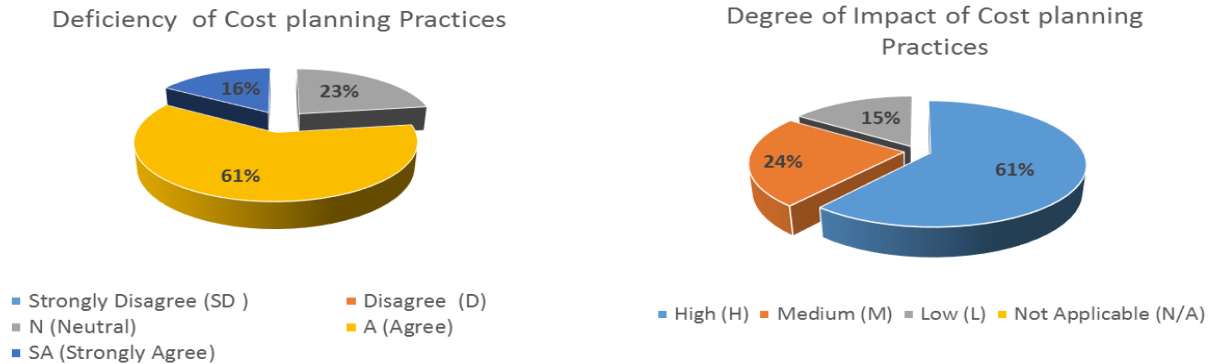


Figure 4.9: Respondent's opinion of Advancement of Cost Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.9, where the aggregate deficiency and impact of cost planning practices are assessed, 77% of respondents either agree or strongly agree that these planning practices are poorly accomplished within the case organization. On the other hand, 61% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of cost planning practices have been assessed, a detailed assessment of the underlying cost planning practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.454 indicates the lack of detailed cost estimation in the planning phase and thus it is one of the least advanced practices. This is true where about 73% of respondents agree this practice is inadequately accomplished. On the other hand, an RII of 0.737 indicates the relatively high degree of impact of this practice on successful project completion, with 68% of respondents confirming to this effect.
- “Additional cost /variations/ due to change in scope, design inclusion in plans ” is another least advanced practice with an RII of 0.385 and roughly 73% of respondents affirming its inadequately practiced. This lack of inclusion of cost variations into plans, with an RII of 0.60 has surprisingly a relatively lower degree of impact on successful project completion, where only 46% of respondents deem it as having a high impact.
- With an RII of 0.40, roughly 71% of respondents believe there is a significant difference between estimated cost and contact amount and as such, is one of the least advanced practices in this category. On the other hand, with an RII of 0.737, 68% of respondents believe it has a high impact on project success.

In reference to table 4.4, the greatest contrast is observed in the 3rd cost planning practice, where “significant difference between estimated cost and contact amount” is ranked the 9th least advanced practice. Interview results corroborate that this difference is largely due to lack of adequate cost estimation in the planning phase, where 73% of respondents agree so. “The

original contract price, which is the winning price is developed within a short and speedy bid period, that it is mostly an inadequate representation of the actual costs. Add to this the effects of inflation; this is largely responsible for loss of contractor's profit. Ultimately this results in a demoralized contractor which undeniably affects work quality.” This corresponds to this specific cost planning practice having the 16th highest degree of impact on completion of projects successfully.

In summary, cost planning practices are ranked the 4th least advanced and again the 4th most important practice impacting successful project completion. Accordingly, this planning practice is the 5th most critical planning practice requiring the enterprises action.

4.3.5 ADVANCEMENT AND DEGREE OF IMPACT OF QUALITY PLANNING PRACTICES

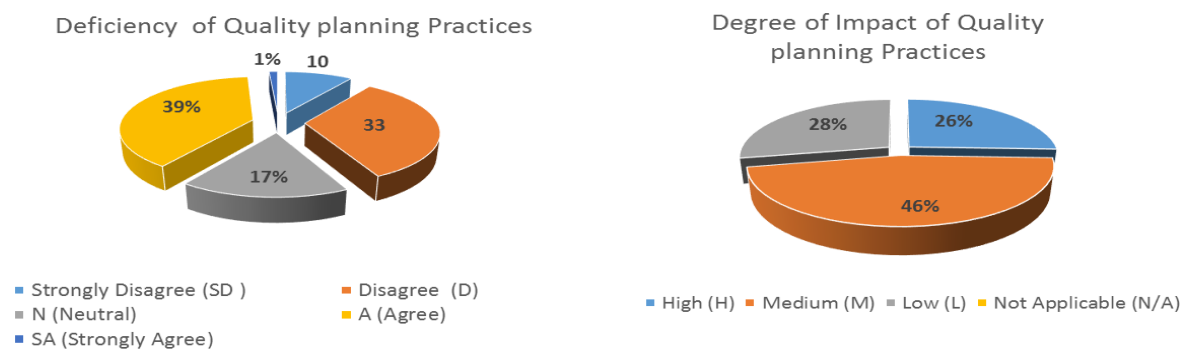


Figure 4.10: Respondent's opinion of Advancement of Quality Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.10, where the aggregate deficiency and impact of quality planning practices are assessed, only 39% of respondents agree that these planning practices are poorly performed within the case organization. On the other hand, only 17% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of quality planning practices have been assessed, a detailed assessment of the underlying planning practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.780 indicates the presence of quality management policies procedures & guidelines and thus it is one of the advanced practices. This is true where only 14% of respondents agree this practice is inadequately accomplished. On the other hand, an RII of 0.702 indicates the relatively slightly-high degree of impact of this practice on successful project completion, with a 51% of respondents confirming to this effect.
- “Project quality plan preparation” is one of the least advanced practices with an RII of 0.463 and roughly 63% of respondents affirming it's inadequately practiced. Surprisingly, the absence of a quality plan, with an RII of 0.486, has a relatively lower degree of impact on successful project completion, where 43% of respondents believe so.

In reference to table 4.4, the greater contrast is observed in the 2nd quality planning practice, where absence of quality plan preparation is ranked the 24th least advanced practice. Although this may not appear so damaging at 1st glance, 63% respondents agree to its absence. Interview results corroborate, “While specifications are prepared and strongly require adherence to, for which noncompliance has great precautions, no plan is actually prepared to monitor quality against. Where you have other planning practices in dire need, quality planning is outside the limelight.” This corresponds to quality plan preparation having one of the least impacts on completion of projects successfully; at 40th place.

Generally however, quality planning practices are ranked the 9th least advanced and the 13th most important practice impacting successful project completion. Accordingly, this planning practice is the 11th most critical planning practice requiring the enterprises action.

4.3.6 ADVANCEMENT AND DEGREE OF IMPACT OF HUMAN RESOURCE PLANNING PRACTICES

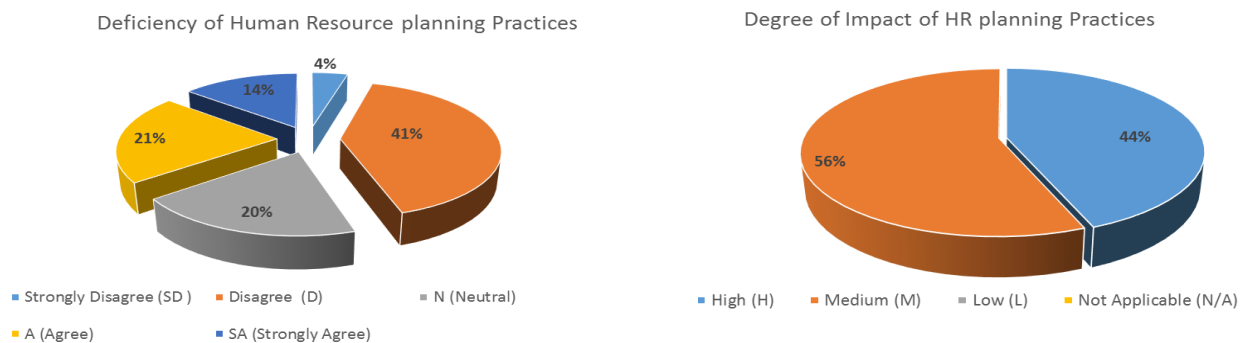


Figure 4.11: Respondent’s opinion of Advancement of HR Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.11, where the aggregate deficiency and impact of HR planning practices are assessed, only 21% of respondents agree that these planning practices are poorly performed within the case organization. On the other hand, 56% of respondents believe it has a relatively moderate aggregate impact on successful project completion.

Now that the overall deficiency and impact of HR planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- a) An RII of 0.746 indicates manpower plans are incorporated into project plans and thus it is one of the more advanced practices. This is true where none of the respondents believe this practice is lacking. This is also corroborated with the works of Abebe (2015) where 80% of respondents agree this is one of the developed practices. On the other hand, it has an RII of 0.707 and 53% respondents believe it has a slightly high impact on successful project completion.
- b) “Detail skill requirement, Roles & Responsibilities of the position” is another relatively advanced practice with an RII of 0.795 where none of respondents believe its inadequately

practiced. Abebe (2015) similarly analyzed that 73% of respondents believe this is one of the better developed practices. This practice, with an RII of 0.649 has a moderate degree of impact on successful project completion, where roughly 76% of respondents testify so.

c) Contrarily, with a low RII of 0.444, roughly 63% of respondents believe HR team doesn't participate in planning and as such, is one of the least advanced practices in this category. The works of Abebe (2015), with a mean of only 2.9, do not offer any solid conclusions regarding this practice. On the other hand, with an RII of 0.678, only 39% of respondents believe it has high impact on project success.

d) 78% of respondents agree there is a lack of timely recruitment and selection of project teams. With an RII of 0.415, it's the 13th least advanced practices. Just as importantly, 58% of respondents, with a high RII of 0.717 deem this practice as having a relatively high impact on project success.

In reference to table 4.4, the greatest contrast is observed in the 4th HR planning practice, where "Timely recruitment and selection of project team" is ranked the 13th least advanced practice and 1st of its category. Interview results corroborate, "project managers involve the HR team only at the last minute ones a core project team has left the project. This creates a huge information gap as there is no proper transfer of the works from the departed team member to the new one." Additionally, "despite that there is a manpower plan as part of the project plan, its only included as a formality and is usually unrealistic. While it should be prepared together with the HR team, the office engineering team planner is solely responsible for this plan. Sadly, in most cases, it is sent to head office for approval as part of the project plan, without the HR department ever even signing off on it. The ironic part is, no one at head office even pays attention to this plan. This has a deciding impact on projects getting their required manpower in a timely manner." This corresponds to this specific HR planning practice having the 23rd highest degree of impact on completion of projects successfully. Although this may not sound critical enough, HR planning practices are overall ranked the 8th least advanced and again the 7th most important practice impacting successful project completion. Accordingly, HR planning practices are the 8th most critical planning practice requiring the enterprises action.

4.3.7 ADVANCEMENT AND DEGREE OF IMPACT OF EQUIPMENT PLANNING PRACTICES

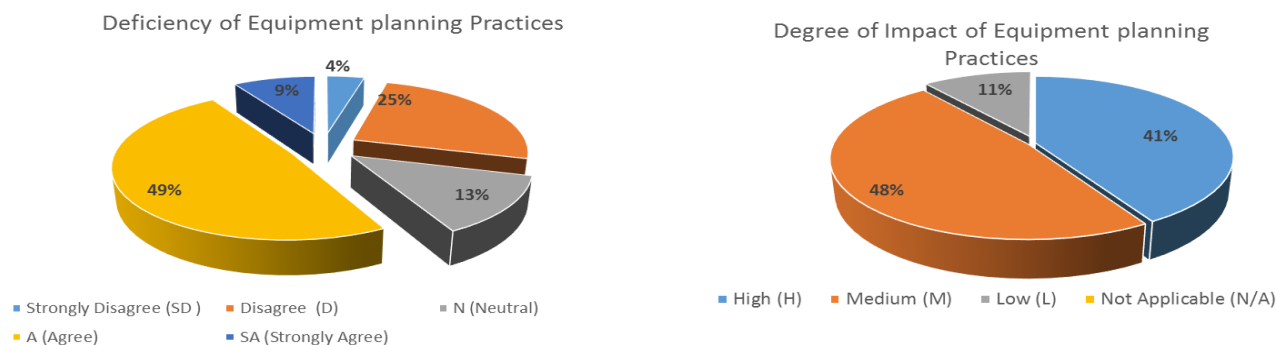


Figure 4.12: Respondent's opinion of Advancement of Equipment Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.12, where the aggregate deficiency and impact of equipment planning practices are assessed, 58% of respondents either agree or strongly agree that these planning practices are poorly performed within the case organization. On the other hand, 48% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of equipment planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- a) An RII of 0.780 indicates detailed equipment plans are well designed and thus it is one of the more advanced practices. This is true where only 9.8% of the respondents believe this practice is lacking. Similarly, the works of Abebe (2015) corroborate there is relatively good equipment planning practice within the company. On the other hand, it has an RII of 0.712 and 56% respondents believe it has a slightly high impact on successful project completion.
- b) “Facilitating of equipment sharing among projects” is however one of the least advanced practices with an RII of 0.420 where 65% respondents believe its inadequately practiced. The works of Abebe (2015) testify the same. This practice, with an RII of 0.722 has a high degree of impact on successful project completion, where roughly 68% of respondents testify so.
- c) Worse, with a low RII of 0.40, roughly 70% of respondents agree to the absence of an equipment maintenance plan and as such, is one of the least advanced practices in this category. The works of Abebe (2015) again testify the same. On the other hand, with an RII of 0.551, roughly 76% of respondents believe it has only a moderate impact on project success.

In reference to table 4.4, the greatest contrast is observed in the 2nd equipment planning practice, where “Facilitating of equipment sharing among projects” is ranked the 14th least advanced practice. Interview results corroborate, “The true cause of the lack of inter- project equipment sharing is that nobody actually uses the equipment schedules. The company doesn’t even have a separate person responsible for inter project resource sharing that utilizes the schedules and deals with an overlap of equipment needs amongst projects. This is really the cause for high equipment idle times and overuse at the other extreme. The delay of some equipment is so critical, that the entire project is also delayed. The costs are just as high.” This is in line with this specific equipment planning practice having the 19th highest degree of impact on completion of projects successfully.

Overall, equipment planning practices are ranked the 7th least advanced and the 11th most important practice impacting successful project completion. Accordingly, equipment planning practices are the 7th most critical planning practice requiring the enterprises action. In relation to the works of Abebe (2015), although its rank in advancement and criticality is not assessed, equipment planning practices are one of the least developed practices.

4.3.8 ADVANCEMENT AND DEGREE OF IMPACT OF MATERIAL PLANNING PRACTICES

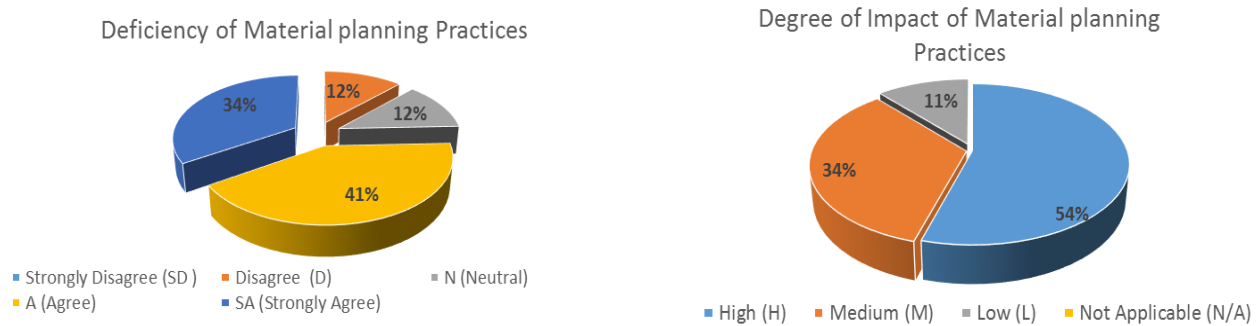


Figure 4.13: Respondent's opinion of Advancement of Material Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.13, where the aggregate deficiency and impact of material planning practices are assessed, 75% of respondents either agree or strongly agree that these planning practices are poorly performed within the case organization. On the other hand, 54% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of material planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.507 indicates the so-so presence of a detailed plan for material acquisition and thus, it is one of the moderately advanced practices. This is true where 56% of the respondents believe this practice is lacking. This is however in contradiction to Abebe (2015), where 79% of respondents testify this practice is developed. On the other hand, it has an RII of 0.53 and 66% respondents believe it has a moderate impact on successful project completion.
- "Consideration of risks associated with material unavailability and cost increase" is however the 6th least advanced practice with an RII of 0.380 where 82% respondents believe it's inadequately practiced. Same is exemplified in the works of Abebe (2015), where 65% of respondents believe this practice is lacking. This practice, with an RII of 0.761 ranks as having the 8th highest degree of impact on successful project completion, where roughly 80% of respondents testify so.
- Worse, with a low RII of 0.327, roughly 88% of respondents agree there is lack of special consideration of materials requiring long-lead time and critical items and as such, is one of the least advanced practices of all categories. On the other hand, with an RII of 0.766, roughly 83% of respondents believe it has a high impact on project success. Abebe (2015) however doesn't offer any solid conclusion, where a mean close to 3 indicates neutrality.

In reference to table 4.4, the greatest contrast is observed in the 3rd material planning practice, where “Special consideration of materials requiring long-lead time and critical items” is ranked the 3rd least advanced practice of all categories. In an industry where material shortage is the norm, lead times are critical in assuring timely delivery. Interview results elaborate, “Lead times are almost always ignored where materials are ordered so late or extremely early. On one extreme, reorders are common to satisfy shortage where works ultimately delay due to late delivery. On the other extreme are reorders to replace damaged surpluses materials due to early delivery. Both instances are causes of cost and time overruns.” This is in line with this specific material planning practice having the 7th highest degree of impact on completion of projects successfully.

Overall, material planning practices are ranked the 3rd least advanced and the 8th most important practice impacting successful project completion. Accordingly, this planning practice is the 4th most critical planning practice requiring the enterprises attention and action.

4.3.9 ADVANCEMENT AND DEGREE OF IMPACT OF COMMUNICATION PLANNING PRACTICES

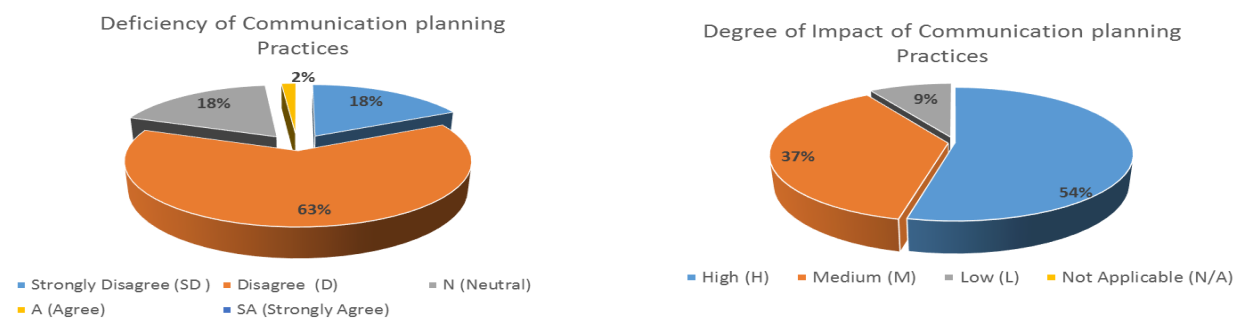


Figure 4.14: Respondent’s opinion of Advancement of Communication Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.14, where the aggregate deficiency and impact of communication planning practices are assessed, only 2% of respondents agree that these planning practices are poorly performed within the case organization. On the other hand, 54% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of communication planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- An RII of 0.766 indicates communication plans and strategies are established during project planning process and thus, it is one of the most advanced practices. This is true where none of the respondents believe this practice is lacking. On the other hand, it has an RII of 0.683 and 51% respondents believe it has a high impact on successful project completion.
- “Determination of communication channels during project planning process” is one of the most advanced practice with an RII of 0.790 where only roughly 5% respondents believe

its inadequately practiced. This practice, with an RII of 0.629 ranks as having a moderate degree of impact on successful project completion, where roughly 51% of respondents testify so.

c) With a high RII of 0.824, none of respondents agree there is lack of Maintenance of On-going communication with project stakeholders and as such, is one of the most advanced practices of all categories. On the other hand, with an RII of 0.756, roughly 78% of respondents believe it has a high impact on project success.

In reference to table 4.4, it is clear that communication planning practice are one of the most advanced practices in the enterprise. Interview results explain, “contract provisions mandatorily decide the level and kind of communication that needs to be maintained with the consultant and client. The enterprise closely follows this requirement, where its absence is a guarantee for a breach of contract. Projects also have a strong communication with head office, as most request and approval processes are handled through them. However, it is a complete opposite where project to project communications are concerned. This is also true for communications amongst case teams of the same project. The strategies and plans for inter and intra project communication is ill designed and most of the chaos and hostility in project environments, in addition to its effect on project progress are attributed to this.”

Overall, communication planning practices are ranked the most advanced and the 6th most important practice impacting successful project completion. In light that this practice is the most advanced, it is the 13th (least) critical planning practice requiring the enterprises attention and action. However, this is not true for intra and inter project communications.

4.3.10 ADVANCEMENT AND DEGREE OF IMPACT OF RISK PLANNING PRACTICES

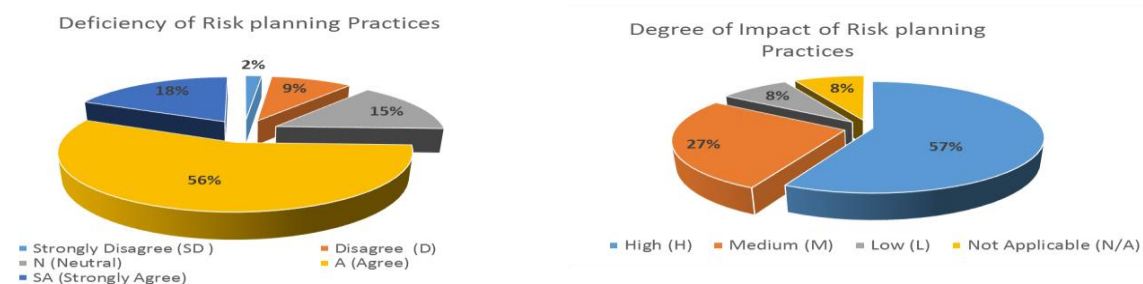


Figure 4.15: Respondent's opinion of Advancement of Risk Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.15, where the aggregate deficiency and impact of risk planning practices are assessed, 74% of respondents either agree or strongly agree that these planning practices are poorly performed within the case organization. On the other hand, 57% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of risk planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- a) An RII of 0.493 indicates there is low practice of risk identification at the planning stage and thus it is one of the least advanced practices. This is true where roughly 68% of respondents believe this practice is lacking. On the other hand, it has an RII of 0.785 and 92% respondents believe it has a high impact on successful project completion.
- b) “Conducting risk analysis during the planning stage” is another least advanced practice with an RII of 0.424 where 76% of respondents believe its inadequately practiced. This practice, with an RII of 0.746 has a high degree of impact on successful project completion, where roughly 73% of respondents testify so.
- c) With a low RII of 0.415, roughly 78% of respondents testify there is no separate unit/person responsible for project risk management planning and as such, is one of the least advanced observations in this category. On the other hand, with an RII of 0.420, only 5% of respondents believe it has high impact on project success.
- d) 68% of respondents agree risk response plans are not prepared at the planning stage. With an RII of 0.429, it’s the 18th least advanced practices. Just as importantly, 58% of respondents, with a high RII of 0.717 deem this practice as having a relatively high impact on project success.

In reference to table 4.4, it is a given that while risk identification is ill performed, predictably, risk analysis and response are little or nonexistent at all. The lack of attention to identification of potential risks has already been discussed in the previous section as one of the highest determinant factors affecting advancement of planning practices. Perhaps the only peculiar point of this category is that “Separate unit/person responsible for project risk management planning” is ranked as having the 42nd (least) impact on project success. Interview results explain that a separate accountable person or unit is not particularly necessary. It would be more beneficial if included as part of the planning and monitoring division with some key members of management included as final decision makers on whether to absorb or mitigate risks. Further, interview results explain, “Where the enterprise has extremely low risk planning practices, mostly due to short sighted management only concerned with the next approved payment certificate and lack of awareness on the operations team, it will continue to incur avoidable cost and time lapses.” This is in line with this planning practice having the 10th highest degree of impact on successful completion of projects. Overall, risk planning practices are ranked the 6th least advanced and the 10th most important practice impacting successful project completion. Accordingly, this planning practice is the 6th most critical planning practice requiring the enterprises attention and action. Abebe (2015) similarly emphasizes that risk planning is aggregately on of the majorly probelmatic areas of planning within the enterprise.

4.3.11 ADVANCEMENT AND DEGREE OF IMPACT OF PROCUREMENT PLANNING PRACTICES

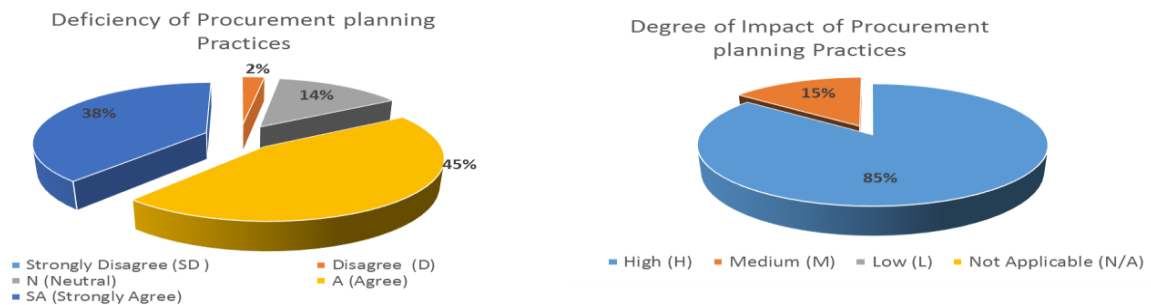


Figure 4.16: Respondent's opinion of Advancement of Procurement Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.16, where the aggregate deficiency and impact of procurement planning practices are assessed, 83% of respondents either agree or strongly agree that these planning practices are poorly performed within the case organization. On the other hand, 85% of respondents believe it has a high aggregate impact on successful project completion.

Now that the overall deficiency and impact of procurement planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.5, important interpretations can be made.

- a) An RII of 0.405 indicates the lack of preparation of detailed procurement plan of goods and service needed for a project and thus it is one of the least advanced practices. This is true where roughly 90% of respondents believe this practice is lacking. On the other hand, with an RII of 0.780, it has the 3rd highest degree of impact on successful project completion where 90% respondents believe so.
- b) The lack of special attention to major supply items especially those shipped from overseas or requiring special manufacturing is the least advanced practice with the lowest RII 0.259 where 78% of respondents strongly agree its inadequately practiced. This practice, with an RII of 0.790 has the highest degree of impact on successful project completion, where 95% of respondents testify so.
- c) With a low RII of 0.439, roughly 65% of respondents testify there is a lack of awareness about the importance of project procurement plan and as such, is one of the least advanced observations in this category. On the other hand, with an RII of 0.771, 85% of respondents believe it has the 4th highest impact on project success.
- d) 84% of respondents confirm procurement plans are not revised with project plan revisions. With an RII of 0.341, it's the 4th least advanced practices. Just as importantly, 70% of respondents, with a high RII of 0.741 deem this practice as having one of the highest impacts on project success.

In reference to table 4.4, the greatest contrast of all 42 planning practices is observed in the 2nd procurement planning practice, where "Major and/or special supply items identification and special attention given" is ranked the very least advanced practice of all. Interview results further

emphasize, “These special supply items, mostly shipped from overseas, are used for building finishing works, which are prone to time overruns. This is because shortage of foreign currency in the country gives way for a long waiting list followed by a minimum 4 months shipping process after a long international procurement bid. It is not that project managers are unaware that this lead time is necessary. Project managers usually backload these items on project plans and wait till the last minute to give the go ahead to procure these special items to decrease the probability that consultants make specification changes ones shipping has begun, which sadly, is likely, and the contractor by law absorbs the costs. However this is also one of the leading and most devastating causes of time overruns.”

Overall, procurement planning practices are ranked the very least advanced and the most important practice impacting successful project completion. Accordingly, this planning practice is the most critical planning practice requiring the enterprises attention and action. Abebe (2015) denotes that this planning practice is indeed one of the least developed, in that only 14% of respondents believe there is even an enterprise wide awareness about the importance of procurement planning.

4.3.12 ADVANCEMENT AND DEGREE OF IMPACT OF SAFETY PLANNING PRACTICES

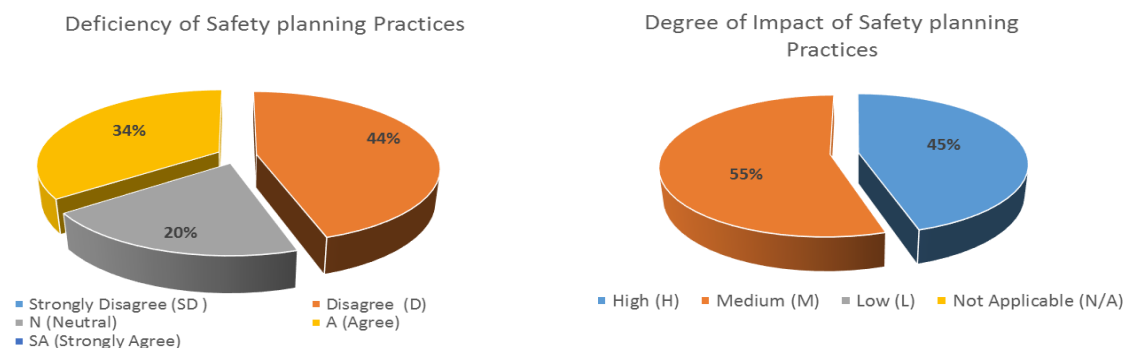


Figure 4.17: Respondent's opinion of Advancement of Safety Planning Practices and Degree of Impact on Project Successful completion

Source: Survey Data

According to figure 4.17, where the aggregate deficiency and impact of safety planning practices are assessed, only 34% of respondents agree that these planning practices are poorly performed within the case organization. On the other hand, 55% of respondents believe it has a moderate aggregate impact on successful project completion.

Now that the overall deficiency and impact of safety planning practices have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- a) An RII of 0.473 indicates the lack of preparation of detailed safety plan and thus it is one of the least advanced practices. This is true where roughly 63% of respondents believe this practice is lacking. On the other hand, with an RII of 0.732, it has a high degree of impact on successful project completion where 66% respondents believe so.

b) “Organizational policies, Procedures and guidelines for safety management” is a relatively advanced practice with a high RII 0.776 where none of the respondents believe its inadequately practiced. This practice, with an RII of 0.649 has a moderate degree of impact on successful project completion, where roughly 76% of respondents testify so.

In reference to table 4.4, despite the existence of policies, procedures and guidelines for safety management, safety plans are ill prepared. It is to be recalled that “Giving no or little attention for safety requirement during planning” was ranked as one of the least influential factors for advancement of planning practices. It is also to be recalled that interview results refuted questionnaire findings stating, “The good safety records of the company shouldn’t be confused with good safety planning. Safety requirements are absolutely essential if in the long run, the enterprise wants to avoid compensation costs for injury as well as penalties for negligence for authorities, which ultimately will harm its reputation. ” Same is the case with the above notion that the degree of impact of “Organizational policies, Procedures and guidelines for safety management” is ranked a moderate 29th. Interview results again contradict this finding, “If procedures and guidelines are absent, a good safety plan cannot be prepared. The fact DCE has a good record of safety practices does not mean it will continue to do so.” Perhaps the low ranking of both the factor (little/no attention to safety) and the perceived relatively moderate importance of safety guidelines for project success is another indication of how little awareness safety planning has in the organization.

Despite these contradictions, overall, safety planning practices are ranked the 10th least advanced and the 5th most important practice impacting successful project completion. Accordingly, this planning practice is the 9th most critical planning practice requiring the enterprises attention and action. The works of Abebe (2015) however, with a mean close to 3 present inconclusive findings in relation to this planning practice.

4.3.13 ADVANCEMENT AND DEGREE OF IMPACT OF PROJECT MANAGEMENT TOOLS & TECHNIQUES (PMTT)

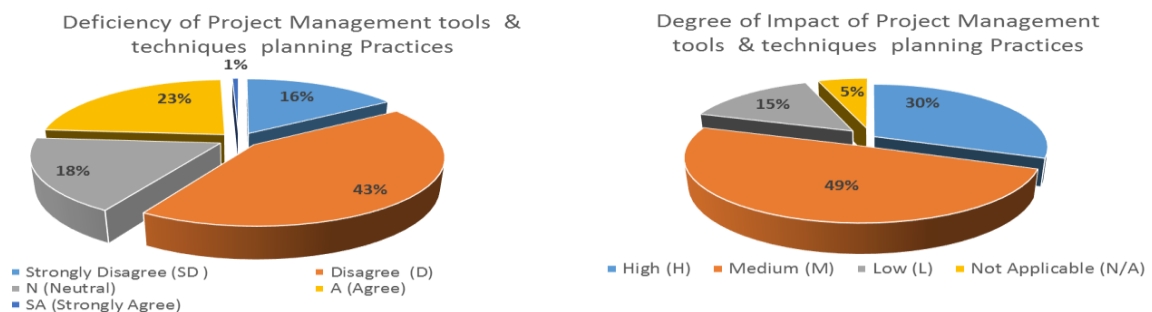


Figure 4.18: Respondent’s opinion of Advancement of Project Management tools & techniques and Degree of Impact on Successful Project completion

Source: Survey Data

According to figure 4.18, where the aggregate deficiency and impact of Project Management tools & techniques are assessed, only 24% of respondents agree that these planning practices are

poorly performed within the case organization. On the other hand, 49% of respondents believe it has a moderate aggregate impact on successful project completion.

Now that the overall deficiency and impact of project management tools and techniques have been assessed, a detailed assessment of the underlying practices is critical. In reference to table 4.4, important interpretations can be made.

- a) An RII of 0.849 indicates the proper use of WBS for defining and planning projects and thus it is one of the best advanced practices. This is true where none of respondents believe this practice is lacking. On the other hand, with an RII of 0.629, it has a moderate impact on successful project completion where 51% respondents believe so.
- b) “Effectively utilization of project scheduling tools such as; Gantt chart & network scheduling” is a moderately advanced practice with an RII 0.605 where 51% of respondents agree its inadequately practiced. This practice, with an RII of 0.439 has one of the lowest degrees of impact on successful project completion, where 41.5% of respondents testify it has low impact and 22% believe it doesn’t impact at all.
- c) With an RII of 0.571, roughly 44% of respondents testify there is a lack of project management software and as such, is one of the moderately advanced practices of all categories. On the other hand, with an RII of 0.649, 75% of respondents believe it a moderate impact on project success.
- d) None of the respondents believe there is lack of use of project cost estimation techniques. With an RII of 0.776, it’s one of the best advanced practices. Just as importantly, 61% of respondents, with a high RII of 0.722 deem this practice as having one of the highest impacts on project success.

In reference to table 4.4, the greatest contrast is observed in the 3rd component of project management tools and techniques, where “Use of project management software” is ranked as having only a moderate impact on completion of projects successfully. It is to be recalled that the entire category of Software related factors was ranked as having the least influence on planning. Interview results explained use of project management software while helpful was not an absolute necessity, as more all-inclusive tools like Excel did the job’s requirement. On the other hand, there is no absolute obligation to use gantt charts and network diagrams, as simple cash flow schedules are mostly employed and found successful. “However, this does not mean these tools and techniques should be overlooked”, an interviewee explains. Overall, project management tools and techniques are ranked the 12th least advanced and the again the 12th most important practice impacting successful project completion. Accordingly, this planning practice is the 12th most critical planning practice requiring the enterprises attention and action.

CHAPTER-FIVE

SUMMARY OF FINDINGS, CONCLUSIONS & RECOMMENDATIONS.

5.1 SUMMARY OF MAJOR FINDINGS

5.1.1 UNDERLYING FACTORS INFLUENCING PLANNING PRACTICES

Amongst six categories of factors influencing planning practices, management related factors, closely followed by time related factors were found to be the most influential for advancement of planning practices. These six categories were derived from 30 underlying factors out of which shortage of time to plan was ranked as the most influential factor of all and unrealistic contract durations was found to be the 2nd most influential. The 3rd, 4th and 5th most influential factors influencing planning practices were discovered to be lack of attention for identification & allocation of potential risks, low level of project management knowledge/experience in the country and low level construction management capacity respectively. Where software related factors were found to have the least influence, shortage of computer and/or software in the case organization was found the least influential.

5.1.2 ADVANCEMENT OF PLANNING PRACTICES

The paper also intended to discover the level of advancement of the nine project planning knowledge areas with an addition of safety, equipment, material and project management tools and techniques. Accordingly, procurement planning practices were overwhelmingly found to be the least advanced, followed by integration, material, cost and scope planning practices, in that order. The most advanced practice in the case organization was found communication planning. Where 42 component variables of the planning knowledge areas were assessed, identification and special attention to major/special supply items especially from overseas was found the least advanced practice, followed by the lack of inclusion of design changes in revised plans. The 3rd, 4th and 5th least advanced practices were found to be lack of special consideration of materials requiring long-lead time, lack of revision of procurement plan with the revision of a project time plan and lack of top level management active involvement during project planning, respectively. In contrast, written standards, guide lines and manuals & procedures for planning project works was the most advanced practice in the enterprise.

5.1.3 DEGREE OF IMPACT ON SUCCESSFUL PROJECT COMPLETION

Where the level of impact of the aforementioned 13 general planning practices were assessed, procurement planning practices were found as having the highest impact on successful project completion, closely followed by scope planning practices. The 3rd, 4th and 5th most impactful practices were found to be time, cost and safety planning practices respectively. For the 42 possible component variables, identification and special attention to major/special supply items especially from overseas was found to have the highest impact on successful project completion. The 2nd highest impact was attributed to Risk identification during the planning stage while the 3rd was preparation of detailed procurement plan. The practices and observations

respectively having the 4th highest impacts were found to be inclusion of design changes in revised plans and awareness about the importance of a procurement plan. Relatively speaking, the practice with the least impact on project success was found to be the designation of a separate unit/person responsible for project risk management planning.

5.1.4 CRITICAL PRACTICES

Perhaps the goal of this paper is to determine the critical practices; the least advanced practices which simultaneously have the greatest impact on successful project completion, so as to help the enterprise focus on those practices for completion of project successfully. The study found that the most critical of the 13 general planning practices was procurement planning where identification and special attention to major/special supply items especially from overseas was ranked as most critical. The 2nd most critical practice was found to be scope planning, where inclusion of design changes in revised plans was ranked as 2nd of all 42 practices. The 3rd, 4th and 5th most critical general planning practices were found to be integration, material and cost planning practices. Special consideration of materials requiring long-lead time, revision of procurement plan with the revision of a project time plan and consideration of risks associated with material unavailability and cost increase were found the 3rd, 4th and 5th most critical from the 42 specific practices. These make up the top 5 most critical planning practices; those least advanced and having the highest impacts on successful project completion, requiring the enterprises attention and action.

5.2 CONCLUSION

This research aimed at assessing the construction project planning practices of DCE. The scrutiny of these planning practices was broken down into an assessment of the underlying factors influencing them, an examination of the level of advancement of existing planning practices as well as their perceived degree of impact on successful project completion. In light of these, the research intended to discover the least advanced and most impactful planning practices, based on their criticality, requiring the enterprise's attention and action.

To start of, 30 possible factors influential to project planning were identified and grouped into six major categories based on the nature of the factors. This was followed by determination of 13 general planning practices nine of which are adopted from planning knowledge areas as per PMI (2008), and the remaining are included to put project management in the context of construction management. Subsequently, 42 specific planning practices were identified. All 30 factors and 42 planning practices were included in a three part questionnaire with an unstructured interview designed to supplement questionnaire results. A three part methodology, where the relative importance index (RII) was used to determine levels of advancement, impact and criticality, made ranking results possible. Accordingly, the following major conclusions are made:

Firstly, the top most influential factors affecting planning practices of the enterprise, in descending order are:

- Shortage of time for planning or Short time to do the work
- Unrealistic or short contract duration
- Giving no or little attention for identification & allocation of potential risks
- Low level of project management knowledge/experience/practice in the country
- Low level construction management capacity/maturity in the country
- Incomplete, unclear or inadequate details in drawing, specification and BOQ
- Little/no involvement of the people who must do the work in planning process.
- Shortage of qualified, skilled & professional planner in the country
- Complexity and difficulty of planning software and
- Giving no or little attention for quality requirement during planning

Secondly, the least advanced planning practices of the enterprise, in descending order were found to be:

- Identification of major/special supply items especially shipped from overseas
- Inclusion of design changes during execution phase in revised plans
- Special consideration of critical items and materials requiring long-lead time
- Revision of procurement plan with the revision of a project time plan.
- Active involvement of top level management during project planning
- Consideration of risks associated with material unavailability and cost increase

- Inclusion of additional cost (variations) due to change in scope and design inclusion in plans
- Strong integration between project office engineering case team and construction case team (refer Annex B)

Thirdly, those planning practices having the highest impact on successful completion of projects undertaken by the enterprise, in descending order were found to be:

- Identification of major/special supply items especially shipped from overseas
- Risk identification during the planning stage
- Preparation of detailed procurement plan
- Strong integration between project office engineering case team (planning) and construction case team
- Inclusion of design changes during execution phase in revised plans
- Awareness about the importance of project procurement plan
- Special consideration of materials requiring long-lead time and critical items
- Consideration of risks associated with material unavailability and cost increase
- Maintenance of On-going communication with project stakeholders
- Sufficient time for project design and quantity preparation

Finally, the most critical planning practices; the least advanced and simultaneously having the greatest impacts on successful completion of projects undertaken by the enterprise, thus requiring focus and mobilization of improvement efforts for better planning practices (in descending order) are concluded to be:

- Identification of major/special supply items especially shipped from overseas
- Inclusion of design changes during execution phase in revised plans
- Special consideration of materials requiring long-lead time and critical items
- Revision of procurement plan with the revision of a project time plan
- Consideration of risks associated with material unavailability and cost increase
- Strong integration between project office engineering case team (planning) and construction case team
- Preparation of detailed procurement plan
- Minimizing difference between estimated cost and contract amount /winning price
- Awareness about the importance of project procurement plan
- Conducting risk analysis during the planning stage.

5.3 RECOMMENDATIONS

The purpose of this paper is to expose the specific deficient areas of planning within Defense Construction Enterprise that are simultaneously the greatest determinants of project success. This is with the intention to aid management focus only on those critical planning areas having the ability to make or break project success, instead of mobilizing its improvement efforts on all planning areas indiscriminately which is uneconomical and exhaustive. As such, the paper offers the following recommendations, in relation to the factors influencing planning and determined critical practices.

With respect to the underlying factors influencing advancement of planning practices of the enterprise, the following recommendations are made:

- a) Operations division case teams at head office and the project managers at projects, should provide enough time for planners to do their work. Hastily works are prone to reworks. Additionally, planning conducted under the pressure of an unrealistic deadline cannot possibly incorporate information from other divisions; procurement, contract, HR etc.
- b) Before submitting bids, it is absolutely necessary to check the quantity of work to be executed within the scope of the project and make a preliminary plan to assess if total project duration is realistic compared to that provided in bid documents.
- c) There should be a team comprising of the planners, a member of upper management, the office and construction engineering case team leaders with the procurement case team responsible for risk identification & allocation before any master schedule or revision is prepared.
- d) Drawings, specifications and BOQs provided by the consultant cannot be absolute. It is the responsibility of operations managers to designate personnel capable of finding the metaphorical holes in these documents early in the project so that they are include in plans.
- e) The involvement of site engineers and the construction engineering case teams, as they are ultimately the people who must do the work, can't be stressed enough.
- f) Continuous training should be provided to planners to refine their skills and subsequently, qualification assessments should be employed.

With respect to critical planning practices requiring the enterprise's mobilization of efforts, the following recommendations are made:

- a) Management should focus its greatest efforts towards reinforcing its procurement planning practices. Procurement divisions should address material shipping requirements, lead times and identification of long and short term supply requirements. Personnel should inform management of any deviations; unexpected events and cost increases that have the ability to derail plans and ultimately, projects.
- b) There should be close coordination between the planners, contract and operation divisions responsible for addressing design changes, so that they are included in revised plans in a timely manner.

- c) Procurement divisions should work closely with planners, for timely and adequate information sharing, so that procurement plans are revised with the revision of project time plans.
- d) Management should give special attention to consideration of risks associated with material unavailability and cost increase, and what kind of risk response mechanism should be implemented for identified and analyzed risks. It is recommended to have brainstorming sessions in the presence of management members, planners and concerned project members.
- e) Project managers should be retrained and stop using the office and construction case team leaders as control tools through harboring distrust and outing one another as the harmony of the two case teams is essential for project success.
- f) Procurement case team leaders should be empowered to carry out their own detailed plans that latter on will be incorporated in project plans. The general notion in the enterprise that they are only a helping hand to the construction case team should be irradiated, as there work has the ability to make or break projects.

These being said, the enterprise should focus on the entire list of critical planning practices mentioned in table 24, in their descending order, as all mentioned practices are important determinants towards successful project completion.

5.3.1 SUGGESTION FOR FUTURE RESEARCH

This research contains certain limitations that should be kept in mind for future research reference. Thus, caution is to be taken concerning the applicability of these findings to project planning practice in Defense Construction Enterprise as a whole since this research targeted projects of the building sector and not other sectors such as road, water works, and other physical infrastructures constructions. In consideration of the limitations and the gaps, the research suggests that future study need be done to assess:

- a) The status of project planning practices in other construction sectors, within the same case organization.
- b) An assessment of the harmonization of the planned capacity with the available capacity (such as resources, capital, technology, etc.) in order to measure the reliability of project plans of the enterprise.
- c) The capacity of projects to perform and monitor the planned works.
- d) As in this paper, the assessment of underlying factors influencing planning practices are examined as a whole, a future research could focus on which specific factors contribute to which existing planning practice. An in-depth research focused only on one element or planning knowledge area of the enterprise could also shade light on the deficiencies of the practice.

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APPENDIX

APPENDIX-A

Questionnaire for data collection

Dear respondents,

I am undertaking a research survey on construction project focusing on planning in Defense construction enterprise.

The research is an individual research project as part of my study for MA Degree at Addis Ababa University. The main purpose of the research questionnaire is to collect information regarding the current condition of construction project planning practice in defense construction enterprise. As a key staff you are invited to participate in this survey. The information you provide in response to the items in the questionnaire will be used as part of the data needed for the study. All the information you provide will be kept in strict confidentiality and it will be used only for academic research. Therefore, please answer each question carefully. There is no right or wrong answer. If you are unsure of an answer, please respond with your best estimate. I value your participation and thank you for the commitment of time, energy and effort. If you have any further question, I can be reached at the address below. If you have received the soft copy version of this questionnaire, please send back via Telegram, using the cell phone number below.

Sincerely,
Rediet Ahmed
Project Office Engineer at DCE, MOND HQ project (Former)
Post graduate student, Project Management
Addis Ababa University
Email Redietamd@gmail.com
Cellphone No. 0911621488

GENERAL INSTRUCTIONS

- ✚ There is no need of writing your name
- ✚ In all cases where answers options are available please make an (x) in the appropriate box.

Part I. Background Information about the Respondents

Please use (x) mark in the relevant box for your response

- a. Gender Female ☐ Male ☐
- b. Educational back ground
 - 1. PHD ☐
 - 2. MA/MSc ☐
 - 3. BA/BSc ☐
 - 4. College Diploma ☐
- c. Work Experience
 - 1. Less than 5 years ☐
 - 2. 5-10 years ☐
 - 3. 10-15 years ☐
 - 4. Above 15 year ☐
- d. Job Title
 - 1. Manager
 - 2. Case Team ☐
 - 3. Project manager ☐
 - 4. Others (.....)

Please write your title _____

Part 2- Factors Influencing Existing Planning Practice of DCE

General Direction: Please rate the degree of influence by making an (X) mark where appropriate for the following identified factors that influence existing planning practices, based on your knowledge of practice.

NB:- SD= Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree

H= High, L=Low, M=Medium, NA=Not at all

Category	No	Factors That Influence Planning Practices	Degree Of Influence			
			H	M	L	NA
Time Related	1	Unrealistic or short contract duration				
	2	Unrealistic or short bid period (duration between date of invitation to bid and date of submission) and/or mobilization period (duration between site hand over and commencement date)				
	3	Shortage of time for planning or Short time to do the work (planning)				
Management Related	4	Low level of project management knowledge, experience and practice of the practitioners in Ethiopia construction industry (i.e. on Contract administration, Project planning and Project monitoring capabilities).				
	5	Low level construction and management capacity and maturity in Ethiopia construction industry				
	6	Unavailability or shortage of qualified planners or skilled professional planner in the country's industry				
Information Related	7	Incomplete, unclear or inadequate details in drawing, specification and BOQ				
	8	Lack or unavailability of standards for resource output factors and crew formation in the company as well as in the country's industry				
	9	Lack or unavailability of reference documents related to earlier similar projects' plan, work procedure, success and failure				
	10	Lack or unavailability of practical standard and template in the company as well as in the country's industry for structuring activities in WBS				
Skill, Knowledge, and Attitude Related	11	Planners or project managers lack of or incomplete understanding on construction site processes and construction work procedures, and materials and other resources supply chain				
	12	Planners or project managers lack of or incomplete skill to examine and formulate for task outputs and durations				
	13	Little or no involvement of the people who must do the work (such as construction engineers, site engineers, superintendents, etc) in the planning process.				

	14	Disinterest of planners, project managers and management of the company in project planning due to perceived poor returns from its implementation				
	15	Cultural and individual issues such as firefighting behavior, short term thinking, poor team work behavior, etc				
	16	Planners or project managers lack of or incomplete planning skills in the areas of securing commitments, assuring measurable milestones, processing information, and facilitating top management involvement.				
Planning Techniques, Tools and Process Related	17	Planning in too little detail when designing and preparing WBS				
	18	Planning in too much detail when designing and preparing WBS				
	19	Giving no or little attention for detail of execution, technological implication of different construction techniques, and production capacity of machines and labors during planning				
	20	Giving no or little attention for estimation of activity cost and time during planning				
	21	Giving no or little attention for sequencing of tasks and their dependency, precedence, and lead and lag during planning				
	22	Giving no or little attention for working hour, overtime, holly days, non-working days and other related issues during planning				
	23	Giving no or little attention for short term and long term funding requirement during planning				
	24	Giving no or little attention for safety requirement during planning				
	25	Giving no or little attention for quality requirement during planning				
Software Related	26	Giving no or little attention for identification and allocation of potential risks during planning				
	27	Lack of or little awareness on the use of planning software				
	28	Inadequate or little skill and knowledge of planners or project managers to operate and use planning software				
	29	Unavailability or shortage of computer as well as software (due to cost or other reasons)				
	30	Complexity and difficulty of planning software				

PART -3: Questions Specific to the Project Planning Practice of DCE

Please indicate your level of agreement with the following statements by making an (X)

Variables	N.	Description	Degree Of Presence					Degree Of Impact (on Successful project completion)				
			S D	D	N	A	S A	H	M	L	N A	
Integration	31.	The following are lacking in integration planning:										
		a. key stakeholders active involvement in planning stage										
		b. Strong integration between project office engineering case team (planning) and construction case team										
		c. Top level management active involvement during projectplanning										
Scope	32.	The following are lacking in scope planning:										
		a. Well defined scope in the planning phase										
		b. Sufficient time for project design and quantity preparation/ development										
		c. Design changes during execution phase inclusion in revised plans										
Time	33.	The following are lacking in time planning:										
		a. Written standards, guide lines and manuals & procedures for planning project works										
		b. Project activity determination in the planning phase										
		c. Project planning activities completion prior to project execution										
		d. The enterprise project schedule revision and updating of finish dates when time claims are approved										
Cost	34.	The following are lacking in cost planning:										
		a. Detailed cost estimation in the planning phase										
		b. Additional cost /variations/ due to change in scope, design inclusion in plans										
		c. Significant difference between estimated cost and contract amount /winning price										
Quality	35.	The following are lacking in quality planning:										
		a. Quality management policies procedures & guidelines										
		b. Project quality plan preparation										

Variables	N.	Description	Degree Of Presence					Degree Of Impact (on Successful project completion)			
			S D	D	N	A	S A	H	M	L	NA
Human Resource	36.	The following are lacking in human resource planning:									
		a. Incorporation of manpower plan in project plan									
		b. Detail skill requirement, Roles & Responsibilities of the position									
		c. Participation of human resource management team member's in project planning									
		d. Timely recruitment and selection of project team									
Machinery	37.	The following are lacking in equipment planning:									
		a. Detail of what, how much and when equipment are needed.									
		b. Facilitating of equipment sharing among projects									
		c. Presence of an equipment maintenance plan									
Material Plan	38.	The following are lacking in material planning:									
		a. Detail plan to acquire and use project materials									
		b. Consideration of risks associated with material unavailability and cost increase									
		c. Special consideration of materials requiring long-lead time and critical items									
Communication	39.	The following are lacking in communication planning:									
		a. Establishment of communication plans and strategies during project planning process									
		b. Determination of communication channels during project planning process									
		c. Maintenance of On-going communication with project stakeholders									
Risk	40.	The following are lacking in risk planning:									
		a. Risk identification during the planning stage									
		b. Conducting risk analysis during the planning stage									
		c. Separate unit/person responsible for project risk management planning									
		d. Preparation of risk response in the planning stage									

Variables	N.	Description	Degree Of Presence					Degree Of Impact (on Successful project completion)			
			S D	D	N	A	S A	H	M	L	NA
Procurement	41.	The following are lacking in procurement planning:									
		a. Preparation of detailed procurement plan of goods and service needed for a project.									
		b. Major and/or special supply items (such as those required in large quantity / requiring special manufacturing/ shipped from overseas identification and special attention given									
		c. Awareness about the importance of project procurement plan									
Safety	42.	The following are lacking in safety planning:									
		a. Safety plan preparation (determining safety standards and requirements and devising action plan)									
		b. Organizational policies, Procedures and guidelines for safety management									
Project Management tools & techniques (PMTT)	43.	The following are lacking in PMTT:									
		a. Work break down structure (WBS) used for defining and planning projects									
		b. Effectively utilization of project scheduling tools such us; Gantt chart& network scheduling.									
		c. Use of project management software									
		d. Use of Project Cost Estimation techniques /Analogy estimate,parametric estimates, and/or expert opinion.									