

SCOPE MANAGEMENT PLANNING APPROACH IN BUILDING CONSTRUCTION
PROJECTS: THE CASE OF BISHOFTU CITY BUILDING CONSTRUCTION PROJECTS



SAMUEL BEDADA JIMA

A THESIS SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING, SCHOOL
OF CIVIL ENGINEERING AND ARCHITECTURE PRESENTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER'S IN
CONSTRUCTION ENGINEERING AND MANAGMENT

OFFICE OF GRADUATE STUDIES

ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

SEPTEMBER, 2022

ADAMA, ETHIOPIA

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Declaration

I hereby declare that this Master Thesis entitled “**Scope Management Planning approach in building construction management: The case of Bishoftu city building construction projects**” is my original work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. All sources of materials that are used for this thesis proposal have been duly acknowledged through citation

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I/we, the advisor(s) of this thesis, hereby certify that I/we have read the revised version of the thesis entitled “**Scope Management Planning approach in building construction management: The case of Bishoftu city building construction projects**” prepared under my/our guidance by Samuel Bedada Jima submitted in partial fulfillment of the requirements for the degree of Masters of Science in Construction Engineering and Management. Therefore, I/we recommend the submission of revised version of the thesis to the department following the applicable procedures.

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ACKNOWLEDGEMENT

First of all, I would like to express my deepest gratitude to the almighty God for his blessing and helping me endlessly in every aspect of my life. My heartfelt thank goes to my advisor Dr. Bahiru Bewket for his continuous technical advice, guidance, and quickly reply to each request of mine. Thirdly, I would like to thank the employees of the stakeholder's construction companies and the top management for their willingness to fill out the questionnaires distributed with comprehensive and important information which made the data analysis easier.

And, you my family and friends for your endless encouragement in order to achieve my dream, which is the most practical energy that motivates me to step up and build advanced perspective, you have a big respect and love.

To all of you, I wish you a blessing from God.

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ACRONOMS

CI - Construction Industry

EEA - Ethiopian Economic Association

GDP - Gross Domestic Product

PDU - Project Document Updated

PM - Project Management

PMBok - Project Management Body of Knowledge

PMI - Project Management Institute

PMP - Project Management Plan

PM4DEV - Project Management for Development

SPSS - Statistical Product and Service Solutions

PASW - Predictive Analytics Software

PDU – Project Document Updated

RMP – Requirement Management Plan

SMP – Scope Management Plan

WBS - Work Breakdown Structure

WPI - Work Performance Information

TOR - Term of Reference

ABSTRACT

Project scope management plan is a process in which what work is required in a project is defined and checking that all of that work is done. Improper definition of this work and poor practices of scope management plan leads to scope change which is reflected on objectives of initially planned projects mostly like budget, schedule, resources, and quality. Accordingly, this study mainly assesses the status of project scope management practices of Bishoftu city Building construction project stakeholders. To get information for study of 18 projects were selected randomly from a total of 40 ongoing projects of a city. The study used mixed research approach to gather data and describe the status of scope management practices in the project and asses the effects of scope change on the projects. The target populations of the study were: public and private projects that have under construction in Bishoftu city. This study has used both primary and secondary sources of data. Primary data collected through questionnaire distributed to Engineers, project managers, staff of consultant firms, contractors, clients, and governmental offices. The collected data through questionnaires were analyzed using statistical packages for social sciences (SPSS).When summarized; it is difficult to acknowledge the soundness of practices of plan scope management and collecting requirements from stakeholder processes. Both process needs to be improved by responsible body which is clients. Similarly, the truth worthiness of practices creating work breaks down structure not enough. The contractor needs to improve himself on WBS creating process. Even if scope defining steps which is done by client is at good, it needs to be improved by clients on its implementations. Scope verifying/validating and scope controlling process which is the responsibility of both client and contractors are not practiced as well as enough. This shows there is lack of integration between these two bodies on implementation of the processes. From different parameters of construction projects: Schedule delay, budget rises, redesign, resource unavailability, and quality problems are the most affected area of building construction project parameters which leads the project to failed. Researcher recommends the stakeholder to using scope management planning processes properly and a proactive management style to reduce challenges of scope changes from happening.

Key words: *Building construction project, scope management plan, scope management practices, scope management process, Effect of scope change*

CHAPTER ONE

1 INTRODUCTION

1.1 Background of the study

The construction industry is an important part of any economy. Infrastructures delivered by the Construction industry and its key allies affect economic growth. Construction, which has the responsibility of creating, defining and maintaining the built environment within which most other social and economic activities take place, is one of the most important ways in which societies create new values. The industry provides society with delivery mechanisms for many aspects of economic, social, political, environmental needs making its products essential to mankind's physical and social day-to day activities (TESFAHUN G/MARIAM, 2019).

Construction industry (CI) makes critical commitments to the financial improvement interaction or to socioeconomic development process of a country. Internationally, the development business enormously impacts the economy, the environment & the society and sector accounts for around six percent of the world GDP (Costello, 2017).

Ethiopia's economy is rapidly rising throughout Africa, and the construction industry (CI) provides huge contributions to the country's economy (EEA, 2018). Agriculture, industry, and services contributed 2.5, 4.4, and 4.0 percentage points, respectively, to the 10.9 percent growth in total value-added observed in fiscal year 2016/17. During the same fiscal year, the construction industry alone contributed a 3.4 percentage points (31.2 percent) of real GDP growth (EEA, 2018).

In Ethiopia, the CI is an area that opens the entryway for the development of numerous additional industries (EEA, 2018). According to this report, Building works need a significant amount of input. For instance, they demand different metal products, clay works, and cement and cement products, etc. As such, the growth and expansion of these industries will surely follow the growth of the CI.

The CI is divided in to four main categories. These are residential building, institutional and commercial building, specialized industrial construction, and infrastructure and heavy construction (Brook Hailemariam, 2020).

Construction project management is the discipline of organizing and managing resources in such a way that these resources deliver all the work required to complete a project within defined scope, time, and cost constraints. As defined by the Project Management Institute, a project is a temporary endeavor undertaken to create a unique product, service, or result (PMI, 2017). This property of being a temporary undertaking contrasts with processes, or operations, which are permanent or semi-permanent ongoing functional work to create the same product or service over-and-over again.

Modern construction project management theory states that every project has three dimensions shall to be maintained: budget, timeline, and performance requirements. The budget dimension is the expected cost of the work to be accomplished; it is the project's stated or allowed cost. The timetable dimension includes both the time period over which the task will be completed and the target date for completion of the project. The performance requirement dimensions includes the final product's quality and quantitative measures (Thomsett, 2010).

To say a construction project's implementation successful completed, it should meets these three-dimensional goals, which include, completing the project on time, within a budget, and according to the client's quality standards and defined scope.

The fundamental test of effective performance execution in construction project management is achieving the desired outcomes, which is demonstrated by meeting the scope. It takes precedence above deadlines and budget constraints (Kalkidan Kebede, 2020).

There are ten (10) main known Project management knowledge areas which includes; project integration management, project scope management, project time management, project cost management, project quality management, project resource management, project communication management, Project risk management, Project stakeholder management and project procurement management (Square, 2000; PMI, 2013). But, in addition to those ten project management knowledge area, PMI (2016), rises these number to twelve by adding two

project management knowledge area include; Project Health, Safety, Security, and Environmental (HSSE) Management; and Project Financial Management.

Project scope management is a subset of project management that includes the process required to insure that the project includes all the work required, and only the work required to complete the project successfully. It consists: initiation, scope planning, scope definition, scope verification and scope change control (PMI, 2016).

The project scope is throughout the project so that it can be used as an appropriate way to achieve project deliverables. According to Kalkidan Kebede (2020), the project scope sets a line that the project manager and stakeholders will follow to determine which path to take or not take in order to achieve the project's important success elements. As a result, changes in scope can have an impact on the project's cost, schedule, risk, and even quality.

Determining the scope of a project the first step in properly managing a project is to define its scope. Before starting a project, be sure that all of the work that will be required to meet the project's goals has been considered and well-articulated. The most significant component of the upfront process of creating a project is scope definition, which helps to properly define the project's logical bounds (Ogunberu, Akintelu and Olaposi, 2018).

The primary test of effective project management performance is achieving the intended effect, which is achieved by realizing the project scope. The failure to manage and control this component of the project appears to be the most common cause of project failure (Ifeanyi, 2019).

Scope planning is the first process in scope management process, is called Plan Scope Management, which is coming under planning process group. This is the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled. It provides guidance and directions on scope will be managed. Similarly, scope definition comes under planning process group, and it is the process of developing a detailed description of the project and product. The project scope serves as a reference for all future project decisions (Ehetemariam, 2018).

Construction project scope changes are common and likely to occur from a variety of sources, for a variety of reasons, at any stage of the project, and can have considerable negative effects on costs and schedule delays (Lukhele, Botha and Mbanga, 2021).

This study have tried to add his contribution by assessing the way construction project scope management plan conducted and to identify of the most viable effects of scope change on building construction projects.

1.2 Statement of the problem

The construction sector is one of the most important sectors with projects of different types which contribute to the political, economic, social and technological development of Ethiopia. Lack of good PM practices leads to inefficiencies like construction delays, extra costs and less quality (Brook Hailemariam, 2020).

Since 2001 in Ethiopia, the construction sector has seen considerable growth. The study by Tebeje Zewdu (2015) indicated that the GDP contribution of the sector has been raised to 5.6% and approaches to the sub-Saharan counties' average GDP contribution of the sector (6%).

Despite this prominent share of the construction industry in the Ethiopian economy, like in other developing countries, it faces many challenges in its practice which may bring about project failure or unsuccessful. To state some of these challenges are; project time overruns, project cost overruns, poor quality of project deliverables, a failure to cope with project requirements and the inability to adopt best practices (Tebeje Zewdu, 2015).

From many factors caused project time overrun and cost overrun, project scope management process is one from known twelve project management areas (Brook Hailemariam, 2020). Tebeje Zewdu (2015) argued that a failure or uncertainty in the project scope management process has a direct impact on the project's basic objectives like; cost, time, and quality. The magnitude of the impact varies from project to project, although it could be huge in mega projects.

Project scope management plan has a significant impact on a project's success, both positively and negatively, and the project manager must handle it with great care. Failure or uncertainty

in the project scope management process has a direct impact on the project's cost, schedule, and quality (Brook Hailemariam, 2020).

The goal of good and proper project scope definition is to provide enough information to identify the work to be done in order to avoid major changes that could affect the project's performance. Appropriate project scope management planning with a clear project scope helps to reduce the risk of cost overruns and delays. A typical project success factor is the scope definition level, which allows project stakeholders to decide whether or not to carry a project forward into detailed design and construction.

Kissi and Ansah (2013) defined professional PM practices as the skills and science of planning, designing, and managing activities throughout the project lifecycle. PM practices are applicable to many projects running in different sectors of the Economy of a country.

Poor management of the project scope planning and scope change problem is one of the leading causes of project failures, either because the project manager did not spend enough time defining the work, stakeholders did not agree on the scope, or there was a lack of a good scope planning management, which leads to adding work not authorized or budgeted to the project, which is known as scope creep. Scope creep, or uncontrolled changes in a project's scope, refers to a project's tendency to include more work than originally defined, which typically leads to higher project expenses and a delay in the project's completion date (Khan, 2016).

According to Khan (2016), the purpose of project scope change management is to verify the viability of the approved Project Contract (or agreement) and Project Logical Framework (Log frame). The Project Contract, in other words, establishes a causal relationship between the project's inputs, processes, outputs, results, and objectives, whereas the Log frame establishes a causal link between the project's inputs, processes, outputs, outcomes, and objectives.

Lack of a clear project scope definition, improper scope plan management practice as well as improper management of these, have been recognized as major barriers to project success (Fageha and Aibinu, 2014).

A different expert in the field of project scope management plan agrees that inappropriate scope definition and poor scope management plan practices, as well as, changing the scope of a project during the implementation phase, will have an impact on the project's cost, quality, and schedule mostly.

Additionally, it has been observed that many newly constructed buildings have a variety of problems. Among these problems include the inappropriate scope management plan practices, not following of scope management process while planning for scope, no consistent path or frame to be followed while managing and planning the scope, lack of site arrangement, lack of good arrangement of partition, lack of or insufficient parking, changes to the building's height and length, extended waits before construction begins and finishes, and even the fact that they are not seen while entering the service as soon as they are completed.

As a result, it's critical to research project scope management planning approaches in building construction projects to determine their strengths and weaknesses in fulfilling the goals that they're supposed to achieve through scope management planning activities. It also aids us in assessing scope management plan practices and effects of scope change on construction projects.

This study aims to assess project scope management planning approach in construction project of Bishoftu city. It has taken ongoing building construction projects which are currently under construction by different contractors as cases of study.

1.3 Research Questions

1. What are the current scope management planning practices in building construction projects of Bishoftu city?
2. What are effects of scope change on building construction projects of Bishoftu city?
3. What are appropriate scope management planning frame works for building construction projects of Bishoftu city?

1.4 Objectives of the study

1.4.1 General Objectives

The general objective of this study is to assess scope management planning approach in Bishoftu city building construction project.

1.4.2 Specific Objectives

1. To assess the current scope management planning practices in Bishoftu city building construction projects.
2. To assess effects of scope change in Bishoftu city building construction projects.
3. To develop the appropriate conceptual scope management planning frame work for Bishoftu city building construction projects.

1.5 Significances of the study

The current study is therefore expected to provide valuable information about the status of the scope management planning approach of Bishoftu city on ongoing building projects constructed by employed external contractors. This will also assist the stakeholders involved in building construction projects in the city to have notions of the weakness and strengths of the project scope planning management approach activity of building projects, and it helps to minimize the effects of scope change due to weak, poor and improper practices of scope plan management on construction projects. It can be a great input, especially for project managers and the three main stake holders (Contractors, Client and Consultant) as well as for junior professionals.

Additionally, the findings of this study as well provided researches working in the area to get an overview of the situation in the area and provided an input for further research in to the area.

1.6 Scope of the study

Currently different building construction projects are undertaken by different investors, organizations, individuals and even by city administration or state government in Bishoftu city. For managing purpose, these building construction projects are grouped in to private

projects and public projects. These mostly includes, private building construction projects such as: Hotel and mixed use building, Resorts construction, Real state, Industrial building construction, production and packaging shade and Public building construction projects such as: Bishoftu city Market center construction, Construction of Bishoftu cultural hall and construction of Bishoftu city Court office..

The current study delimited to scope management planning approach of only a new building construction projects which are active or under construction contracted by employed external contractors at 2021/22 and not completed.

1.7 Limitation of the Study

There are different standards and guidelines that are better known and mostly used like: Project management Institute (PMI): Project management body of knowledge (PMBOK), CCTA Projects in controlled environment (PRINCE), International project management association, Association for project management (APM), International organization for standards: Guidelines to quality in project management (ISO1006), US department of defense: Earned value management system (EVMS) and others. But, due to limitation of time, this study have only adopted the standards of Guide to the Project Management Body of Knowledge (PMBOK) issued by the Project Management Institute (PMI), and empirical scope management plan literature were also used.

This study also focuses on the outputs of the scope management plan practices and limited to the scope management process that is parts of the planning process group. Also, some respondents' involuntary act to fill the questionnaires and only some project managers' participation on this study are among the limitation of this study

1.8 Organization of the report of the study

This research is organized into five chapters, references and appendixes. Chapter one gives out the introduction, which discuss about the general ideas and relevance of study. It explains the background, the problem statement, the objectives, the significance, the scope as well as the organization of the research. Chapter two covers the literature review, and quotes the different local and abroad related works and books and guides which have done in this area of study. Chapter three aims to describe in detail the method and methodology of the project followed

in this research study. Chapter four contains data presentation and analysis of the information gathered through questionnaire, interview and observation. Chapter five presents conclusions and recommendations of the research. And finally, references and appendixes are attached.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Overview

Building construction in Ethiopia dates back to time immemorial and cannot be predicted exactly. But we have the traditional building construction and the modern building construction methods which are still widely in use throughout the country. In the traditional building construction method there are various practices by each nations and nationalities (Yibekal Adamu, 2018).

The modern building construction method began in Ethiopia during emperor Minilik's reign especially after the victory of Adwa and since then it passed through various phases whenever there was a change in government (Yibekal Adamu, 2018). According the author, During Minilik's reign the Italian war prisoners of Adwa and the coming of the Armenian refugees sought to be the first phase of modern building construction in Ethiopia. After the completion of the Ethio - Italian five year war the second era of modern building construction began. War prisoners who got mercy to live in the country began the construction business and this practice led to the establishment of the construction industry, the establishment of municipalities at various then known towns and cities in Ethiopia and eventually the exercise of modern construction practices. During the Dergue regime the third phase of modern building construction saw a major change in scope and methodology which retarded the industry though considerable amount of labors involved and trained professionals were also available.

In modern building construction project, a project scope is the most essential part of any project especially in the CI, having a better project outcome is significant because construction is one of the most important sectors in many economies and a significant contributor to the GDP of most countries. Construction projects face failures due to inadequate and improper scope definition & cost overruns, and delays (Kalkidan Kebede, 2020).

2.2 Theoretical Literature Review

2.2.1 Definition of Project

A project, according to PMI, is a periodic endeavor undertaken to generate a unique product, service, or outcome. Due to its temporary nature, each project has its own distinct beginning and end. When the project's objectives have been completed, or when the project is terminated because its objectives will not or cannot be met, or when the need for the project has passed, the project has come to an end. As a result, a project is an effort involving a series of activities and resources aimed at achieving a specific output while taking into account constraints such as time, quality, resource, cost, and a defined scope to create a service or a capability to perform a service, which commonly introduces a change (Lampa *et al.*, 2017; PMI, 2013).

2.2.2 Definition of Project Management

Project management is the application of knowledge, skills, tools and techniques to project activities to meet and satisfy the project requirements. This is achieved through the application of logically grouped processes and procedures, identifying requirements, needs, concerns, customer expectations and balancing competing project constraints, limitations and project boundaries to achieve project objectives that fulfill expected quality standards and stakeholder expectations (PMI, 2013; Handzic and Bassi, 2017).

Project management is accomplished through the application and integration of project management processes for initiating, planning, executing, monitoring and controlling, closing (Handzic and Bassi, 2017).

Project management is a set of management activities performed in and on an organization, under the leadership of a designated person, to move from a given current state to a defined target state. Generally accepted project management activities are scope (which includes, by the definition of scope, integrative activities), communication, cost, human resources (HR), procurement, quality, risk, stakeholder, and time management activities (Kalkidan Kebede, 2020).

Project management is critical for a more efficient construction project implementation and service delivery process that reduces the risk of cost overruns, timetable slippages, and quality

improvement while also increasing the chances of success. Project management, in particular, assists in assessing the value of project implementation and providing proactive guidance, control, and coordination on the conduct of project implementation with objective metrics to address concerns about doing the right thing, the right way, and getting it done well to achieve desired benefits and meet expectations (PMI, 2013)

In other words, project management supplies tools to circumscribe the scope or boundaries of the project and any changes to the project. It defines and maintains communication links across organizational and occupational boundaries. It anticipates risks, uncertainties and measures progress and the quality of work delivered within expected duration and project constraint.

2.2.3 Definition of Project Management process

A process is a collection of interrelated actions and activities that are carried out to produce a predetermined product, service, or outcome. The inputs, tools and procedures that can be used, and the ensuing outputs all define each process. These procedures ensure that the project runs well throughout its entire life cycle. The tools and procedures used to apply the skills and capabilities specified in the Knowledge Area are included in these processes (PMI, 2013).

PMI (2017) describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups (or Process Groups):

Initiating Process Group: Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.

Planning Process Group: Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.

Executing Process Group: Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.

Monitoring and controlling Process Group: Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.

Closing Process Group: Those processes performed to finalize all activities across all Process Groups to formally close the project or phase.

2.2.4 Definition of Project scope

Scope refers to the detailed set of deliverables or features of a project. These deliverables are derived from a project's requirements (Avantika Monnappa, 2021). According to PMBOK, the work that needs to be done to deliver a product, service, or outcome with the required features and functionalities is said to be a project scope. Scope definition's main goal is to break down large deliverables into smaller, more manageable pieces for easier execution. It also specifies the expected duration of work and any delay that may occur (PMI, 2017).

Scope is the description of the boundaries of the project. It defines what the project will deliver and what it will not deliver. Scope is the view all stakeholders have from the project; it is a definition of the limits of the project (Khan, 2016).

The scope of a project can be defined in terms of the functionality which the project is intended to provide, attain, or span. A project scope statement defines, in writing, drawings and price figures, the intended span of work expected and to be provided for in plans for a new facility (Hartley, 2020). Project scope defines what is or is not included in the project, and controls what is added or removed as the project is executed (Ifeanyi, 2019).

Project scope definition is the process whereby the work that is needed to produce a building is identified and described in sufficient detail to facilitate project execution. It gives the project team an understanding of what needs to be done while at the same time helping the team in setting up management control systems that can be applied during project execution; and could impact on project outcomes (Fageha and Aibinu, 2014).

2.2.5 Project scope management

Project scope management comprises the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully is

primarily concerned with defining and controlling what is and is not included in the project (Dawit Yibgeta, 2019). Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project (Handzic and Bassi, 2017)

Project scope identification and management is important as it involves getting information required to start a project, and the features the end result would have that would meet project stakeholders' requirements. This means that project scope looks at the work that needs to be accomplished to deliver a product, service, or result with the specified features and functions (Ifeanyi, 2019).

2.2.6 Project Scope Management Process

Project scope management process involves clear communication tools to ensure that stakeholders and project team members have similar understand of the scope of the project while approving on how the project goals and objectives will be obtained (Ting and Taib, 2018).

Ting and Taib (2018) and Al-Rubaiei, Nifa and Musa (2018) argued that the main reasons for having scope management processes are to avoid challenges during the project execution phase especially when there is a new or amendment on the scope, to determine, Clearly "what is" or "is not" included in the project, to controls and monitor what gets added or removed in the execution phase and to establishes control instruments to address factors that may result in changes during the project lifecycle.

Similarly, Nath and Momin (2014) stated that managing the scope of a project is vital to the success of any project. If it is not keenly controlled throughout the course of a project, there are a number of issues which may ascend. The project assails its schedule and the project goes beyond its finances.

Project scope management process has various steps, these are: Plan scope management, Collect requirement, Scope definition, Create WBS, Scope verification and Scope change control (Avantika Monnappa 2021; PMI, 2021; Al-Rubaiei, Nifa and Musa 2018).

From these, plan scope management, collect requirement, scope definition and create WBS done under planning process group of project management process, while, validate or

verification scope and control scope is done under the stage of monitoring and controlling process group of project management process (Mulcahy, 2020).

Table 2. 1 Project Scope management process & project management process

	Project management process group				
	Initiating	Planning	Executing	Monitoring and controlling	Closing
Project scope management process		Plan scope management		Validate/verification on scope	
		Collect requirement		Control scope	
		Define scope			
		Create WBS			

Source: (Mulcahy, 2020; PMBOK, 2017)

As shown in the table below, these project scope management processes are performed by different stakeholders as explained by Badiru, Badiru, and Badiru (2019)

Table 2. 2 Responsibility distribution of scope management process

Scope management steps	Role played by
Plan scope management	Client
Collect requirements	Client
Define scope	Client
Create WBS	Contractor
Verify and Validate scope	Client & Contractor
Control scope	Client & Contractor

2.2.6.1 Plan scope management

It is the first process in the Project Scope Management process. PMI (2013), Fifth Edition, added several processes to separate the initial planning activities from other activities. The Scope Management plan describes the project scope and documents how it will be further defined, validated, and controlled (Avantika Monnappa, 2021). It's a process of producing a written statement as the basis for future project decisions and for determining the project's boundaries. It may include the project's charter, the justifications, its expected constraints and assumptions (Nath and Momin, 2014).

Plan Scope Management is the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled. The key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project (Handzic and Bassi, 2017). This process performed once or at predefined points in the projects (PMI, 2017).

Two main outputs of this process in scope management plan and requirement management plan. In developing these outputs this process uses different documents of initiating organization/s likes project charter documents (the project purpose, high level project description, assumptions, constraints, high level project requirement to be satisfied), project management plan (quality management plan, project life cycle description, development approach), enterprise environmental factors (organization's culture, infrastructure, personnel administration, market place condition) and organization process asset (policies and procedure, historical information and lesson learned repositories). Expert judgment, data analysis and meeting are used as tools and techniques in this process (PMI, 2017).

The outputs of this process are scope management plan and requirement management plan.

Scope management plan: Is a component of project management plan that describes how the scope will be defined, developed, monitored, controlled, and validated (Handzic and Bassi, 2017). The development of this output is beginning with analysis of information contained in project charter. PMI (2017) argued that Project management plan details the process the teams will follow in the process of preparing project scope statement, creation of WBS from the detailed project scope statement, approving and maintaining the scope baseline, how formal acceptance of the completed project deliverables will be obtained.

Requirement management plan: Is a component of project management plan that describes how project and product requirement will be documented, analyzed and managed (Handzic and Bassi, 2017). It provides clarity on how project teams will determine which types of requirements need to be collected for the project. PMI (2017) explains that requirement management plan shows how; requirement activities will be planned, changes will be initiated, impacts of this changes will be analyzed, these changes will be traced and reported, as well as the level of authorization required to approve this changes.

This document also describes the requirement prioritization process, metrics that will be used and the rationale for using them and traceability structure that reflect the requirement attributes captured on the traceability matrix.

2.2.6.2 Collect requirements

Collecting requirement is the process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives (PMI, 2021). The authors conveyed that collect requirements describes how the requirement will be elicited, analyzed, documented or recorded in enough detail to be included in the scope baseline and to be measured once project execution begins ,and finally could be managed properly.

The project success if mostly influenced by active stakeholder involvement in the discovery and decomposition of needs into requirements and by the care taken in determining, documenting, and managing the requirements of the product, service or result if the project. Requirement includes conditions or capabilities that are to meet by the project or present in the product, service, or result to satisfy an agreement or other formally imposed specification. Requirements also include the quantified and documented needs and expectations of the sponsor, customer, and other stakeholders (PMI, 2017).

According to thus authors, Requirements has categorized to different types, business requirements, Stakeholder requirement, solution requirement, transition, project requirement and quality requirement.

The project manager must define the best approach and tools to collect all the requirements of the project. Components of the plan can include: requirements configuration management, requirement prioritization, product metrics and traceability matrix (Handzic and Bassi 2017; Ifeanyi 2019). PMI (2017) stated that a requirement should only be included only when it is able to fulfill the stated objectives of the projects.

Brook Hailemariam (2020) stated that the first step in this process is identification of project stake holders' together with their interest and level effect initially, which is important for preparation of stakeholder register, and the formulation of strategy for managing stakeholders. Then the next step is to collect requirements from identified stake holder. The author also

explained collect requirement is not the sole responsibility of project manager, rather primarily it is a user or stakeholder function the project manager facilitates the process and the stakeholder tell what the project manager should have to do.

This process involves documenting stakeholders' needs with the stated intent of meeting the project's objectives. The process attempts to leave no stone unturned, resulting in an in-depth list of project requirements. If this process is performed thoroughly and correctly, it can significantly reduce the possibility of unpleasant surprises as the project moves toward completion (Avantika Monnappa, 2021).

As Brook Hailemariam (2020), the stakeholders' requirements are gathered using the appropriate tools and techniques and then summarized. A pattern will emerge, which helps to eliminate duplicates, group similar requirement together, and so on. During the process of defining requirement, environmental factors such as business rules and policies, infrastructure, and organizations' culture are take in to account. Then, deliverables and requirement which are needed to be done in order for the project to be successfully are documented. The next and the final step in the collect requirement process is prioritizing the requirement which are important to meet the goal of the project.

During collecting requirements, historical information and lessons learned from previous projects could be involved. It helps in gaining an understanding of what were the requirements in similar projects.

The output of this process are documented requirements and prepared requirement traceability matrix. While developing these outputs, project charter, project management plan, business documents, agreement enterprise environmental factors, organizational process assets, etc. are used as an inputs and expert judgments, data gathering, data analysis, decision making, data representation, interpersonal' and teams' skill, context diagram and prototypes as a tool and techniques of the process (PMI, 2017).

Requirement documentation: When collection of requirements is completed they are documented. The documentation should be clear and unambiguous. Requirement initially start out at high level, as more information about the requirement is known, it becomes

progressively more detailed. Requirements need to be unambiguous-measurable and testable, complete, consistent, traceable and acceptable to key stakeholder before being base lined. The requirement document may be a simple document containing all the requirements divided stakeholder and priority, or more detailed from containing an executive summary, detailed description and attachments. Requirement documentation describes how individual requirements meet the business need for the project (PMI, 2021).

Requirement Traceability Matrix: A requirement traceability matrix is a grid that links initial product requirements to deliverables that satisfy them. Linking requirements to the business and project objectives helps to ensures that each requirement added a value. It also provides a means of track requirements throughout project life cycle, which helps to ensure that requirements approved in the requirement documentation are delivered at the end of the project. At last, it provides the structure for managing changes to the project scope (PMI, 2017). According to the author, requirement traceability matrix may include Business needs, opportunities, goals, and objectives, Project objectives, Project scope and WBS deliverables, Product design, Product development, Test strategy and test scenarios, High-level requirements to more detailed requirements.

2.2.6.3 Scope Define

Scope define process is the third process scope management process comes after plan scope management process and requirement collecting process. This process mainly concerned with outlining the boundaries of the project, delineating the work that will be delivered during the course of the project and defining the main deliverables of the project. It completes the project scope (PMI, 2017).

Defining a project scope is the first step in successfully managing a project. It is important to ensure that all the work required to achieve project objective are considered and well-articulated before project commencement. Scope definition is perhaps the most important part of the upfront process of defining a project as it helps to clearly describe the logical boundaries of the project (Ogunberu, Akintelu and Olaposi, 2018).

Scope define process involves the preparation of a detailed description of the project and product, and its major deliverables (Handzic and Bassi, 2017). The scope clearly states what

the project is supposed to achieve and what it cannot accomplish (Et.al, 2021). The supporting documents are reviewed to ensure that the project will deliver work in line with the stated goals. The scope that results states the stakeholders' needs and communicates expectations for project performance (Avantika Monnappa, 2021).

According to Kalkidan Kebede (2020), The key benefit of scope define is that it describes the project, service, or result boundaries by defining which of the requirements collected will be included in and excluded from the project scope. As Brook Hailemariam (2020) stated, the main purpose of scope define process is defining what is included in the project and defining what is not be included within the project (i.e... exclusion), which helps to clearly describe the expected outcomes of the project. According to the author, unambiguously defined scope shows the boundaries of the project while a poorly defined scope will lead to perpetual evaluation of what is included and excluded in the project.

According to Nath and Momin (2014), Scope definition includes dividing the major project deliverables in order to smaller, more manageable subdivisions to: Enhance the accuracy of cost, span, and storage estimates, Put down a basis for performance measurement and control, and Expedite clear accountability assignments.

When defining project scope what we should kept in our minds are statutory requirements, stakeholder requirements, contract agreement, design specification and drawings, Life cycle costing, value engineering, and constructability analysis, project management aspects (PMI, 2016):

Statutory requirements: is a statutory permit, helps to specify requirements that may impacts the project scope. Government establishes safety and health requirements to protect the construction workers, or public, and environments, whereas, owners usually perform social and environmental impact assessments to obtain a statutory permit. Remedial or improvement actions resulted from these assessment should be a part of project scope and planned accordingly.

Stakeholder requirements: Early identification and analysis of requirements to ensure whether they are properly addressed should be done.

Project management aspects: Scope management planning should consider and/or determine aspects such as critical milestones, project budget, deliverables, acceptance criteria, scope exclusions, constraints, assumptions, and results from risk assessment, which together reveal how the project should be constructed.

Once the project scope is not properly defined at the beginning of projects, the likelihood of failure (lack of customer satisfaction) is high (Ogunberu, Akintelu and Olaposi, 2018).

The main outcomes of scope define process are project scope statement and project document updates which are helps us to have full project documents (Ifeanyi, 2019). Documents or inputs used in this process in developing these outputs are project charter, project management plan, project document, enterprise environmental factors, organization process assets and etc. expert judgment, data analysis, decision making, interpersonal and teams' skill, product analysis and other are used as a tools and techniques of analysis (PMI, 2021).

Project scope statement: A project scope statement is a written confirmation of the results that the project will produce and the terms and conditions under the project work will be performed, before actual project work started, the concerned project stakeholders, project initiator/s and the project team, should agree on all terms in the scope statement (Brook Hailemariam, 2020).

The project scope statement is the description of the project scope, major deliverables, assumptions, and constraints. The project scope statement documents the entire scope including project and product scope. Is used to prepare a more detailed plan for the project, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's baseline (PMI, 2017).

The degree and level of details explanation of the project scope statement while describing the work that will be included in the project and the work that is excluded is assists the project management team in controlling the overall project scope (PMI, 2017). The detailed project scope statement may include product scope description, acceptance criteria and Project exclusions.

Even though the project charter and project scope statement may appear to be redundant at times, they are distinct in terms of the level of details given in each. The project charter contains high-level information, whereas the project statement describes the scope component in detail. These elements are gradually developed during the project (PMI, 2017)

A project scope statement defines, in writing, drawings and price figures, the intended span of work expected and to be provided for in plans for a new facility. The scope statement should also spell out expectations about any eventual extensions, and should include a contingency policy as well. The scope statement should be a clear communication of the extent and functionality of the facility, between the proposers, sponsors, designers, constructors and the users or purchasers (Hartley, 2020).

Strong project scope statement has a characteristics like define the boundaries of the project, define the business need and the expected outcomes of the project, identify constraints that limit a project team's options for developing a solution, list assumption regarding decisions outside the project team's control, identify business processes impacted by the project, identify internal and external entities with the project team will interface (Eastwood, 2019).

Project document updates: Is a project documents that may be updated as a result of carrying out this process include assumption log, requirements documentation, requirement traceability matrix, stakeholder register. When additional information on existing information or new information is gathered as a result of this process, it is recorded in the respective document which corresponds to the additional or new information obtained (PMI, 2017).

2.2.6.4 Create Work Breakdown Structure (WBS)

Creating a work breakdown structure (WBS) is the process of breaking down project deliverables and project work into smaller, more manageable chunks (Handzic and Bassi, 2017). WBS improves cost, duration, and resource estimations, establishes a baseline for performance assessment and control, and makes explicit responsibility assignments easier (Ifeanyi 2019).

Even though the creating WBS is a crucial part of the Scope Management process, many project managers ignore it, which causes inappropriate planning. The WBS enables managers

and team to break down a high-level scope statement into smaller, more achievable work packages. The WBS that results should include a complete list of all work packages required for completing the project (Avantika Monnappa, 2021).

Additionally the author argued that, a WBS is a project management technique for defining and organizing the total scope of a project, using a hierarchical tree structure. The first two levels of the WBS define a set of planned outcomes that collectively and exclusively represent 100% of the project scope. At each subsequent level, the children of a parent node collectively and exclusively represent 100% of the scope of their parent node. A well-designed WBS describes planned outcomes instead of planned actions. Outcomes are the desired ends of the project, and can be predicted accurately; actions comprise the project plan and may be difficult to predict accurately. A well-designed WBS makes it easy to assign any project activity to one and only one terminal element of the WBS (Et.al, 2021).

The WBS is a hierarchy of all project work, it is a vertical breakdown, moving from the project goal to the tasks or subtasks. This decomposition process allows a good level of confidence in estimating the final project schedule and budget. It shows all the work that needs to be accomplished. At the top level is the project ultimate goal, the second level contains the project objectives, the third level has the project activities and depending on the size and complexity of each activity the WBS may contain a fourth level that describe the tasks (Khan, 2006).

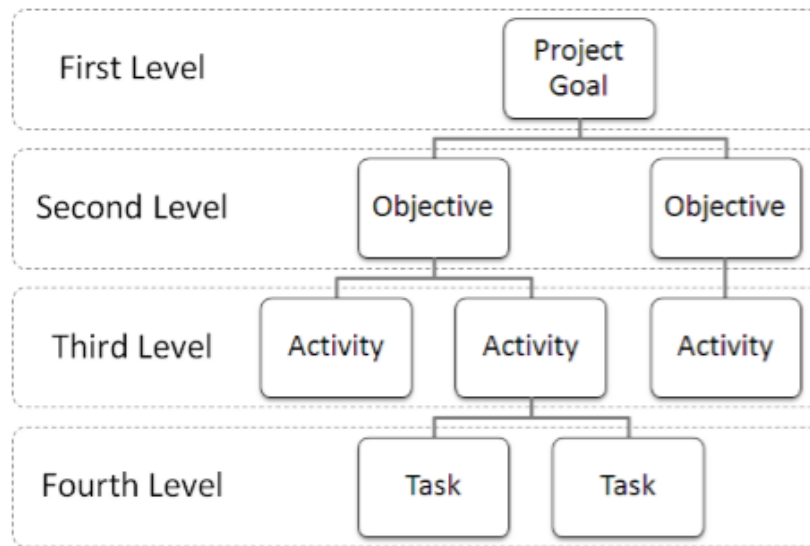


Figure 2. 1 Project WBS

Source (Compiled by researcher)

This process uses inputs like project management plan, project documents, enterprise environmental factors and organizational process assets and expert judgments and decomposition as a tools and techniques to have an output of prepared scope baseline and updated project documents (PMI, 2017).

Scope baseline: The scope baseline is the approved version of scope statements, WBS, its associated WBS dictionary, which can be changed only through formal control procedures and is used as a basis for comparison. Components of scope baseline may include project scope statement, WBS, work package, planning package and WBS dictionary (PMI, 2017).

WBS dictionary: After creating the WBS, it is required to create a WBS dictionary. WBS dictionary is a project document that provides detailed deliverable, activity, and scheduling information about each component in the WBS. WBS dictionary is a document that supports the WBS. Most of the information included in the WBS dictionary is created by other processes and added to this document at a later stage. Information in WBS dictionary may include code of account identifier, description of work, assumption and constraints, responsible organization, schedule milestone, associated schedule activities, acceptance

criteria, agreement information, resource required, cost estimate, quality requirement, technical reference and etc. (PMI, 2017).

Work component descriptions are described in the WBS dictionary. It includes a high-level summary of the work package as well as details regarding the work package's activities. Costs, budgets, schedule dates, resource assignments, and activity descriptions are all specified in the WBS dictionary. This allows project team members to be properly informed about the project's scope, and it also helps the team avoid executing work that is unnecessary or outside the scope of the project. This makes it easier to complete the project scope and prevents scope creep. It also assists in making the project understandable to project stakeholders (Brook Hailemariam, 2020). An example of WBS Dictionary is shown on tables at the end as Appendix C.

Project document updated: project document may be updated as a result of this process which include assumption log, requirement documentation (PMI, 2017).

The assumption log and requirements documentation are two project documents that may be amended as a result of this procedure. Additional assumptions or limitations identified during the Create WBS process are added to the assumption log. The documentation for requirements may be updated to reflect approved modifications made during the Create WBS process (Brook Hailemariam, 2020).

2.2.6.5 Validation/Verification of Scope

Validate scope is the process of formalizing acceptance of the completed project deliverables. The key benefit of this process is that it brings objectivity to the acceptance process and increases the probability of final product, service, or result acceptance by validating each deliverable. This process is performed periodically throughout the project as needed (PMI, 2017).

Ifeanyi (2019) stated that the Key project stakeholders, such as the customer and sponsor for the project, inspect and then formally accept the deliverables during this process. If the deliverables are not acceptable, the customer or sponsor usually requests changes. According

to him, the main outputs of this process, therefore, are accepted deliverables and change requests.

Scope validation is the process of obtaining formal acceptance of the project scope by the stakeholders (Et.al, 2021). It requires reviewing deliverables and work results to ensure that all were completed correctly and satisfactorily (Handzic and Bassi, 2017).

The Validate Scope process focuses mainly on customer acceptance. It is when the project customer formally accepts all the project deliverables. This process occurs at the end of each phase. During the process, the customer gives feedback on the work that was performed (Avantika Monnappa, 2021).

Accepted deliverables, work performance information, change request and project document updates may raise at the completion of this process. In developing this output at the end, this process uses project management plan, project documents, verified deliverables and work performance data as an input and inspection and decision making as a tool and techniques to analyses (PMI, 2017).

Accepted deliverables: deliverables that meet the acceptance criteria are formally signed off and approved by the customer or sponsor. Formal documentation received from the customer or sponsor acknowledging formal stakeholder acceptance of the project's deliverables is forwarded to the close project or phase process.

Work performance information: work performance information includes information about project progress, such as which deliverables have been accepted and which have not been accepted and the reasons why.

Change request: the completed deliverables that have not been formally accepted, as well as the reasons for their non-acceptance, are documented. A change request for defect correction may be required for those deliverables. The changes request are processed through the perform integrated change control procedure for review and disposition.

Project document updates: project document that may be updated as a result of carrying out this process include lesson learned register, requirements documentation, requirements traceability matrix.

2.2.6.6 Scope control

Control scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. The key benefit of this process is that that scope baseline is maintained throughout the project. This process is performed throughout the project (PMI, 2017).

Project scope control is the last and one of the critical processes in the scope management cycle because it is at this stage that the project management team has to prevent scope creep, while ensuring that all the changes are beneficial to the project (PMI, 2013).

Controlling the project scope ensures all requested changes and recommended corrective or preventive actions are processed through the perform integrated change control process (Et.al, 2021). Control scope is also used to manage the actual changes when they occur and is integrated with the other control processes. The uncontrolled expansion to product or project scope without adjustments to time, cost, and resources is referred to as scope creep. Change is inevitable; therefore, some type of change control process is mandatory for every project (PMI, 2017).

As Nath and Momin (2014), Scope change control is concerned with: Impelling the features that create scope changes to guarantee that changes are settled upon, Determining that a scope change has occurred and Running the actual changes when and if they occur. Scope control process uses project management plan, project documents, work performance data, organizational process asset as an inputs and data analysis as a tool and techniques in order to have an output of work performance information, change request, project management plan updates and project document updates (PMI, 2017).

2.2.7 Project Scope Change

Any change, at any stage, in the functionality of the project or facility is termed a scope change. All other changes which result from design errors and omissions, acts of God, or

changed conditions are classified as refinements or alterations. Overruns resulting from alterations, refinements and cost escalations are independent of scope changes (Hartley, 2020).

Hartley (2020) and Nath and Momin (2014) stated that the change in functionality can be of three types and can be in the horizontal or vertical direction:

Change in the capacity of functionality: In the working period, this type of change can be either an addition or a subtraction. Increase or reduction in the length or breadth of the road while maintaining other requirements, or increase or decrease in the number of standardized apartment blocks to be built are examples.

Change in the quality of functionality: This type of adjustment involves adding or subtracting functionality from the scope of work in order to modify the overall functioning. In a road design, examples include adding or removing separators, toll booths, extra-markings, and guardrails, as well as adding or removing facing in a building.

Complete change in the functionality: This type of change includes a complete redesign of a project's or facilities initial functionality. Changing the design of a flexible pavement to a rigid pavement, or changing the design of a structure from reinforced concrete to structural steel, is instances of such changes.

Sometimes if the capacity or size of an item, activity or portion of a project is changed the functionality of that item, activity or portion does not change. But if the size is increased to such an extent that a change in functionality occurs, then it can result in scope modification (Hartley 2020; Nath and Momin, 2014).

The project manager and the clients make an official decision to change the feature of the project deliverable, either by expanding or decreasing its functionality.

Changing the scope of a project usually requires adjusting the cost, budget, other features, or the timetable

2.2.8 Cause of Project Scope Change

Changes to scope during a project would be best to be avoided as they bring the challenge of increasing cost and schedule. Since, it is always difficult to get additional finance resource; hence it is important to justify the causes of any scope request.

According to Ifeanyi (2019), common causes of scope changes are:

External event: Changes in the competitive environment or a new regulation can cause the team or the stakeholders to reconsider the product Scope.

Error in defining of project: If a requirement was left out in defining the scope originally, the scope will have to be changed to include the new requirement. An error in defining the project scope, such as needed to employ specific procedures or processes, could entail changing the project scope.

Value-adding change: Sometimes a team member finds a better way of accomplishing the work or determines how to improve quality by doing things differently.

Implementing a contingency plan or work around: If a risk event occurs and there is need to take actions to respond to it, the actions could cause a change to either the project or product scope

Beneficiaries see the outcome and wants changes: Some outcomes of development projects employ a life cycle that allows for iterative development as the beneficiaries see interim deliverables. This is still a scope change, but the project team plans for the design and the deliverables to evolve with each of iteration.

According to Yibekal Adamu (2018) cause of scope change, which are unavoidable for the good of the project deliverable are: the business needs have changed, the organization has changed, exploit technology improvements, the organizations priorities have changed, new business partners and channels, new legislation and regulations, globalization & standards etc., effect of other projects and initiatives and poor scoping. Change in material price, Inadequate definition of specification, Cost change, Proper scope is not done and Budget overrun

Mohtadi et al. (2019) explains Causes of scope changes are design deficiency, criteria changes, unforeseen conditions (which include differing site condition), changes in the scope directed by the owner.

Badiru, Badiru, and Badiru (2019) explain that causes of scope changes categories in to two groups as internal and external causes, which are listed in table below

Figure 2. 2 Causes of project scope changes

S/n	Internal causes	External causes
1	Poor definition of requirements in scope description	A change in law or standards set by environment
2	Technological uncertainty	Governmental interventions
3	Users or team members learning new things about the project or environment	Uncertain weather conditions
4	Lack of coordination	Unavailability of equipment
5	Lack of integration of project parts	Uncertain inflation
6	Disputes between team members	Lack of experience of the contractor
7	Errors and omissions in design	
8	Poor interdisciplinary communication	
9	Tasks assigned to wrong person within project team	The contractors' desire to improve his financial conditions

2.2.9 Project Scope Change Management

The goal of scope change management is to ensure that the approved Project Contract (or agreement) and Project Logical Framework remain viable (Log frame). In other words, the Project Contract establishes a causal relationship between the project's inputs, processes, outputs, outcomes, and objectives, whereas the Log frame establishes a causal link between the project's inputs, processes, outputs, outcomes, and objectives (Khan, 2016)

Scope change management need to consist of forecasting possible changes, identifying changes that occurred, plan measures to prevent negative impact and coordinate changes throughout the entire project (Badiru, Badiru, and Badiru, 2019).

Yibekal Adamu (2018) argued that the best line of defense against scope change is to ensure that the scope is as well defined as possible from the start. That implies you'll decide what's included and what's not. It's common for individuals to overlook "what isn't," which is a big mistake. Before making any changes to your project, you must first complete the following two steps: Make a clear understanding of the change and how it will affect your project.

According to him, it is not possible to assume there will be no changes during the life of the project. For example, changes may come from the beneficiaries who want additional deliverables, then the initial estimates for budget, and schedule may no longer be valid. If the donor agrees to include the new work into the project scope, the project manager has the right to expect that the current budget and deadline will be modified (usually increased) to reflect this additional work. This new estimated cost, effort and duration now become the approved target.

Ifeanyi (2019) puts down the future for controlling project scope change as:

Change control responsibilities: Specification of each team member's responsibility to manage project scope change, including guidance for project team members to use reasonable judgment before adjusting work that could be considered "out of scope," and related guidance for managing stakeholders requests or directions for work adjustments that could present scope issues or otherwise be contrary to the established work assignment.

Control authority: Specification of who is authorized to approve changes in project scope; usually the project manager, but sometimes the project executive (sponsor) or other senior manager (or control board) retains this responsibility.

Control plan management: Designation of a change control manager (for assignment on larger projects) who will maintain the change control log, manage incoming change requests, monitor change evaluations, and oversee approved change implementations; this may include authorization to collaborate on changes with the customer, in addition to negotiation of change requests with the customer.

One of the main requirements for scope management is that all changes to the project scope must be approved by management and the project's donor. For successful construction project

management, a good awareness of causes and effects is always required (Sun, Vidalakis and Oza, 2009).

2.3 Empirical Reviews

2.3.1 General literature

Many researchers have conducted a study in the different components of project scope definition and scope change management practices.

Nahod (2012) investigated Scope Control through Managing Changes in Construction Projects to the overall success of a project. It has been carried out on change management in Croatian construction practice, based on the theoretical basis for the research called Dynamic Planning and Control Methodology (DPM), through questionnaires and interviews were processed, from key project stakeholders and found that there can be no project success without a systematically and professionally appointed system for managing the scope. Scope control is achieved through managing changes. He recommends for further research should focus on the improvement of quality in the calculation of change impact as well as verification of the impact of a project manager's competencies on managing changes.

Hartley (2020) has presented the concept of scope management to search for the reasons for scope changes and as a result he found that if factors that contribute to the decision making process of the owner are rightly directed, and the relation between the designers and owner is properly managed, a major portion of scope management until will function. He recommends that by improving the interaction, attention, knowledge, and experience of the players involved, the scope development process will be improved. The improvement in these factors improves the scope definition process by better defining the needs and in the modification process by better attention to details in the process.

F.M. REIJNDORP (2018) studied identifying possibilities to improve scope management of Dutch infrastructure projects, to contribute to an improved scope management process by identifying the bottlenecks that hamper this process and provide solutions for these bottlenecks, by comparing literature findings with practical experiences using qualitative research based on a literature study followed by empirical research. It is concluded that

applying only the theory from PMBOK not creates clarity about the steps and the roles and responsibilities linked to the steps, In addition, barriers are still present. He suggested that Systems engineers contribute to scope management by managing the requirements during the project. These requirements flow through the scope management steps from collecting the requirements to validation. Contract managers are essential when managing scope. The contract managers must use the implementation guide to ensure the steps are defined in the contract and the roles and responsibilities are linked to the steps.

Et.al, (2021) examined the relationship between the stakeholder's involvement, project managers' skills, top management strategy, and project scope management in the funded government project in the sultanate of Oman. A statistical tool which is Statistical Product and Service Solutions (SPSS) was used to analyze the data collected, and found indicated that there is a positive and significant relationship between the stakeholder's involvement, project managers' skills, top management strategy, and project scope management. And also confirmed that stakeholder involvement, project managers' skills, top management strategy have a positive effect on the project scope management. The study has suggested a future study on a numbers of others influencing factors on the project management practices of government projects.

Al-Rubaiei, Nifa, and Musa (2018) studied Project Scope Management through Multiple Perspectives by using a definition of scope management as the main process and found that Project management is a dynamic business method and standards, but the project scope part has to be freeze at the beginning of the project to accomplish the project goals and objectives effectively. They suggest making the most verified choice of methods or standards resulting from an explanation of the task of optimizing the project's scope to the following measures: profit, time, cost, and quality. They also recommend further on the scope of the project management filed and its impact on project success rate.

The work of Lukhele, Botha, and Mbanga (2021) has sought to explore the relations between project complexities and scope changes in construction projects, to find possible precautions and preventive measures to minimize the occurrence of scope changes in construction projects. The TOE (Technical Organizational Environmental) framework was adopted and

applied to a multiple-case study research design to explore and denote project complexity relations to scope changes in construction projects. uses a qualitative multiple-case study approach to explore the dynamics of project complexities within which scope changes are emanating and found that ‘project complexities’ are an inherent and defining feature of construction projects and also argues that construction projects by their very own nature are dynamic and complex, and as such, scope changes are inevitable during the project delivery. They recommend additional studies to determine the statistical significance and the cause-effect of the variables thereof.

2.3.2 Literature Specific to Ethiopia

Yibekal Adamu (2018) analyzed the severity and frequency of the causes of scope change during the implementation phase of building construction projects. A questionnaire survey is conducted on pertinent stakeholders and found that building construction projects commonly share key characteristics scope changes as a major cause of quality problems, project delays, and cost overruns are not studied in Ethiopia. So any work that is not part of the defined scope should not be included in the project schedule. Causes and effects of scope changes in construction project in Ethiopia; identifying factors for scope changes and their resulting impacts on project deliverance is suggested for future work.

Kalkidan Kebede (2020) investigated factors influencing project scope performance at Bole Ayat 2 site 40/60 condominium projects by adopting a descriptive research design to collect quantitative data using a questionnaire as the instrument. The Lack of complete definition of project scope and its impact on critical factors, Underestimating activity duration and cost estimation and activity sequencing, and the fact that there is no clear agreement between the client and the contractor concerning how to verify the activities with what is stated in the contract on regular basis and the awareness that at Change in project activities results to change in Project schedule/time cost and quality are the major challenges related to project scope management processes. A proper mix of experience and knowledge and other management skills, regular communication and meetings with the major stakeholders, design bid build (DBB) project delivery system need to be adjusted and updated to avoid the length of the process, applying a proactive management style to prevent challenges and scope change from happening are among advised solution from the researcher.

Brook Hailemariam (2020) assessed the strengths and the weakness of project scope management practices of road construction projects in Addis Ababa. A Mixed research approach or mixing or combining of quantitative and qualitative research approach is applied, but mainly a Quantitative approach to gather numerical data is used.

According to him, the scope management practice of the road construction projects is at good status except for practices of requirement planning and requirements management used in the scope management process of the projects, and the incapability of the authority in managing stakeholders' requirements' of the projects have seen. He advised improving the requirement planning and management practices of the projects by making the organizational structure of the authority supportive` for the collaborative work of the units working on requirements planning and management, conducting a continuous discussion with the stakeholders of the projects, and identifying the problems and situations in the ground; and conducting continuous research on the issue of requirements planning and management in the authority to identify the real problem and to develop a solution for it.

2.4 Research gap on scope management planning

Planning has long been a subject of discussion in the building industry. Many guides have been developed and much knowledge resides with experienced practitioners. However, early planning in many cases is not performed well in the building construction industry. Consequently, the building sector suffers from poor or incomplete scope definition, frequently experiencing considerable changes that result majorly in significant cost, schedule overruns and quality problems.

Project management in general and Project scope management in particular are typically tied to organizational objectives, basically, cost, times and quality and help to achieve specific outcomes. The ability to define and then effectively control the scope of a project depends a lot on the goals and requirements of the project. Therefore, we need to gather the necessary information up front, before we ever start the project. By clearly understanding the needs of the stakeholders and the capabilities and constraints of our resources, we have a higher chance to succeed.

Therefore, scope management plan is really a mechanism for monitoring and managing scope of the projects. In order to define this plan, it is important to understand the potential risks and issues, as well as the needs of the business and objectives of the project. It is these components that will enable the identification of potential changes to scope as the project progresses, and also provide anticipated means and limits for future changes. In other words, as the project progresses, this plan will provide a framework for making key decisions about requested changes to scope.

Writing a scope statement, Scope statements define both what a project will involve and what it will not involve. Getting typically into specifics about the project budget, timeframe, and deliverables is a scope statement. These parameters help you determine what tasks to include in your project. For example, you might consider: Deliverables: These are tangible products, services, or results that you will produce during your project. Somewhere in your project should be tasks that reflect the delivery of each deliverable such as key dates, and project completion criteria's.

Most of the study focused in scope management in general, this study differs from other literatures, it asses specifically the practice of scope management plan and causes for change of scope change in building construction projects of Bishoftu city. Inefficiency of scope management plan practices in different phase of a building construction project is the main reason for cost and time overruns and it remained common problem in every construction project in general and critical mainly in building projects.

Improper scope definition, poor control of scope, and scope change during the implementation phase of a construction project is the main reason for cost, quality problem, and time overruns and it remained common problem in every construction project in general, and critical mainly in building construction projects in Ethiopia, and in Bishoftu city too. However, the extents of how the practices of scope management planning process going on, and as well as the frequency and consequences of occurrence of scope changing elements have remained understudied.

As far as the review of the researcher is concerned no work is obtained on private building construction projects under different categories as a population on scope management

planning approach, and effect of scope change on building projects done in the context of Ethiopia, and also in Bishoftu city. Despite a very many problems concerned with project objective failure observed in Building projects in the city whether in public or private projects.

CHAPTER THREE

3 METHODOLOGY

3.1 Introduction

In this chapter the study area, research design and approaches, population and samples, data collection method, data analysis methods, reliability, and validity test have briefly presented. Further description and illustration are given on how each data collection tool has applied.

3.2 Description of study area

This study entitled “Project Scope management approach of construction project: The case of Bishoftu City Construction projects” have undertaken on randomly selected private and public Building construction projects constructed by employed external contractors and running in different areas of Bishoftu city.

Bishoftu city is located in Ethiopia, in Oromia Regional State at a distance of 47 km from the capital Addis Ababa. Its astronomical location is 8° 43"- 8° 45" North Latitude & 38° 56"- 39° 01" East Longitude (Daba, 2021). The city was founded in 1917. Bishoftu is one of the reform towns in the region and has a city administration, municipality and 15 kebeles which are grouped under 4 sub-city. The town has its own administration structure plan which was prepared in 2010.

The city is surrounded by seven (7) natural lakes and that is why the city called '*the land of lakes*'. The city is also attracted by many tourist and those lakes cause the investors to invest in the town. The major building construction types in this city are Hotel building, resort and waterscape construction, mixed use building, commercial building, industrial building, residential building, cultural hall building, Industrial shade construction, landscape construction and other public project construction.

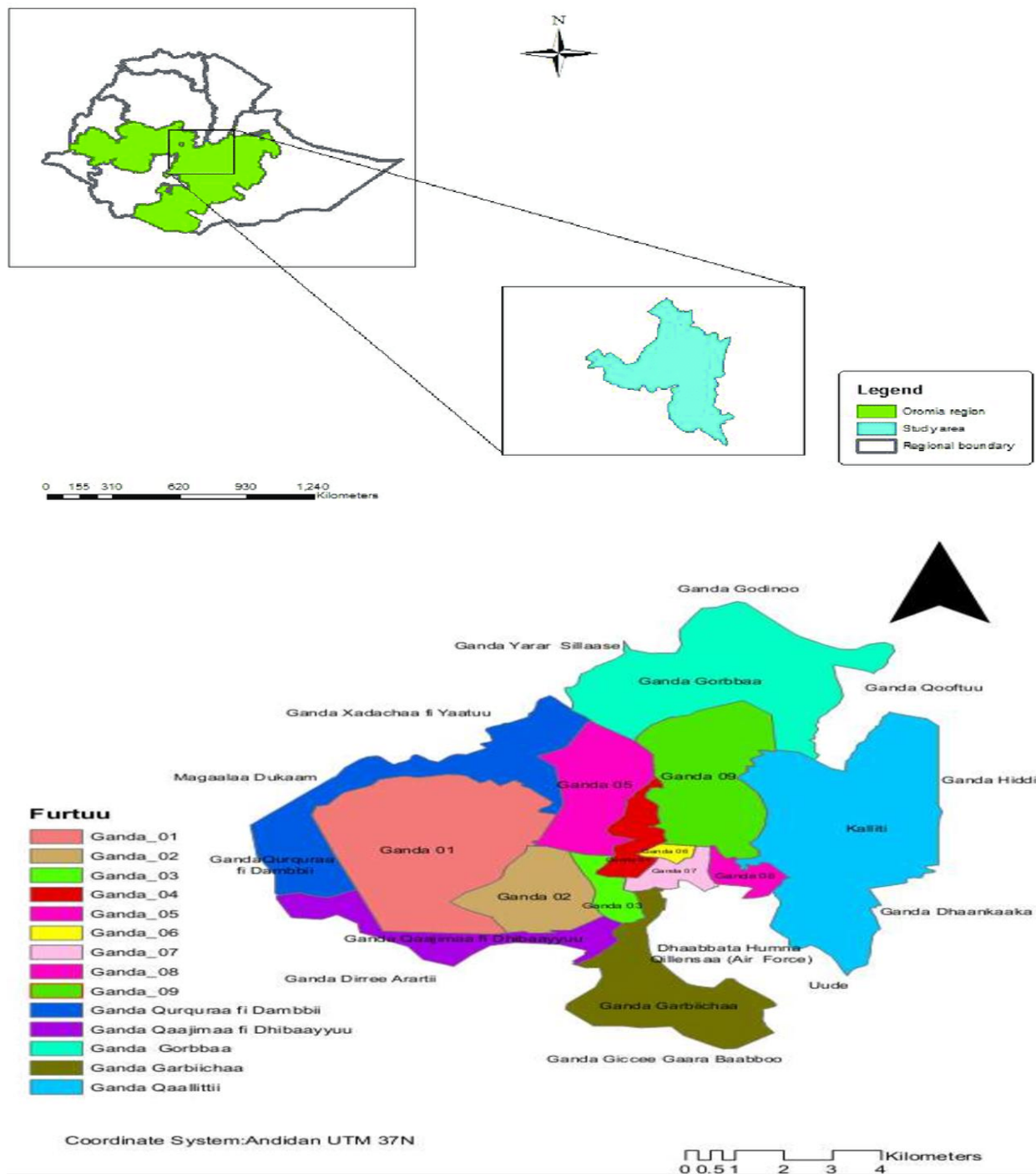


Figure 3. 1 Bishoftu city Administration Boundary map (study area)

Source: (Daba, 2021) and Google map images

3.3 Study Design

According to (Kothari, 2004) a research design is the arrangement of conditions for the collection of data and its analysis. He further illustrates that the function of research design is to serve as a frame to collect relevant evidence with minimal costs with respect to time and money. It constitutes the blueprint for collection, measurement and analysis of data.

The objective of this study is to assess scope planning management approach in building construction project by using mixed research approach of both qualitative and quantitative data. In this study, since the focus of the study is the description of the situation as it exists at present, a descriptive research design was employed and both qualitative and quantitative data were observed.

Descriptive survey method, allow the collection of a large amount of data by using questionnaires in an economical way, easy to explain and understandable way (Saunders, Lewis and Thornhill, 2007) . It defines an opinion, attitude, or behavior held by a group of people on a given subject by combining quantitative and qualitative data to provide with relevant and accurate information. Therefore, this study will uses descriptive survey method.

3.4 Population of the study

A population is a collection of people, things, or things from which samples are gathered. A population is an entire collection of people or elements who share at least one characteristic. (Kalkidan Kebede, 2020).

The population of this study is private and public construction projects that have under construction in Bishoftu city. This study has used a descriptive, cross sectional research design, with a target population size of Forty (40) building construction projects which are under construction

These Forty (40) building construction projects has taken from the report that is done annually by Bishoftu city administration construction office, category ‘C’ building construction that has got construction permission license, and inspected and supervised under his office which is an average from the last three years. Both private and public building constructions which are only currently active projects have been included.

According to Showkat and Parveen (2017), in stratified sampling method, the population elements are divided into strata on the basis of some characteristics and from each of these smaller homogeneous groups draw at random a predetermined number of units

Singh, Singh and Masuku (2014) argued that if the population is heterogeneous, stratified random sampling is an effective data collecting strategy. The entire heterogeneous population is separated into a number of homogeneous groupings, commonly referred to as Strata, each of which is homogeneous within itself, and then units are randomly selected from each of these strata. The sample size in each stratum changes depending on the stratum's relative relevance in the population. The sample has been selected from those strata like: mixed use building construction project, resort construction project, landscape construction projects, industrial and production shade construction projects, public construction projects and Real estate construction project.

3.4.1 Sampling Design

Currently there are many ongoing projects which are constructed by external constructors under the supervision of recruited consultants, Bishoftu city municipality, Bishoftu city Construction office.

When it comes to gathering population data, there are a variety of options. In some circumstances, measuring the entire population to gain an accurate picture of the people at hand is achievable (the exhaustive survey). However, in some circumstances, a sub-group of the population is made possible. This sub-group is known as a sample,' and sampling is a technique for picking a representative subset of the population. (Showkat and Parveen, 2017).

3.4.2 Sample size Determination

Sample size determination is the technique of selecting the number of observations to include in a sample. The sample size is carefully fixed so that it will be adequate to draw valid and generalized conclusions.

Case study approaches facilitate in-depth investigation of particular instances of a phenomenon. Those cases could be chosen in a variety of ways, including to be representative

of general cases (typical; case selection is related to statistical sampling), personalized case(s), random, and so on (Fellows and Liu, 2008).

The fixation of the adequate sample size requires specific information about the problems under investigation in the population under study (Neilson, 2011). A sample size of Eighteen (18) samples have been used based on (Daba, 2021) recommendation that 10%-20% of population size is a sufficient sample size, which in this case, 45% of population has been selected for sample size. This sample size is the sum of different sample size in each stratum depending on the stratum's relative relevance in the population.

Table 3. 1 Sample size determination

S/N	Name of Sub-group	Population	Sample Size
1	Resort construction project	5	3
2	Mixed use (commercial) Building construction	18	5
3	Industrial and production shade construction project	10	3
4	Landscape construction project	1	1
5	Public Construction project	3	3
6	Real estate construction project	3	3
Total		40	18

Source: own survey data (2022)

3.4.3 Sampling Techniques

Sampling is the method of selecting a representative subset of the population called sample. Sample is a portion of a population or universe (Showkat and Parveen, 2017).

The study of these populations have carried out by a random selection of sampling techniques from each group of mixed use building, resort building, landscape, industrial and production shade, and public building construction projects from which the required information to find

Table 3. 2 Samples of Population from both private and public projects

S/N	Name of project	Client	Ownership	Function
1	B+G+5 building construction	Alemayew Niguse	Private	Hotel and resort
2	Hebron Resort construction	MH Engineering	Private	Resort
3	G+6 Aparthama construction	Africawit Construction	Private	Aparthama
4	RAMA real estate construction	RAMA Construction	Private	Real estate
5	G+4 and shade construction	D/zit Food Complex	Private	Production shade
6	G+B+12 building construction	DUGDA Construction	Private	Hotel & Mixed use
7	B+G+6+Terrace construction	Pyramid resort	Private	Resort
8	TK Hotel (B+G+8) construction	TK	Private	Hotel & Mixed use
9	B+G+5 building	Ermiyas Yohannis	Private	Mixed use
10	Cultural Hall Construction	City Administration	Public	Culture center
11	Market Center Construction	City Administration	Public	Mixed use
12	Urban Park (landscape)	City Administration	Public	Recreation Center
13	B+G+7 Mixed use building	Dawit Wolde Arega	Private	Commercial
14	B+G+8 Hotel Building	Tsigereda Tuji	Private	Mixed use
15	Bishoftu city Court Office	City Administration	Public	Office
16	Hebron Resort construction	MH Engineering	Private	Real estate
17	Construction of Production packaging and storing shade	Wakjira Tefera	Private	Package and store shade
18	Construction of KAM Ceramic production shade	KAM	Private	Production shade

Source: Report from construction office and own survey data (2022)

3.5 Method of data collection

Data collection is simply how information is gathered. Under this, sources of data, and data collecting instruments have studied in detail.

3.5.1 Sources of data

There are several ways of collecting the appropriate data which differ considerably in context of costs, time and other resources at the disposal of the researcher (Kothari, 2004). In this study, the researcher has collected data from both primary and secondary sources. Data from both primary and secondary sources have cross checked and triangulated to enhance the

validity of the research. There are two types of data, namely primary and secondary data. The Researcher may use either both or one of the types of data depending on the research type and data collect by researcher (Saunders, Lewis and Thornhill, 2007).

3.5.1.1 Primary data sources

Primary source of data is the information that the researcher finds out by himself regarding a specific topic using questionnaires. The primary data was gathered particularly by using likert scaled standard questionnaires (Kalkidan Kebede, 2020). The Likert-type scale method uses a range of responses: “strongly Disagree”, “Disagree”, “Neutral”, “Agree”, and "Strongly Agree", with a numeric value of 1-5, respectively.

For this research purpose, primary data has been collected through standardize questionnaire. Archival data, interviews, questionnaires, observations, and other data collecting techniques are frequently used in case studies (Fellows and Liu, 2008). Primary data have originated by a researcher for the specific purpose of addressing the problem at hand. The researcher have simultaneously collect both qualitative and quantitative data. Targeted respondents have been source of data.

3.5.1.2 Secondary data sources

For secondary data, contract documents, manuals, directives, proclamation, annual reports, internet sources, other unpublished materials and articles related construction project scope change management have been used. This data have serve as reference and also have guided the focus of clarify research question.

3.5.2 Data Collection Instruments

A combination of data collection instruments have been employed in this research. When this study involves the opinion and experience of individuals through interview method of data collection, Observation (participant observations, Overt), Archival (actual) data, documented data and questionnaires have been used as an instrument for data collection.

3.5.2.1 Questionnaires

Questionnaires are general term that include all techniques of data collection in which each person is asked to respond to the same set of questions in a predetermined order (Saunders, Lewis and Thornhill, 2007).

Questionnaires are both open and close-ended which has prepared and distributed to the respondents which have drawn by using randomized sampling technique. Under purposive/judgmental sampling technique, the researcher has selected those who were knowledgeable and able to deliver the required data. The researcher intentionally has select seventy (70) respondents (project managers, office engineers, supervisors, architects, etc.) from different employers which are participated on the execution Eighteen (18) building construction projects which have used in this this study as samples. The one with necessary, reliable and relevant information that suited the purpose of the study have selected. These includes: staff of Contractors, staff of consultants, Construction office staff, city's administration project committee, city's Municipality infrastructure department staffs and clients and other stakeholders. Questions which have used for questionaries' for both open and close-ended and interviews are attached at the end as Appendix A.

3.5.2.2 Interviews

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews (Kothari, 2004).

In this study unstructured (In-depth) interviews type of interview method have been used, in which participant are free to talk about what he/she deems important, with little directional influence from researcher, and interviewee have allowed to talk freely. In-depth interview have held with a four (4) experts employed at different position in governmental and private organization in Bishoftu city. These are: with a team leader of the procurement technical team of Bishoftu city administration, at the investment office with the expert who has permitted investment, with a project manager of consulting office, and lastly with a site engineer of contractor. The interview questions are also annexed herewith at the end.

3.5.2.3 Observation

Observation is a scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to checks and controls on validity and reliability (Kothari, 2004).

Participant types of observation (researcher becomes much more involved in the counting by direct observation) have been used under this study. From participant observation types, Overt (everyone knows who the researcher is and what he/she is doing) have been used for this research. The physical status of all samples of population has observed by the researcher. Not only physical status, but also, some document related with the projects like design, contract agreement, bill of quantity, original document, modified document, documents related with scope of the project (WBS, change, validate, control of scope), especially in public projects, the researcher have observed such things.

3.5.2.4 Case Studies

Under this two main issues have been studied in detail. The aim is to identify whether there is a good scope management planning practices, or not, and whether the building construction projects are affected by scope changes. Major reasons for scope changes are by poor and improper scope management planning practices.

The case study analysis is based on the aspects derived literature review from PMBOK (PMI, 2013). Scope management planning steps in building construction projects, roles and responsibilities of the parties, and effects of scope changes on building construction projects were major points which have identified.

In this section the interview setup and case selection are discussed, followed by the case study results. Prior to the interviews case documentation is reviewed such as the requirement specification and project management plan. This forms the basis for the case study interviews. Subsequently, in each case study, three experts are interviewed, all fulfilling a different role in the project, to ensure different perspectives of scope management in the project team are studied. The cases are chosen from: First, the projects are all building construction projects which are under construction in Bishoftu city (two from public projects and one from private projects), each projects are ongoing construction projects under different employer, contractor

and consultants. Second, both relevant documentation and people available to interview. Since the interview results need to be validated, they need to be compared to the case documentation. Therefore access is needed to information about the defined scope and scope management steps, roles and responsibilities and procedures concerning scope management. Lastly, in addition to the documentation, three project team members (each from client, contractor, and consultants respectively) with different roles need to be available to participate in the case study interviews.

Case -1

This project is called “Construction of Bishoftu city Cultural Hall” which is executed by Walabu construction Share Company as a contractor, ETG design and consulting share company as a consultant, and Bishoftu city administration as an employer. The project concerns activities within culture, rules, and norms of Oromo people and takes place in Bishoftu city. The contract agreement between the client and contractor is on the day of 29th September, 2021 to complete the construction with 45,048,877.02 ETB within one year contract period time. The project management plan describes that regarding scope management, the contractor is obliged to make a WBS and an object tree. The client is obliged to define the scope, project’s requirement properly. Clients is responsible for collect requirements from stake holder and define scope of the projects.

Interviewers participated on this projects are project manager, project coordinator, and technical coordinator.

Case -2

This project is called “Construction of Market center Buildings” which is executed by Zewudu Lema B.C as a contractor, ETG design and consulting share company as a consultant, and Bishoftu city administration Commercial office as an employer. Thus, market center project includes one block G+4 Building and two block G+3 Buildings. The project concerns the activities such as; constructing a commercial center for the farmers who are displaced from their original agricultural land at different times for the development of investments and other needs of the Bishoftu city. The contract agreement between the client and contractor is on the

day of 7th May, 2017 to complete the construction with 50,257,185.65 ETB within two year contract period time. Process owners (from clients), project coordinators (from consultants) and site engineer (from contractor) are participated on the interviews.

. Case -3

This project is a private project “Construction B+G+8 Hotel building” which is executed by MH engineering as a contractor, and TK as an employer. The project is concerned on the constructing star 4 types of hotel standard for the land of lakes and tourism, of Bishoftu city. The contract agreement between the client and contractor is on the day of 20th September, 2016 to complete the construction with cost of 426,282,545.92 ETB to finish within three and half years. Scope management tasks are described. It is pointed out that a WBS should be made by the contractor.

Project manager (from consultant), civil engineer (from contractor), project coordinator (from client) have been participated on the interviews and gave us their feedback..

3.6 Methods of Data Analysis

In this study, descriptive statistical techniques have been employed for the analysis of data obtained from both the primary and secondary sources.

For the first objectives’ of this research, the data have been coded according to the questionnaire. As stated earlier the Likert-type scale method have used a range of responses: “strongly Disagree”, “Disagree”, “Neutral”, “Agree”, and "Strongly Agree", with a likely wood value of 1-5, respectively. So that it can be entered and processed in the SPSS (statistical product and service solution) package known by the name PASW (Predictive Analytics Software). Simple statistical tools like mean (from measures of central tendency), Standard deviation (from measure of dispersion), tables and frequencies have been used in the analysis and presentation of quantitative data. Mean is sum observed variable values & divide by number of observation, which is sensitive to extreme values. But, standard deviation is uses all data values in measuring data distribution around mean. It is a value describes extent of spread between data points & average (mean).

The higher the value for the standard deviation, the more spread out the values are in a sample. Conversely, the lower the value for the standard deviation, the more tightly packed together the values. A small standard deviation represents data where the results are very close in value to the mean. With regard to the data that have been gathered through interview, the researcher has taken notes, have described and summarized the data and analyzed the data thematically.

For the second objectives of this research, in the questionnaire, respondents have asked to rate the degree of impact (consequences) and frequency (probability) of occurrence for each of the twenty descriptions of scope change effects on project caused by scope change throughout the construction phase of the project, which has chosen based on various literature. The degree of impact (consequences) has five scales and also the frequency (probability) of occurrence has five scales. Weighing is assigned to each of the categories as shown below. A questionnaire is attached at the end as Appendix A.

Table 3. 3 Weighing assigned to degree of impact (severity) and frequency of occurrence

Probability of occurrence	Rare	Unlikely	Moderate	Likely	Almost Certain
Impact (consequences)	Very Low	Low	Moderate	High	Very High
Likelihood score	1	2	3	4	5

Therefore the collected responses from each respondent on each specified description of scope change effects has been summarized and counted in their respective categories. The responses were analyzed through the following statistical techniques and indices according to (Assaf and Al-Hejji, 2006):

- a) Frequency Index (F.I) : This formula is used to rank effects of scope change on a construction project based on the probability of occurrence indicated by respondents

$$\text{Frequency Index (F.I) \%} = \left(\frac{\sum_{i=1}^5 B_i N_i}{5 \sum_{i=1}^5 N_i} \right) * 100\% \dots\dots\dots [1]$$

where B is a constant expression weighting given to each response, it ranges from ‘1’ for Rare to ‘5’ for Almost certain; N is the frequency of response.

- b) Severity Index (S.I): Is a formula used to rank effects of scope change on construction project based on consequences (impact) indicated by respondents.

$$\text{Severity Index (S.I) \%} = \left(\frac{\sum_{i=1}^5 A_i N_i}{5 \sum_{i=1}^5 N_i} \right) * 100\% \dots\dots\dots [2]$$

Where A is a constant expression weighting given to each response, it ranges from ‘1’ for Very low to ‘5’ for Very high; N is the frequency of response.

- c) Importance Index (I.I): the importance index of each effects calculated as a function of both Frequency Index and Severity Indices, as follows:

$$\text{Important Index (I.I) \%} = [\text{F.I (\%)} * \text{S.I (\%)}] / 100\% \dots\dots\dots [3]$$

- d) Ranking of description of effects of scope change variables on a project considers the severity index, frequency index and importance index on the basis of the value for each effect calculated from the response of respondent by assigning the first rank for the highest value, the second rank to the next highest value and so on.

For the last objectives of this research, depending on the literature reviewed and result of analyzed data, frame work for scope management plan have developed.

3.7 Reliability and Validity of Data

According to Kothari (2004), validity is the extent to which a test measures what we actually wish to measure. Reliability has to do with the accuracy and precision of a measurement procedure. Reliability refers to the extent to which the data collection techniques or analysis procedures will yield consistent findings, while validity is concerned with whether the findings are really about what they appear to be about (Saunders, Lewis and Thornhill, 2007).

To ensure validity of the data, the researcher have used Advisor, project managers, Experts, experienced professional to check for how actually the details of data collection instruments will accomplish researcher objectives. The researcher has ensured case company data base information from authoritative personnel.

In order to achieve reliability of data, in addition to the 5-likert scale, space for respondent’s comments on the particular variables have been provided to get respondents understanding on the matter. The respondents’ responses from same department have been checked for consistency on some of the questions they responded. Interview has used to crosscheck data

collected through questionnaire. To avoid error in coding, two people have been used, one reading and other entering in the SPSS software. The reliability of the study data have been tested using SPSS to calculate the Cronbach's alpha coefficient of internal consistency of the variables which have been used in the questionnaire.

To find out the internal consistency of the questionnaire, (how questions are closely related collectively), Cronbach's alpha ($C\alpha$) has measured. Alpha coefficient defined in the following ranges (Tariq *et al.*, 2020): $0.8 > C\alpha > 0.7$ (Acceptable), $0.7 > C\alpha > 0.6$ (Questionable), $0.6 > C\alpha > 0.5$ (Poor) and $0.5 > C\alpha > 0.4$ (Unacceptable). Since we have different items grouped under different categories, we are not going to calculate Cronbach's alpha coefficient for entire items at once, which is incorrect and does not make a sense. So we have to calculate for each scale items separately, which means we need to have different Cronbach's alpha coefficient.

Table 3. 4 Cronbach's alpha coefficient separately for each scaled items

	Scope management process	Cases (N)			Cronbach's alpha ($C\alpha$)	Number of items
		Valid	Excluded	Total		
1	Plan Scope management	70	0	70	0.887	11
2	Collect requirements	70	0	70	0.922	12
3	Define project Scope	70	0	70	0.904	10
4	Create WBS	70	0	70	0.907	10
5	Validate/Verification	70	0	70	0.718	5
6	Control Scope	70	0	70	0.871	5
Average Cronbach's alpha ($C\alpha$)					0.868	

Table 3. 5 Cronbach's alpha coefficient description of effects of scope change effects

	Effects of scope changes	Cases (N)			Cronbach's alpha ($C\alpha$)	Number of items
		Valid	Excluded	Total		
	Description of effects of scope changes	70	0	70	0.914	20

Source: SPSS (Version 22)

The results were passed since Cronbach's Alpha values for both are more than 0.7, which is implying that constructs are considered to be a consistent to measure the variables.

3.8 Ethical considerations

Ethics is becoming an increasingly prominent issue for all researchers. Researchers will be encouraged to employ knowledge of research ethics in practice. Ethical issues have been a prominent throughout this research process, including during the data collection, during the analysis and writing up of the final report.

The researcher has clarified to the respondents about the objectives of the study and explains that the information will be used only for research and academic purposes. During conducting data collection, both honesty and respect for the rights of the respondents have been in place. Again, the researcher has respected the rights to anonymity, confidentiality and informed consent of the respondents.

CHAPTER FOUR

4 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of the data collected through questionnaires, and from documents of building construction projects.

This chapter was organized on to four sections, the first section describes a general introduction about a chapter, the second section of this chapter describes the profiles of respondents, the third section of this chapter describes the opinion of respondents on project scope management planning practices (which is the first objective of this research) based on results from the SPSS , the fourth section of this chapter describes the effects of scope change on the project of selected case projects from the perspectives view of respondents (which is the second objective of this research) and the last section describes the developed conceptual framework of the scope management plan by the researcher (which is the third and last objective of this research).

Originally, 70 questionnaires were distributed to respondents. From which 65 questionnaires were physically distributed to the respondents and 5 questionnaires were sent using telegram application. Of distributed 70 questionnaires, all are filled and returned successfully. Hence, 100% of the distributed questionnaires are responded to successfully.

4.2 Profiles of respondents

4.2.1 Educational qualification of respondents

Regarding the educational level of the respondents, the respondents fall into three categories of educational qualification: 3(4.3%) had a diploma, 42(60%) had a Bachelor's degree and 25(35.7%) had a Master's degree. In general, 67(95.7%) of the respondents had a Bachelor's degree and above. (See table 4.1)

The respondents' educational profiles indicate that most of the respondents have adequate educational qualifications and this indicates their opinion regarding the scope management

practices of building projects and the effects of scope change on a building project is based on appropriate academic knowledge.

Table 4. 1 Educational Qualification of respondents

Level of Education of respondents	Frequency	Percent	Cumulative Percent
Diploma	3	4.3	4.3
1st Degree (B.SC, BA	42	60.0	64.3
2nd Degree (M.BA, M.SC)	25	35.7	100.0
Total	70	100.0	

Source: SPSS (Version 22)

4.2.2 Respondents Experience in Building Projects

Regarding respondents' experience in building projects, 18.6% of them have work experience of fewer than 5 years in building projects, and 37.1% of the respondents have experience which is greater than 5 years and less than 10 years of work experience. While 25.7% of the respondents have between 11 years to 15 years of work experience in building projects and the rest 18.6% (N=13) have greater than 15 years of work experience. Therefore, we can conclude that respondents have enough experience in building projects even if it is not magnificent. (See Table 4.2). This will shade a shadow on the problem-solving capability of the team which is known through rich work experience which will the intern be reflected in building projects constructed.

Table 4. 2 Experiences of respondents in building projects

Experience of respondents in Building construction	Frequency	Percent	Cumulative Percent
1- 5 years	13	18.6	18.6
6- 10 years	26	37.1	55.7
11- 15 years	18	25.7	81.4
More than 15 Years	13	18.6	100.0
Total	70	100.0	

Source: SPSS (Version 22)

4.2.3 Respondents Experience as a leader/ member of Building design team

Concerning respondents' experience as a leader/member of the building design team, 62.9% of total respondents have experience in the building design team of fewer than 5 years, 28.6% of the total respondents have between 6 to 10 years of experience, while 4.3% of total respondents have work experience 11 to 15 years and the rest 4.3% of total respondents have greater than 15 years' work experiences in building design team. (See Table 4.3)

Table 4. 3 Experiences of respondents as a leader/member of building design team

Experience of respondents in design team	Frequency	Percent	Cumulative Percent
1- 5 years	44	62.9	62.9
6- 10 years	20	28.6	91.4
11- 15 years	3	4.3	95.7
More than 15 years	3	4.3	100.0
Total	70	100.0	

Source: SPSS (Version 22)

Hence, it can be concluded that even if it is not magnificent most of the respondents have enough experience in building project designing. Accordingly, their opinion and view on the project scope management practices and effects of scope change on building projects are based on their non- ignorable in building projects designing. This will shade shadow the problem-solving capability of the team which is known through rich work experience which will intern to be reflected on building projects constructed.

4.2.4 The organization in which the respondents work

While concerning respondents' organization they have working for, 24.3% of total respondents employed in contractor' company, 18.6% of total respondents working for consultant' company, while 18.6% of total respondents have working in employer (client) company, and the remaining 38.6% of total respondents have employed in different a government sectors. (See Table 4.4)

Table 4. 4 The organization in which respondents have working

Organization in which respondents have working	Frequency	Percent	Cumulative Percent
Contractor	17	24.3	24.3
Consultant	13	18.6	42.9
Employer (client)	13	18.6	61.4
Governmental office	27	38.6	100.0
Total	70	100.0	

Source: SPSS (Version 22)

4.2.5 Categories of projects in which Respondents work

When we looking at categories of project that respondents working, 52.9% of total respondents are working in private building projects, and the left 47.1% of total respondents have working in public (governmental) building projects. (See Table 4.5)

Table 4. 5 Categories of project in which respondents work

Categories of Building projects	Frequency	Percent	Cumulative Percent
Private project	37	52.9	52.9
Public (governmental)	33	47.1	100.0
Total	70	100.0	

Source: SPSS (Version 22)

4.2.5 Types of Private Building projects in which respondents work

While looking for types private building projects respondents working in, when 8.6% of total respondents working in resort construction, 14.3% of total respondents have working commercial/mixed use building, 17.1% of total respondents have working industrial/production shade types of building construction, 10% of total respondents have working in real estate building and the rest 2.9% have working in land scape constructions. (See Table 4.6)

Table 4. 6 Types of private building projects respondents working in

Types of Building projects	Frequency	Percent	Cumulative Percent
Resort	6	8.6	8.6
Commercial l/mixed use	10	14.3	22.9
Industrial /production shade	12	17.1	40.0
Real estate	7	10.0	50.0
land scape	2	2.9	52.9
Public/ governmental project	33	47.1	100.0
Total	70	100.0	

Source: SPSS (Version 22)

4.3 Building construction Projects Scope Management plan practices in Bishoftu city

Scope management can make a project successful or lead a project to failure. If the scope of a project is not defined poorly, inadequately and improperly managed, it can quickly go off track the projects, messing up the schedule of the projects and depleting the project cost. This causes many projects to fail.

Respondents' opinion in activities or indicators relating to project scope management plan practices: practices of planning scope management of projects, requirement collection from stakeholder practices of the project, scope definition practices of the project, practice of decomposing of the total scope of the work of the project, scope validation/verification practices of the project and scope controlling practice of the project, have been gathered. The analyses of collected data are presented below using tables and percentages in six sections.

4.3.1 Plan Scope management

Plan scope management is an essential document used in managing the scope of project which details the processes of defining the scope of the project, validating/verification the scope of the project, controlling the scope of project. Plan scope management primarily concerned with defining how the scope is explained, developed structured and verified.

This study raised eleven (11) items of inquiry for the assessment of plan scope management practices of building construction projects in Bishoftu city. So, ideally, to determine which

task is mostly practiced, we would look at a mean value. And, to determine how much people have an agreement on similarly practicing this task around the mean is determined by standard deviation. Specifically, as showed in Table 4.7, on average, from these eleven (11) items of inquiry, the average values of respondents on the eight items of inquiry are in the range of 3.66 to 3.90 points of likert-scale each of which are closer to the likert-scale of 4 points, which is most probably equivalent to 4; which is designates for agreement, this tells us the most practiced task. All standard deviation (SD) value is greater than zero which could mean, that maybe there is a lot of variance of variety in terms of how different respondents practice this task. Five items have a high SD value, which indicates that the data points are spread out over a wider range of mean values. This means there is strong disagreement between respondents on these tasks which have an SD value of greater than 1.

But Generally, as a process, when the opinion of all these respondents are summarized together respondents have an average perception of 3.61 point of liker scale which is exactly between liker scale point of 3 and 4 which designates neutral and agree respectively and shows half agreement and half neutrality of the respondents on the eleven items of inquiry.

This implies that most of the employees of the respondents have no full confidence on the scope management practices of the authority which will have a pressure to do their in an organized way. It also affects the direction of all the efforts of employees in one direction. There will be any loss of effort of an employ which may be part of the deliverables produced in the life of projects.

Table 4. 7 Descriptive statistics for the Plan Scope management process

A	Plan scope management practices	Mean	Std. Deviation	Rank
A.1	Scope management plan & requirements management plan are produced in the scope management planning and management process	3.86	.905	2
A.2	The scope management plan clearly describes the Process of preparing a project scope statement	3.90	.871	1
A.3	The scope management plan clearly describes the Process of the creation of the WBS.	3.76	.939	4
A.4	The scope management plan clearly describes the Process of how the scope baseline will be approved and maintained	3.71	.903	6
A.5	The scope management plan clearly describes the Process of how formal acceptance of the completed project deliverables will be obtained	3.74	.863	5
A.6	A document (a master plan) that compiles the needs, resources, assumptions, risks and constraints, to understand customer's level of performance expectation will prepare.	3.39	1.094	9
A.7	Organizational culture, structure, Geographic distribution of facilities and resources; Government standards, Infrastructure, human resources, Personnel administration, and Market conditions on planning are considered while planning the scope of the project	3.77	1.132	3
A.8	Due consideration is given to plans, processes, policies, procedures, and knowledge bases while planning the scope of the project.	3.66	.946	8
A.9	There is an Expertise judgment with specialized education, knowledge, skill, experience, involved while project scope planning	3.33	1.018	10
A.10	Preparation of Meetings which include the stakeholders of a project on project scope plan preparation was considered.	3.70	1.040	7
A.11	As a matter of economy the client doesn't wants to limit the amount spent on feasibility and project authorization/budget studies.	2.86	1.219	11
Overall Average		3.61	0.99	

Source: SPSS (Version 22)

4.3.2 Collecting Requirement from Stakeholders

The process of determining, documenting and managing stakeholders' needs and requirements to satisfy the project management task's project objectives is referred to collect requirement process. Twelve (12) statements like activities are used to analyses stakeholders' requirement management strategies in selected building projects.

When the response of the respondents on twelve items of inquiry are concluded, as showed in Table 4.8, a few tasks or opinion on the four items of inquiry are in the range of 3.51 to 3.73 points of likert scale which are close to the 4 points of likert scale, which shows that these tasks have been practiced mostly compared to the other task. But, since most of the task has a high SD value, among the respondents, the practice is not consistent around the mean. The others eight items of inquiry has an average value of respondents' opinion are in the range of 3.30 to 3.49 which is close to 3 point of likert scale (neutral).

As a process, when the opinions of all these respondents are summarized together, respondents have an average perception of 3.49 point of liker scale which is lies between liker scale point of 3 and 4, designates for neutral and agreement respectively.

This indicates that responses of the most of the respondents show opinion of greater than neutral (3) and less than agree (4) on the twelve items of inquiry raised to assess the requirement collecting process practices of the project. This implies that most of the employees of the respondents have no full confidence on the requirements of the projects are included in documents, the included requirements are documented and traced well and the accomplishments' of these requirements to the end of the project is traced properly. Which means, maybe there is an occasions that the projects are not meeting the objectives for which they are initiated for due to the exclusion of some requirements from the requirement documentation. Also the requirements which are documented may also failed to be satisfied due to lack of formal follow up their accomplishment. This will raise objections from stake holders whose requirements are excluded or not properly managed which will intern the lower the moral of project team members and the accomplishment level of the project.

Table 4. 8 Descriptive analysis of Collection of requirement from stake holders

B	Practices of collecting requirements from stakeholder	Mean	Std. Deviation	Rank
B.1	Requirements are documented and requirements traceability matrix is developed in the scope management planning and management process.	3.49	1.032	6
B.2	The requirement documentation of the project/s include/s requirements of the organization (Business requirements);Stakeholder requirements; Features, functions, and characteristics of the product, service, or result; Data conversion and training requirements	3.54	1.045	3
B.3	In the requirements documentation, requirements start out at a high level and become progressively more detailed as more information about the requirements is known	3.49	.864	5
B.4	Requirements in the documentation are tracked throughout the project life cycle by the requirements traceability matrix.	3.43	1.001	8
B.5	Product requirements from their origin are linked to the deliverables that satisfy them by the requirements traceability matrix.	3.30	.953	12
B.6	Each requirement is linked to the organizational/ business/ and project objectives by requirements traceability matrix	3.51	1.073	4
B.7	The requirements traceability matrix records attributes associated with each requirement & manages changes to the scope of the work.	3.39	.906	10
B.8	There is a requirement configuration management & productive metrics in all the requirements categorized by stakeholder	3.39	1.011	11
B.9	Requirements made unambiguous /measurable and testable/, traceable, complete, consistent, and acceptable to key stakeholders before being base lined.	3.41	.893	9
B.10	There is adequate definition of project complete requirements	3.70	.823	2
B.11	There is a system of Organizing workshops and interview with the stakeholders to ensure thorough stakeholder involvement, and improve the collection of requirements	3.73	.947	1
B.12	There is an organized listing and prioritizing all the requirements categorized by stakeholder	3.49	1.073	7
Overall Average		3.49	0.97	

Source: SPSS (Version 22)

4.3.3 Define the Project scope

The define project scope process is largely concerned with establishing projects boundaries, the work that will be delivered during the projects, and the projects primary deliverables.

The opinions of the respondents on ten elements of inquiry that are raised to assess the scope defining practices of the projects are divided in to five likert scale that indicates the respondents differing viewpoints.

Table 4. 9 Descriptive analysis of project scope definition process

C	Define project scope practices	Mean	Std. Deviation	Rank
C.1	A clear project scope statement is defined /stated/ in the scope management planning and management process	3.91	.864	7
C.2	The project scope statement describes any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.	3.79	.832	10
C.3	The project scope statement Progressively elaborates the characteristics of the product, service, or result described in the project charter/Term of reference/ and requirements documentation	3.84	.987	8
C.4	The project scope statement clearly describes acceptance criteria of the deliverables.	3.96	.859	4
C.5	The project scope statement describes what is excluded from the project.	4.23	.765	2
C.6	The project scope statement enables the project team to perform more detailed planning	4.16	.735	3
C.7	The project scope statement guides the project team's work during execution.	4.30	.749	1
C.8	The project scope statement provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.	3.91	.717	6
C.9	The project scope statement creates common understanding of the project scope among project stakeholders.	3.94	1.020	5
C.10	Expertise judgment provided was not give due attention while project scope definition of the project	3.83	.851	9
Overall Average		3.99	0.84	

Source: SPSS (Version 22)

The average values of respondents' opinion of the ten items of the inquiry used in this section of the assessment are in the range of 3.79 to 4.3 points of likert scale which is close to 4 of point of likert scale. This indicates that the ten average values of respondent's opinion are above the likert scale of 4 point.

The majorities of respondents' shows a response of agree when we look for mean value of task. Similarly, except for a single task with the SD values of greater than 1, all tasks' SD values is less than 1 which indicates that the values in a statistical data set are close to the mean (or average) of the data set. Even if it is at an agreement level, the task was practiced in all organizations with equivalent consistency, which implies most of the respondents have a clear view of where to go and what to achieve, have a clear view of the project to be executed, this helps to build a good team spirit in a the project and to move in similar direction to achievement of one common objectives agreed initially. This avoids waste of the projects teams' time and resources.

4.3.4 Create Work Breakdown Structure process

The create WBS process is the process of subdividing projects deliverables and projects work in to smaller and manageable components. In order to assess the practices of WBS creation of building construction projects, ten relevant statements were developed to be answered by participants.

Table 4.10 shows that all items have an SD value of less 1 which indicates that values are clustered close to the mean. Amount of variability, of the individual data values from the mean is low.

Of these 10 relevant tasks, the mean values of 4 tasks are around 3.36, 3.4, and 3.54 which is close to 3 and designates for an opinion of neutral. All these indicates that the majority of the respondents have an opinion of neutral on these 4 items of inquiry which are developed to assess WBS creation practices of projects. In the practice of these tasks in their organization, the respondents have a neutral opinion. This may mean there is little practice for this task or/and the respondents have no confidence in the practices of how scope baseline changed, WBS dictionary preparation, and work packages identified.

Table 4. 10 Descriptive analysis of WBS creating process

D	Create Work Breakdown Structure (WBS) Practices	Mean	Std. Deviation	Rank
D.1	A scope base line which includes the WBS, the WBS dictionary, the work package is set in the scope management planning and management process.	3.76	.939	4
D.2	The scope baseline is changed only through formal change control procedures	3.47	.974	9
D.3	The total scope of the work to be carried out by the project team is properly decomposed.	3.71	.950	6
D.4	Each descending level of the hierarchical decomposition (WBS) represents an increasingly detailed definition of the project work.	3.76	.908	3
D.5	The WBS dictionary document supports the WBS	3.54	.879	7
D.6	The lowest level of the WBS, work package, is with a unique identifier	3.36	.869	10
D.7	Do these identifiers provide a structure for hierarchical summation of costs, schedule, and resource information and form a code of accounts?	3.47	.896	8
D.8	The WBS dictionary provides detailed deliverable, activity, and scheduling information about each component in the WBS.	3.76	.955	5
D.9	The scope baseline included as a component of the project management plan.	3.91	.775	2
D.10	The scope baseline is used as a basis for comparison.	3.94	.796	1
Overall Average		3.67	0.89	

Source: SPSS (Version 22)

On the other hand, when we see it, the mean value of six (6) items has the respondent's opinion of around 3.71 or 3.94 which is closer to 4 likert scale value that designates for agree. All these indicate that the majority of the respondents have an opinion of agreement on these 6 items of inquiry which are developed to assess WBS creation practices of projects. The practice of these tasks in their organization is at a high level.

But generally as a process, the overall average value of the mean 3.67 shows an agreement of most of the respondents on the idea that there is a set point of reference for every activity to be done in the project which helps to see every project activity accomplishments from the set of point of reference or Term of reference (TOR). This will avoid confusion and strengthen unity in project team. Also this point of reference changed only the full knowledge of project team

raises the confidence of team on their work. Additionally the respondents' agreement on the sufficient decomposition of the total project work indicates that they are comfortable with the size of the project work done by an individual and also the adequacy of the time given for its accomplishments.

4.3.5 Validating/verification of scope

Validate Scope is the process of formally accepting the project deliverables that have been completed. By verifying each output, this method offers objectivity to the acceptance process and increases the possibility of final product, service, or result acceptance. In order to assess the practices of scope validation/verification process of building construction projects, five relevant items of inquiry were developed to be answered by respondents.

Table 4. 11 Descriptive analysis of scope validation process

E	Validate/Verification scope practices	Mean	Std. Deviation	Rank
E.1	Deliverables that meet the acceptance criteria are formally signed off and approved by the customer or sponsor	3.49	0.959	5
E.2	Work performance information includes information about project progress, such as which deliverables have been accepted, communicated & documented and which have not been accepted and the reasons why	3.8	0.926	3
E.3	The completed deliverables that have not been formally accepted are documented, along with the reasons for non-acceptance of those deliverables. Those deliverables may require a change request for defect repair	3.49	0.944	4
E.4	There is clear agreements between the client and the contractor Concerning how to verify the activities with what is stated in the contract on regular basis	4.17	0.9	1
E.5	Regular meetings are held between the client and the Contractor to ensure that both actors are up to date about the state of the project	4.03	0.916	2
Overall Average		3.80	0.93	

Source: SPSS (Version 22)

Table 4.11 above shows that two task has a mean value close to 3 likert scale value that designates neutral. This is to mean that the respondents have no confidence in what has going on in their organization on how to prepare acceptance criteria and approve them, or how to

document unaccepted deliverables with their reason for not accepting the change request. The SD values show how observer opinions' values stuck to their respective mean values. The values given by the respondents depending on their opinion are very close in value to the mean although the mean values have differing.

On the other hand, the mean value of three (3) items has the respondent's opinion of around 3.8, 4.03 & 4.17 which is closer to 4 likert scale value that designates for agree.

After all, the overall average values of mean value of respondents opinion is 3.80 which is closer to 4 likert scale value that designates agree. These indicate that the majority of the respondents have an opinion of agreement on the five items of inquiry which are developed to assess scope validation practices of projects.

The agreement of most of respondents indicates that there is the respondents have a confidence on the activity conducted under this process: developing acceptance criteria, work performance information, change request and validation procedures and updating projects documents which is the final output of this process. There is also a regular meeting between the team with the stake holders to ensure that both actors are up to date about state of the project. This raises the confidence of the team on the project work and avoids the confusion about the change on project.

4.3.6 Control of scope

One of the most important activities in the scope management cycle is project scope change control, because it is at this time that the project management team must prevent scope creep while ensuring that any modifications are beneficial to the project. And here, In order to assess the practices of control of project scope process of building construction projects, five activities were developed to be answered by respondents.

Table 4.12 shows that, the majority of respondents have an opinion of strongly agree and Agree except on 1 activity and the mean value of respondents opinion is 3.53 which is closer to 4 likert scale value that designates agree. All these indicate that the almost all of the respondents have an opinion of agreement on the five items of inquiry which are developed to assess project scope control practices of projects. Additionally, these shows the respondents have well informed on the update of project document due to change request and work

performance measurement of the project. The SD values indicate the respondent's opinion is clustered around the mean, and the practicing level among the organization has the same level.

Table 4. 12 Descriptive analysis of project scope control process

F	Control Scope practices	Mean	Std. Deviation	Rank
F.1	The is a system to Monitoring the scope creep and Change requests within the defined boundaries considering the delay and cost incurred	3.77	.887	3
F.2	There is Project performance measurements to Assess the magnitude of variation interims of cost and time frame from the original scope baseline.	4.00	.834	2
F.3	A system for keeping track of scope changes to seek for Patterns is considered	3.53	.812	5
F.4	The is a formal agreement to a discussion between that Involves The contractor on scope changes.	3.76	.939	4
F.5	There is a proper awareness that Change in project activities results to change in Project schedule/time cost and quality	4.07	.953	1
Overall Average		3.83	0.89	

Source; SPSS (Version 22)

4.4 Effects of scope change on Building construction projects of Bishoftu city

Change often reflects the uncertainties that occur during the early stage of the project. Projects scope changes are requested as a result of different perspective that each stakeholders has on the project. The most common cause of project failure is when projects fail to meet their specified budget, schedule, scope, and other project organizations' criteria for determining project failure, even though the occurrence frequency and degree of consequences they have on the project are variable.

4.4.1 Findings and results

Data analyses is done using the above mentioned statistical methods from the viewpoints of respondents which are employees in different governmental and non-governmental organization , those who are engaged in different types of building construction projects, and illustrates the findings and results of the survey from severity, frequency and importance indices of all the variables of scope change effects on projects.

And from the data analysis the indices and rank results of all variables are shown on the Table 4.14 below, but the detail and summary of the responses has been attached as Appendix B.

From point of view of participants, the most frequently occurred, and by his occurrence the items that affect the success of construction projects are delays in the schedule of the project, changes in cost (rising up of budget of project), redesign, project resource unavailability, rises in quality problems issues, slow down project progress, Communications and coordination gaps and claims are ranking from first to eighth respectively and all have an Importance Index greater than 50%. Brief explanation on thus and others terms have attached at the end as APPENDIX E

Table 4. 13 Indices and rank of scope change effects on a Building construction project

S/N	Descriptions of scope change effects	F.I (%)	S.I (%)	I.I (%)	Rank
1	Schedule delays	83.4	81.4	67.9	1
2	Change of cost (raise)	79.1	81.4	64.4	2
3	Redesign	75	78	58.8	3
4	Project resource unavailability	77.4	74.3	57.5	4
5	Quality problems issues	71.7	76.6	54.9	5
6	slow down project progress	73.7	73.7	54.3	6
7	Communication and coordination gaps	72.6	71.7	52	7
8	Claims	75.4	67.4	50.9	8
9	Lower productivity	68.9	68.6	47.2	9
10	Disputes	68	69.1	47	10
11	Rework	66.3	68.3	45.3	11
12	Lack of motivation and direction	67.1	65.1	43.7	12
13	Project risk	65.7	64.3	42.2	13
14	Failure to meet customer satisfaction	62.6	64	40	14
15	Increase effort	65.7	60	39.4	15
16	Poor effort estimation	66.3	58.9	39	16
17	Project failures	50	77.4	38.7	17
18	Wastages of effort	61.4	60.6	37.2	18
19	Project priority change	59.1	59.7	35.3	19
20	Error generation rate	53.7	61.1	32.8	20

Source: SPSS (Version 22) and Excel

4.4.2 Results from open questionnaires

Depending on the responses from respondents, ideas and opinion are summarized as follows. To have a best practice on project scope management plan, foremost, properly implementing the scope management process, giving training for the expert and stakeholders, following and keeping laws and regulations and standard of construction, sharing knowledge and experience from previous project, leading the CI by experienced professional, and so on.

Effects on a construction project due to scope changes are schedule delays, resources wastages, less customer satisfaction, conflict of interest between the stakeholders, rises of cost of materials, buying ability of money fall with respect to schedule delay, end user complain rises, disputes and claims between the stakeholders, are some of them.

Generally, to have a good and properly defined project scope, there is a role that all stakeholders need to improve what is expected from them regarding the scope management plan depending on the project scope management planning process. There should be an organized structure of the project management office, especially in a private project. The project scope management planning process should be followed by all stakeholders accordingly. Rules and regulations, and proclamations concerned with CI should be obeyed.

4.4.3 Results from Interviews

In addition to the data collected through questionnaires and pieces of evidence gathered from the document of the project, a depth interview was held with a team leader of the procurement technical team of Bishoftu city administration, at the investment office with the expert who has permitted investment, and lastly with a manager of consulting office. The responses of the officers are presented below.

When we look at the ideas of these team leaders and the manager, we have to divide the ideas into two depending on the owner of the project, which is a private and public project. Because, as the point of view of these interviewers the practice and experience of project scope management process within these categories have differed.

From the interview, for the public projects, it is understood that in confirmation of the responses in the questionnaire the team leaders argued that all the scope management

processes are well practiced, except for some activities. But this doesn't mean the practicing scope management planning experience is perfect and it doesn't mean that there is no change of scope and so no effect of scope change on projects.

In most public projects the most influential stakeholders are the client (government), the sponsor (government or/and International Organization), a consulting company, contractors, and the society around (product-user). Especially, mostly, projects held by sponsorship of international organizations like World Bank, and IMF, are passed through all project scope management plan process, even though, some technical terms are used interchangeably and sometimes missed. If the project is not planned, defined, managed, or controlled properly it leads to scope change, which directly affects mainly the schedule and budget of the project, which are very sensitive issues and not compromised by these sponsors. This leads them to stop their sponsorship agreement even not only for this specific project but also for the next one. Due to this, even other reasons are not allowed by the stakeholders to change the scope.

Even so, this doesn't mean that there are no problems to be improved. Practices like requirement management plan, requirement traceability matrix, and requirement documentation from all stakeholders, WBS, and WBS dictionary are some of them that need some improvements to take up to some level for a better and fully accomplishments of the project.

For the other project sponsored by the government, although, the scope is defined properly, sometimes there is flexibility in changing the scope (adding, subtracting) due to other external and internal factors. These factors could be political issues, sponsorship phase out, client changes, client ideas changes, and so on. This leads to the construction project not being finished at the initially defined schedule and budget.

The other idea is when the project is a private project. In private construction projects there are project scope management planning practices and experiences that are different from the public project in the city. Even if there are some problems, there may be only a handful of projects where the project scope management planning practices are held in.

In private projects, most of the time, the sponsor is one single person or the owner himself. Some documents related to the scope of the project are prepared only for the sake of getting

permission for construction or investing in a CI from a governmental body. Not only because the owner is the only sponsor, but also because there is no follow-up and supervision from the government, and even though there is no structured project management office (PMO), procedures and steps in the project scope management plan process are not well practiced. These and other factors lead the client to improperly manage, control, and validate the scope of the project. So, there are many practices that need to be improved which start with a project study and followed by a feasibility study, and also all project scope management planning process.

Scope change is happening not only because of the formulation of an improper definition of scope is, but also due to changing business direction, foreign currency, natural accidents, and so on. This change causes the project not to be finished within a schedule, and by initial budget, leads to low quality of work, time money of value falling, product users will be prevented from getting what they need to get on time, resources not available, etc.

4.4.4 Results of Case Studies

Analyzing the cases provides insight in the process of scope management in practice and the problems arising when executing this process within the projects. This section presents the results of each case.

The findings are categorized as: A comparison between the project documentation and interviewees answers to test the knowledge of the interviewees concerning the scope definition and the scope management procedure; The scope management plan steps; The roles and responsibilities of stakeholders involved in the process; and Proactive scope change management and identified problems.

Case -1

Documentation scope definition & practices of scope management plan process

The scope is defined in the requirement specification which is accessible for everyone in the project team. The requirements parts of the scope are accessible and up-to-date in the tool realities. Not every project team member understands the importance of using this tool the right way since the focus is more on technical aspects instead of the processes. Also, the scope

management tasks belonging to the contractor are not adequately described in the project documentation.

Scope management plan process steps

Collecting the requirements and creating a first definition of the scope was performed by the client. The contractor creates a detailed version of the scope, creates the WBS, performs verification and validation, and controls the scope. Scope management could be improved by connecting the WBS to roles and responsibilities in the project team. Predicting and handling scope change could be improved using a tool to provide an up-to-date overview of changes. The current formal process of scope change management is criticized due to the long lead time

Roles and responsibilities

The interviewees are unanimous about the fact that one person needs to be fully responsible for scope management. This person should have full knowledge about the content of the activities and about the contractual agreements. It is stated that instead of the project manager, a contract manager must be responsible for scope management since it comes down to managing the requirements and therefore, knowledge about contractual agreements is required.

Proactive scope change management

Proactive management means experiences from previous projects should be used to anticipate future change. These experiences currently emerged in the form of tacit knowledge, which means experts do have the knowledge but the documentation is lacking. By improving the documentation changes might be predicted. In addition, a continuous verification and validation between the contractor and the client smoothens the scope change process and create a pro-active attitude.

Identified problems

Identified problems are; Team members do not see the importance of a tool to track scope, scope management plan process not known and practiced properly by responsible stakeholders, There is no common understanding of the roles within the project team, A

project team member fulfilling the role of a contract manager is missing, A lack of information due to different composition of the team in different process steps, The responsibility for designing is assigned to the contractor on paper, but in practice the client is responsible.

Case -2

Documentation scope definition & scope management process

Scope definition is clear among the project management team, but not to the workers carrying out the activities on site. Those workers are aware of a part of the scope, not the complete context. Memo's in which scope is documented are not accessible to everyone in the project. The tool Vise is used to document all the requirements and they are connected to the parts of the scope. The scope management tasks are not described in the project documentation. However, the tasks are known by the interviewees.

Scope management plan process steps

Collecting the requirements and defining the scope is done by the client and the contractor together with help of a maintenance contractor that is aware of the current state of the project. The WBS and verification set up is created by the contractor. Scope control is present in the form of validation of requirements throughout the project. It is suggested that the sequence of the steps might be changed if necessary, for example in case of a different project type or in case of time pressure.

Roles and responsibilities

One person needs to be responsible to ensure clear communication with the client. Insight and support given by the technical manager is necessary. The responsible project manager must be aware of all the contractual matters. Another role important to execute the scope management steps with sufficient substantive knowledge is the environmental manager. In addition, the stakeholders influenced by or can influence the project need to be taken into account to safeguard the requirements. In case of large projects, it is recommended to assign a scope manager.

Proactive scope change management

Use of experiences can be beneficial in some cases. It can also make a project team anxious and reserved in taking chances. Changes coming from the client are seen as an opportunity. To improve ways to anticipate on changes expectations must be managed by documenting experiences. Also, the client and the contractor need to discuss possible scope changes regularly.

Identified problems

Identified problems are; Not everyone in the project team agrees with the process approach, There is a lot of discussion concerning scope change, A system for keeping track of changes to seek for patterns is not used yet, Expectations concerning scope change are not identified nor managed correctly, the stakeholders are not plays their role and responsibilities as per the requirements and the are not followed the scope management plan process properly. The stakeholders are not considered throughout the complete scope management process, A person fulfilling the role of a scope manager is missing in large projects.

. Case -3

Documentation scope definition & scope management process

The scope is defined in the contract and accessible to every project team member. The experts are aware of the general scope, but not of the exact information per blocks. The provided scope management documentation does not describe the scope management tasks completely. For example, collecting requirements is client's task and creating the WBS is part of the contractor's tasks, but not described in the documentation.

Scope management plan process steps

The client is responsible for collecting the requirements and defining the scope. WBS created by the contractor. The contractor is obliged to come up with a verification plan. It is mentioned that between the steps important information get lost because different teams work on different scope management steps. Also, the decision-making within the steps takes too much time.

Roles and responsibilities

The client is mainly responsible for managing the scope. The project manager does not have enough specific knowledge to execute all the scope management plan process steps. Therefore the following other roles are needed; environmental manager, technical manager, scope manager and a contract manager. The knowledge of the managers fulfilling these roles is combined to reach an adequate project result.

Proactive scope change management

Currently there is knowledge exchange among project teams that execute the same type of projects. However, it is not documented yet. The tool Relatics is used to keep track of changes and their impacts. It is possible to include other risks in this tool, but this is not done.

Identified problems

Identified problems are; Detailed scope is not known by team members because they work on several contracts, There is loss of information between process steps, The responsible actor of each step is not documented, A scope change does not come with extra capacity in terms of employees or budget, Knowledge shared among project team members of different project teams is not correctly documented, Stakeholder involvement is not done thoroughly in the beginning of the project, and Decision-making within the steps takes too much time

Overall, the ability to define and then effectively control the scope of a project depends a lot on the goals and requirements of the project. For this reason, we need to gather the necessary information up front, before we ever start the project. By clearly understanding the needs of the stakeholders and the capabilities and constraints of our resources, we have a higher chance to succeed.

The responsibility for the scope management plan steps is distributed between the client and the contractor. It is stated that within the clients and the contractors' organization, preferably one person is responsible for scope management for clarity. But, the responsible body has not taken his responsibility and accounted for unaccomplished steps they assigned for.

In addition, the roles and responsibilities are not defined nor documented in the project documentation and also, no documentation concerning previous projects experiences is

available, the project team is not familiar with tools to analyze previous changes and seek for patterns, Loss of information between the steps, The stakeholders are not involved throughout the complete project. The WBS must be connected to roles to increase understanding among project team members of each other's responsibilities; - Sometimes the WBS is mentioned in project documentation but an overall definition of scope management tasks is lacking; - Between the steps information gets lost.

Also, it has seen that the verification and validation of scope need improvement. In the start-up phase of the project a better verification & validation plan should be prepared and there should be clarity about the task division between the client and the contractor. For the step scope control, it is found that when a scope change must be handled, the lead time of the formal procedure is too long which leads to skipping parts of the process.

4.5 Conceptual Frame work for scope management plan processes & Practice in Bishoftu city

The researcher have used PMI's project definition that project is a temporary endeavor undertake to create a unique product, service. In this study, the temporary endeavors are building construction projects which are carried out by different employer in Bishoftu city. The unique products of this temporary endeavor are depends on the purpose why construction takes place. To perform construction projects successfully, effective project scope management practices should be taken by all main stakeholders in every project task area, throughout the project's life cycle time.

The researcher used the terms and process from PMI, a guide to project management body of knowledge (PMI, 2017), and (F.M. REIJNDORP, 2018) and summarized as shown in figure and tables below. In this framework, the independent variables are all the scope management processes with their respective inputs and the dependent variable are their output, which is the last output after these each processes. The effective practicing and application of these processes help us to have a good, proper, and adequate project scope management in our building construction projects.

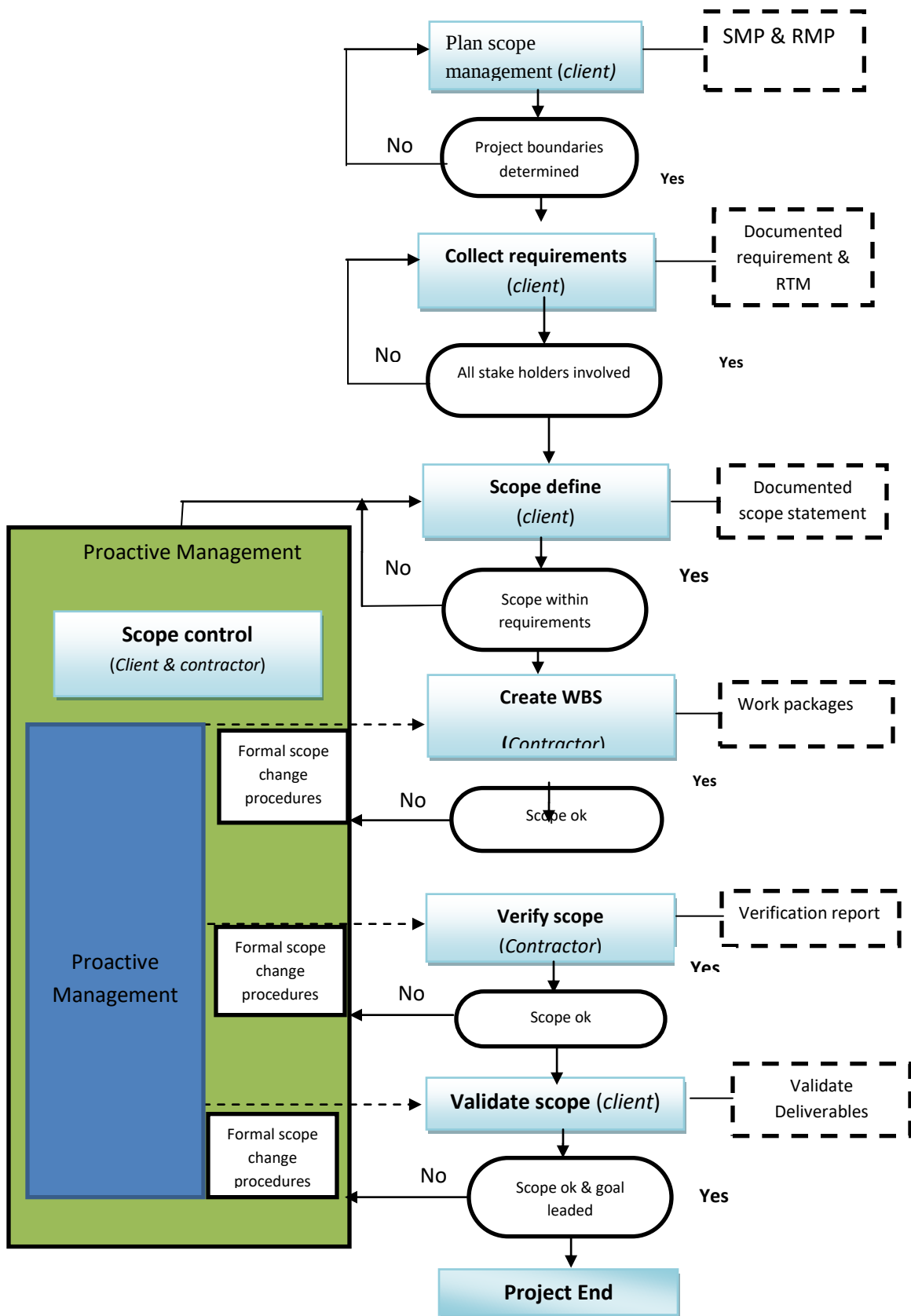


Figure 4. 1 Conceptual frame work of project scope management implementation procedures

Plan scope management: Is to create scope management plan (SMP) that documents how the project will be defined, validated, and controlled, and a requirement management plan (RMP) to describes how project and product requirement will be documented, analyzed, and managed. Under this process client provides clarity how project team will determine which types of requirement need to be collected for the project. Client is the responsible stakeholder to determine project boundaries by preparing a good SMP and RMP. Inputs used are Project charter, project management plan, business documents, agreement enterprise environmental factors, organizational process assets through tools and techniques like Expert judgments, data analysis decisions making, and meeting to have an outputs of guidance and direction on how scope will be managed throughout the project, Scope management plan and requirement management plan.

Collect Requirements: Is to properly define the objective and the scope of the project, the requirements of the stakeholder must be collected carefully, which is done by client. Depends on the complexity and size of the projects, it needs to be whether a scope manager need to be assigned. Thorough stakeholder involvement is required for a good scope management process, so it is ensured that all important stakeholders are identified and their requirements are gathered. It is done by Client again and again until all stakeholders are involved and requirements are collected as per requirement management plan. Project charter project management plan, business documents, agreement enterprise environmental factors, organizational process assets are inputs used to have an outputs of Documented requirements, and Requirement traceability matrix by using Interviews, focus groups, expert judgments, data gathering, data analysis decisions making, data representation, interpersonal and team skill, context diagram, prototypes as a tools and techniques.

Define scope: To insure it is possible to monitor the scope during the project, documenting the scope in highly accessible format for the complete project team is important. Functional requirements, process descriptions and scope management steps are described. If possible, it is advised, to ask the contractor for input to ensure the execution of the activities and achieving the project goal is feasible. This process involves outlining the boundaries of the project,

delineating the work that will be delivered, and defining main deliverables of the project. It is done by Client. This process uses Project charter, project management plan, project documents, enterprise environmental factors, organizational process assets as an inputs and Expert judgments, data gathering, data analysis decisions making, interpersonal and team skill, product analysis, facilitated workshop as a tools and techniques finally get an output of Project scope statement (product scope description, acceptance criteria, project exclusion), and project document update. If scopes are not well defined within the requirement, the client has a responsibility to execute this process again and again until the scope is fully defined.

Create WBS: Is Decomposing (breaking down) project deliverables and project work into smaller, more manageable chunks. This allows good level of confidence in estimating of project schedule and cost. Work packages are defined and linked to roles within the project team, and responsibilities are assigned. Contractor is major responsible body for the activities under this process. To have like Prepared scope baseline, and updated project document as an output, the contractors uses Project management plan, project documents, enterprise environmental factors, organizational process assets as an inputs and Expert judgments, and decomposition as a tools and techniques.

Verify scope: Is done by contractors. Contractor describes the verification process of each activity, before the execution. During regular meetings with the client, it should be checked whether the requirements are met by performing the activities. After this the responsibilities goes to the client, and the contractor should be awarded, and must be highly alerted, between steps information should not be loosed. Under this process Project management plan, project documents, enterprise environmental factors, organizational process assets used as an inputs and Inspection of activities, and a check list as a tools and techniques to have an output of Verified deliverable, reached stakeholders desire, and verified documents.

Validation scope: Is a process in which formalizing acceptance of the completed project deliverable is taken. The client is responsible for ensuring the end result of the project is as promised to the stakeholders, and fulfills the function as defined in the requirement documentation. Key stakeholders like customer and sponsor for the project, inspect and formally accept the deliverables, if not, customer or sponsor usually request change. The process is expected to be done by client. By using Project management plan, project

documents, verified deliverables, and work performance data as an input and Inspection of activities, and decision making as a tools and techniques, we have an outputs of Accepted deliverables, work performance information, project document updated, and change request.

Control scope: Project managers from both client's and contractors tend to keep the scope within the boundaries or scope baseline by monitoring scope change throughout the project's life. This process ensures all requests of changes and recommended corrective or preventive actions are processed through integrated with other change control process. Both clients and contractors are responsible for the activities under this process. Inputs like Project management plan, project documents, work performance data, and organizational process asset, and data analysis is used as tools and techniques to get Work performance information, change request, project management plan updated, and project document updated. An overview with the project experiences at the end of the project, and in case of a scope change, the updated scope description in the event of a scope change will be included in the results of this project.

In projects, proactive management means that possible barriers and scope changes are predicted, and anticipated on; this is through capturing lessons learned from previous similar projects. Questions like, when the most changes can be expected of specific barriers experienced on one scope management step every time, could be answered. All project team members should understand the importance of using a tool to track the scope unless it could be difficult to monitor the scope in later steps. So scope state needs to be updated and available to everyone on the project team. It is recommended to use proactive management systems to control and manage scope, in addition to following the process and procedures.

When it is impossible to executing the activities within the defined scope, scope change needs to be processed. Clients and contractors identify and announce changes, and they have their own roles in processing the change procedures. The client is responsible for the budget decisions, whereas, the contractor is responsible to ensure the activities are adjusted to the new scope.

CHAPTER FIVE

5 CONCLUSIONS AND RECOMMENDATION

5.1 Introduction

This chapter presents a summary of findings and some recommendations made for improving the project management gap observed during the study. This chapter has five sections. The first section is an introduction part that presents us with the contents of the chapter. The second section presents a summary of the finding on project scope management practices. The third section presents a summary of the findings on the effects of scope change on projects. The fourth section presents the conclusion and the last section presents recommendations hoped to fill the gap identified during the study.

5.2 Conclusion for project scope management planning practices

Plan scope management

The majority of the respondents agreed that management of scope of building construction projects are planned initially and scope management plan is prepared to execute this plan. Additionally, they agreed that prepared scope management plan clearly describes process of preparing project scope statement, creation of the WBS, how the scope baseline will be approved and maintained, how formal acceptance of the completed project deliverables will be obtained. Also, they have agreed that there is a consideration of Meetings which include the stakeholders of a project and Organizational culture was considered while preparation project scope plan. But, as whole, the client or the responsible bodies were weak on this stage to participate in all activities. This process needs to be improved again and again by the client, since the responsible body for the plan scope management is client or the sponsor of the construction project.

Collect requirements

From the total response of the participants it can be concluded that, respondents agreed on; the Organizing workshops and interview with the stakeholders to ensure thorough stakeholder involvement, and improve the collection of requirements, the adequate definition of project

complete requirements, inclusion of components of requirement in the requirement documentation of a project/s and linking of each requirement to the organizational/ business/ and project objectives. But, on other items of inquiry, the respondents have an opinion of neutrality and which imply that most of the study's participants do have not full confidence in the full sound practices of management used for managing the requirements of the projects.

Although, in most activity, the clients or the sponsor or the responsible body were failed to accomplish his activities under this process. Clients are responsible body for falling to meet projects objectives due to weak requirement collection from different stakeholders. This process needs to be improved by the client.

Define Scope

Most of the respondents strongly agree with the presence of the project scope statement and its clarity in describing what is excluded from the project, its capacity in enabling the project team to perform more detailed planning and guiding their works during execution. The respondents likewise showed an opinion of whether an agreement or strongly agreement on comprehensiveness of scope statement in its'; clearly describing of acceptance criteria of the deliverables, creating common understanding of the project scope among project stakeholders, on its ability of providing a baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries and on the presence of defined clear project scope statement in the scope management process. There is a good practices of scope defining process of scope management plan comparing to other processes.

Create WBS

Respondents agree that the scope baseline is used as a basis for comparison and is a component of the project management plan. The respondents also have an agreement on that, a component of scope baseline are used in scope management planning and process, WBS dictionary provides detailed deliverable, activity, and scheduling information about each component in the WBS and Each descending level of the hierarchical decomposition (WBS) represents an increasingly detailed definition of the project work. Most the respondents also agree that there is a proper decomposition of the total scope of the work to be carried out by the project team, WBS dictionary document supports WBS, there is a unique identifier for the

lowest level of the WBS, work package, and usages of these identifiers for hierarchical summation of costs, schedule, and resource information and formal procedures followed in changing the scope of baseline of the project. Contractor's needs to be improve themselves on some activities while practicing WBS process, to divided works in to small, simple and most manageable work items. Finally, contractor is responsible body for not creating the WBS detailed and implementing the activities accordingly.

Verify/Validate scope

Most respondents strongly agree there are regular meetings are held between the client and contractor to ensure that both actors are up to date about the state of the project and clear agreements between them concerning how to verify the activities with what is stated in the contract on regular basis. Respondents agree that information such as which deliverables have been accepted, communicated & documented and which have not been accepted and the reasons why is included in the project progress of Work performance information. This process needs to be improved both by client and contractor, since both parties are responsible bodies for falling of projects due to inefficient or unclear or lack verifying/validating scope process of the building construction projects. There is also lack of integration of these responsible bodies while practicing the activities under this process.

Control scope

Most of the respondents strongly agree or agree that there is proper awareness that change in project activities results to change in project schedule/time cost and quality, and there is a project performance measurement to assess the magnitude of variation interims of cost and time frame from the original scope baseline. Also, most respondents has an agreement on the availability of a system to Monitoring the scope creep and Change requests within the defined boundaries considering the delay and cost incurred, and formal agreement to a discussion between that involves the contractor on scope changes.

Generally, based on the findings of the assessment of this project work, which assess scope management practices of building construction projects of Bishoftu city it can be concluded that the scope management practices of the building construction projects need improvement in plan scope management and collection of requirement from stakeholder practices, because

these processes are bases for defining, managing, controlling scope properly and adequately. Scope management practices on other processes are need to be improved at some level.

In an interview held with team leaders of procurement heads and investment office experts, it is understood that the ineffectiveness of most projects in meeting their initially set objectives is the incapability of the owners/client in managing the stakeholders' requirements of the projects, improper scope define, unassigned of experienced and educated professions in the place of project manager, and unstaffed project management office has seen especially in private projects.

5.3 Effects of scope change on building construction projects

In building construction projects change is never been avoided, especially, changes related to scope which are caused by many external and internal reasons as seen in the literature review. Scope change will lead construction projects to be unsuccessful with all the construction parameters.

Depending on the importance index calculated from the opinion of respondents, the parameters of projects which affected mostly and similarly bring a huge effect on projects are, as supported by literature, is a schedule of the project. A schedule by itself is not a single parameter, rather, due to change in a schedule, many other construction parameters could affect like budget, resource unavailability, time value of many degraded, conflict of interest, claims, and disputes are some of them.

Next to the schedule, other effects on construction projects are changes in cost (rises), redesign, resource unavailability, quality problem issues, slowdown of project progress, and communications and coordination gaps are the parameters that affect the building construction projects requirement.

5.4 Recommendation

The following recommendations are made to the scope management practices of Bishoftu city building construction on the analysis made above which are recommended to be implemented in the future construction projects of the city.

- Using a proactive management style is prevents challenges of scope changes from happening. When lessons learned from previous similar projects are well documented and used for the next time as an experience, the project teams use these experiences from documented projects, to improve future projects, which is called proactive management. Not only when managing scope change, but especially in monitoring scope, is this necessary. In each of the process steps, these lessons serve the aim to predict patterns in possible barriers and scope changes. By creating an overview of these past experiences and applying those to current projects scope is managed proactively.
- Especially, for private building projects, assigning experienced and educated professionals for specific project scope management task is recommended. The structure of the PMO should be fully staffed with talented expertise. Project or contract managers are essential in managing the project scope. Contract managers must be able to define a guide line to ensure the steps are defined in the contract and the roles and responsibilities are linked to the steps.

5.4.1 For Future work

- This research is of qualitative nature. If subsequent research only includes finished projects as cases for the case studies, it is possible to quantify the result, especially on the effect of scope change on building construction projects. It also the use of the implementation guide influences the projects result in terms of schedule, cost, resources and productivity.

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APPENDIX A
Adama Science and Technology University (ASTU)
School of Engineering
Department of Civil Engineering
Stream of Construction Engineering and Management (CEM) M.SC Program

March, 2022

Dear, sir/Madam

This questionnaire aims at exploring information regarding the scope planning management approach in construction project. The response will be used for as a component of the data that is needed for the Thesis work entitled “**Scope Management Planning Approach In Building Construction Project: The case of Bishoftu City Building Construction projects**”, which is being conducted as partial fulfillment of an M.SC program in Construction Engineering and management in Adama Science and Technology University; School of Engineering, Department of Civil Engineering. The result of the study will contribute to the activity of assessing current practices of scope planning management employed on the construction project and assessing effects of scope change on construction projects and the drawbacks in properly managing scope of Building projects.

Since the success of this study depends on the cooperation of all targeted respondents, the information that will be obtained from the questionnaire, you are kindly requested to respond to the questions to the best of your knowledge.

Your honest and thoughtful response is invaluable

Thank you, in advance for your co-operation and participating in the project work

Samuel Bedada Jima

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Section I: Questionnaires

Part I: Demographic Profile

Please respond to the following questions by marking (X) sign:

1. Educational status

Diploma ☐

2nd Degree (M.BA, M.SC) ☐

1st Degree ☐

3rd Degree (PhD.) ☐

Other ☐

2. How long have you been working in Building construction projects?

1- 5 years ☐

6- 10 years ☐

11- 15 years ☐

More than 15 Years ☐

3. How many years have you worked as member/leader of design team of Building construction project/s?

1- 5 years ☐

6- 10 years ☐

11- 15 years ☐

More than 15 years ☐

4. In which organization (office) have you working?

Contractor ☐ Consultant ☐ Employer (client) ☐

Governmental (Construction, municipality, and others) ☐

5. Currently, on which building project have you working?

Private project ☐ Public Project ☐

6. If the answer for question above is 'Private project', what types of building project is it? Resort ☐ Commercial/mixed use ☐ Industries/production shade ☐

Real state ☐ Land scape ☐ Public (Governmental) Project ☐

Part II: Project **scope Management plan** Process

The following set of statements relate to your outlook about the current Scope plan management practice of construction projects in Bishoftu city building projects. Read and show to what extent you agree with the existence in practice of them by marking (X) sign.

Level of Agreement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Likelihood score	1	2	3	4	5
	Parameters				
A	Scope plan				
A.1	Scope management plan & requirements management plan are produced in the scope management planning and management process				
A.2	The scope plan clearly describes the Process of preparing a project scope statement				
A.3	The scope plan clearly describes the Process of the creation of the WBS.				
A.4	The scope plan clearly describes the Process of how the scope baseline will be approved and maintained				
A.5	The scope plan clearly describes the Process of how formal acceptance of the completed project deliverables will be obtained				
A.6	A document (a master plan) that compiles the needs, resources, assumptions, risks and constraints, to understand customers level of performance expectation will be prepared.				
A.7	Organizational culture, structure, Geographic distribution of facilities and resources; Government standards, Infrastructure, human resources, Personnel administration, and Market conditions on planning are considered while planning the scope of the project				
A.8	Due consideration is given to plans, processes, policies, procedures, and knowledge bases while planning the scope of the project.				
A.9	There is an Expertise judgment with specialized education, knowledge, skill, experience, involved while project scope planning				

		1	2	3	4	5
A.10	Preparation of Meetings which include the stakeholders of a project on project scope plan preparation was considered.					
A.11	As a matter of economy the client doesn't wants to limit the amount spent on feasibility and project authorization/budget studies.					
B	Collection of requirements from stake holders					
B.1	Requirements are documented and requirements traceability matrix is developed in the scope management planning and management process.					
B.2	The requirement documentation of the project/s include/s requirements of the organization (<i>Business requirements</i>); <i>Stakeholder requirements</i> ; Features, functions, and characteristics of the product, service, or result; Data conversion and training requirements (<i>Transition and readiness requirements</i>); the actions, processes, or other conditions the project needs to meet (<i>Project requirements</i>); <i>Quality requirements</i>					
B.3	In the requirements documentation, requirements start out at a high level and become progressively more detailed as more information about the requirements is known					
B.4	Requirements in the documentation are tracked throughout the project life cycle by the requirements traceability matrix.					
B.5	Product requirements from their origin are linked to the deliverables that satisfy them by the requirements traceability matrix.					
B.6	Each requirement is linked to the organizational/ business/ and project objectives by requirements traceability matrix					
B.7	The requirements traceability matrix records attributes associated with each requirement & manages changes to the scope of the work.					
B.8	There is a requirement configuration management & productive metrics in all the requirements categorized by stakeholder					
B.9	Requirements made unambiguous /measurable and testable/, traceable, complete, consistent, and acceptable to key stakeholders before being base lined.					
B.10	There is adequate definition of project complete requirements					

		1	2	3	4	5
B.11	There is a system of Organizing workshops and interview with the stakeholders to ensure thorough stakeholder involvement, and improve the collection of requirements					
B.12	There is an organized listing and prioritizing all the requirements categorized by stakeholder					
C	Define Project Scope					
C.1	A clear project scope statement is defined /stated/ in the scope management planning and management process					
C.2	The project scope statement describes any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.					
C.3	The project scope statement Progressively elaborates the characteristics of the product, service, or result described in the project charter/Term of reference/ and requirements documentation					
C.4	The project scope statement clearly describes acceptance criteria of the deliverables.					
C.5	The project scope statement describes what is included and excluded from the project.					
C.6	The project scope statement enables the project team to perform more detailed planning					
C.7	The project scope statement guides the project team's work during execution.					
C.8	The project scope statement provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.					
C.9	The project scope statement creates common understanding of the project scope among project stakeholders.					
C.10	Expertise judgment provided was give due attention while project scope definition of the project					

		1	2	3	4	5
D	Create Work Breakdown Structure (WBS)					
D.1	A scope base line which includes the WBS, the WBS dictionary, the work package is set in the scope management planning and management process.					
D.2	The scope baseline is changed only through formal change control procedures					
D.3	The total scope of the work to be carried out by the project team is properly decomposed.					
D.4	Each descending level of the hierarchical decomposition (WBS) represents an increasingly detailed definition of the project work.					
D.5	The WBS dictionary document supports the WBS					
D.6	The lowest level of the WBS, work package, is with a unique identifier					
D.7	Do the identifiers provide a structure for hierarchical summation of costs, schedule, and resource information and form a code of accounts?					
D.8	The WBS dictionary provides detailed deliverable, activity, and scheduling information about each component in the WBS.					
D.9	The scope baseline included as a component of the project management plan.					
D.10	The scope baseline is used as a basis for comparison.					

		1	2	3	4	5
E	Validate/Verification Scope					
E.1	Deliverables that meet the acceptance criteria are formally signed off and approved by the customer or sponsor					
E.2	Work performance information includes information about project progress, such as which deliverables have been accepted, communicated & documented and which have not been accepted and the reasons why					
E.3	The completed deliverables that have not been formally accepted are documented, along with the reasons for non-acceptance of those deliverables. Those deliverables may require a change request for defect repair					
E.4	There is clear agreements between the client and the contractor Concerning how to verify the activities with what is stated in the contract on regular basis					
E.5	Regular meetings are held between the client and the Contractor to ensure that both actors are up to date about the state of the project					
F	Control Scope					
F.1	There is a systems to Monitoring the scope creep and Change requests within the defined boundaries considering the delay and cost incurred					
F.2	There is a Project performance measurement to Assess the magnitude of variation interims of cost and time frame from the original scope baseline.					
F.3	A system for keeping track of scope changes to seek for Patterns is considered					
F.4	There is formal agreement to a discussion between that Involves The contractor on scope changes.					
F.5	There is a proper awareness that Change in project activities results to change in Project schedule/time cost and quality					

Part II: Effects of scope change on Building Construction project

The following set of descriptive words relate to your outlook about the effect of scope change building project by identifying their level of occurrence and consequences respectively. Read and show to what extent you agree with them by marking (X) sign.

Probability of occurrence	Rare	Unlikely	Moderate	Likely	Almost certain
Consequence	Very low	Low	Moderate	High	Very high
Likelihood score	1	2	3	4	5

S/N	Description of Scope Change Effects	Occurrence Probability					Consequences (impact)				
		Rare (1)	Unlikely (2)	Moderate (3)	Likely (4)	Almost Certain (5)	Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
1	Project Priority change										
2	Lack of Motivation and Direction										
3	Change Cost										
4	Project Resource										
5	Project Risks										
6	Rework										
7	Schedule Delays										
8	Communication and Co-ordination Gaps										
9	Quality Issues										
10	Lower Productivity										
11	Failure to meet Customer Expectations										
12	Poor Effort Estimation										
13	Increase Effort										
14	Effort Waste										
15	Project Failure										
16	Slow Down Project Progress										
17	Error Generation Rate										
18	Claims										
19	Disputes										
20	Redesign										

Part III: Possible solutions to Project Scope plan management practices and effects of scope change on building construction project

1. Have you faced unsuccessful (failed) construction project in your experience?

Yes ☐ No ☐

2. If the answer above is 'yes', in your opinion, do you think the reason is Lack of a clear project scope definition and/or improper scope plan management practices?

Yes ☐ No ☐

3. If the answer above is 'yes', in your opinion, what is a best practices would you recommend for a good project scope plan management?

4. Have you seen effects of scope change on your construction projects?

Yes ☐ No ☐

If the answer on question above is 'yes', what are those effects?

5. As your opinion, do you think having a clear and proper scope plan management and definition reduces effects of scope change on your construction projects? If so, what is your recommendation to have a good scope plan management of construction project?

Thank you

Section II: Interviews questions

The following questions are about scope plan management practices and effects of scope changes on construction projects which are adopted from various literatures.

1. In your organization, is there a fully staffed project management office (PMO)? If so, how members of this office participate in scope management process?
2. In scope management process, is the role of stakeholders identified? If so, are the stakeholders performed their responsibility as well as they assigned?
3. How do you understand the relation between a good scope plan management practices and construction project success in your organization?
4. How do you look for a project scope management processes; plan scope management, collect requirements, scope define, create WBS, verify/validate of scope, and control of scope in your building construction projects? Are these processes practiced well in your organizations? If not, what the reasons behind this?
5. Lack of a clear project scope definition, improper scope management practices as well as improper management of this have been recognized as a major barriers to project success by many researcher. As your opinion did you agree with this idea? Have you some experiences?
6. Did you think scope management plan practices need to be improved? If so, on which area? As your recommendation, how to improve?
7. Have you seen an effect on your project due to scope changes? On which objectives of project this effect happened mostly? What are the causes for the change, and how would you try to resolve it?

APPENDIX B

Table 4. 14 Results on Effects of scope change on a project

S/N	Probability of Occurrence					Total Response	P.I (%)	Degree Consequences					Total Response	Severity Index (%)	Importance index (%)	Rank
	Rare (1)	Unlikely (2)	Moderate (3)	Likely (4)	Almost Certain (5)			Very low (1)	Low (2)	Moderate (3)	High (4)	Very High (5)				
Description of scope change effects																
1	10	12	22	23	3	70	59.1	12	20	11	11	16	70	59.7	35.3	19
2	7	9	18	24	12	70	67.1	6	17	17	13	17	70	65.1	43.7	12
3	4	5	11	20	30	70	79.1	1	3	16	20	30	70	81.4	64.4	2
4	4	1	20	20	25	70	77.4	5	2	15	34	14	70	74.3	57.5	4
5	7	9	20	25	9	70	65.7	8	7	25	22	8	70	64.3	42.2	13
6	10	5	23	17	15	70	66.3	8	6	18	25	13	70	68.3	45.3	11
7	3	4	10	14	39	70	83.4	4	5	10	14	37	70	81.4	67.9	1
8	3	4	30	12	21	70	72.6	4	11	19	12	24	70	71.7	52.0	7
9	3	7	19	28	13	70	71.7	1	9	15	21	24	70	76.6	54.9	5
10	3	4	30	25	8	70	68.9	2	15	14	29	10	70	68.6	47.2	9
11	12	16	11	13	18	70	62.6	14	8	14	18	16	70	64.0	40.0	14
12	5	13	21	17	14	70	66.3	6	20	22	16	6	70	58.9	39.0	16
13	2	12	30	16	10	70	65.7	4	23	21	13	9	70	60.0	39.4	15
14	8	15	22	14	11	70	61.4	8	14	24	16	8	70	60.6	37.2	18
15	26	11	12	14	7	70	50.0	9	7	3	16	35	70	77.4	38.7	17
16	3	8	18	20	21	70	73.7	4	6	17	24	19	70	73.7	54.3	6
17	11	20	23	12	4	70	53.7	9	6	31	20	4	70	61.1	32.8	20
18	4	6	10	32	18	70	75.4	4	11	20	25	10	70	67.4	50.9	8
19	3	13	19	23	12	70	68.0	2	8	26	24	10	70	69.1	47.0	10
20	6	8	7	25	24	70	75.1	1	9	14	18	28	70	78.0	58.6	3

APPENDIX C

Table 2. 3 Example of WBS dictionary

WBS Dictionary		
Project Title	A Building Construction of B+G+6 Mixed use Building	
Project Manager	Mister X	
Date prepared	April, 2022	
Last updated	may, 2022	
Work package name	Construction of Sub-structure	
Work package ID	1.1	
Description of the work	This is a work which includes all activities below Super structure. It is a work package which includes many activities and task.	
Assigned to	Mister X	
Assumption and constraints	Activity must be completed September, 2022	
schedule milestones	Finalization of Sub-structure work	
Resource requirements	Tola, Kedir, Hagos, Selamawit, Miscellaneous	
Cost estimate	5,000,000 ETB	
Activity ID	Activity name	Activity Cost
1.1.1	Excavation and earth work	1,200,000
1.1.2	Masonry Work	800,000
1.1.3	Concrete work	3,000,000
Acceptance Criteria	Finalization of Sub-structure work	
Quality Requirements	Work according to specified standard	

Source: compiled by researcher

APPENDIX D

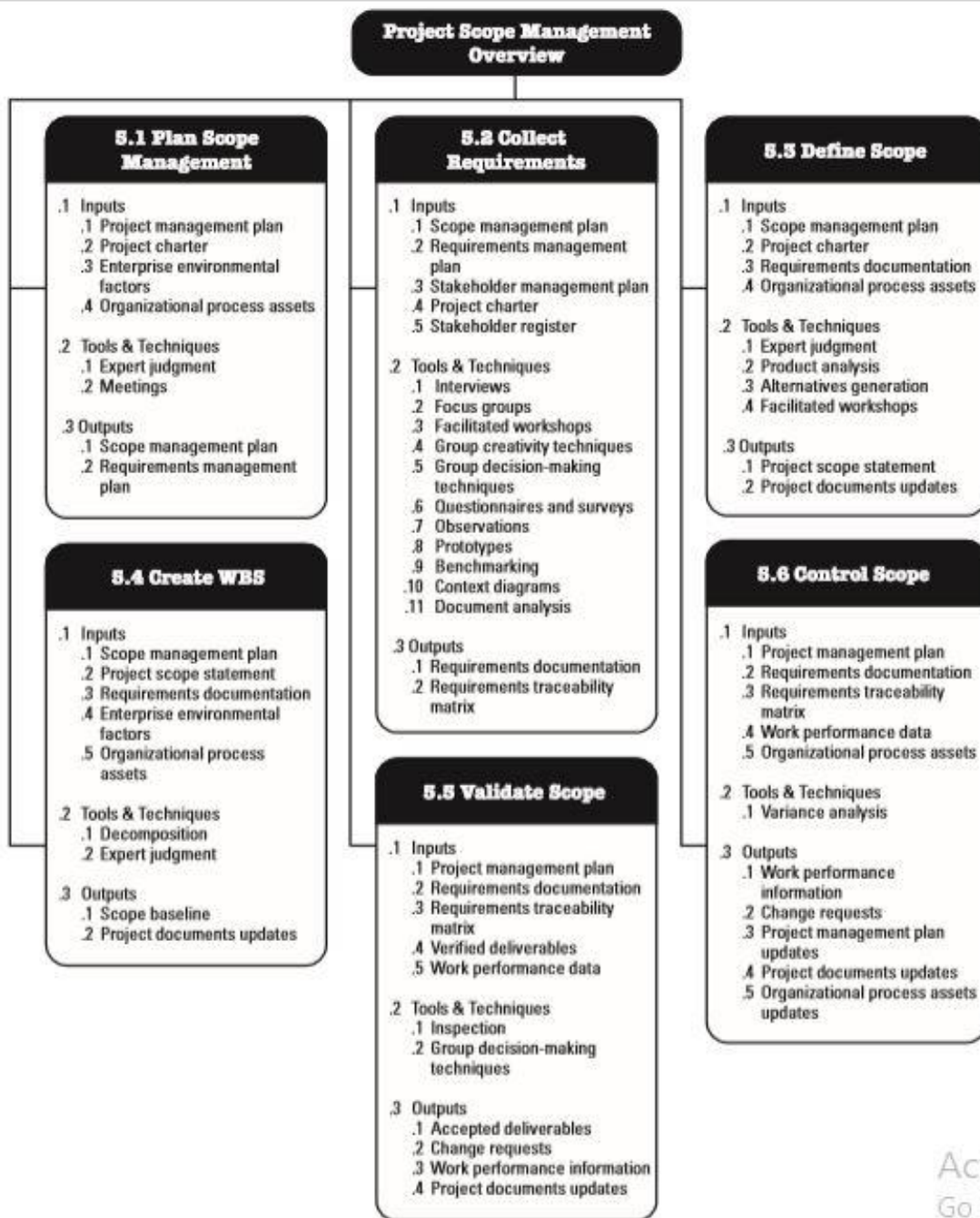


Figure 5. 1 Overview scope management process according to (PMI, 2017)

APPENDIX E

Brief explanation and definition on different terms are listed as bellows:

Project: A temporary endeavor undertaken to create a unique product, service, or result.

Product: An artifact that is produced, is quantifiable, and can be either an end item in itself or a component item.

Scope: The sum of the products, services, and results to be provided as a project.

Product Scope: The features and functions that characterize a product, service, or result.

Project Scope: The work performed to deliver a product, service, or result with the specified features and functions.

Scope Creep: Scope creep is uncontrolled expansion to product or project scope without adjustments to time, cost, and resources.

Scope Management Plan: A component of the project or program management plan that describes how the scope will be defined, developed, monitored, controlled, and validated.

Project Management Office (PMO): A management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques.

Project Priority: Change request arises from the stakeholders due to change in dependency of the task and project deliverable, recorder along with its impact, and incorporated in redirection, reallocation and prioritization process which ultimately results in re-planning the scope of the project. Likewise project priority and functionality change the project scope definition.

Lack of Motivation and Direction: Change can occur during the life of the project from analysis till the maintenance phase of the project and the stakeholders who are responsible for giving direction to the project by their individual's perception, cross cutting of feature, priority and making requirements changes the scope definition of the project. This leads to a decrease in staff motivation and unmeet project deadlines.

Change Cost: While calculating the budget for the software projects, the focal point is on the number of programming statements and size of the project along with the customer's ability to pay for the labor, however, change in the results of the preliminary estimate on budget and schedule overruns and forced the development team to spend more time to finish the task. Variety in life cycle costing, unapproved scope, risk mitigation, initial estimates and adding more decision points to increase cost and reduce contingency reserved for the project.

Milestone: A significant point or event in a project, program, or portfolio

Project Resources: The unavailability of newer technology to handle a change request can have problems reaching the project scope on time and budget. With the demand for new technology, all plans, estimates, schedules must be re-assessed and a new example or prototype must be designed to achieve the varied scope of the task. Moreover, change in resources with limited boundaries of the project goes to the scope creep and increases overhead for potential delays. This scope creep can lead to a technology creep problem for the developers.

Project Risks: Risks come from multiple sources like business risks, technological risks, supplier risk, technical risks, etc. These risks often occur when a team member stops working due to misconduct of required work tasks, inappropriate effort estimation, and emergency. Technological uncertainty, untried assumption constrains, requirement uncertainty and volatility (have an impact on project risk management) can direct blow-out cost afterwards.

Rework: Is an action taken to bring a defective or nonconforming component into compliance with requirements or specifications. Rework exists throughout the life of the project but possesses a maximum contribution during the requirement gathering phase. Factors that contribute to rework include lack of expertise, documentation deficiency, absence of communication, changes in requirements, absence of user involvement, and lack of adequate testing. Rework is the primary reason for schedule delays, budget overrun, unsatisfied clients, and risks even after delivery

Schedule Delays: The number of breaks, waiting periods, third party tool providers, vague scope definition and poor documentation contributes towards lengthy lead time. Project

success and failure are assessed and tracked against the prescribed schedule for the project. To change in model or prototype schedule estimates need to be re-evaluated.

Communication and Co-ordination Gaps: Unrealistic scope changes, trust issues, inappropriate sharing of documents and lack of decision making affect non-technical issues like communication gaps. On the other hand, continuous integration, client involvement, updating the requirement document reduce the level of over scoping.

Quality Issues: Is the degree to which a set of inherent characteristics fulfills requirements. While developing the system and software product code smells refers to the poor technical selections that impact the quality of the code. Quality attributes (performance, security, reliability, availability, and so on.), requirement volatility (code quality, quality of project management and developer's capability) and lack of commitment affect project quality, as it decreases market share and brand value

Lower Productivity: Workforce experience and forecasted completion date of the project affect actual productivity. During the run time execution of the project, an increase in workforce size and process, losses progressively decrease actual productivity.

Failure to meet Customer Expectations: Customers are involved in scope definition, providing the feature, validating requirement, prioritization of the features, and change in the direction of the project. The ever-changing nature of requirements and low development involvement at early phases contribute towards expensive rework and failure to meet customer expectations. Customer involvement and documenting requirement are considered the important practices for reducing scope creep.

Poor Effort Estimation: Early estimate (based on vague requirements and re-estimation during development) and updating of system requirements to keep the documents updated, results in poor estimation.

Increase Effort: Implementing change request at a later stage of the project and effort required to mitigate uncertainty, requires mitigation effort and cost. In some cases, mitigation effort may increase than expected cost of the risk.

Effort Wasted: In software projects change in scope (over scoping, inappropriate equipment, ineffective process & methodology) is inevitable and commitment needs to be sacrificed, ultimately leads to time, cost, and effort overwhelms. The size of the same project is used as a benchmark to estimate the cost, schedule, and effort of the current project.

Project Failure/Project Success: Slowly increase and change in software scope of the project influences the success of the project, due to its non-linear nature. Project success or failure has a direct relation with proper planning and well-defined scope definition. Unauthorized scope changes, lack of client and top management's involvement defining inadequate boundaries and unmanaged risks; resulting project failure. Similarly, a well-defined scope control mechanism along with top management support leads to the success of the project.

Baseline: The approved version of a work product, used as a basis for comparison to actual results.

Backlog: An ordered list of work to be done.

Slow down Project Progress/ Project performance: Project performance can be calculated using the progress of individuals or groups on performing their tasks and work items left. Frequent changes, vague and unstable responsibility, sustainability and tracking under the same team results in a slowdown project progress

Error Generation Rate: Schedule pressure and requirement volatility affect the error rate of the project, which is closely related to software evolution. With time, as fewer tasks remain to be processed, the software development rate falls identically affecting the error rate. Thus, an increase in error generation contributes to schedule and effort overrun.

Deliverables: Any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project. Deliverables also include ancillary results, such as project management reports and documentation. These deliverables may be described at a summary level or in great detail.

Project charter: A document issued by the project initiator or sponsor that formally authorizes the existence of a project and provides the project manager with the authority to

apply organizational resources to project activities. Is a document that provides the high-level of project description, product characteristics, and approval requirements.

Business requirements: These describe the higher-level needs of the organization as a whole, such as the business issues or opportunities, and reasons why a project has been undertaken.

Stakeholder: An individual, group or organization that may affect, be affected by, perceive itself to be affected by a decisions, activity, outcome of a project. (Customer, suppliers, community, managers, employers, sponsors, end users, government)

Stakeholder requirements: These describe needs of a stakeholder or stakeholder group.

Functional requirements: Functional requirements describe the behaviors of the product. Examples include actions, processes, data, and interactions that the product should execute.

Transition and readiness requirements: These describe temporary capabilities, such as data conversion and training requirements, needed to transition from the current as-is state to the desired future state.

Project requirements: These describe the actions, processes, or other conditions the project needs to meet. Examples include milestone dates, contractual obligations, constraints, etc.

Quality requirements: These capture any condition or criteria needed to validate the successful completion of a project deliverable or fulfillment of other project requirements. Examples include tests, certifications, validations, etc.

Acceptance criteria: A set of conditions that is required to be met before deliverables are accepted.

Work package: The lowest level of the WBS is a work package with a unique identifier. These identifiers provide a structure for hierarchical summation of costs, schedule, and resource information and form a code of accounts. Each work package is part of a control account.

Control account: A control account is a management control point where scope, budget, and schedule are integrated and compared to the earned value for performance measurement. A

control account has two or more work packages, though each work package is associated with a single control account.

Planning package: A control account may include one or more planning packages. A planning package is a work breakdown structure component below the control account and above the work package with known work content but without detailed schedule activities.

Risk: An uncertain event or condition that, if it occurs, has a positive effect (*opportunities*, produce a positive project outcome) or negative effect (*threats*, have a negative impacts on the project) on one or more project objectives.

Lessons learned: The knowledge (both positive and negative experiences that occur throughout the project life cycle) gained during a project which shows how projects events where addressed or should be addressed in the future for the purpose of improving future performance.

Requirements Management Plan: A component of the project or program management plan that describes how requirements will be analyzed, documented, and managed.

Artifact: A template, document, output, or project deliverable.

Team Charter: A document that records the team values, agreements, and operating guidelines, as well as establishes clear expectations regarding acceptable behavior by project team members.

Project Management Body of Knowledge (PMBOK): A term that describes the knowledge within the profession of project management

