Scope Change Management: Implication for Building Construction Projects Success, a Case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector

In Partial Fulfillment of the Requirements for the Degree of Masters in Project Management

By: Ekram Kebir

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Addis Ababa, Ethiopia

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A Project Work Submitted to Addis Ababa University, School of Commerce

In Partial Fulfillment of the Requirements for the Degree of Masters in Project Management

By: Ekram Kebir

Advisor: Adane Atara (PhD)

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DECLARATION

I, Ekram Kebir Muhammed, hereby declare that this thesis entitled "Scope Change Management: Implication for Building Construction Projects Success, a Case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector" is my original work, I have carried out the present study independently with the supervision and support of my research advisor Adane Atara (PhD). I further confirm that this paper has never been submitted to any other university for any degree, diploma or fellowship. Finally, I declare that all source materials used in this research has been duly recognized and acknowledged.

Signature

……..……

Date

…….……

CERTIFICATION

I, the undersigned certify that I have read and hereby recommend for acceptance by the Addis Ababa University, School of Commerce a dissertation entitled: *"Scope Change Management: Implication for Building Construction Projects Success, a Case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector" in* partial fulfillment of the requirements for the Degree of Masters in Project Management.

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Dr. Adane Atara

(Advisor)

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Date

APPROVED BY BOARD OF EXAMINERS

_____	_____	_____
Advisor	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

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ABBREVATIONS AND ACRONYMS

ECDSWCo: Ethiopian Construction Design & Supervision Works Corporation

BUDSWS: Building & Urban design & Supervision Works Sector

CDSCo: Construction Design Share Company

WWDS: Water Works Design and Supervision Enterprise

TCDSCo: Transport Construction Design Share Company

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ABSTRACT

The main purpose of this research paper is to study scope change management: Implication for Building Construction Projects Success, a Case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector. The five factors that have been examined in this study are requirement collection, project scope definition, creating WBS, scope verification and scope control. A total number of responses from 154 respondents were used for analysis in this research study. Questionnaires with closed ended and five point Likert scale items were used as instrument to collect data for the research. The data collected were analyzed in SPSS 20.0 Version. Descriptive statistics was used to explain the demographic characteristics of respondents and to discuss the descriptive report of responses provided by the respondents by measuring, mean and standard deviation. The result has shown that overall mean for the five aspects of project scope change management, the score for requirement collection, scope definition, WBS creation, scope verification and scope control were 2.521, 2.75, 3.20, 2.420 and 2.593, respectively which were all less than the cut-off point developed by Alfarra (2009) which indicates that the five aspects of project scope change management mentioned above are not properly practiced in BUDSWS and need further improvement. This study result is based on descriptive analysis scope change management Thus, it is suggested that future researchers conduct explanatory research to find out the variables that shows level of effect of the aspects of project scope change management using inferential statistical analysis.

***Key words**: Scope change management, requirement collection, scope definition, Work Breakdown Structure, scope verification, scope control*

CHAPTER ONE

INTRODUCTION

The purpose of this research paper is to analyze the scope change management: implication for building construction projects success with particular emphasis on ECDSWCo- Building & Urban Design & Supervision Works Sector. This chapter includes background of the study; statement of the problem; research questions; objectives of the study; scope and limitation of the study, significance of the study and organization of the study.

1.1Background of the study

Despite being a new field in comparison to other related management science, project management is widely considered as one of the fastest growing disciplines in today's industry. It is becoming increasingly important in companies for the control and development of business decisions. It is distinguished by management restructuring strategies and the adaptation of particular management techniques with the goal of improving control and utilization of existing resources. Project management was once restricted to the US Department of Defense. The notion of project management is now used in a wide range of businesses and organizations, including the construction industry (Kerzner. H, 2009).

Construction projects provide a substantial contribution to a country's socioeconomic development. The construction business has a tremendous impact on the economy, the environment, and society on a global scale, accounting for around 6% of global GDP. (World Economic Forum, 2016) as cited by Kalkidan K(2019).

In this way, construction projects in Ethiopia also provide significant contributions to the Ethiopian economy (EEA, 2011). In terms of government infrastructure development, public construction projects use the most of the government's annual capital expenditure (Ministry of Construction, 2016). The construction sector's contribution is greater and the industry has been playing a crucial role in sustaining country's rapid and equitable socio-economic development and changing the livelihood of millions of peoples and the sector had a 9.5 percent share from country's total Gross Domestic Product (Ministry of Construction, 2016) as cited by (Kalkidan. K, 2019).

Recognizing the importance of the construction industry in the country's growth, understanding and implementing the concept of project management, as well as determining whether or not the country's construction projects are finished within the project scope, is critical.

The Project Management Institute [PMBoK, 2000] defines a project as a temporary undertaking with a defined start and end date that is undertaken to generate a one-of-a-kind product or service. Projects are defined as the accomplishment of a given goal through the application of resources to a sequence of activities or tasks.

The preparation of the scope definition package is a crucial subprocess of the pre-project planning process. The process of defining and preparing projects for execution is known as scope definition. It is at this crucial stage where risks associated with the project are analyzed and the specific project execution approach is defined.

The goal of scope change management in this context is to keep track of product and project limits, which can be a difficult task because the lines aren't always clear and

clearly defined, and they can involve political, social, technological, organizational, and economic forces (Alexander et al, 2009).

The project's success is determined by a well-defined project scope. However, within the initial project, there are very few completed projects. Changes are unavoidable, and they have the potential to devastate not only the project's morale, but also the project as a whole. Changes to the scope of the consolidation should be kept to a minimum and approved by the project manager and the client / user (Kerzner. H, 2009).

The scope of the project leads the line that the project manager and the parties involved must follow in order to know in which direction they should or should not move towards achieving the critical success factors of the project due to changes in the size of the impact on the cost, timing, risks, and quality of the project. Karl (2014) adds that there is a well-defined range and set of expectations of project stakeholders.

The main question in this context is: "What are some aspects of the project scope change management that really affects the success of the projects in the Ethiopian context?"

Therefore, the main objective of this research is to study the various aspects of managing the project scope, which is key to the success of construction projects in the Ethiopian context, as in the case ECDSWCo, Construction and design, urban, and control sector.

1.2 Statement of the problem

The management of project scope is critical to project success. The goal of every project is to complete the task within the time and budget constraints. However, this does not occur in practice, and more projects than we anticipate are unable to be completed and meet the deadline. Many projects begin with good ideas, large investments, and significant effort. However, the majority of them fail miserably. A major contributor to

project failure is a lack of understanding or definition of project and product scope at the start of the project (Muhammed, N, et al, 2013). Because of frequently changing requirements, changes in project course while the project is already in progress, a lack of clarity in the requirements, budget overruns, and a lack of stakeholder engagement, most projects face scope change, which leads to severe project alteration and has a more visible impact on cost, schedule, and quality.

According to scholars such as Fageha et al (2013), an incomplete scope definition in the early stages of a project's life cycle is a common source of difficulty in the construction project development process. Harrington &McNellis, (2006) One of the most typical reasons for project failure, according to some, is the inability to adequately define or manage scope.

According to Olander and Landin (2005), if stakeholders are not effectively engaged and their concerns and expectations are not appropriately addressed, conflict and disputes might occur during the implementation of a construction project..

Kalkidan, K(2019), points out that the lack of expertise of experts in these areas, according to special education, knowledge, skills, and experience, and the shortage of a scheme for organizing seminars and interview guides to ensure deep stakeholder engagement in order to improve requirement analysis collection, the lack of a complete definition of the project size and its impact on critical underestimation, and the absence of a complete definition of the project size and its impact on critical underestimation, in terms of the scope of the project management process.

It is noted by Schattemanet al. (2006) that project risk management should follow the protocol for changing the range since the range of changes entails risks for the project.

They demonstrated that in the face of considerable uncertainty, a thorough risk methodology essential for project planning and construction can be implemented. When executing duties, and managing adjustments, this should be kept in mind.

In a study conducted by Adebayo et. al (2018) on the application of the project management practice scale for project success within telecommunications companies, Nigeria, found that the application of the project management practice scale has a significant impact on project success, meeting expectations, satisfaction and better allocation of resources, and timely delivery of the project. Telecommunications companies should therefore require that the scope of management practices is used when executing telecommunications projects, since low success rates are included in projects that will be implemented without the scope of management practices .The result of regression analysis showed that four (customer expectations β = -.663, p =.000, customers satisfaction β=.852, p <0.05, resource allocation β=1.055, p <0.05, and project duration,β=-1.086, p <0.05) out of the six (6) indicators used had significant impact on project successes in the selected firms at 0.05 level of significance.

In a study conducted by Muhammad, N., et al., (2013), the value of space is in the success of a project that has a well-defined and controlled scope, resulting in high quality assurance and in agreed costs, within this schedule for stakeholders. While there is an understanding of the need to implement projects, surprisingly little has been published about the importance of the project success scale. This research is a subject of discussion, as well as the fact that the space needs to be clearly defined and can be controlled, and some of these may be the main factor behind poor area management, and how this can be

achieved. It was concluded that a better understanding of the differences between project and product scale can bring a greater likelihood of project success.

Also, according to Igor's research. L, et al., (2017), type of project management, strategy and it was found that it is the lack of understanding of project requirements that has become the main factor that hinders project implementation, since often stakeholders do not fully understand their needs at the beginning of the project, which will lead to a change in the project life cycle, and this increases the cost and time of implementation.

From the findings stated above, a number of studies have highlighted factors of project failures such as corruption, insufficient skills or lack of competence, insufficient planning or design, and management issues, among many others..

As can be seen from these results, it is clear that many studies have identified reasons for project failure such as corruption, lack of ability or lack of professionalism, and lack of planning, designing, and managing other people's problems. Many of these studies did not relate to the area of change management or to the factor that contributes to project success or defeat. Some research on this topic has been conducted in Ethiopia, but a but they are few. The studies reviewed indicate that minimal studies have explored the project scope change management, which shows that there is a knowledge gap that justifies the need for more study. No study combined the six variables: collecting requirement, project scope definition, creation of WBS, scope verification and scope control practices to find out whether these variables are really practiced and influence the project success in Ethiopian construction projects context. Therefore, by analyzing the

above variables and measuring their impact on the success of construction projects, this study aims to fill this gap.

1.3 Objectives of the study

1.3.1 General Objectives

The general objective of this study is to assess scope change management and implication for Building Construction Projects Success, a case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector.

1.3.2 Specific Objectives

- To assess collection of project requirements practice and its implication for project success in ECDSWCo- Building & Urban Design & Supervision Works Sector.
- To study project scope definition practice and its implication for project success in ECDSWCo- Building & Urban Design & Supervision Works Sector.
- To investigate creation of WBS practice and its implication for project success in ECDSWCo- Building & Urban Design & Supervision Works Sector.
- To study project scope verfirication practice and its implication for project success in ECDSWCo- Building & Urban & Supervision Works Sector.
- To investigate project scope control practice and its implication for project success in ECDSWCo- Building & Urban Design & Supervision Works Sector.

1.4 Research Questions

- What does the current practice of collection of project requirements look like in ECDSWCo- Building & Urban Design & Supervision Works Sector?

- How is project scope definition being practiced in ECDSWCo- Building & Urban Design & Supervision Works Sector?
- What does the current practice of creation of WBS look like in ECDSWCo- Building & Urban Design & Supervision Works Sector?
- What does project scope verification practice in ECDSWCo- Building & Urban Design & Supervision Works Sector look like?
- How is project scope control being practiced in ECDSWCo- Building & Urban Design & Supervision Works Sector?

1.5 Scope/Delimitation of the study

Ethiopian Construction Design & Supervision Works Corporation (ECDSWCo.) is a multi-disciplinary engineering firm that was formed by combining three companies: Water Works Design and Supervision Enterprise (WWDSE), Construction Design Share Company (CDSCo.), and Transport Construction Design Share Company (TCDSCo.) that were all involved in planning, study, design and supervision of Water & Hydropower, Building & Transport Sector Works since 1998, 1977 & 1987, respectively. ECDSWCo is now a fully integrated Engineering Consulting Firm giving consultancy services with six business units in areas of Water and Energy, Building and Urban, Transport, Geo-technics and Underground Works. However, this research work focuses on the data to be collected from Building & Urban Design & Supervision Works Sector (BUDSWS). The unit of analysis will be technical staff and will not include supportting staff.

Conceptually, project scope management is a broad concept that encompasses multitude of elements and variables. But, this research will be based on data collected by the

researcher only on the five variables (factors) affecting project scope change management namely collection of requirements, definition of project scope, WBS creation, scope verification and scope control. In other words, this study will provide an insight into the research question and objectives set out above and are not intended to answer all the matters relating to the project scope change management.

Methodologically, this study will use a quantitative research strategy and descriptive. Regarding the time dimension which relies on a cross-sectional survey that can snapshot the study population.

1.6 Limitation of the study

ECDSWCo is now a fully integrated Engineering Consulting Firm giving consultancy services with six business units in areas of Water and Energy, Building and Urban, Transport, Geo-technics and Underground Works. But this project work focuses only on the Building & Urban Design & Supervision Works Sector. This means that the study is limited to one sector that might lack detailed survey work for this particular topic of research. Moreover, the study might face limitations of relevant references and lack of cooperation by research participants, whose exclusion may affect the validity and generalization of the research result.

1.7 Significance of the study

The purpose of this research is to determine the impact of project scope change management on project success in the ECDSWCo- Building & Urban Design & Supervision Works Sector. The study will be extremely beneficial to ECDSWCo-Building & Urban Design & Supervision Works Sector since it will raise awareness of

existing project scope change management issues and provide relevant recommendations for how to handle them.

The research will benefit the researcher since it will add to the increasing body of knowledge on project scope change management challenges and will allow the researcher to fulfill a portion of the requirements for a Masters in Project Management degree once the study is completed.

The study will also serve as a reference for future research on the impact of scope change management on project success in Ethiopia. This study will be useful to future researchers because it will supply them with relevant information on the subject.

Project management staffs of the ECDSWCo- Building & Urban Design & Supervision Works Sector will also benefit much from the study to be undertaken in line with project scope change management. The study will enable them to use the recommendations given to enhance high level of cooperation in their various job groups.

1.8 Organization of the study

There are five chapters in this research. The first chapter covers the study's introduction and background, as well as the statement of the problem, research questions, study objectives, scope/delimitation, study limitations, and relevance. The review of related literature is the subject of the second chapter. The third part is about study technique, while the fourth part is about data analysis and interpretation. The study's summary, conclusion, and recommendation are presented in Chapter 5.

1.9 Definition of terms

- **Project:** A project is a short-term undertaking that aims to provide a one-of-a-kind product, result, or service. Due to the transient nature of projects, they must have a defined start and end date for completion. (PMBoK, 2013)
- **Project management** is the process of applying knowledge, skills, tools, and procedures to project activities in order to reach and achieve project goals. This is accomplished by using logically organized processes and procedures, identifying requirements, needs, concerns, and customers ' expectations, and attempting to balance able to compete project constraints, restrictions, and project boundaries in order to meet project objectives that meet expected quality standards and stakeholder expectations. (PMBOK, 2013).
- **Project scope Management:** Project scope management refers to all of the procedures that must be followed to guarantee that the project is reorganized to only the work that is required to provide a required product, service, or result.

  The effort necessary to produce a project's deliverable is referred to as project scope. Change happens, and project scope management is the act of managing scope modifications while still completing the project on time and on budget. A work breakdown structure is frequently used to specify scope, and changes should be made only through formal change control procedures. (PMI)
- **Scope change:** is defined as a change in activities caused by an alteration or modification to the specific conditions, hypotheses, or requirements given at the start of a project. (Gokulkarthi & Gowrishankar, 2015; Nahod, 2012).

In almost any successful project management endeavor it is conceivable that some change in scope might be necessary. Veering from the initial scope of the project could potentially cause costs to mount or deadlines to be unmet.

Managing these scope changes can be challenging for even the most skillful project manager. First, the baseline for change must be identified then proper management of the change in scope is required.

To deal with project adjustments, the project manager must decide which changes will be made and how each one will affect project deliverables, as well as how deviations from the perceived scope would affect the project's final outcome.

While certain scope changes are unavoidable, it is critical to weigh each requested change and assess its influence on overall project management. (PMBOK 3rd & 4th edition)

- **Requirements Collection:** Collect requirements is a process that determines as well as documents and manages the needs and requirements of the stakeholders to meet the objectives of the project management tasks. This documentation is very important as it provides the basis for defining as well as managing the scope of the project. (PMBOK, 5th Edition)

  Requirements elicitation (also known as Requirements Gathering or Capture) is the process of gathering a list of requirements (functional, system, technical, and so on) from various stakeholders (customers, users, vendors, IT staff, and so on) to serve as the foundation for the formal Requirements Definition. (Inflectra, January 29, 2020)

- **Project Scope Definition:** One of the first and most important steps in project management is to flesh out a statement or scope definition which identifies and describes all work necessary to produce the final product. The purpose of the scope description is to ensure that everyone in the team knows what is expected of them during the project. Furthermore, any project work that may be reasonably anticipated must be determined and reported. During the project management process, the scope specification should also allow for proper administrative control. (PMBOK, 3rd edition)
- **Creating WBS:** A deliverable-oriented hierarchical deconstruction of the project team's work to achieve the project's objectives and produce the requisite deliverables. A work breakdown structure defines all the things a project needs to accomplish, organized into multiple levels, and displayed graphically. The WBS essentially outlines the project's "what." Everything you need to complete the project is laid out in a single, easy-to-understand diagram. The goal of this diagram is to break down complicated activities into smaller, easier-to-manage components.
- **Scope Verification:** When it comes to project management, it's critical to acquire the consent of stakeholders once the project's scope has been specified. If the project is small, scope verification may simply require a single signature from the principal sponsor or customer; however, larger projects may include multiple stakeholders.

  It's critical to receive express scope verification from key stakeholders, which could be a formal signature on paper or an email that specifically states project

permission. Whatever approach is used, a record of the scope verification must be kept. Of course, the stakeholders should have already seen draft versions of the plan, so the verification procedure should be a formality. (PMBOK, 3rd edition)

- **Scope Control:** One of the most important aspects of project management is scope control. Good project management necessitates managing scope in such a way that a project's objectives can be met on schedule while also resolving issues that are crucial to the project's success. Good scope control allows for the altering and addition of key tasks while avoiding the addition of unneeded or unsuitable elements.

  The ability to determine which elements must be addressed during a successful project is critical to scope change management and a great project conclusion. It is critical for a project manager to maintain flexibility by modifying and adding tasks that will determine whether or not a project succeeds. Items that are not important to a successful delivery or that would be better suited to a phase two release or follow-up version should be excluded from the present project scope, especially if their completion would jeopardize the project's on-time delivery or implementation goals.

  Good scope control therefore is critical to project management and must be managed with a balance of flexibility for critical items and rigidity against adding superfluous “bells and whistles”. (PMBOK, 4th edition)

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The goal of this chapter is to review the work of other researchers in the field of project scope change management. Theoretical and empirical reviews are conducted, leading to the development of a conceptual framework that is proposed to guide the research. The research gap is identified, and the adopted conceptual framework is discussed.

2.1 Theoretical Literature Review

2.1.1 Project: An overview

A project is a short-term undertaking that aims to provide a one-of-a-kind product, result, or service.

Due to the transient nature of projects, they must have a defined start and end date for completion. The project's end date is reached when the project's objectives are met, when the project is terminated owing to unmet objectives, or when the project's original necessity is no longer met (PMBOK, 2013). A project can result in the creation of a product, such as a component, another item, or an end item in and of itself; a capacity to provide a service; or a result, such as an item or a document that can be used for the purpose for which it was created. A project is a collection of interconnected work activities that are constrained by the project boundary (scope), available budget for the project, and the timeframe (schedule) in which the project is expected to be completed in order to deliver capital assets (project deliverables) required to meet an organization's strategic goals (Construction Project Management, 2006). All projects share common characteristics, such as the projection of ideas and activities into new endeavors, as well as elements of risk and uncertainty that could lead to event and task completion delays. Project management assists in predicting as many of these dangers and problems as

possible, as well as planning, organizing, and controlling these activities so that projects are completed successfully despite these risks. (Lock, 2007).

2.1.2Concept of Project Management

Project management is the process of applying information, skills, tools, and procedures to project activities in order to fulfill and satisfy project requirements. This is performed by using logically ordered processes and procedures, identifying requirements, needs, concerns, and customer expectations, and balancing competing project restrictions, limitations, and project restrictions to fulfill desired quality standards and stakeholder expectations. (PMBOK, 2013).

Project management is critical for a more efficient telecommunications project execution and service provision process that reduces the likelihood of cost overruns, timetable slippages, quality enhancement, and success. Project management, in particular, aids in evaluating the significance of project implementation and delivers proactive guidance, control, and coordination on the comportment of project execution using objective metrics to raise questions about doing the right things, correctly, and well in order to achieve the desired benefits and exceed standards. (PMBOK, 2013).

Project management, in other terms, provides tools for establishing a project's scope or boundaries, as well as any changes to the project. It develops and maintains communication ties between organizations and occupations. It foresees risks and uncertainties, and it tracks progress and the quality of work completed within the project's time and budget limits.

The monitoring of implementation process is the responsibility of project management, which involves defining a feasible timetable, constructing a financial reporting model for

the project, measuring efforts versus plan, managing costs against budget, and so on. It has well-defined limits, input and output, and activities that are prioritized in terms of time and space. The project's outcome must be delivered to a specific receiver, presumably the customer, and the project should add significant measure. (Passenheim, 2009).

2.1.3 Project Scope Management

Project scope management encompasses all of the practices required to ensure that the project is efficient to only the necessary work in order to attain the desired product, service, or result. Scope discusses to what needs to be done, and scope management is the method of managing what needs to be done (Wysocki, 2009).

The execution of an infrastructure project is subject to a number of requirements in order to achieve a high-quality result (Lau & Kong, 2006; The British Standards Institution, 2013). One of these requirements is the project scope definition, which is defined as the activities that must be carried out in order to complete a project with the desired outcome (Turner, 2009). This outcome refers to meeting the project's end goal by delivering a high-quality end product that meets the client's requirements on time and within budget (Project Management Institute, 2000; Heldman, 2009; The British Standards Institution, 2013; Turner, 2009; Meredith & Mantel, 2009).

The “iron triangle,” a project management visualization that shows how a high-quality project can be completed, is built on scope, cost, and schedule (see Figure below) (Atkinson, 1999).

Figure 2-1: Iron Triangle

Source: Atkinson (1999)

The iron triangle demonstrates that scope is a particularly important aspect of project management that must be controlled in relation to the baseline throughout the project's lifetime (Project Management Academy, 2017; Koskela & Howell, 2002).

In their 2006 edition, IPMA defined project scope as defining the project "boundaries" in terms of project deliverables, and this is done by attempting to identify in detail all of the work to be done as compared to the project initiation stage, in order to provide a clearer picture of the entire project (IPMA, 2006). As a result, project scope management encompasses all of the processes involved in defining and controlling what is and is not included in a project. The primary goal of project scoping is to ensure that the project team and stakeholders have a common understanding of what product, service, or result the project will produce and what processes will be used to achieve that goal. Among these procedures are the following:

- Scope planning: is the process of determining how the scope will be defined, verified, and controlled.

• Scope definition: Reviewing the project charter and initial scope statement, and adding more details as necessities are developed and change requests are accepted.

• Developing a work breakdown structure (WBS): Breaking down the major project deliverables into smaller, more controllable components.

• Scope verification: This is the process of ratifying acceptance of the project scope.

• Scope control: Monitoring changes to project scope as and when they happen (PMI, 2013).

2.3.1 Collect requirements

The scope change management plan is a document that comprises descriptions of all the actions mandatory to complete the project, the creation of the work breakdown structure (WBS), verification of project deliverable completion, and control requests for changes to the project scope. The project charter, preliminary scope statement, and project management plan are important inputs in this process. Scope planning tools and techniques include standards, meetings, and expert judgment. The business need is aligned with the company's objectives, and a project is launched while keeping project feasibility criteria in mind. The feasibility of a project is a combination of technical, economic, and financial feasibility. The availability of technological knowledge and materials is investigated in the technical feasibility. The economic feasibility study investigates the project's rates of return and compares the cost-benefit of various scenarios. Finally, the availability of necessary funds and the organization's credit rating are checked during the financial feasibility evaluation (Khan, 2006).

2.1.3.2 Project Scope definition

The process of developing a more detailed description of the project's product, service, or result is known as project scope definition. The primary goal of the scope definition is to clearly define the project's boundaries while taking into account the needs of all project stakeholders. It is critical to clearly define the boundaries and get the stakeholders to agree on them. As a result, in the case of external projects, the defined scope of the project is usually included in the contractual agreements between the sponsor and the service provider. This is still important in internal projects between the sponsor and the project team.

It is critical that the elements within and outside of the scope of the project are well defined in order to understand what should be under project control. As a result, it is critical that the project manager and his team identify more elements in detail and differentiate between what is within and outside of scope. The document used for this purpose is the project scope statement.

The project scope statement is built on the preliminary scope statement, project charter, organizational process assets, and approved change requests. Expert judgment, product analysis, alternative generation, and facilitated workshops are some of the tools and techniques used for scope definition (PMI, 2013).

The process of defining scope is iterative. This step includes the creation of the scope statement as well as the setup of the Work Breakdown Structure (WBS). The Project Definition Rating Index (PDRI) tool, according to Cho and Gibson (2001), is a useful tool in scope definition. This is a weighted checklist created by a Construction Industry Institute research team. It assists the project team in determining which steps are required

to define project scope. Furthermore, it can be used as a benchmarking tool for organizations to use in evaluating scope definition completion versus previous project performance (Cho & Gibson, 2001).

In infrastructure projects, a requirement specification is frequently present at the start of the project. The requirements are already collected within this requirement specification. However, there is a slight distinction between collecting requirements and converting them into functional requirements. Typically the contractor, the consultant and the client works together to complete this task. The specification of requirements is an iterative process that includes feedback loops about the requirements and design (Alsem, et al., 2013).

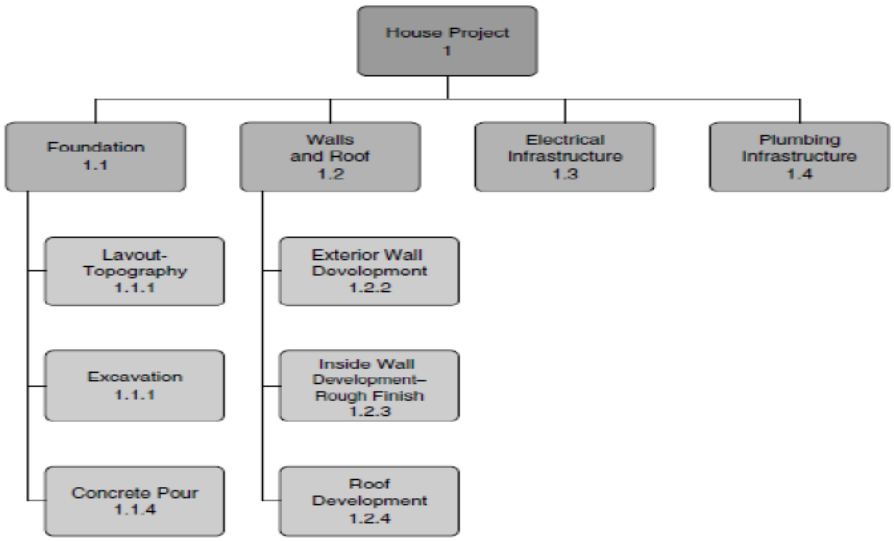
2.1.3.3 Create Work Breakdown Structure (WBS)

The work breakdown structure (WBS) is a deliverable-oriented grouping of the work involved in a project that defines the project's overall scope. Kerzner defines a work breakdown structure (WBS) as “a product-oriented family tree subdivision of the hardware, services, and data required to produce the end product” (Kerzner, 2003). This "family tree" structure attempts to organize all of the project's work into tasks that are defined, estimated, and tracked.

It is a fundamental document that serves as the foundation for project planning and management, including project schedules, costs, resources, and changes. The name of the problem or opportunity to be addressed is labeled at the tree's root. The main inputs for creating a WBS are the project scope statement and project management plan, and it serves as input to the following key project management activities: cost estimation and budgeting, resource planning, risk management planning, and activity definition.

Work breakdown structure tools and techniques include decomposition and expert judgment, with outputs such as scope baseline and project document updates. The scope baseline includes project documents such as the project statement of work and the work breakdown structure dictionary. The WBS dictionary contains detailed information about each component's deliverables, activities, and scheduling information. The WBS dictionary contains the following information.: code of account identifier, description of work, assumptions and constraints, responsible organization, schedule milestones, associated schedule activities, resources required, cost estimates, quality requirements, acceptance criteria, technical references, and agreement information. (PMI, 2013). Figure below shows a simple WBS of a house project.

Figure2-2: Example of WBS of a simple house project.



Source: (Norman, Brotherton, Fried, 2008. P.30)

The purpose of a work breakdown structure is to construct work packages that reduce a project's complexity. Smaller job packages are easier to organize and execute (de Boer,

Bruinsma, Elich, van Luling, &Wemeijer, 2009). The actions that must be accomplished, as well as the requirements, information, and hazards that have been recognized, are all included in each work package.

2.1.3.4 Scope Verification

This is the procedure for formally accepting the completed project deliverables. This is done to ensure that a product, service, or result meets the needs of the project's sponsor or customer, as well as other identified stakeholders. It is important to note the difference between validate scope and quality control. Whiles validation of scope is concerned with acceptance of deliverables by external entities such as the project sponsor or customer and other stakeholders, quality control is the evaluation of whether or not a product, service, or result complies with a regulation, requirement, or specification, which is purely internal process. Some of the tools use for this process is inspection group decision-making techniques

A continuous feedback loop verifies the scope of all work completed within the project. It entails reviewing the design and engineering deliverables that were required during the scope planning and definition phase. The job has to be in conformity with the legislation and design documentation. To check the project’s progress, the earned value methodology can be employed. This method uses indices to determine the cost and schedule progress. It compares the work that was planned to the work that was actually completed. Throughout the project, this verification procedure should be carried out on a constant basis with the purpose of identifying (de Boer, Bruinsma, Elich, van Luling, &Wemeijer, 2009).

2.1.3.5 Control scope

The process of influencing the factors that cause project scope changes by controlling the impact of those factors is known as project scope control. This is to ensure that all demanded changes and suggested curative actions are managed through the project integrated change control process. Scope control manages definite changes to the scope management plan in order to reduce or eliminate project scope 'creep,' which is the addition of more features to the already approved project scope as a result of poor requirement collection (Wysocki, 2009).

Change control systems, configuration management, and variance analysis - a method for determining the reason and degree of variance between baseline and actual performance - are tools and techniques used for scope control.

During this stage, the project team monitors the scope and processes any changes that may occur. The key activity is to monitor the scope and keep it within the defined boundaries, but if there appear to be problems during scope verification, the scope must be changed. It can also be the case that undesired changes arise which needs to be managed.

2.1.4 Scope Change

A scope change is defined as a change or modification to the defined conditions, assumptions, or requirements stated at the start of a project that results in a change in activities (Gokulkarthi&Gowrishankar, 2015; Nahod, 2012).

There are two types of scope changes: rework and change orders (Huang, Kong, Guo, Baldwin, & Li, 2007; Hao, Shen, &Neelamkavil, 2008; Sidney, 2006).

- **Rework:** Due to quality faults, variance, poor design, or poor on-site management, the process of recreating a process or operation is known as rework. The new option still satisfies the minimum standards. Although the rework procedure is straightforward, the expenses might be quite costly because it is frequently accompanied by the dismantling of what has previously been constructed. (Hao, Shen, &Neelamkavil, 2008).
- **A change order** is a change that occurs as a result of an unplanned event that cannot be simply replaced. It must be negotiated on a case-by-case basis, and all parties must sign a written agreement. Coordinating all parts of the change orders, including paperwork, drawings, processes, information, costs, schedule, and staff, is part of managing these modifications. (Hao, Shen, &Neelamkavil, 2008).

2.1.4.1 Why must scope change be managed?

It is critical to manage scope change because it can have a negative impact on the quality of a project's end result (Ndihokubwayo& Haupt, 2009; Sweis, Sweis, Hammad, &Shboul, 2008; Hwang & Low, 2012). Several other authors have investigated the need for managing scope change. Table 2-1 presents a list of negative consequences found in the literature.

Table 2:1 Overview of scope of scope change consequnces

CONSEQUENCES OF SCOPE CHANGE
Additional works
Cost – and time overruns
Disputes between actor
Need to hire additional specialist equipment and personnel
Lowering professional reputation actors
Degradation of quality standards
Adjustment in contract duration
Delay in payment contractor
Schedule delay
Poor professional relations
Decrease in productivity
Decrease in quality end result
Delay of material & tools

(Arain & Low, 2005; Charoenngam, Coquinco, & Hadikusumo, 2003; Gokulkarthi & Gowrishankar, 2015; Ndihokubwayo & Haupt, 2009)

2.1.4.2 How must scope change be managed?

The scope change management process was thoroughly defined in the reviewed literature. This section provides information on these approaches. Second, the boundary conditions for an effective scope change management process are established.

2.1.4.3 Process of scope change management

Forecasting potential changes, identifying changes that have occurred, planning measures to mitigate negative impact, and coordinating changes across the entire project are all part of scope change management (Hao, Shen, &Neelamkavil, 2008; Voropajev, 1998; Motawa, Anumba, Lee, & Pena-Mora, 2007).

Schatteman et al. (2006) emphasized that because scope change introduces risks to the project, project risk management must be implemented in any scope change procedure. They stated that an integrated risk methodology is thus required for planning construction

projects carried out in the face of high uncertainty. This must be considered when performing scope change management.

Three scope change management procedures are briefly discussed here, beginning with the five-stage model proposed by Hao, Shen, and Neelamkavil (2008). Second, Ibbset alchange .'s management procedure (2001). What they all have in common is the need for identification of change, analyzing and implementing it and learning from changes.

A. Five stage model

A good scope change management process, according to Hao, Shen, and Neelamkavil (2008), consists of five stages: identify, evaluate and propose, approve, implement, and review scope change.

i. Identify change

An effective system is required to define the relationships between requirements, malfunctions, and various aspects of change in order to identify changes, including their source, cause, and potential actions. Several researchers investigated the causes of scope shift. Poor requirement definition, a lack of integration of project components, and technological uncertainty are a few examples (Sharma, 2016; Meredith & Mantel, 2009). In this step, an overview of researched causes can be used.

ii. Evaluate and propose changes

In this stage, the effects of changes are predicted based on predefined criteria. Change options are optimized, and the result is a proposal change order that summarizes the change and its impacts, as well as an action plan with costs, schedule, personnel, and so on.

iii. Approve changes

All parties involved must agree on the proposed change of work, which is documented in the proposal change order. A change review process facilitates this by involving decisions on whether to accept, improve, as well as reject changes.

iv. Implement changes

This step modifies documentation, coordination, designs, and drawings as needed. To ensure that all aspects of the project are kept up to date, an operational system is required. Finally, all documentation is linked to each other to allow for change analysis.

v. Review changes

This analysis uses data from the implementation stage as input. Following the implementation of changes, the system's performance is evaluated (Hao, Shen, &Neelamkavil, 2008). In addition, the changes itself are reviewed with the aim to learn from them.

B. Change management procedure

A change management procedure was described by Ibbset et al. (2001). By following five steps, the goal is to minimize unwanted changes and promote beneficial changes within projects.

i. Promote a balanced change culture

ii. Recognize changes in projects

iii. Evaluate changes

vi. Implement change

vii. Learn from changes by improving lessons learned

C. Change control system

A third method for controlling scope change was presented in the form of a change control system that included the steps listed below (Hussain, 2012; Clarity Consultants, 2017):

i. Set-up a clear communication system, which is used both during routine activities as well as during negotiation processes.
ii. Analyze impact of scope change.
iii. Document changes in writing.
iv. Ask management to approve changes.
v. Embed approve changes in project plan.
vi. Learn from previous experiences by documenting changes and their process of management.

2.1.4.4 Boundary conditions for a good scope change process

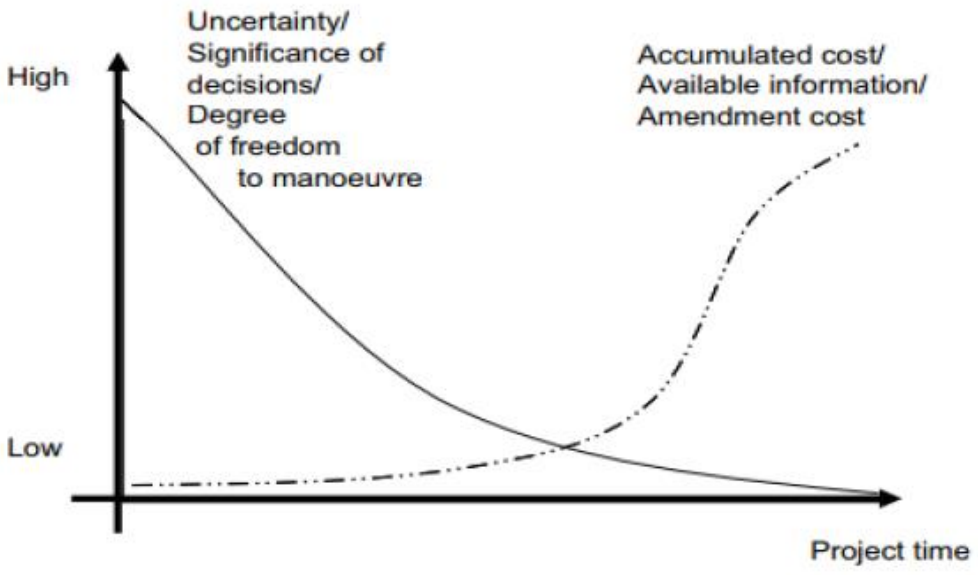
According to the research, a scope change management procedure must be used within the following parameters:

• A good front-end planning

To effectively anticipate, prepare for, and manage change, project managers must engage in detailed planning, including incremental review options, as well as integrate the work activities of consultants, subcontractors, and suppliers (Love, Holt, Shen, & Irani, 2002; Baker & Greer, 2011). Many high-risk change orders in projects can be avoided with good front-end planning (Taylor, Uddin, Goodrum, & McCoy, 2012; Faniran, Love, & Smith, 2000).

Figure 2-3 shows that the project's uncertainty is highest during the front end development phase. Change orders are relatively inexpensive if they occur early in the project (Olssen, 2005). There is less uncertainty at the end of a project, but the costs of changes are very high; this should be considered in the planning (Olssen, Project Flexibility in Large, 2006).

Figure 2-3 Uncertainty and costs over project lifetime



Source: Olssen, Project Flexibility in Large, 2006

- **All project team members are accountable for scope change management**

Everyone on the project team, not just the project manager, must go through the scope change management process. This results in an increase in the success rate of the scope change management process steps. The performance of the project team members improves when the processes are understood (Palmetto Document Systems Inc., 2016).

- **The use of a change control board**

This board is formed by assembling a core group of change agents. Change agents' work capacity, availability, and capability should be carefully considered (Lines, Sullivan, Smithwick, &Mischung, 2015). It is especially important to include multiple organizations in decision-making when multiple organizations are involved in the project. The idea is that the project team determines the project's impact and cost. The control board considers the project's impact and value, as well as the timing. The control board also decides whether or not to approve the change request. Different actors value the costs and other impacts in this way, allowing for an objective comparison.

- **Increase understanding of roles within project team**

To accelerate the scope change decision-making process, it must be clear which roles and responsibilities are assigned to which actor. It should be clear who makes the decision to make a change (Palmetto Document Systems Inc., 2016).

- **Low resistance to implement scope change within project team**

According to Lines et al. (2015), proper implementation of scope change procedures is only possible if there is low resistance to embed scope change among project team members. If the decision is made to implement a scope change, the project team must be willing to accept the consequences of this change.

- **Involvement of the right representatives**

Each stakeholder group is required to appoint a representative. It is critical that these representatives participate in the change process at the appropriate time (Baker & Greer, 2011).

2.1.5 Project scope change control features

Hill (2010) lists the following features that can be included in the change control:

1. **Change control responsibilities**: Specification of each team member's responsibilities for managing project scope change, such as supervision for project team members to use reasonable judgment before altering work that could be viewed "out of scope," as well as relevant guidance for organizing stakeholders' requests or instructions for work adjustments that could cause scope issues or be opposite to the defined work assignment.
2. **Control authority**: Specification of who is authorized to approve changes to the project scope; usually the project manager, but sometimes the project executive (sponsor) or another senior manager (or control board) is in charge.
3. **Control plan management**: Designation of a change control manager (for larger projects) to establish the change management log, control incoming proposed changes, monitor change analyses, and coordinate corrective action implementations; this may include approval to cooperate on changes with the client, as well as negotiation of scope changes.

2.1.6 Causes of scope change

Changing the scope of a project should be avoided since it increases the risk of cost and schedule overruns. Obtaining extra monetary capacity would be tough. As a result, justifying the rationale for any scope request is crucial. Jones, Snyder, Stackpole, and Lambert (2011) go into detail about the several causes of project scope change. The following are the projected common reasons of scope changes:

1. **External event**: Changes in the competitive situation or a new rule may prompt the team or stakeholders to rethink the scope of the product.
2. **Error in defining product scope**: If a prerequisite was left out in defining the scope originally, the scope will have to be reformed to include the new condition.
3. **Error in defining project scope**: A mistake in defining the project scope, such as the necessity to use specific procedures or processes, could result in the project scope being changed..
4. **Value-adding change**: A team member may discover a better technique to do the task or understand how to increase quality by doing things differently on occasion..
5. **Implementing a contingency plan or work around**: If a risk event occurs and actions are required to respond, the activities may result in a change to the project or product scope..
6. **Beneficiaries see the outcome and wants changes:** Some result infrastructure projects have a life cycle that allows for iterative development when interim outcomes are seen by the beneficiaries. Although this is still a scope adjustment, the project team anticipates that the design and outputs will develop with each iteration..

2.1.7 Determinant of project success

According to Parviz and Ginger (2002), there are two types of project success factors: those that deal with things and those that deal with people. Measurement of planning processes' performance, budget control, schedule management, scope management, risk management strategies, change management, and integration efforts are all elements to

consider. Feelings, priorities, and perceptions are all things to consider while dealing with people. To avoid losing morale, it is vital that people's difficulties receive the attention they demand. The importance of project team morale was identified in this study, particularly when the project scope has been raised or changed in such a way that the team must redo previously performed work..

If different stakeholders define success differently, the project may end up with various people tugging in various directions. In project management, the success of a project is measured by its efficacy. (Hyva ri, 2006). Since there is no clear picture of where the project is going and what it will require, stakeholders may have opposing viewpoints.. According to Harrington and McNellis (2006), one of the most common reasons of project fiasco is an incapability to properly define or efficiently manage scope.

In order for all stakeholders to support project implementation, it is necessary to effectively convey project scope to them.. According to Harrington and McNellis (2006), The process must be correctly implemented with the help of all members of the project team, the project manager's specific attention, and additional support from the project sponsor and steering committee..

The effectiveness of a project is determined by how well people manage resource requirements and how well they respect project inclusiveness and exclusion considerations. In recent years, researchers have been interested in aspects that may influence project management performance..

In their article, Judges and Muller (2005) stated that getting a group of individuals to agree on a definition of good art is similar to measuring success in a project environment.

Project success is a hotly disputed topic that rarely comes to a consensus. During the execution stage of the project life cycle, we were confined to criteria that represent an appreciation of success across the full project and product life cycle. (Judges and Muller, 2005).

Jugdes and Müller distinguish four periods, each of which broadens the definitions of success. Project success in the 1970s was determined by time, cost, and functionality improvements, as well as the delivery systems. The necessity of preparation and turnover was acknowledged in the 1980s and 1990s. Taking into account corporate and stakeholder viewpoints, lists of Key Success Factors became common. Frameworks for Key Success Factors have recently been created on the idea that success is stakeholder-dependent and entails engagement between project vendor and beneficiary. The project product and its use, employee growth and development, the customer, advantages to the delivery organization, senior management, and the environment were all taken into consideration. For the future, they anticipate further broadening of the definition of success, especially taking into account factors from the conceptual stages of the project life cycle and the close-down of the project's product, together with an increasing understanding of the importance of the project sponsor's view of success.

Cooke-Davies (2001) Factors linked to improved project management as well as factors that contribute to successful projects were discovered. He specifies that meeting deadlines and staying within budget are important aspects in project success. Projects can be considered a failure if they are not finished on time, within budget, within scope, or to the desired quality, according to Davis and Papa konstantinou (2012).

According to Thomas, Jacques, Adams, and Kihneman-Woote (2008), “There are several situations where the initial project objectives were not accomplished, yet the client was quite satisfied,” says the author. Other cases occur in which the project's basic goals were attained but the client was dissatisfied with the outcome.”

Shenhar, Dvir, Levy, and Maltz (2001) define four levels of project success: project efficiency, customer impact, business success, and future planning. However, Zwikael and Globerson (2006) It's worth noting that several characteristics of success are typically linked. “All four success-measures (Meeting planning goals; End-user benefits; Contractor benefits; and Overall project success) are substantially inter-correlated,” according to Dvir, Raz, and Shenhar (2003), meaning that projects seen to be successful are beneficial for all stakeholders.”

2.3 Empirical Literature Review

According to Ahsan and Gunawan (2010)'s project cost and schedule efficiency are the key reasons of poor project results, according to a study on the cost and schedule performance of international development projects. According to the study's findings, most late projects face unexpected cost and schedule modifications.

According to Fageha and Aibinu (2013), Cost overruns can be avoided with proper front-end project planning and explicit project scope specification. Costly adjustments, delays, rework, cost overruns, schedule overruns, and project failure can all result from poor project planning and scope definition. The purpose of project definition is to offer enough evidence to evaluate the work that needs to be done so that large modifications that could negatively affect project performance are avoided. (Gibson et al., 2006).

Changes often reflect the doubts that arise during the initial stages of a project (Assaf & Al-Hejji, 2006, as cited by Fageha & Aibinu) (2013). According to this study, changes are sought as a result of the diverse viewpoints that each stakeholder has on the project. It is consequently vital to have a well-defined project during the pre-project planning stage for successful project execution and an acceptable project conclusion. And this can only be done if all stakeholders are included in the project definition from the start. It's unreasonable to ask stakeholders for feedback on a project's outcome after it's over, especially if their involvement is minimal. When one or more stakeholders' input is ignored, either intentionally or unintentionally, an incomplete project specification can result. Failure to examine and define stakeholders' demands and concerns at an initial stage in the project can lead to extreme risks being neglected, leading in project challenges and underperformance (Atkinson, Crawford & Ward 2006). As a result, project scope definition is crucial for boosting client satisfaction and ensuring the successful execution of project projects. (Heywood & Smith, 2006).

The report focuses on project failure reasons, claiming that corruption and a lack of professionalism are two of the most common causes of project failure in Nigeria. Most initiatives, according to the report, are judged failures if they do not fulfill their planned cost, time, or scope. However, Ika (2012, cited by Zuofa and Ochieng (2014)) shown that projects might be completed within the time, cost, and scope constraints yet still be considered failures. As a result, failure must be considered in addition to these criteria, with stakeholder goals, societal benefits, and project organization being included among the factors for defining project failure. Several researchers, including Nelson (2005), support the assertion while critiquing the use of traditional measures such as cost, time,

scope, and other conventional factors to define project failure, arguing that valuation evaluation criteria such as project efficacy, value to organizations, and learning possibilities must be taken into account when assessing failure of the project, according to the study..

According to Pretorius Steyn and Jordaan (2012)'s study, The management of scope, time, cost, and quality has a direct relationship with project outcome, and project success is dependent on the environment and context. According to the study, in order to present a more impartial image of the real scenario, the customer's opinion on the project's outcome should also be taken into account. This study didn't look at whether or not considering the customer's point of view has an impact on project success. Corruption, a lack of competence, inexperienced people, and a lack of essential abilities were among the top concerns recognized as being responsible for the vast majority of project failures in Nigeria, according to Zuofa and Ochieng's (2014) report. The difficulties identified by the focus group, according to Zuofa and Ochieng, are strongly related to summaries of current and prior studies on the main reasons for project failure in Nigeria.

Olalusi and Otunola (2012) In Nigeria, failed construction projects have been attributed to faulty estimating, a lack of accessible competent workers, insufficient planning, poor risk management, a misunderstanding of the task demand, and corruption.

Project failures are still widespread in Nigeria, according to Akinyokun, Angaye, and Ubaru (2009), who were referenced in the same report. Poor planning, a lack of top management support, and project managers with insufficient experience and knowledge were all blamed in their study. In the Nigerian construction sector, Oyewobi, Ganiyu,

Oke, Ola-Awo, and Shittu (2011) found that corruption and corrupt practices are the fundamental reasons of unethical project performance and hindered progress. Corruption, improper timing of budget discharges, ill-timed payment of productivity certificates, society and labour disputes, construction company fallback, and imprecise evaluation of the project environment were found to be to blame for failures in the majority of local government funded projects in Niamey. Ubani, Nwachukwu, and Nwokonkwo (2010) studied project plan variation causes and their implications to project failure, finding design flaws, management challenges, and resources delivery constraints as key variance factors that lead to project failure. Corruption, inadequate training or lack of competence, inadequate planning or design, and management challenges, among other factors, have all been identified as causes of project failure in previous research. Many of these studies did not take scope change management into account when determining whether a project would succeed or fail.

2.4 Conceptual Framework

The research framework has been developed based on a review of the related literatures. The conceptual framework below depicts the relationship between the five project scope change management aspects (Independent Variables) and the dependent variable (Project success).

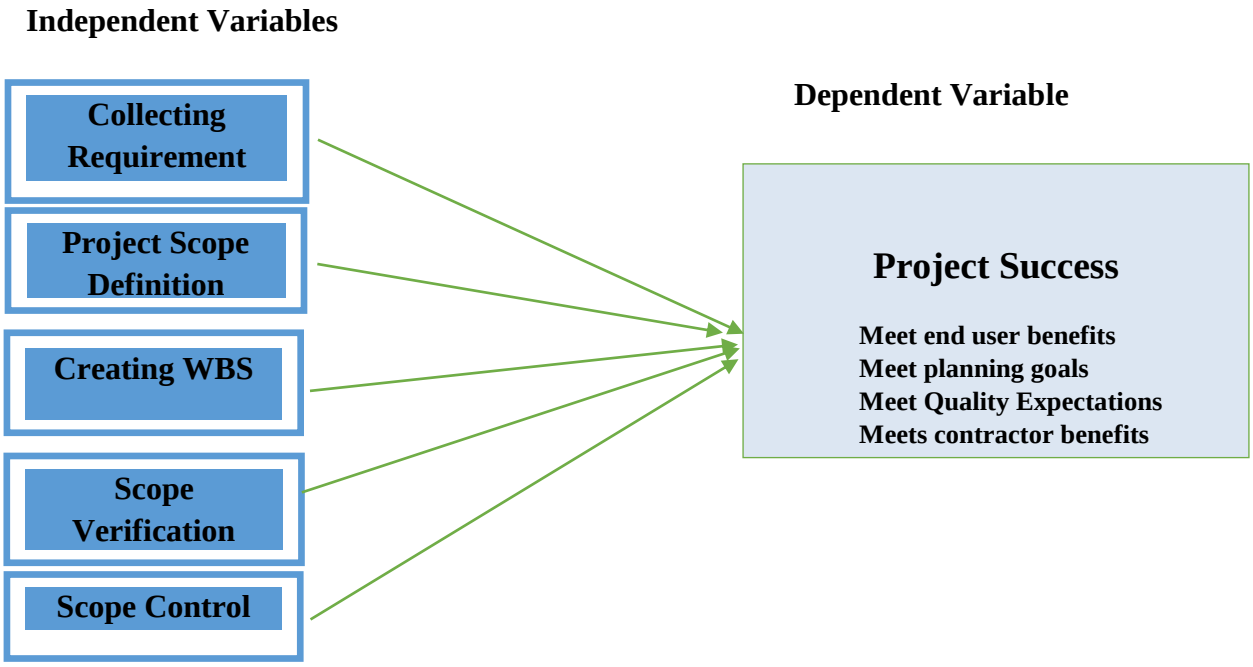


Figure 2-4– Conceptual framework adopted from review of related literature(Source: Khan(2006), PMI(2013), Cho & Gibson(2001), Alsem, et al.(2013), Kerzner(2003), de Boer, Bruinsma, Elich, van Luling, &Wemeijer(2009), Wysocki(2009).

2.5 Research Gap

A number of studies emphasized project failure causes such as corruption, insufficient skills or lack of professionalism, insufficient planning or design, and management issues, among others. Many of these studies did not consider scope change management as a factor in project success or failure. As a result, research on the analysis of scope change management and its impact on project success: the case of ECDSWCo- Building & Urban Design & Supervision Works Sector is required.

CHAPTER THREE

METHODOLOGY OF THE STUDY

This chapter describes the study methodology that the researcher will use to carry out the research study. It discusses the research design, research approach, and target population, as well as sample size, data sources, data collection and analysis procedures, reliability and validity, and ethical considerations.

3.1 Description of the study Area

The Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo) is established as a Federal Government Public Enterprise by Council of Ministers Regulation No. 365/2015 and its wide ranges of objectives in multi-disciplinary civil engineering works. The authorized capital of the Corporation shall be Birr 1,301,515,785. Out of which Birr 393,771,990.00 is paid up in cash and in kind.

Ethiopian Construction Design & Supervision Works Corporation (ECDSWCo.) is a multi-disciplinary Construction company that was formed by the merger of three companies: Water Works Design and Supervision Enterprise (WWDSE), Construction Design Share Company (CDSCo.) and Transport Construction Design Share Company (TCDSCo.) that were actively involved in Planning, Study, Design and Supervision of Water & Hydropower, Building & Transport Sector Works since 1998, 1977 & 1987, respectively. ECDSWCo is now a fully integrated Engineering Consulting Firm with six business units providing advisory services in the fields of water and energy, building and urban planning, transportation, geo-technics, and underground works. This study, however, is focused to the Building & Urban Design & Supervision Works Sector. BUDSWS possesses highly professional and skilled man power with variety of multi-

disciplined engineering firm and provides professional services. Currently, the Sector has 519 staff, 330 technical and 189 supportive staffs. (Source: BUDSWS HRM Department, 2021).

3.2 Research Design

The research design is the overarching plan for how the study will be carried out. Observational, descriptive, exploratory, experimental, and diagnostic research designs were identified by Chandran and Kothari (2004). In this study, the researcher utilized a descriptive design. According to Kothari (2004), descriptive research studies are those that are concerned with describing the features of a specific individual or group. The researcher can use the descriptive research design to describe occurrences in terms of attitude, values, and attributes (Mugenda & Mugenda, 2003). This method is appropriate for this study because the research sought to describe the perceptions of ECDSWCo-Building & Urban Design & Supervision Works Sector employees.

3.3 Research Approach

According to John (2014), the term "research approaches" refers to a variety of study strategies and procedures ranging from general assumptions to specific data collecting, analysis, and interpretation methodologies. There are three main types of research methodologies: qualitative, quantitative, and mixed methodologies. If the purpose of the inquiry is to describe people's attitudes, a quantitative survey, according to Christensen (1985), is the ideal tool to use. As a result, in this study, a quantitative research approach was used, with responses obtained from ECDSWCo- BUDSWS technical employees.

3.4 Target Population and sampling technique

A population, according to Aagaard and Hauer (2013), is a well-defined or set of people, services, elements, and events, group of things, or households that are being studied. This study's population (sampling frame) consists of all BUDSWS technical employees at various functional levels. The study concentrated on technical staffs who directly deal with the organization's day-to-day project management activities because they are the most familiar with the subject matter of the study. This study included 330 technical staff from the ECDSWCo- BUDSWS.

Sampling is a scientific method of selecting characteristics of a population. In order to produce a valid result in this study, the researcher used a simple random sampling technique.

3.5 Sample size

The sample size is the number of items drawn from the population (Kothari, 2007). For the purposes of this study, the formula established by (Kothari, 2004) was used to compute a representative sample (n) for a proportion as follows:

$$n = \frac{z^2.p.q.\ N}{e^2\ (N-1) + z^2.p.q}$$

Where, p= proportion of success=75%

q=proportion of fail=25%

z=confidence level=1.96

e=standard error=5%

N=total population=330

n=sample size,

Therefore, the sample size will be: $\frac{(1.96)^2 x\ 0.75x\ 0.25x330}{0.05^2(330-1) + 1.96^2 x\ 0.75x\ 0.25}$

$$\mathbf{n = 154.069873 \approx 154}$$

3.5 Data Sources and Types

This study drew on both primary and secondary sources of information. The primary data was gathered through a questionnaire distributed to the sample respondents. Secondary data was gathered from books and journals related to the topic under study in order to develop a conceptual framework and aid in the analysis of scope change management in ECDSWCo- BUDSWS.

3.6 Data Collection Procedures

To collect relevant data for the study, the researcher used questionnaires to collect primary data. A structured questionnaire is regarded as the best data collection instrument for survey research (Askia, 1999). As a result, a structured questionnaire with closed-ended questions on a 5-point Likert scale was used. A 5-point scale is more reliable and valid than shorter or longer scales (Krosnick & Fabrigar, 1997). As a result, in this study, a five-point rating scale was used to measure responses to the subject of study, with respondents marking 1 for “Strongly Disagree,” 2 for “Disagree,” 3 for “Neutral,” 4 for “Agree,” and 5 for “Strongly Agree.”

3.7 Data Analysis

The quantitative data gathered via the questionnaire was analyzed using the descriptive method. Tables were used to summarize and provide a clear picture of the distribution of respondents' responses to each question in the questionnaire. To assist in the computation of quantitative data, SPSS version 20.0 was used.

3.8 Validity

Validity refers to the appropriateness, significance, and use of evidence used to justify interpretations. The validity of the evaluation is also influenced by the actions and decisions done as a result of the results obtained (Cooper & Schindler, 2003). The

intended purpose of a survey testing instrument, rather than the survey itself, is used to validate it. Gathering information to support the survey's results on the impact of project scope management on project success is part of validating the survey. According to Glesne (2011), the normal approach for analyzing the content validity of a measure is to consult with a professional or expert in that subject, hence project management professionals will be sought for advice.

3.9 Ethical Consideration

The moral distinction between what is right and wrong, and what is unethical or ethical, is defined as ethics (Bhattacherjee, 2012). To be ethical, a researcher should consider the respondents' voluntary participation. Subjects of the study must be assured that their participation in the study is entirely voluntary and that they have complete freedom to withdraw from the study at any time without repercussions. The respondents' names were not requested in order to ensure the confidentiality of the information they provided. All information obtained in this study was strictly used for academic purposes, and respondents were assured of the confidentiality of any information provided.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter analyzes, discusses, and interprets two major sections. Part one entails a descriptive analysis of the demographic characteristics of the study's sample population. The respondents are discussed in this regard in terms of gender, age, years of service, and educational level.

Part two examines the study's findings in light of the theoretical framework outlined in chapter two. This section includes a descriptive report of the respondents' responses to the scope change management in ECDSWCo- BUDSWS. Questionnaires were distributed to the organization's 154 technical staff, 135 of whom completed and returned the questionnaires. This corresponded to a valid response rate of 87.66 percent, which was used for analysis. SPSS (version 20) statistical software was used to analyze the collected data.

4.1 Demographic characteristics of the respondents

Item A and B of Table 4.1 show the gender and age distributions of the sample population of respondents, respectively. Male respondents accounted for 73.3 percent of all respondents. In this study, female representation was 26.7 percent. As a result, the vast majority of respondents were men.

In terms of age, it is easy to see that the age group 25-35, which accounts for 76.30 percent of the workforce population, is clearly dominant. However, the least percentage of respondents were over the age of 56, accounting for only 3% of the sample population. In contrast, 16 respondents (11.90 percent) were between the ages of 46 and 55.

Table 4- 1 Respondents' demographic characteristics

DEMOGRAPHIC	FREQUENCY(N)	PERCENTAGE
A. Gender		
Male	99	73.30%
Female	36	26.70%
Total	135	100.00
B. Age		
18-24 years	12	8.90 %
25-35 years	55	40.70 %
36-45 years	48	35.60 %
46-55 years	16	11.90%
Above 56 years	4	3.0%
Total	135	100.00%
C. Years of service		
Less than a year	2	1.50%
1-3 years	8	5.90%
3-5years	34	25.20%
Above 5 years	91	67.40%
Total	135	100.00%
D. Educational level		
Below Diploma	19	14.1%
Diploma	25	18.5%
BA/BSC	79	58.50%
MA/MSC	12	8.90%
Total	135	100.00%

Source: Research Data (2021)

According to Table 4-1, Item C, respondents with a length of service of 5 years or more made up the majority, accounting for 91 (67.4 percent of the population), followed by 34 (25.2 percent) of respondents with a length of service of 3-5 years. However, only two respondents (1.5 percent) had less than one year of experience in the organizations. As a result, it is possible to conclude that such a relatively longer year of services may have provided the respondents with ample experience and a better understanding of the various issues related to ECDSWCo- BUDSWS project scope change management.

The educational distribution of the respondents was also a subject of investigation for this study. According to Table 4.1, Item D, 79 respondents (58.50 percent) had first degrees, which dominated the population, and 12 respondents (8.90 percent) had Master Degrees.

4.2 Descriptive Analysis of Data

During descriptive data analysis averages (means), and standard deviations were computed for each construct on the Likert Scales, ranging from Strongly Disagree=1 to Strongly Agree=5. The weighted average categories for each result are interpreted as follows according to the range developed by Alfarra, 2009: 1.00-1.79 (Strongly Disagree); 1.80-2.59 (Disagree); 2.60-3.39 (Neutral); 3.40-4.19 (Agree) and 4.20-5.00 (Strongly Agree).

4.2.1 Collecting Requirements

The scope management plan is a document that includes descriptions of all the activities that must be completed in order to complete the project. The project charter, preliminary scope statement, and project management plan are important inputs in this process. Scope planning tools and techniques include standards, meetings, and expert judgment (Kahn, 2006).

In this regard, respondents were asked whether or not collecting project requirements is practiced at ECDSWCo- BUDSWS. The researcher used a five-point Likert scale to obtain direct responses from the respondents, and the mean score and standard deviation are shown in table 4.2.

As shown in the table, majority of the respondents categorically indicated that ECDSWCo- BUDSWS inadequately defines descriptions of all the activities needed to complete in the project (mean=2.39). When the scope is not defined with a whole set of

requirements, it would have a major effect on material and labor cost which indirectly affects project cash flow and delay in delivery time of the project deliverables.

While collecting the requirements for the project undertakings, the contractor participation on project scope preparation and gathering of requirements has a substantial benefit since the contractor has better understandings on how to minimize cost overruns and other issues related to the project like delivery time for project completion. However, majority of the respondents categorically indicated that ECDSWCo- BUDSWS does not involve all stakeholders while collecting requirements (mean=2.42).

Table 4- 2 Collecting Requirements

COLLECTING REQUIREMENTS	N	MEAN	STD. DEVIATION
1. BUDSWS adequately defines descriptions of all the activities needed to complete the project	135	2.39	.959
2. BUDSWS involves all stakeholders while collecting requirements	135	2.42	.989
3. The organization has put in place the system of organizing workshops and meetings to ensure that stakeholders and experts are thoroughly involved while collecting requirements.	135	2.52	1.062
4. The business need is aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria	135	2.79	1.219
5. The organization lists and prioritizes all the requirements outlined by stakeholders.	135	2.50	1.056
Overall mean score		2.521	1.057

Source: Research Data (2021)

Moreover, as it is presented in table 4.2 above, majority of the respondents showed that there is no scheme of established workshops and conferences to ensure that stakeholders and experts are thoroughly involved while collecting requirements(mean=2.52).

Therefore, BUDSWS needs to establish meetings and workshops and ensure the stakeholders participation and improve the collection of requirements. One of the major tools to collect involvements from all the stakeholders during project scoping is to organize meetings and workshops to collect the desires of each stakeholder and plan the project accordingly.

In collecting project requirement, the business needs have to be aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria. The project feasibility is a combination of technical, economic and financial feasibility. The technical feasibility explores the availability of technological knowledge and materials. The economic feasibility explores the rates of return for the project and evaluates the cost-benefit of different scenarios. Last, during the financial feasibility evaluation, the availability of necessary funds and credit rating of the organization is checked (Khan, 2006). However, considerable number of the respondents took neutral position that the business need of BUDSWS is aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria (mean=2.79).

Finally, the nonappearance of a planned listing and ordering all the requirements outlined by stakeholders (mean=2.50) also created a communication breach between all stakeholders. So, every stakeholder need to list his or her desires so that everyone knows what is expected from them.

When we also see the overall mean (mean=2.521), the score is less than the cut-off point developed by Alfarra (2009)which infers that collecting project requirement is not properly practiced and needs further improvement.

Therefore, as per the responses obtained from the respondents and result of the descriptive analysis, it can be concluded that collecting project requirement in BUDSWS needs improvement for the project undertakings to be successful in BUDSWS. Descriptions of all the activities needed to complete the project should be adequately defined; all stakeholders should be involved while collecting requirements; the organization has to put in place the system of organizing workshops and meetings to ensure that stakeholders and experts are thoroughly involved while collecting requirements; the business need should be aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria;. BUDSWS should list and prioritize all the requirements outlined by stakeholders.

4.2.2 Project Scope Definition

Respondents were also asked to give their opinion how project scope definition is being practiced in BUDSWS. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the table 4.3.

As it can be seen from the table, majority of the respondents indicated that the boundaries of the project are not clearly described in BUDSWS taking into account the requirements from all the stakeholders in the project performance (mean=2.36). The organization does not ensure that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control (mean=2.51).

The project scope statement is built on the preliminary scope statement, project charter, organizational process assets, and approved modification requests. Expert judgment, product analysis, alternative creation, and facilitated workshops are some of the tools and approaches utilized in scope defining. (PMI, 2013).

However, the organization neither uses tools and techniques like expert judgment, product analysis, alternatives generation, and facilitated workshops to define scope for the projects(mean=2.60) nor documents scope change management and makes accessible to everyone within the project team(mean=2.32). Majority of the respondents indicated that the defined scope of the project is included in the contractual agreements between the sponsor and the service provider in the case of external projects (mean=3.96).

Table 4- 3 Project Scope Definition

PROJECT SCOPE DEFINITION	N	MEAN	STD. DEVIATION
1. BUDSWS clearly describes the boundaries of the project taking into account the requirements from all the stakeholders in the project.	135	2.36	1.084
2. The organization ensures that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control.	135	2.51	1.112
3. The organization uses tools and techniques like expert judgment, product analysis, alternatives generation, and facilitated workshops to define scope for the projects	135	2.60	1.111
4. Scope management tasks are well documented and are accessible to everyone within the project team.	135	2.32	1.078
5. The defined scope of the project is included in the contractual agreements between the sponsor and the service provider in the case of external projects.	135	3.96	1.115
Overall mean score		2.75	1.000

Source: Research Data (2021)

Therefore, as per the responses obtained from the respondents and result of the descriptive analysis, it can be concluded that project scope definition in BUDSWS needs improvement for the project undertakings to be successful in BUDSWS. BUDSWS should clearly describe the boundaries of the project taking into account the requirements

from all the stakeholders in the project; the organization needs to ensure that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control; the organization need to use tools and techniques like expert judgment, product analysis, alternatives generation, and facilitated workshops to define scope for the projects; scope change management tasks should be well documented and get accessible to everyone within the project team.

4.2.3 Work Breakdown Structure (WBS)

The WBS is a hierarchical breakdown of the whole scope of work that the project team must do in order to meet the project's objectives and achieve the requisite deliverables.. To this end, the respondents were also asked to give their opinion whether creating WBS is being practiced in BUDSWS. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the **table 4.4**.

The descriptive analysis shows that BUDSWS maintains detailed information about deliverables, activities, and scheduling information of each component of the work (mean=3.96).

As it can be seen from the table, however, contractors are not involved in creating WBS (mean=2.47). Considerable number of respondents indicated that WBS serves as input to cost estimation and budgeting, resource planning, risk management planning, and activity definition in BUDSWS (mean=3.91).

Nonetheless, majority of the respondents remained indifferent that the organization develops WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked(mean=3.13). Finally it has been reported that the

organization hardly uses tools and techniques to create WBS such as decomposition, and expert judgment and which has output such as scope baseline and project documents updates(mean=2.53).

Table 4- 4 Creating Work Breakdown (WBS)

WORK BREAKDOWN STRUCTURE(WBS)	N	MEAN	STD. DEVIATION
1. The organization maintains detailed information about deliverables, activities, and scheduling information of each component of the work	135	3.96	.978
2. The organization involves the contractor in creating WBS	135	2.47	.783
3. In BUDSWS, WBS serves as input to cost estimation and budgeting, resource planning, risk management planning, and activity definition.	135	3.91	.778
4. The organization develops WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked.	135	3.13	1.312
5. The organization uses tools and techniques to create WBS such as decomposition, and expert judgment and which has output such as scope baseline and project documents updates	135	2.53	1.061
Overall mean score		3.20	0.9824

Source: Research Data (2021)

Therefore, as per the responses obtained from the respondents and result of the descriptive analysis, it can be concluded that creation of WBS in BUDSWS needs improvement in that the organization needs to maintains detailed information about deliverables, activities, and scheduling information of each component of the work; should develop WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked and that the organization should use tools and techniques to create WBS such as decomposition, and expert judgment and which

has output such as scope baseline and project documents updates. Work decomposition helps the contractor to create a strategy to finish the project within time and budget.

4.2.4 Scope Verification

One of the scope verification parameter is formalizing the acceptance of the project deliverables. As it can be seen from the table, there is no distinct contract between the client and the contractor about how to validate the activities with what is stated in the agreement on regular foundation (mean=2.28).

Table 4- 5 Scope Verification

SCOPE VERIFICATION	N	MEAN	STD. DEVIATION
1. BUDSWS formalizes acceptance of the completed project deliverables	135	2.28	1.196
2. The organization ensures /validates that a product, service, or result meets the needs of the sponsor or client and other recognized stakeholders in the project	135	2.45	1.284
3. The organization inspects qualities to measure whether deliverables meet requirements and performance criteria.	135	2.53	1.294
Overall mean score		2.42	1.258

Source: Research Data (2021)

Scope verification has a lot to do with reviews which are made with the client about deliverables and the sponsor to ensure that the scope is in accordance with the initial goals of the sponsor. However, considerable number of respondents indicated that the organization does not ensure that a product, service, or result meets the needs of the sponsor or customer and other identified stakeholders in the project (mean=2.45).

As a result, a structure must be in place to keep these stakeholders informed about the project's progress, and the contractor should outline how each action will be checked

during execution in a document prior to the project's execution. Another aspect of scope verification is that it entails regular meetings between the client and the contractor to keep both parties informed about the project's status, as well as quality inspections such as measuring and reviewing whether deliverables match specifications and performance criteria. The respondents, on the other hand, stated that the organization rarely inspects attributes to determine whether deliverables match objectives and performance criteria. (mean=2.53).

Therefore, as per the responses obtained from the respondents and result of the descriptive analysis, it can be concluded that scope verification practice in BUDSWS needs improvement in that the organization needs to develop clear agreement between the client and the contractor concerning how to verify the activities with what is stated in the contract on regular basis; ensure that a product, service, or result meets the needs of the sponsor or customer and other identified stakeholders in the project and that organization properly inspects qualities to measure whether deliverables meet requirements and performance criteria.

4.2.5 Scope Control

Respondents were also asked to give their opinion how project scope control is being practiced in BUDSWS. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the table 4.6.

As can be seen from the table, there is no mechanism in place to keep track of scope creep and change requests while taking into account the time and expense required. (mean=2.49). There is no formal agreement to a discussion between that involves the

contractor on scope changes, and there is no system for keeping track of scope changes to look for patterns. The contractor not being involved on scope of the project, including monitoring and control, creates cost and time gaps on the project.

Table 4- 6 Scope Control

SCOPE CONTROL	N	MEAN	STD. DEVIATION
1. The organization controls scope to manage the actual changes to the scope management plan so as to reduce or eliminate project scope 'creep'	135	2.55	1.348
2. BUDSWS uses tools and techniques used for scope control such as change control systems, configuration management, and variance analysis - for determining the cause and degree of difference between the baseline and actual performance.	135	2.59	1.317
3. Monitoring the scope and keeping it within the defined boundaries is the key act	135	2.64	1.342
Overall mean score		2.593	1.336

Source: Research Data (2021)

A variance analysis is a strategy for understanding the source and degree of difference between the project's baseline and actual performance, as well as assessing whether corrective or preventive action is needed. According to the respondents' survey, BUDSWS rarely uses scope control tools and techniques including change control systems, configuration management, and variance analysis to determine the cause and degree of difference between baseline and actual performance. (mean=2.55). Also it has been stated that monitoring the scope and keeping it within the defined borders is the minimal (mean=2.58).

Therefore, as per the responses obtained from the respondents and result of the descriptive analysis, it can be concluded that scope verification practice in BUDSWS

needs improvement in that the organization needs to develop a system to monitor the scope creep and variation requests within the well-defined boundaries considering the delay and cost incurred; needs to use tools and techniques used for scope control such as change control systems, configuration management, and variance analysis - for determining the cause and degree of variation between baseline and actual performance, as well as for monitoring the scope and keeping it within the set parameters

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

The final chapter of the research is a summary of the study's major findings. Conclusions are drawn from these major findings, and recommendations, which the researcher assumes will be implemented, are also forwarded.

5.1. Summary of the findings

In this study, descriptive statistics was used to analyze the demographic characteristics of the respondents; responses of the respondents on project scope change management of BUDSWS using mean and standard deviation.

i. **Collecting Requirements**: The majority of respondents said that BUDSWS insufficiently outlines descriptions of all the activities needed to accomplish the project based on their individual mean score of the constructs identified under requirement collection. (mean=2.39); majority of the respondents categorically indicated that BUDSWS does not involve all stakeholders while collecting requirements (mean=2.42); there is no system of organizing workshops and meetings to ensure that stakeholders and experts are thoroughly involved while collecting requirements (mean=2.52); need of BUDSWS is rarely aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria (mean=2.79). Moreover, an organized listing and prioritizing all the requirements outlined by stakeholders is absent in BUDSWS (mean=2.50)

ii. **Project Scope Definition**: According to the individual mean score for the constructs indicated under project scope definition, majority of the respondents majority of the respondents indicated that boundaries of the project are not clearly

described in BUDSWS taking into account the requirements from all the stakeholders in the project performance (mean=2.36).

The organization does not ensure that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control (mean=2.51). The organization neither uses tools and techniques like expert judgment, product analysis, alternatives generation, nor facilitated workshops to define scope for the projects (mean=2.60) nor documents scope change management and makes accessible to everyone within the project team (mean=2.32). Majority of the respondents also indicated that the defined scope of the project is included in the contractual agreements between the sponsor and the service provider in the case of external projects (mean=3.96).

iii. **Work Breakdown Structure(WBS):** As per the individual mean scores of the constructs indicated under creating WBS, BUDSWS maintains detailed information about deliverables, activities, and scheduling information of each component of the work(mean=3.96). However, it has been reported that contractors are not involved in creating WBS (mean=2.47). Considerable number of respondents indicated that WBS serves as input to cost estimation and budgeting, resource planning, risk management planning, and activity definition in BUDSWS (mean=3.91).

Nonetheless, majority of the respondents remained indifferent that the organization develops WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked(mean=3.13). Finally it has been reported that the organization hardly uses tools and techniques

to create WBS such as decomposition, and expert judgment and which has output such as scope baseline and project documents updates(mean=2.53)

iv. **Scope Verification:** According to the individual mean score of the constructs under scope verification, 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 (mean=2.28); considerable number of respondents indicated that the organization does not ensure that a product, service, or result meets the needs of the sponsor or customer and other identified stakeholders in the project (mean=2.45). Similarly, it has been reported by the respondents that the organization rarely inspects qualities to measure whether deliverables meet requirements and performance criteria (mean=2.53).

v. **Scope Control :** A mechanism to monitor scope creep and change requests within the set boundaries, taking into account the time and cost incurred, is missing, according to the individual mean score of the constructions under scope control. (mean=2.49). BUDSWS hardly uses tools and techniques used for scope control such as change control systems, configuration management, and variance analysis - for determining the cause and degree of difference between the baseline and actual performance (mean=2.55). Also it has been reported that monitoring the scope and keeping it within the defined boundaries is the minimal (mean=2.58).

5.2 Conclusion

Scope change management is a knowledge area of great relevance to project management as it defines all the work required for the project to be successfully completed. Despite this, it has been verified by this empirical study that the main tools/aspects of available

project scope change management: requirement collection, scope definition, WBS creation, scope verification and scope change control did not approach the scope change management totality and practices in BUDSWS. Thus, properly practicing the process is fundamental to the application of the scope change management, since poorly collected requirements, for example, can lead to changes in deadlines, costs, and even cancellation of the project.

As the project implementation goes further, the scope changes will get costly and the financial impact of the change can be quite large to mitigate such enormous impact on the project. So, all the stakeholders shall set project baseline at the planning stage to measure performance against it, define scope, verify scope and developed project execution plan with all stakeholders and shall ensure that the scope of work is well defined and the schedule and the resource plan is focused on the deliverables.

As it can be seen from overall mean for the five aspects of project scope change management practices, the score for requirement collection, scope definition, WBS creation, scope verification and scope control were 2.521, 2.75, 3.20, 2.420 and 2.593, respectively which were all less than the cut-off point developed by Alfarra (2009) which indicates that the five aspects of project scope change management mentioned above are not properly practiced in BUDSWS and need further improvement.

5.3 Recommendations

- It is advised that descriptions of all the activities required to complete the project should be adequately defined; all stakeholders should be involved while collecting requirements; the organization has to put in place the system of organizing

workshops and meetings to ensure that stakeholders and experts are thoroughly involved while collecting requirements; the business need should be aligned with a company's objectives and a project should be initiated, being aware of project feasibility criteria;. BUDSWS should list and prioritize all the requirements outlined by stakeholders.

- It is advised that BUDSWS should clearly describe the boundaries of the project taking into account the requirements from all the stakeholders in the project; the organization needs to ensure that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control; the organization needs to use tools and techniques like expert judgment, product analysis, alternatives generation, and facilitated workshops to define scope for the projects; scope change management tasks should be well documented and get accessible to everyone within the project team and finally the defined scope of the project should be included in the contractual agreements between the sponsor and the service provider in the case of external projects.
- It is advised that the organization needs to maintains detailed information about deliverables, activities, and scheduling information of each component of the work; should develop WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked and that the organization should use tools and techniques to create WBS such as decomposition, and expert judgment and which has output such as scope baseline and project documents updates. Work decomposition helps the contractor to create a strategy to finish the project within time and budget.

- It is advised that BUDSWS should developed clear agreement between the client and the contractor concerning how to verify the activities with what is stated in the contract on regular basis; ensure that a product, service, or result meets the needs of the sponsor or customer and other identified stakeholders in the project and that organization properly inspects qualities to measure whether deliverables meet requirements and performance criteria.
- It is advised that the organization needs to develop a system to monitor the scope creep and change requests within the defined boundaries considering the delay and cost incurred; needs to use tools and techniques used for scope control such as change control systems, configuration management, and Variance analysis that is used to determine the source and extent of the difference between baseline and actual performance, as well as to monitor the scope and keep it within the stated parameters.

5.4 Further Research Directions

This study is based only on descriptive analysis of scope change management and its implication for building construction projects success. Thus, this study suggests future researchers to conduct explanatory research to find out the variables that shows level of effect of project scope change management using inferential statistical analysis.

Moreover, this study is based on the responses obtained from a single organization engaged in construction design and supervision work. Thus, it is suggested to conduct study on similar construction companies in Ethiopia to find out if the same problem exists and provide solutions thereof .

REFERENCES

Adedayo. O, Sunday. O, Titilayo O., 2018. Application of project scope management practices on project success among telecommunication organizations in Nigeria, International Journal of Development and Sustainability. pp 518-532

Ahsan, K., & Gunawan, I., 2010. Analysis of cost and schedule performance of international development projects. International Journal of Project Management. 28(1): pp. 68-78.

Alexander, I., Beus-Dukic, L., 2009. Discovering requirements: how to specify products and services.

Alsem, D., Kamerman, J., van Leeuwen, C., van Ruijven, L., den Toom, T., & Vos, M. 2013. Leidraad voor Systems Engineering binnen de GWW-sector.

Arain, F., & Low, S., 2005. Strategic Management of variation orders for institutional buildings: leveraging on information technology.

Atkinson, R., 1999. Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. International Journal of Project Management, 17(6), 337-342.

Bhattacherjee, A., 2012. Social Science Research: Principles, Methods and Practices.

Charoenngam, C., Coquinco, S., & Hadikusumo, B., 2003. Web-based application for managing change orders in construction projects. Construction Innovation.

Cho, C.-S., & Gibson, G., 2001. Building Project Scope Definition Using Project Definition Rating Index. Journal of architectural engineering.

Cooke-Davies, T., 2001. The real project success factors. International Journal of Project Management, 20(3): pp.185-190.

Davis,J., & Papakonstantinou, P., 2012. Research project success: The essential guide for science and engineering students. London: Royal society of chemistry.

De Boer, G., Bruinsma, H., Elich, E., van Luling, B., & Wemeijer, G. 2009. Leidraad voor Systems Engineering binnen de GWW Sector Versie 2.

Fageha, M.K., &Aibinu, A.A., 2013. Managing project scope definition to improve stakeholders' participation and enhance project outcome. Journal of Procedia -Social and Behavioral Sciences. pp. 154–164.

Glesne, C., 2011. Becoming qualitative researchers. Boston: Pearson

Gokulkarthi, M., & Gowrishankar, K., 2015. A study on impacts of change order in construction projects. International Jounral of Science and Engineering Research, 3(4).

Hao, Q., Shen, W., & Neelamkavil, J., 2008. Managing changes in construction. Archives des publications du CNRC.

Harrington, H.J., & McNellis, T., 2006. Project management excellence: The art of excelling in project management. Washington DC: Paton press LLC.

Heldman, K., 2009. Project Management Professional Exam (Fifth Ed.). Indiana: Wiley Publishing, Inc.

Hill, G.M., 2010. The complete project management methodology and toolkit. New York: Taylor & Francis group.

Huang, T., Kong, C., Guo, H., Baldwin, A., & Li, H., 2007. A virtual prototyping system for simulating construction processes. Automation in construction, 16(5), 576-585.

Hussain, O., 2012. Direct Cost of Scope Creep in Governmental Construction Projects in Qatar. Global Journal of Management and Business Research, 12(14), 73-83.

Hwang, B.-G., & Low, L.,2012. Construction project change management in Singapore: status, importance and impact. International Journal of Project Management, 817-826.

Hyva¨ri, I., 2006. "Project management effectiveness in project-oriented business organizations", International Journal of Project Management. 24: pp. 216–225.

Judge. P., & Muller, A., 2005. Transformational and transactional leadership: A metaanalytic test of their relative validity. Journal of Applied Psychology No.89, pp.755-768.

Kalkidan Kebede, 2019. Assessment of the Impact of Project Scope Management on Project Performance of construction Projects: The case of 40/60 saving house condominium project Bole Hayat 2 sites, Addis Ababa University, School of Commerce, Unpublished Master Thesis.

Kerzner, H(2003). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. 8th edition. John Wiley & Sons Inc., Haboken. ISBN 0-471-22577-0

Kerzner, H. 2009. Project Management: A system approach to planning, scheduling and control, 10th Edition.

Khan, A, 2006. Project scope management. Cost engineering, 48(6).

Koskela, L., & Howell, G., 2002. The underlying theory of project management is obsolete. The PMI Research Conference. Seattle.

Kothari, C.R, 2004. Research Methodology. Methods and Techniques (2nd Ed.). New Delhi: New Age International.

Lock, D., 2007. Project management. 9th ed. Hampshire GU11 3HR: Gower Publishing Limited, pp.5-10.

Meredith, J. R., & Mantel, S. J., 2009. Project management a managerial approach (seventh Ed.). John Wiley & Sons, Inc.

Motawa, I., Anumba, C., Lee, S., & Pena-Mora, F.,2007. An integrated system for change management in construction. Automtion in Construction , 368-377.

Muhammad N., Zohreh P.,Mojde S, .2013. Significance of Scope in Project Success, ELSEVIER International Journal, pp722 – 729

Mugenda, O.M. & Mugenda, A.G., 2003. Research Methods; Quantitative and Qualitative Approaches. Nairobi: Acts Press.

Nahod, M.-M., 2012. Scope Control Through Managing Changes in Construction Projects. Organization, Technology and Management in Construction, 4(1), 438-447.

Ndihokubwayo, R., & Haupt, T., 2009. Variation orders on construction projects: value adding or waste? International Journal or Construction Project Management, 1(2).

Parviz, R., & Ginger, L., 2002.The advance project management office: A comprehensive look at function and implementation. USA: St. Lucie Press.

Passenheim, O., 2009. Project Management. Ventus publishing, UK, available at: http://bookboon.com/en/search?q=project+management,

Project Management Institute, 2000. A guide to project management body of knowledge (PMBok) (Fifth Ed.)

Project Management Institute, 2013. A guide to the project management body of knowledge (PMBOK GUIDE) (5thEd.). Pennsylvania: PMI, Inc.

Schatteman, D., Herroelen, w., Boone, A., & van de Vonder, S., 2006. A methodology for integrated risk management and proactive scheduling of construction projects. Leuven: Belgian Building Reserach Institute.

Sharma, R., 2016. Scope definition and management of scope changes and scope creep in large infrastructure projects in construction industry for lump sum contracts. Delft: TU Delft.

Sweis, G., Sweis, R., Hammad, A. A., & Shboul, A, 2008. Delays in construction projects: The case of Jordan. International Journal of Project Management, 26(6).

Voropajev, V., 1998. Change management - a key integrative function of PM in transition economies. International Journal of Project Management, 15-19.

Wysocki, R.K., 2009. Effective Project Management: Traditional, Agile, extreme. 5th Edition. Wiley Publishing, Inc. UK

APPENDIX A: QUESTIONNAIRE

ADDIS ABAB UNIVERSITY, SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

Dear respondent,

The purpose of this questionnaire is to collect data about **Scope Change Management: Implication for Building Construction Projects Success, a Case of Ethiopian Construction Design & Supervision Works Corporation-Building & Urban Design & Supervision Works Sector.** The collected data will be used as a primary data in the study which I am conducting as a partial fulfillment of the requirement for the successful completion of MA in Project Management. The information you provide will be used for academic purposes only and will be treated as confidential. Your genuine and timely responses are quite vital for the success of this study.

Thank you in advance for your cooperation!!!

Section A: Demographic Characteristics of Respondents

1. **Gender:** A. Male ☐ B. Female ☐
2. **Age:** A. 18-24 ☐ B. 25-35 ☐ C. 36-45 ☐
   D. 46-55 ☐ E. 56 and above ☐
3. **Year of Experience:** A. Less than 1 year
   B. 1-3 Years
   C. 3-5 Years
   D. Above 5 years
4. **Educational level:** A. Below Diploma ☐ B. Diploma ☐ C. BA/BSC ☐
   D. MA/MSC ☐ E. Other (Please specify) _____

Section B: The project scope change management practices in Ethiopian Construction Design & Supervision Works Corporation- Building & Urban Design & Supervision Works Sector.

This section contains 21 statements related to the project scope change management in Ethiopian construction designs and supervision works corporation-building and urban design & supervision works sector. (Please tick (√) the box which you think is appropriate. The five points Likert Scale (1-5) shows different states of agreement in which: **1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree.**

SN	Statements	Rating				
(A)	**Collecting Requirements**	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1	BUDSWS adequately defines descriptions of all the activities needed to complete the project					
2	BUDSWS involves all stakeholders while collecting requirements					
3	The organization has put in place the system of organizing workshops and meetings to ensure that stakeholders and experts are thoroughly involved while collecting requirements.					
4	The business need is aligned with a company's objectives and a project is initiated, being aware of project feasibility criteria					
5	The organization lists and prioritizes all the requirements outlined by stakeholders.					
(B)	**Project Scope Definition**	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1	BUDSWS clearly describes the boundaries of the project taking into account the requirements from all the stakeholders in the project.					
2	The organization ensures that the elements within the scope and out of the scope are well defined in order to clearly understand what should be under the project control.					

3	The organization uses tools and techniques like expert judgment, product analysis, alternatives generation, and facilitated workshops to define scope for the projects					
4	Scope management tasks are well documented and are accessible to everyone within the project team.					
5	The defined scope of the project is included in the contractual agreements between the sponsor and the service provider in the case of external projects.					
(C)	**Creating Work Breakdown Structure(WBS)**	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1	The organization maintains detailed information about deliverables, activities, and scheduling information of each component of the work					
2	The organization involves the contractor in creating WBS					
3	In BUDSWS, WBS serves as input to cost estimation and budgeting, resource planning, risk management planning, and activity definition.					
4	The organization develops WBS that captures all the work of the project in an organized way into tasks that are defined, estimated and tracked.					
5	The organization uses tools and techniques to create WBS such as decomposition, and expert judgment and which has output such as scope baseline and project documents updates					
(D)	**Scope Verification**	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1	BUDSWS formalizes acceptance of the completed project deliverables					
2	The organization ensures /validates that a product, service, or result meets the needs of the sponsor or customer and other identified stakeholders in the project					
3	The organization inspects qualities to measure whether deliverables meet requirements and performance criteria.					

(E)	Scope Control	1(SD)	2(D)	3(N)	4(A)	5(SA)
1	The organization controls scope to manage the actual changes to the scope management plan so as to reduce or eliminate project scope 'creep'					
2	BUDSWS uses tools and techniques used for scope control such as change control systems, configuration management, and variance analysis - for determining the cause and degree of difference between the baseline and actual performance.					
3	Monitoring the scope and keeping it within the defined boundaries is the key act					

Thank you for your cooperation!!!