ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
COLLEGE OF BUSINESS AND ECONOMICS

ASSESSMENT OF DISTRESSED PROJECT MANAGEMENT PRACTICES: THE CASE OF EOTC AROGE KERA PROJECTS

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Declaration

I, Bezawit Aklilu, with ID Number GSE/2687/13 do hereby declare that; this Project Work entitled 'ASSESSMENT OF DISTRESSED PROJECT MANAGEMENT PRACTICES: THE CASE OF EOTC AROGE KERA PROJECTS' is my original work and it has not been submitted partially; or in full, by any other person (except where explicitly defined in the acknowledgments) for an award of a degree in any other university/institution.

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Certificate

SCHOOL OF COMMERCE, GRADUATE STUDIES PROGRAM

M.A IN PROJECT MANAGEMENT

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List of Acronyms

EOTC	Ethiopian Orthodox Tewahedo Church
WBS	Work Breakdown Structure
PMBOK	Project Management Body of knowledge
PMLC	Project management life cycle
SPI	Schedule Performance Index
CPI	Cost Performance Index

Abstract

The study seeks to assess the factors of distress, the impact of the occurred distress and to identify the strategies to be implemented for dealing with the negative impacts of the distress in two Ethiopian Orthodox Tewahedo church (EOTC) building construction projects, the so called Aroge kera 1000m2 and 480m2 projects. The study uses both quantitative and qualitative data analysis. The quantitative data obtained from the questionnaire survey were analyzed using Relative Important Index (RII) and the qualitative data gathered using interviews were analyzed using Narrative analysis.The research found out that, five significant factors contributed to the distress of the two Aroge kera projects. This are: Economic downturns (inflation), Price escalation of construction material in the market, Unrealistic estimation of cost, Ineffective planning and scheduling and Delays in approval of contractual claims, such as an extension of time and cost. Consequently, the findings of the study disclosed 8 major impacts of distress. This are Cost overruns, Time overruns, Bad Reputation, Negative social impact, Stress, Financial Loss (Bankruptcy), Greater overhead cost due to rework and Delays in getting profit.

Key Words: *Cost overrun, Time overrun, Cause and effect of distressed projects,*

Recovery strategies of distressed projects

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The construction industry is known for its chronic problems of fragmentation, low productivity, time and cost over-runs; poor safety, inferior working conditions, and insufficient quality which ultimately leads to project failure and poor construction images.(El-sokhn and Othman, 2014)

Numerous construction projects worldwide become distressed for a multitude of reasons and this distress can occur in any phase of a construction project. A construction project in distress is a situation in the project life cycle where completion of the project within the previous time and cost is in Doubt. A “distressed” situation can be defined as a (Kumar Paul et al., 2020) construction project that has exceeded (or is projected to exceed) its project budget and\or its project schedule. Distressed construction projects are those that are running over time or budget and need to be brought back on track.

In developing countries like Ethiopia, It is common that many projects encompass significant time and cost overruns with compromised quality or even total termination and abandonment.

One of the main causes of distressed construction projects is a lack of proper planning or poor project management. A project that lacks a clear timeline, budget, or communication structure can easily fall into distress. Whenever a project lacks a clear direction, it is easy for unexpected issues to arise, leading to delays and budget overruns. When a project is already in distress, it requires significant effort and investment to drive it back on track, and in some cases, it may be difficult to recover.

Another cause of distressed construction projects is the occurrence of unexpected events such as natural disasters or pandemics. Natural calamities such as hurricanes, floods, and earthquakes can severely damage construction sites. The pandemic, for instance, has

caused enormous delays in many construction projects and construction companies (Kristanti, Safriza, and Salim, 2023) due to the difficulties in maintaining social distancing and the restricted availability of construction materials. These unexpected events can cause serious delays, cost overruns, and in some cases, the complete abandonment of the project.

When a construction project falls into distress, it is essential to take immediate action to avoid further delays and losses. The first step is to conduct a thorough investigation into the root cause of the problem. This investigation can help identify the specific issues that need to be addressed, such as budgetary constraints, poor planning, or unexpected events. Once the issues are identified, corrective action must be taken to address them as quickly as possible. For instance, the construction project's timeline can be extended, additional funding can be sourced, or project management can be improved. (K. Wysocki, 2014)

Previous research conducted by (Koshe and Jha, 2016), (Kuhil and Seifu, 2019), and others indicated that frequent causes for the distress of many projects are, market inflation, shortage of materials, poorly defined project scope, client-initiated variations, under-estimation of the project cost by consultants, poor inspection/supervision of projects by consultants, delays in payments of completed works, variations in designs, lack of proper communication, poor site management and project management skill. This undesirable experience causes distress in the project and affects the client and stakeholders of the project.

Another cause of distressed construction projects is inadequate funding. The project may start with an optimistic budget that fails to account for unexpected costs, change orders, or inflation. Furthermore, the project may encounter difficulties in securing financing due to economic downturns, geopolitical risks, or lender restrictions. As a result, the project may run out of money, leaving its stakeholders in a dire situation.

These problems made several projects face challenges that are exposing them to a great amount of schedule, and cost overruns that in turn affected the very profits that were supposed to be gained from these projects.

Since the Identification of factors that contributed to the distress on the project, provides the basis for pragmatic solutions to enhance the chances of project success, This research was carried out to evaluate the factors contributing to the distress factors or overrun of key project performance indicators and their impact on the projects performance at Ethiopian Orthodox Tewahedo Church (EOTC) Two B+G+9 Apartment Building projects which is being constructed at Addis Ababa around Aroge kera area.

1.2 Background of the Projects/Organization

Ethiopian Orthodox Tewahedo Church (EOTC) is an Oriental Orthodox Christian church in Ethiopia. It is one of the oldest Christian churches and has a history dating back over 1600 years. EOTC is an important institution in Ethiopian society and plays a vital role in the spiritual, educational, healthcare, Economic, and social life of Ethiopia.

The church has a long history of establishing schools and universities. These institutions provide education to countless students and have helped shape the country's intellectual landscape. The church also runs many hospitals and clinics throughout Ethiopia, providing medical care to those who need it. EOTC is also involved in a range of social services, including poverty relief, disaster response, and community development.

Historically, the Ethiopian Orthodox Church has played an important role in the country's economy. It was one of the largest landowners in Ethiopia prior to the 1974 revolution, with considerable influence over the country's political and economic systems.

After the revolution, the church's land holdings were significantly reduced, but it still owns a significant amount of property and assets in the country. These assets include schools, hospitals, Apartments, Commercial centers, and other institutions that contribute to the country's economic development.

In addition to its primary mission of spreading the gospel, expanding and strengthening model schools, building churches, and strengthening spiritual service, Ethiopian Orthodox

Tewahedo Church (EOTC) has been strengthening its economic capacity through various development projects.

The Church is doing effective work by engaging in the construction of various projects in order to provide housing facilities at affordable prices, creating permanent and temporary job opportunities for many people by being engaged in building constructions and also playing a typical role in the construction of the appearance of our county.

In recent previous years, the church has launched and been executing different construction projects some of them are; Two B+G+9 Apartment Buildings, at Addis Ababa Aroge kera, B+G+2 Meeting Hall inside EOTC patriarchate head office compound, the B+G+4 commercial building at Diredawa city, B+G+7 Apartment building at Bashawolde chilot, Addis Ababa.

Like most of our country's projects, the project consultant's assessment evaluation shows that EOTC's projects are also subjected to cost and time overrun. Especially the two B+G+9 Apartment Buildings which is being constructed at Addis Ababa, around Aroge kera have faced a tremendous challenge in the execution progress. Hence this paper will focus on this particular project.

These two Aroge kera Apartment buildings were contracted on May, 2017 G.C with an intended completion period of 365 days starting from the contract signing date. The first building lies on 1000m2 and the other on 480m2 plot of land within less than 100m apart. The 1000m2 was contracted to Two Y Engineering and the 480m2 to Modcon Engineering PLC with open Bid procurement type with an initial contract amount of Birr 65,688,673.18 and 34,800,808.78 respectively.

Performance assessments were made on the two EOTC Aroge Kera projects regarding the two main parameters i.e., Time and Cost using different documents such as Consultant's progress reports, contract documents, and payment certificates and presented as follows.

1.2.1 Time

Main contractual information of the projects regarding time or schedule is presented in the Table 2.1 below.

	Aroge kera 1000m2	**Aroge kera 480m2**
Main Contract signing date	1st May 2017	17th May 2017
Intended completion period	365 days	365 days
Addendum Contract 01 Signing date	Feb 18/2019	Jan 17/2019
Intended completion period	425 days	425 days
Addendum Contract 02 Signing date	10th Nov 2021	12th Oct 2021
Intended completion period	110 days	28 days
Termination Date	13th Sep 2022	24th Aug 2022
New Contract Signing Date	29th Mar 2023	29th Mar 2023
Intended completion period	365 days	120 days
Total delay from original completion date	5.9 years	5.2 years

Table 2.1: Contractual information of the projects regarding time

The main contract for Aroge kera 1000m2 and 480m2 projects were signed on May 01 and 17,2017 accordingly with completion period of 365 days. Then Addendum contract 01 was signed with addition of 425 days, omission of finishing work items and price adjustment on cement and rebar materials due to market inflation.

Even though Time extension and price adjustment was provided, the contractors were unable to execute the works as per the contract, additional contract 02 was signed for Aroge kera 1000m2 and 480m2 on Nov 10th and Oct 12th of 2021 with completion period 110 and 28 days respectively.

The motivation for the signing of addendum contract 02 was the price escalation occurred on the construction materials and the design revision of the buildings based on the client's request; this causes introduction of new item of works to the contract that caused omission on some work items from the previous contracts and addition of some new work items.

Even though a lot of assistance and efforts made to complete the projects, the contractors were still unable to complete and hand over the project to the client. Therefore, both project's contractors got terminated, new bid is launched for the remaining works and the winner contractor's takeover the project sites signing new contract on date 28th march 2022 with an intended completion date of March 28th 2024 for Aroge kera 1000m2 project and July 27th 2023 for Aroge kera 480m2 project.

As presented on table 4.1, the total delay of the Aroge kera 1000m2 and 480m2 projects from the original contract's completion date is 5.9 and 5.2 years respectively, if the projects completed as per the current contract schedule.

1.2.2 Cost

	Aroge kera 1000m2	**Aroge kera 480m2**
Main Contract Amount	65,688,673.18	Birr 34,800,808.78
Addendum Contract 01 Amount	Birr 78,108,975.14	Birr 46,420,059.41
Addendum Contract 02 Amount	Birr 55,042,801.81	Birr 11,027,105.35
Total Payment upon termination	Birr 29,883,375.51	Birr 37,883,082.97
Percentage of work done upon termination	20%	70%
New Contract Amount (Labor Based)	Birr 55,791,033.17	Birr 8,090,829.59
Expected material cost	Birr 193,098,009.34	Birr 77,724,364.66
Total Expected project cost	Birr 278,772,418.02	Birr 123,698,277.22
Total project cost increment (%)	424%	355%

Table 2.1: Contractual information of the projects regarding cost

When we evaluate the performance of Aroge kera 1000m2 project with respect to Cost, with 20% work completion, Birr 29,883,375.51 is incurred and in order to complete the remaining works, additional Birr 248,889,042.51 is estimated to be needed as per the

current market price. Therefore, the final project cost would be Birr 278,772,418.02. This shows that, the project cost increase by **4.24-fold** from the original contract price.

Whereas, the Aroge kera 480m2 project shows better performance than the 1000m2 project but still it exhibits a significant amount delay and cost increment, with 70% work completion, Birr 37,883,082.97 is incurred and in order to complete the remaining works, additional Birr 85,815,194.25 is estimated to be needed as per the current market price. Therefore, the final project cost would be Birr 123,698,277.22. This shows that, the project cost increase by **3.55-fold** from the original contract price.

Not only additional cost is incurred to owner of the projects, but also it inhibits the owner to collect the revenue generated from renting the buildings, if it would have been completed on the intended time interval.

1.3 Statement of the Problem

Construction projects can be complex and prone to unexpected challenges throughout their lifecycle. Even with the most careful planning and execution, unforeseen circumstances such as natural disasters, financial instability, or economic downturns can result in distressed construction projects (K. Wysocki,2014). Distressed construction projects refer to projects that face significant challenges or obstacles that threaten their completion or success. These projects can cause immense financial losses for the stakeholders involved, and addressing them in a timely manner is crucial to avoid further losses.

Despite the progressive economic potential, the construction industry faces challenges of cost and time overruns which has an undesirable impact on the contractual parties involved in the project. Construction delays and cost overruns are a worldwide phenomenon since one of the major problems in the construction industry involves unexpected acquired costs and the late delivery of projects (Dlamini and Cumberlege, 2021).

The effects of distressed construction projects can be severe and far-reaching. The project owners may suffer financial losses, reputation damage, or legal liabilities. The contractors may face liquidated damages, termination, or bankruptcy. The workers and suppliers may

lose their jobs or go unpaid. The community may be affected by the project's negative impacts on the environment, traffic, noise, or public safety. Moreover, distressed construction projects can undermine public trust in the construction industry and deter investment in future projects.

Construction delays are occurring in every phase of a construction project and are common problems in construction projects in Ethiopia. Thus, If the delay is not identified and the corrective project management decision is not taken in time a project may incur extra costs and extension of project time, which gives dissatisfaction to all the parties involved and nowadays it's becoming a major obstruction for developing countries like Ethiopia, where there is a chronic shortage of housing.

According to a report by the World Bank, Ethiopia's urban population is growing at a rate of 5% annually, and this growth is expected to continue in the coming years. With such a rapid increase in urbanization, the housing demand has outstripped the supply, resulting in a chronic housing shortage. As a major religious organization in Ethiopia, the Ethiopian Orthodox Tewahido Church has been participating in this crucial area by launching different projects, Aroge kera is also one of the projects having this problem in mind. However, these projects have faced numerous challenges such as delays, cost overruns, and poor quality of construction.

So, the research will assess the factors that lead the project into distressed condition, the impact of the occurred distress in achieving its organizational goal, and the Prevention and intervention strategies implemented to minimize this negative impact on EOTC's Two Aroge kera Building construction projects.

1.4 Research Questions

The study addressed the following major research questions: -

1. What are the factors that lead the project into distressed condition?
2. What are the effects/impacts of the occurred distress?

3. What preventive and intervention strategies would mitigate the negative impact of the distress if implemented?

1.5 Research Objectives

1.5.1 General Objective

The general objective of the study is to assess the important factors contributed to the distress of the project, the impact of the occurred distress in EOTC's Aroge kera Building construction projects and to identify useful preventive and intervention strategies to be implemented for dealing with these distressed projects.

1.5.2 Specific Objectives

1. To identify the factors that contributed to the distress of the project from the client, the contractor, and the consultant side in the EOTC's Aroge kera Building construction projects.
2. To assess the impact of the occurred distress on EOTC's Aroge kera Building construction projects.
3. To identify useful preventive and intervention strategies to minimize the impact of distress on the success of the EOTC's Aroge kera Building construction projects.

1.6 The study scope and Limitation

The study solely examines the causes of distress, the effects of the distress, and the measures taken to alleviate its impact on the two Aroge Kera building projects of EOTC.

The lack of accurately recorded data and proper documentation for the study, lack of sufficient transparency during interviews, the unwillingness of the top management of the consultant of the project to participate in the study, and the lack of research done on Ethiopian orthodox church projects in Ethiopia are some of the limitations encountered in the process of the study.

1.7 Organization of the study

This study was organized into five chapters. Chapter 2 will present the literature review. Chapter 3 is devoted to the presentation and discussion of the suitable research methodology that will be used in this research and also describes how the data is collected. Chapter 4 presents the empirical findings of the study extracted from the information gathered using the questionnaires and interviews. Chapter 5 presents conclusions and recommendations based on the findings from the empirical data and theories.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This literature review explores different research, journals, conference proceedings, and other materials related to the phenomenon being studied. The focus is on identifying the factors contributing to distress, the impact of stress, and the preventive and intervention strategies implemented in the project.

2.2 Nature of the Construction Industry

Construction projects are complex because of the division of tasks and responsibilities between architects, engineers, and contractors (Ortega, 2000). The long time period taken by the project to be completed, the involvement and integration of different specialties, the uncertainty and risk involved in the construction industry, and also the production of unique projects that are witnessed widely in the past years due to globalization. The construction industry is known for its chronic problems of crumbling, low productivity, time and cost overruns; poor safety, mediocre working conditions, and insufficient quality which ultimately leads to project failure and poor construction images. (El-sokhn and Othman, 2014).

The issue of time overrun and cost overrun is a global challenge in the construction industry. Time overrun is an unanticipated delay in a construction project due to the unavailability of adequate resources and other administrative problems. Similarly, cost overrun involves unexpected costs incurred in excess of budgeted amounts due to underestimation of the actual project cost during the planning of a project. (Raykar, 2016) Every country's construction industry faces its own set of unique and sometimes overlapping challenges. The construction industry involves processes that are complex and dynamic (Oshungade and Kruger, 2017). The construction industry is heavily influenced by its changing environment, which can cause stress or failure in projects. Uncertainty and risk are common in this industry due to factors like weather, material availability, and labor shortages. These uncertainties can lead to delays, cost overruns, and other problems that can cause distress to a project. (El-sokhn and Othman, 2014).

When it comes to the construction industry, it should be viewed as a single, fluid system within a particular market. It's impossible for any individual or organization to fully comprehend how a project will be impacted and evolve over time. Therefore, it's not possible to manage the situation completely and according to a set plan. In general, construction managers tend to resist change and instead prioritize adhering to their schedules and contracts. Unfortunately, this often leads to an increase in contract penalties and places the burden of addressing production issues solely on subcontractors. The key question becomes how to improve overall performance in this situation.

2.3 Project Distress and its Symptoms

According to (Wysocki Robert K., 2014), a distressed project is one whose performance has surpassed one or multiple metric values and is at a high risk of failure. If any of the metrics surpass their trigger value, the project becomes highly susceptible to failure. Distressed projects exhibit indications of major schedule slip-ups, which could be due to poor estimation, errors, or considerable vendor delays. Additionally, a loss of critical resources or a change in sponsorship could lead to a state of distress and eventual project failure.

It's important to recognize that projects don't typically fall into trouble out of nowhere. Early warning signs exist, but many companies tend to overlook or misinterpret them. Unfortunately, some companies choose to ignore these tell-tale signs and hope for the best. However, failing to acknowledge these indicators early on can lead to expensive corrections down the line. (Kerzner H., 2011).

Discovering warning signs early on allows for more opportunities for recovery. Some examples of these early warning signs include:

- Business case deterioration
- Different opinions on the project’s purpose and objectives
- Unhappy/disinterested stakeholders and steering committee members
- Continuous criticism by stakeholders
- Changes in stakeholders without any warning

- No longer a demand for the deliverables or the product
- Invisible sponsorship
- Delayed decisions resulting in missed deadlines
- High-tension meetings with team and stakeholders
- Finger-pointing and poor acceptance of responsibility
- Lack of organizational process assets
- Failing to close life cycle phases properly
- High turnover of personnel, especially critical workers
- Unrealistic expectations
- Failure in progress reporting
- Technical failure
- Having to work excessive hours and with heavy work loads
- Unclear milestones and other requirements
- Poor morale
- Everything is a crisis
- Poor attendance at team meetings
- Surprises, slow identification of problems, and constant rework
- Poor change control process

The project on distress has exhibited a performance trend that, if continued, will result in its failure. If either or both of the metrics' cumulative history shows certain trends, it indicates that the project is not going as planned. An example of such a trend is an increase in schedule delays, which, if persistent, will result in the project's failure." (Wysocki Robert k., 2014)

Similarly, (McDonagh and partners., 2018) depicted these symptoms as performance trends, slipping schedules, and organizational change. In the event of any of the aforementioned situations occurring, it is crucial to promptly initiate a project intervention process that aims to identify the underlying causes of the distressed state, rectify the situation, and devise a new plan for the project moving forward.

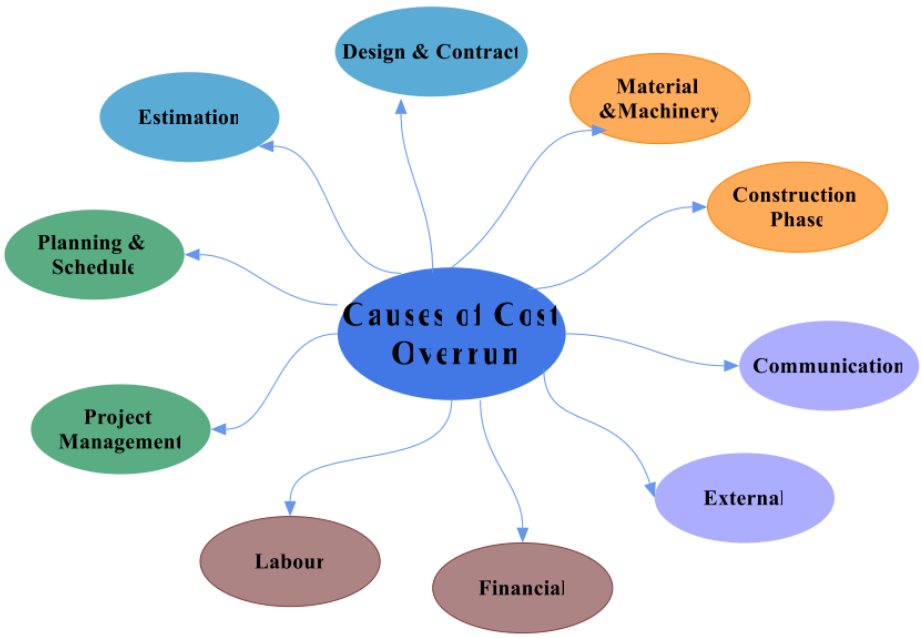
2.4 Factors Contributed to Project Distress

Identifying the causes of distress or failure on a project is crucial in mitigating its impact. It could result from one or a combination of factors, and recognizing them is necessary for addressing the issue effectively.

According to (Roslan, Zainun, and Memon, 2014) During the execution stage, there are eight crucial factors that can lead to time and cost overruns. These are schedule delays; poor site management and supervision; inadequate planning and scheduling; incompetent subcontractors; delay payment to supplier or subcontractor; mistakes during construction; cash flow and financial difficulties faced by contractors; and poor project management.

The research conducted by (Faten Albtoush and Doh, 2019) identified ten categories that contribute to cost overrun. I.e., design and contract-related factors, estimation-related factors, planning, and schedule-related factors, project management-related factors, labor-related factors, financial-related factors, material and machinery-related factors, construction phase-related factors, communication-related factors, and external related factors.

Figure 2.1: Groups of causes of cost overrun in construction projects



Source: Faten Albtoush and Doh, 2019

According to (Faten Albtoush and Doh, 2019), the causes of cost overruns have been identified in 10 different groups as follows:

Design and contract-related factors: mistakes in design frequent design changes, design development, incomplete design at the time of tender, an inadequate pre-construction study, lack of coordination at the design phase, lowest bidding procurement method short bid preparation time inadequate planning and scheduling, lack of experience, lack of communication between parties, changes in the scope of the project, and delays in decision making.

A. **Estimation-related factors:** Inaccurate project duration estimation, incorrect calculation of the initial project expenses, flawed estimation techniques, imprecise quantity take-off, and insufficient expertise and proficiency of the estimator can all lead to project setbacks.
B. **Planning, and schedule-related factors:** The contractor's insufficient planning, lack of cost reporting, and inadequate monitoring during pre- and post-contract stages, as well as scheduling deficiencies and insufficient cost planning and monitoring of funds, have contributed to the planning and schedule-related issues.
C. **Project management-related factors:** There are various factors related to project management, such as inadequate site supervision and management, poor contractor management, insufficient support for project management, flawed contract management by consultants, inadequate financial management and planning, and subpar contract management practices.
D. **Labor-related factors:** There are various challenges that can arise in related to labor, such as low wages for labor and services, subpar performance from subcontractors, a lack of site workers and low labor productivity, a shortage of skilled workers, a scarcity of competent personnel, and a strained relationship between top management and laborers.
E. **Financial-related factors:** The project suffered due to financial-related factors such as insufficient funds, delayed progressive payments, economic instability, financing methods, financial difficulties of the consultant and owner, inconsistent

cash flows, contractor payment issues, and funding problems. These factors caused cost variations, foreign currency fluctuations, and monthly payment difficulties.

F. **Material and machinery-related factors:** There are various factors regarding material and machinery, such as fluctuations in building material prices, financial limitations imposed by the government, inflation-driven increases in material costs, expensive machinery, supply chain issues with contractors, and monopolies on project materials by certain suppliers.

G. **Construction phase-related factors:** There are several factors that can contribute to delays and additional costs during construction projects. These can include the complexity of the work, mistakes made during construction, changes to the project scope, and additional work that needs to be done. Other issues can include a lack of experience among technical consultants, poor management and supervision of project activities, and conflicts of interest between professionals. Additionally, issues such as schedule delays and changes, errors during construction that result in reworks, poor construction practices adopted by the contractor, high transportation costs, and poor labor skills and productivity can all impact the success of a construction project.

H. **Communication-related factors:** One of the major issues in construction is the lack of communication and coordination among key stakeholders, leading to poor communication and conflicts among project participants.

I. **External related factors:** The delays in forest clearance, unpredictable weather conditions, government funding constraints, frequent storms caused by heavy rains and resulting floods, challenging terrain conditions, emergency work, fraudulent practices, unsupportive government policies, bribery and corruption, political instability, land acquisition, and resettlement are all significant challenges to overcome are some of the external factors.

Through interviews with clients and consulting experiences, several factors contributing to project distress or failure have been identified by (Wysocki Robert k., 2014). Some potential reasons include Poor, Inadequate, or No Requirements Documentation, Inappropriate or Insufficient Sponsorship, Complexity of Requirements Not Recognized,

Unwillingness to Make Tough Decisions, Lag Time Between Project Approval and Kick-Off, No Plan Revision after Significant Cuts in Resources or Time, Estimates Done with Little Planning or Thought, over-commitment of Staff Resources, Inconsistent Client Sign-Off, No Credibility in the Baseline Plan, and Unmanageable Project Scope.

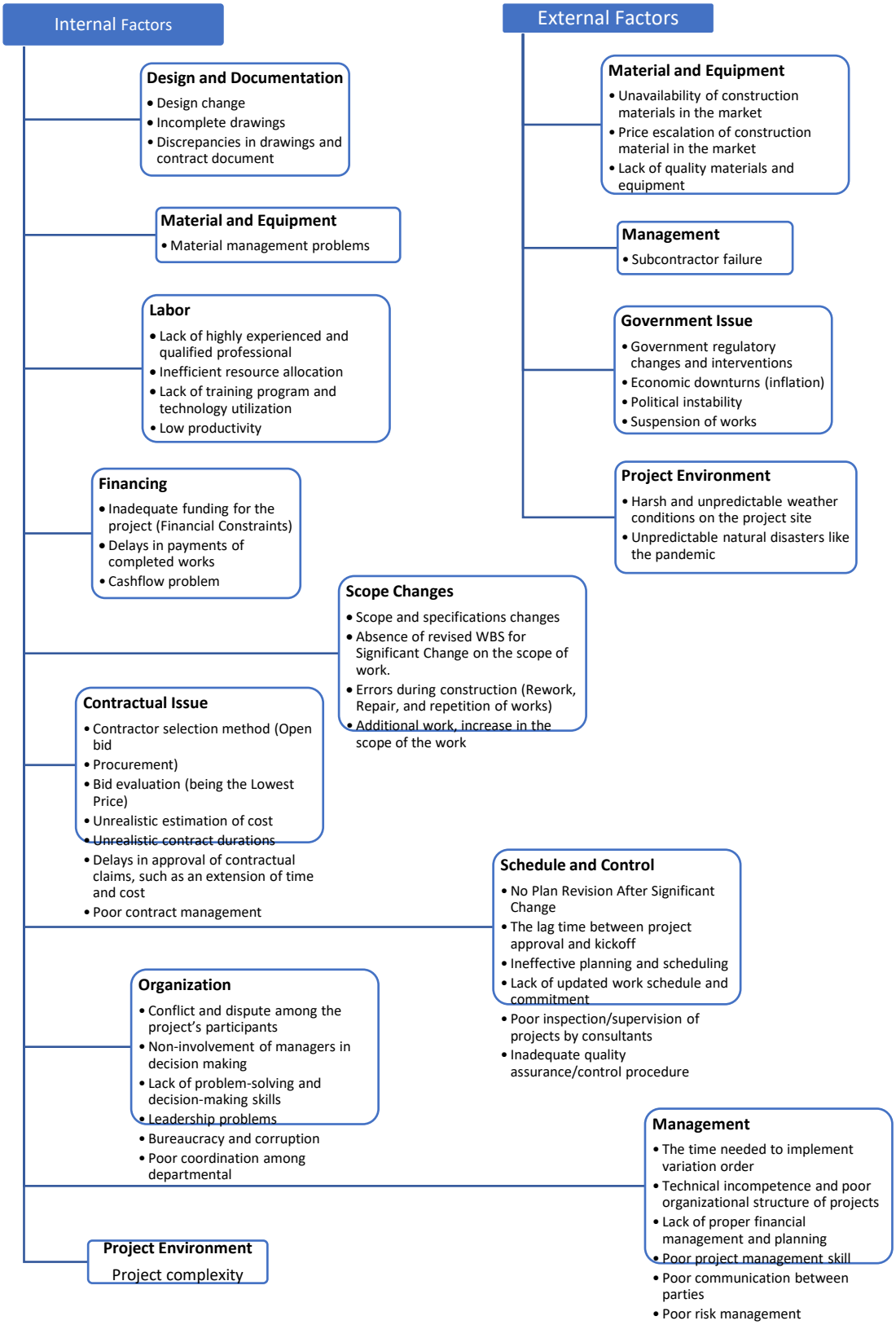
The study conducted by (Sambasivan and Soon, 2007) has identified the 10 primary causes of delay in construction industry; these are (1) the contractor's improper planning, (2) the contractor's poor site management, (3) inadequate contractor experience, (4) inadequate client finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.

The study conducted by (Asiedu and Mkansi, 2023) has identified Critical Factors Contributing to Budget Overruns in Ghana's Telecommunication Industry Construction Projects. These are Poor contract management, inaccurate time and cost estimates, inadequate planning and scheduling, lack/poor communication skills, project manager's competency, the supplier's unable to commit adequate qualified resources unstable organizational environment, and poor supervision and inspections.

Design changes can have a significant impact on project distress, as highlighted in a study by (Bassa et al., 2019). These changes often result in increased project costs and delays, and can even lead to conflicts between owners and contractors. Causes of these changes include inadequate design review, errors and omissions in design, alterations in plans by clients, incomplete contract documents, and varying site conditions.

The potential contributing factors of the distressed project gathered from various literatures with their corresponding categories are presented in the chart below:

Figure 2.2 Conceptual framework



2.5 Effects of Project Distress

According to a study by (Sambasivan and Soon, 2007) , six primary effects of delay have been identified.:

i. **Time overrun:** Factors such as inadequate planning by the contractors, improper site management by the contractors, inadequate project handling experience of contractors, and delay in the payments for the work completed directly affect the completion of the project and cause time overrun

ii. **Cost overrun:** Contract-related factors such as change orders (changes in the deliverables and requirements) and mistakes and discrepancies in the contract document result in cost overrun. Mistakes and discrepancies in the contract document can be in scope, deliverables, resources available and allocated, payment terms, achievement of various milestones, and the project duration

iii. **Disputes:** Factors such as delay in the payments for completed work, frequent owner interference, changing requirements, lack of communication between the various parties, problems with neighbors, and unforeseen site conditions give rise to disputes between the various parties. The disputes, if not resolved amicably, can lead to arbitration or litigation.

iv. **Arbitration:** Client-related and contract relationship-related factors escalate disputes to be settled by the arbitration process. A competent third party can settle the disputes amicably without going to court.

v. **Litigation:** The parties involved in the projects use litigation as a last resort to settle disputes

vi. **Total abandonment:** as we noticed in our city there are a lot of abandoned projects due to various reasons.

As (Bassa et al., 2019) summarized, the finding from the study indicated the major impacts of design change as (1) Completion schedule delay, (2) Increase in project cost, (3) Wastage of materials during rework, (4) Productivity degradation and (5) working extra hours (overtime) to meet deadlines of the project.

Moreover, the effects of delay and cost overrun arising from design change are; additional payment for contractors, rework, demolition, increased overhead expenses, and increase possibility of conflicts between owners and contractors.

2.6 Project Distress Management Strategies

According to (Wysocki Robert k., 2014), there are two types of strategies for distress management in projects. "The first one is prevention strategies used to minimize the likelihood of projects becoming distressed, but despite due diligence, the prevention strategies might not work due to prevailing conditions beyond our control, and a project will still become distressed, If this happens, there are intervention strategies that we can use"

2.6.1 Prevention strategies

"Prevention strategies are proactive practices and processes that you can employ to significantly reduce the number of projects that become distressed" (Wysocki Robert k., 2014). Although there is no guarantee that prevention strategies will prevent a project from becoming distressed, they are your best protection against such an outcome.

According to (Wysocki Robert k., 2014) some of the prevention strategies that might be used to reduce the likelihood of a project becoming distressed are:

Requirements Gathering: Knowing that complete requirements documentation is difficult if not impossible at the beginning of the project, care should be taken when identifying the list of requirements. As project complexity increases, the task is even more difficult mostly due to the dependence between requirements becoming more complex.

Work Breakdown Structure (WBS) construction: Generating a clear and complete WBS is the most difficult part of the project planning process. Having a complete and correct WBS is critical to the success of a Linear or Incremental PMLC model. The entire project plan is based on the assumption that you have a complete WBS. Whatever difference there is between your WBS and a complete WBS will probably be reflected in

the number of scope change requests you get. Processing those scope change requests will seriously compromise the project plan.

Dynamic Risk Management Process: Effective risk management is the best weapon to protect the project from becoming distressed, but it has to be monitored continuously for any changes that might suggest heightened attention to one or more risks.

Scope Change Management Process: Scope change is an area that often gives rise to most project problems. It doesn't make a difference whether this is the result of doing a poor job on gathering and documenting requirements or dealing with a client who has lots of ideas. If there is no management control exercised over the frequency of scope change requests, there are going to be problems. The time to process a scope change request comes from the value-added work time of the team members, which means an aggravated schedule, errors, and ultimately, schedule slippage. The seeds of distress have been planted.

Milestone Trend Charts: The milestone trend chart is one of the few metrics that looks ahead in the project schedule for expected slippages and warns the project manager ahead of time that there may be problems later in the schedule if established trends persist.

Earned Value Analysis: Tracking trends in schedule performance index (SPI) and cost performance index (CPI) values and displaying them in the form of a milestone trend chart is one of the most intuitive metrics for early warnings of cost or schedule problems.

2.6.2 Intervention strategies

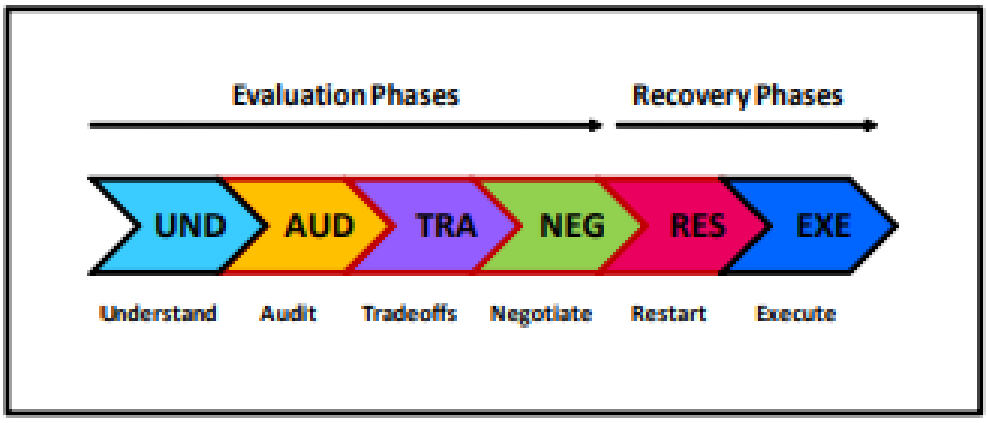
(Kerzner H., 2011) argued that, it is a mistake to believe that any methodology is a miracle cure. Projects are managed by people, not tools or methodologies. A different approach may be necessary for the recovery project to succeed.

Project distress intervention/recovery strategies may differ from industry to industry and from project to project. But as a general guideline, the following six-phase process was

proposed by (Kerzner H., 2011) to recover distressed projects and decrease the chances of project failure.

The first four phases are being used for problem assessment and to evaluate and hopefully verify that the project may be able to be saved. The last two phases are where the actual recovery takes place. These phases can significantly differ from the company's standard methodology life cycle phases.

Figure 2.3: Life Cycle Phases for Recovery Project Management



Source: Kerzner H., 2011

Understanding phase

The purpose of the understanding phase is for the newly assigned RPM to review the project and its history, the business case, project objectives, assumptions, and familiarize himself with stakeholders.

Audit Phase

The audit phase is where a critical assessment of the project's existing status is done. Which includes assessing the actual performance, identify flaws, performing root cause analysis, prioritize problems, and being prepared to address the most serious ones.

Since recovery cannot be accomplished in isolation, it is important to interview the team members as part of the audit phase. This may very well be accomplished at the beginning

of the audit phase to answer the previous questions. The team members may have strong opinions on what went wrong as well as good ideas for a quick and successful recovery.

Tradeoff phase

When the project first began, the constraints were most likely the traditional triple constraints. Time, cost, and scope were the primary constraints, and tradeoffs would have been made on the secondary constraints of quality, risk, value, and image/reputation. When a project becomes distressed, stakeholders know that the original budget and schedule may no longer be valid. In this phase, the RPM identifies the tradeoffs, the expected causalities, what can and cannot be done, what must be fixed first, and the risks involved.

Then the team prepares a checklist of early warning signs that indicate whether intervention is taking place or if the situation is deteriorating further. Once the tradeoffs have been discovered, the stakeholders decide whether the project is worth saving or not.

Negotiation phase

In this phase items important to stakeholders will be identified, prioritized then approved. Additional support from the stakeholders may be necessary to cut through the bureaucracy which could impact rapid decision-making. Stakeholders must be willing to insulate the team from any pressures that can impede the recovery process. It may be necessary to establish new channels of communication.

Restart phase

After the stakeholders have agreed to a recovery plan, the team will be briefed on the stakeholder negotiations as well as the recovery plan and milestones. This is done by fully engaging the project sponsor as well as the key stakeholders for their support and addressing any changes to the roles and responsibilities of the team members.

Execution phase

During the execution phase, the project manager must focus on certain back-to-work implementation factors such as learning from past mistakes, stabilizing scope, rigidly enforcing the scope change control process, providing effective and essential

communications, maintaining positive morale, adopting proactive stakeholder management and insulating the team from politics.

(Atapattu, Domingo, and Sutrisna, 2022) suggested that One of the potential solutions to reduce the effect of cost overrun in construction projects is the embedding of effective resources (human, technical, and material) management systems within construction projects as it seems that most of the causes of cost overrun are related to and external stakeholders is a very important task to deliver projects successfully and reduce cost overrun.

A study done by (Fageha and Aibinu, 2013)indicated that "adequate front-end project planning with clear project scope definition can alleviate the potential for cost overrun, inadequate project planning and poor scope definition can lead to expensive changes, delays, rework, cost overruns, schedule overruns, and project failure."

According to (Hammadi and Nawab, 2016) employing pre-qualification methods of tenderers and selective tendering, rather open competitive tender, comprehensive site investigation, accompanied by the thorough and properly detailed design of groundwork and foundation before commencing construction, clear and comprehensive contract documents to ensure proper communication amongst practitioners, complete and clear project brief from the client to minimize variations (client/consultant initiated), and establishment of construction time prediction model are forwarded as solutions to mitigate failure in construction projects.

According to (PM Solutions, 2011) findings, the top five actions most often taken in a project recovery intervention are Improving communication (stakeholder management), Redefining the project (reducing the scope, re-justifying the project financially.), Adding and/or removing resources, resolving problematic technical issues and replacing the project manager, or bringing in a consultant to manage recovery.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter constitutes the methodology employed for gathering, measuring, and analyzing data, aiming to address research questions.

1.8 Research Design and Approach

The research was intended to gather evidence from the client, consultants, and contractors of the two Argoe kera building projects understudied in regards to the factors causing the distress of the projects, the impact or effects of the occurred distress, and the implemented prevention and intervention strategies implemented in order to get the project to track and mitigate the extent of the damage caused by the distress.

This study has applied the descriptive research method, which aims to gather information about the current state of a particular phenomenon and describe the variables or conditions present in a given situation.(Anastas, 1999).

To gather information, a questionnaire survey and interview were utilized as they are the easiest and most direct methods of inquiry. Asking someone directly is often the best way to extract details about a specific variable. One of the main benefits of using a questionnaire for data collection is its low cost and ability to reach a wide geographic area. Another key advantage is that it can be self-administered, allowing people to answer questions privately on paper without having to speak the answers out loud to another person, thus providing anonymity (Anastas, 1999).

The questionnaire (attached as Annex I of this study) was prepared and distributed digitally using Google Forms and it consists of two sections. the first section comprises general information questions while the second section is a substantive question.

The second section is further divided into three parts. Part one is about Contributing Factors to the Distress of the Projects. These potential factors were gathered through the analysis of various pieces of literature and then categorized into 11 categories, as outlined in the

journal by (Muianga, Granja, and Ruiz, 2014). These factors were selected since they are mentioned repeatedly in various studies of a similar kind. And the respondents were invited to rate these factors according to the level of contribution to the distress of the project using the 5-point Likert scale [Very Low (1) -Low (2) -Medium (3) -High (4) -Very High (5)] based on their personal experience and their own judgment on the project.

In order to achieve desired results, it is crucial to identify statistically robust approaches for determining the key factors that contribute to delays and budget overruns, as noted by (Asiedu and Mkansi, 2023) With limited resources, construction companies in developing countries may struggle to address all factors outlined in construction literature. Therefore, it is important to focus on the most critical factors, a topic that is explored in this study while taking into account the specific characteristics of EOTC construction projects.

In Part Two of the questionnaire, 16 impacts of distress were identified from different studies and presented on the questionnaire so that respondents to rate them on their degree of severity using the same scale used for the factors of distress.

The last part pertains to the prevention and intervention strategies implemented on the project to mitigate the impact of distress. For this section, 11 prevention strategies and 20 intervention strategies were presented to the respondent in order to find out whether the strategies were implemented in the project or not.

Once the statistical data has been gathered through a questionnaire, the responses have been backed up and researched in more depth by interviewing the selected top-level management respondents from the client, the contractors, and the representatives to validate and gather more in-depth insights on the issues.

1.9 Target Population

The target population for this research is a group of 22 individuals, consisting of both the management and technical teams of all project's stakeholders (the Client, the consultant,

and the contractor), who have been directly involved in the two B+G+9 Apartment building projects at Aroge kera site.

1.10 Data Collection Method

Since the population is small, where there are 22 individuals with direct involvement in the projects, a census where the entire population is taken is a suitable option. A census eliminates sampling error and provides data on all the individuals in the population. (Anastas, 1999).

To gather the required data through interview from the population, a purposive non-probability sampling technique was utilized. This method was chosen because the research calls for individuals with extensive knowledge about the project during the project's lifespan.

1.11 Data collection technique

The research used both primary and secondary data. Primary data was collected through questionnaires and interviews. The questionnaires consisted of a combination of open-ended and closed-ended questions. and this allowed the respondents to give subjective and objective opinions relative to each particular question, while secondary data was collected from relevant books, journals, contract documents, performance reports, Meeting minutes, and correspondence letters.

In order to ensure a comprehensive understanding of the phenomenon being studied, the secondary sources have been incorporated with the primary sources. This integration allows for the inclusion of all relevant elements in the research.

Out of the 22 sets of distributed questionnaires, 5 were given to the client, 8 to the consultants, and 9 to the contractors. Unfortunately, only 20 sets (90.9%) were returned, as 2 sets from the consultants were not received.

1.12 Data analysis methods

This study utilized both quantitative and qualitative methodologies for data analysis.

1.12.1 Quantitative data analysis

The quantitative data were analyzed by setting responses for respondents based on which response was repeated several times. In this method, the collected data obtained from the questionnaire respondents are analyzed using statistical methods. IBM SPSS Statistics version 27.0.1 was used for data analysis because of its popularity within both academic and professional contexts. The aim is to produce objective, empirical data that can be measured and expressed in numerical terms. to summarize our data, describing patterns, relationships, and connections, descriptive statistical methods were used, and results were presented using tables and charts.

Calculation of Relative Importance Index (RII): (Hisham and Yahya, 2016), (Bassa et al., 2019), (Elmezain, Baduruzzaman, and Khoiry, 2021) , (Kuhil and Seifu, 2019) ,(Lawrence, Acai, and Otim, 2014) and other researchers used the relative importance index (RII) method in their research. The same method was adopted in this study for analysis of causing factors of distress and impacts of distress within client, consultant and contractors.

According to (Sakhare and Patil, 2019), the researchers consulted with the top management of organizations involved in a case study, as well as other experts and their own past experiences with similar projects. They identified the following Relative Importance Indices (RII) for analyzing projects/sites. Feedback was received on a (1-5) Likert scale, making it impractical to use parametric methods for assessing respondent preferences. Therefore, the relative importance index method was used to determine the relative importance of sustainable criteria in the research.

$$RII = \frac{\sum W}{A \times N}$$

Where: W is weighting given to each factor by the respondents (ranging from 1 to 5),

A is the highest weight (in this case is 5) and

N is the total number of respondents.

The RII value ranges from 0 to 1 with 0 not inclusive. It shows that the higher the value of RII, the more important the sustainable criteria and vice versa.

Scale	Level of contribution/impact	RII
1	Very Low	$0.0 \leq RII \leq 0.2$
2	Low	$0.2 \leq RII \leq 0.4$
3	Medium	$0.4 \leq RII \leq 0.6$
4	High	$0.6 \leq RII \leq 0.8$
5	Very High	$0.8 \leq RII \leq 1.0$

Table 3.2: Classification of RII

1.12.2 Qualitative data analysis

The narrative analysis is used for the analysis of the primary and secondary data that are gathered using interviews and document reviews. The aim is to produce rich and detailed descriptions of the phenomenon being studied.

According to the chapter by (Mahmoud and Tehseen, 2021) narrative analysis is a genre of analytic frames whereby researchers interpret stories that are told within the context of research and/or are shared in everyday life. Furthermore, the document review was used to underpin the analysis by referring to different documents that are collected from the client and contractor's official reports.

1.13 Validity and Reliability of Instruments

In the research process, both reliability and validity are carefully considered in the study to ensure accurate and trustworthy research output It is crucial to ensure the quality and credibility of research in order for it to be truly useful.

Cronbach Alpha (α) is used to check the internal consistency as an estimation of the reliability statistical test. The research also employs diverse data collection tools, including

questionnaire surveys, main stakeholder interviews, and document reviews, to eliminate bias and improve reliability.

To ensure the questionnaire or interview guide aligns with the study's purpose, a validity check is performed. This verifies the appropriateness and relevance of the content. The validity of the questionnaire was determined by ensuring that the questions or items in it conform to the elements identified in the literature. Also, expert judgment was asked from Project Managers to ensure the relevance of the questions, wording, and clarity of the questions in the instrument.

1.14 Ethical considerations

The gathering of data was conducted in accordance with moral and ethical principles. Both primary and secondary data will be collected with the respondents' full consent. Rest assured that the data collected will be kept confidential and used solely for the purpose of the research in an ethical manner.

Ethical considerations were carefully taken into account to ensure that no individuals would be harmed or experience negative consequences as a result of the research activities. The research design was specifically crafted to prevent any discomfort or loss of the respondent’s privacy also the anonymity of the respondents was kept confidential.

CHAPTER 4: DATA PRESENTATION, ANALYSIS, AND DISCUSSION

4.1 Introduction

This chapter presents a series of analyses carried out for the factors of each of the sections. These include the factors of distress, impact of the occurred distress, and the useful recovery strategies of distress to be implemented on the projects.

4.2 Background information of respondent

	N	%
1. Gender		
Female	4	20.0%
Male	16	80.0%
Total	**20**	**100.0%**
2. Respondent organization/company type		
Client	5	25.0%
Consultant	6	30.0%
Contractor	9	45.0%
Total	**20**	**100.0%**
3. Respondents' designation		
Contract engineer	1	5.0%
Management Level	10	50.0%
Office Engineer	3	15.0%
Project Manager	1	5.0%
Site Engineer	2	10.0%
Site supervisor	3	15.0%

Total	**20**	**100.0%**
4. Highest level of education		
Bachelor's degree	8	40.0%
Masters and above	12	60.0%
Total	**20**	**100.0%**
5. Field of study		
Bachelor's degree	8	40.0%
Masters and above	12	60.0%
Total	**20**	**100.0%**
6. Name of the project involved		
Aroge Kera 1000m2 project	5	25.0%
Aroge Kera 480m2 project	6	30.0%
Both	9	45.0%
Total	**20**	**100.0%**

Table 4.3: Background information of Respondent

4.3 Reliability Test

Cronbach Alpha is a coefficient of internal consistency that used as an estimation of the reliability statistical test. It is commonly used reliability test. (Hisham and Yahya, 2016)

Standard Cronbach Alpha formula is

$$\alpha = \frac{k\, r'}{(1 + (k-1)\, r')}$$

Where: α is Cronbach Alpha

k is the number of respondents and

r' is average correlation

Cronbach Alpha, α	Internal Consistency
0.9 ≤ α	Excellent (High Stakes Testing)
0.7 ≤ α< 0.9	Good (Low Stakes Testing)
0.6 ≤α < 0.7	Acceptable
0.5 ≤ α< 0.6	Poor
α<0.5	Unacceptable

Table 4.4: Cronbach Alpha internal consistency index

- Reliability Test on Factors contributed for the distress of the project

  α= 0.95 or 95%

Reliability Statistics (Factors contributed for the distress of the project)	
Cronbach's Alpha	N of Items
.946	49

Table 4.5: Reliability test for factors contributing to distress

- Reliability Test on Impact of the occurred distress

  α= 0.95 or 95%

Reliability Statistics (Impact of the occurred distress)	
Cronbach's Alpha	N of Items
.945	16

Table 4.6: Reliability test for the impact of distress

According to table 4.6, it indicates that 95% of the causes of distress and their impact answered by the respondents have excellent reliability.

4.4 Factors contributed to the distress of the project

The primary data collected through questionary survey on the Factors contributed to the to the project were analyzed using RII. The causes whose RII value scored from 0.8 to 1.0 according to table 3.2 of RII classification used to identify the most significant causes of distress on the projects.

The findings collected from the interview also discussed under each category of cause of distressed. This also help to confirm the information gathered from the questionary survey is valid.

No	Category	Factors	RII	Rank	Category's average RII	Category Rank
1	Design and Documentation	1. Design change	0.71	20	0.68	7
		2. Incomplete drawings	0.66	29		
		3. Discrepancies in drawings and contract document	0.66	29		
2	Material and Equipment	1. Unavailability of construction materials in the market	0.79	6	0.66	9
		2. Price escalation of construction material in the market	0.88	2		
		3. Material management problems	0.57	45		
		4. Lack of quality materials and equipment	0.38	50		
3	Labor	1. Lack of highly experienced and qualified professional	0.63	39	0.66	8
		2. Inefficient resource allocation	0.72	19		
		3. Lack of training program and technology utilization	0.69	23		
		4. Low productivity	0.61	42		
4	Financing	1. Inadequate funding for the project (Financial Constraint)	0.64	37	0.70	5
		2. Delays in payments of completed works	0.70	22		
		3. Cashflow problem	0.75	14		
5	Management	1. The time needed to implement variation order	0.66	29	0.65	10

		2. Technical incompetence and poor organizational structure of projects	0.66	29		
		3. Lack of proper financial management and planning	0.66	29		
		4. Poor project management skill	0.68	26		
		5. Poor communication between parties	0.66	29		
		6. Poor risk management	0.64	37		
		7. Subcontractor failure	0.58	44		
6	Organization	1. Conflict and dispute among the project's participants	0.71	20	0.70	5
		2. Non-involvement of managers in decision making	0.60	43		
		3. Lack of problem-solving and decision-making skills	0.74	16		
		4. Leadership problems	0.77	10		
		5. Bureaucracy and corruption	0.63	39		
		6. Poor coordination among departmental	0.73	17		
7	Schedule and Control	1. No Plan Revision After Significant Change	0.69	23	0.73	3
		2. The lag time between project approval and kickoff	0.78	9		
		3. Ineffective planning and scheduling	0.81	3		
		4. Lack of updated work schedule and commitment	0.79	6		
		5. Poor inspection/supervision of projects by consultants	0.65	35		
		6. Inadequate quality assurance/control procedure	0.67	28		
8	Contractual Issue	1. Contractor selection method (Open bid Procurement)	0.65	35	0.76	1
		2. Bid evaluation (being the Lowest Price)	0.76	12		
		3. Unrealistic estimation of cost	0.81	3		
		4. Unrealistic contract durations	0.75	14		
		5. Delays in approval of contractual claims, such as an extension of time and cost	0.80	5		
		6. Poor contract management	0.79	6		

9	Scope Changes	1. Scope and specifications changes	0.68	26	0.70	4
		2. Absence of revised WBS for Significant Change on the scope of work.	0.73	17		
		3. Errors during construction (Rework, Repair, and repetition of works)	0.63	39		
		4. Additional work, increase in the scope of the work	0.76	12		
10	Government Issue	1. Government regulatory changes and interventions	0.55	47	0.74	2
		2. Economic downturns (inflation)	0.93	1		
		3. Political instability	0.77	10		
		4. suspension of works	0.69	23		
11	Project Environment	1. Project complexity	0.57	45	0.54	11
		2. Harsh and unpredictable weather conditions on the project site	0.54	48		
		3. Unpredictable natural disasters like the pandemic	0.52	49		

Table 4.7: Ranking of factors contributed to the distress of the project

From the summary of results in Table 4.7, it can be observed that the key factors that contributed to the distress of the two Aroge kera projects are:

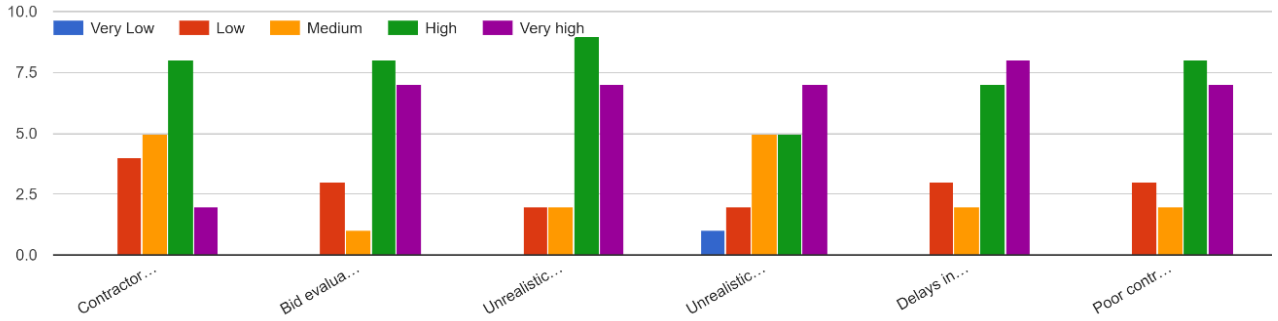
1. Economic downturns (inflation) with RII = 0.93
2. Price escalation of construction material in the market with RII = 0.88
3. Unrealistic estimation of cost with RII = 0.81
4. Ineffective planning and scheduling with RII = 0.81
5. Delays in approval of contractual claims, such as an extension of time and cost with RII = 0.8

Consequently, the research reveals that the under listed five factors are the least in causing distress on the projects.

1. Lack of quality materials and equipment with RII = 0.38
2. Unpredictable natural disasters like the pandemic with RII = 0.52
3. Harsh and unpredictable weather conditions on the project site with RII = 0.54
4. Government regulatory changes and interventions with RII = 0.55
5. Project complexity with RII = 0.57

4.4.1 Contractual issues

Figure 4.1: Contractual related factors of distress



Contractual issues are the first ranking category of distress causing factor with RII value of 0.76 as presented on table 4.7.

Figure 4.1 and Table 4.7 shows that, from contractual related causing factors of distress on the projects, Unrealistic estimation of cost (RII=0.81) and Delays in approval of contractual claims, such as an extension of time and cost (RII=0.80) scores very high. Also, Poor contract management 0.79, Bid evaluation (being the Lowest Price) 0.76, Unrealistic contract durations 0.75 and the contractor's selection method (Open bid Procurement) (RII=0.65) scores high.

The key informants of the project narrated that, At the inception of the project, open bid is launched and Many contractors participated in the bidding process, those who did not receive a score of 70 or higher on the technical evaluation did not move to the financial evaluation. Following that, the contractors who passed the technical evaluation further competed in financial manner. The least bidder was selected and awarded the project.

The bidding document contained sufficient information to enable competition among the bidders to take place based on complete, neutral, and objective terms and the process was fair. However, the awarded bid amount was low compared to the market price since the completion was according to least bidder.

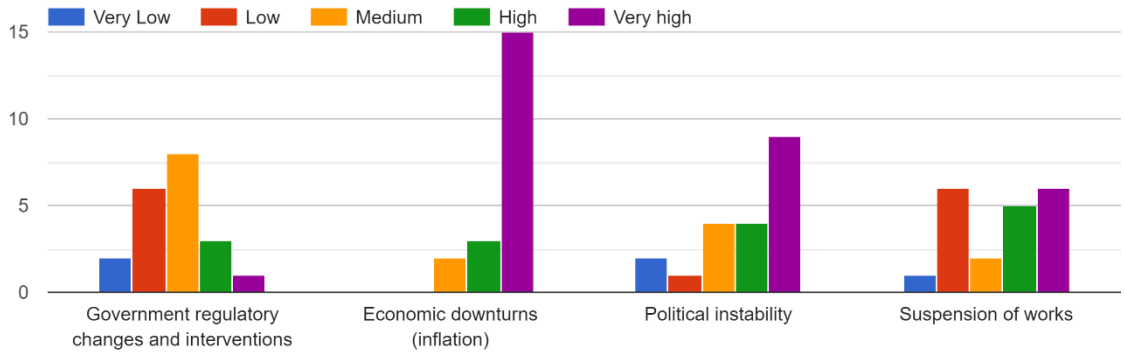
The fact that the competition was held among the participated contractors in an open not selected bid and follows the principle of lowest bidder. This resulted in projects being handed over to under skilled contractors.

The contractual agreement for the construction was signed according to standard document published by The Ethiopian Federal Government Procurement and Property Administration. It has been noticed that Some of the clauses shall be amended according to the project specific characteristics especially the one regarding design change and contract amount increment percentage since these issues highly contributed to distress of the projects.

As the interview revealed, Poor contract administration and delay in the approval of contractual claims was encountered from the consultant's side which led to consultant's termination.

4.4.2 Government issues

Figure 4.2: Governmental related factors of distress



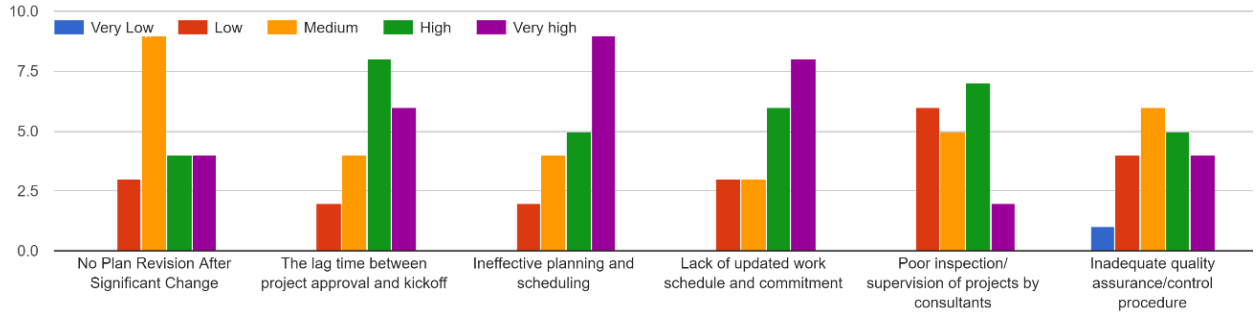
Government issues are ranking second in the category of distress causing factor with RII value of 0.74 as presented on table 4.7.

From the government issue category economic downturns (inflation) with RII 0.93, political instability with RII 0.77 and suspension of works with RII 0.69 scores high as shown in figure 4.2.

As the research confirms, The Economic downturns (inflation) and the political instability happened in Ethiopia over the course of the recent years highly impacted the construction industry and caused a lot of projects to be delayed and extra costs to be incurred.

4.4.3 Schedule and control

Figure 4.3: Schedule and control related factors of distress



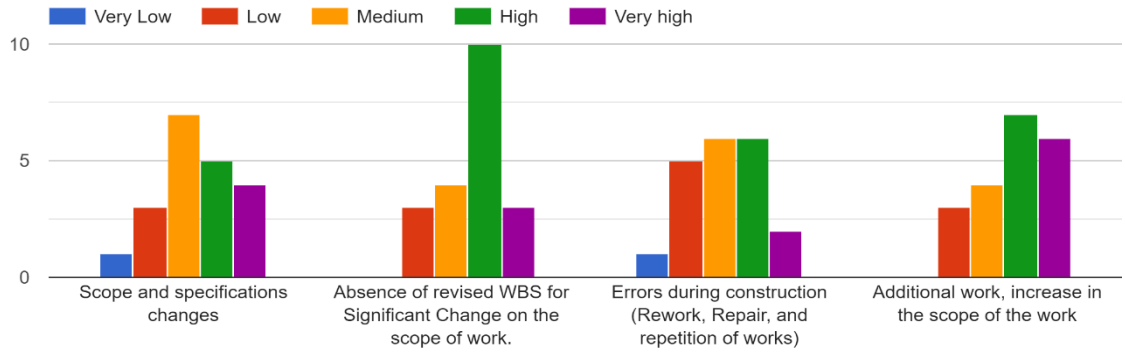
The third ranking factors that causes distress among the list of categories are schedule and control related factors with RII of 0.73.

Ineffective planning and scheduling with RII of 0.81, lack of updated work schedule and commitment with RII of 0.79 and the lag time between project approval and kickoff with RII of 0.78 are the top three causing factors of distress on EOTC Aroge kera projects among the category of schedule and control.

The interview conducted also discloses that, there were disorganization on the activities of work, absence of updated and crashed work schedule, lack of planning of activities ahead of time, absence of work methodology and reluctance to ensure the works and the materials quality from the contractor's side and consequently, lack of continuous follow-up and inspection of the project were noticed from the consultant's side regarding the issues related with schedule and control.

4.4.4 Scope change

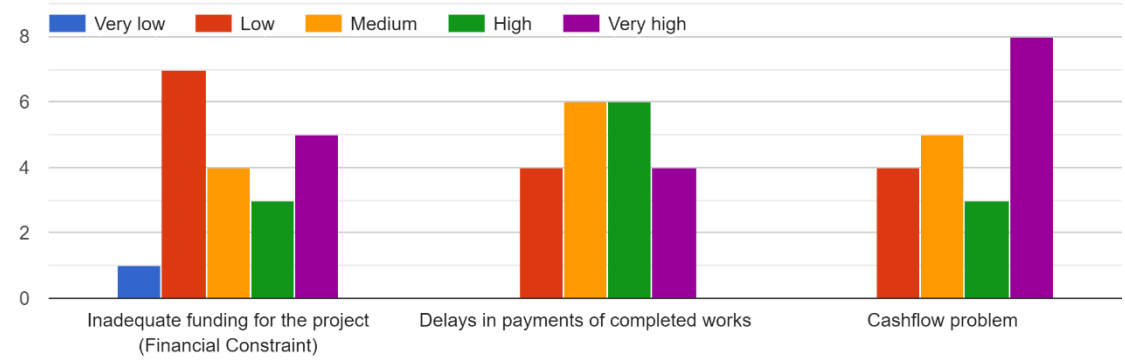
Figure 4.4: Scope change related factors of distress



As the client's key respondent of the interview explains, The scopes of the projects have been changed multiple times over the course of the project. as a result of poor performance of the contractors regarding financial capacity, schedule and quality, most of finishing work items had been omitted from the contract.

4.4.5 Finance

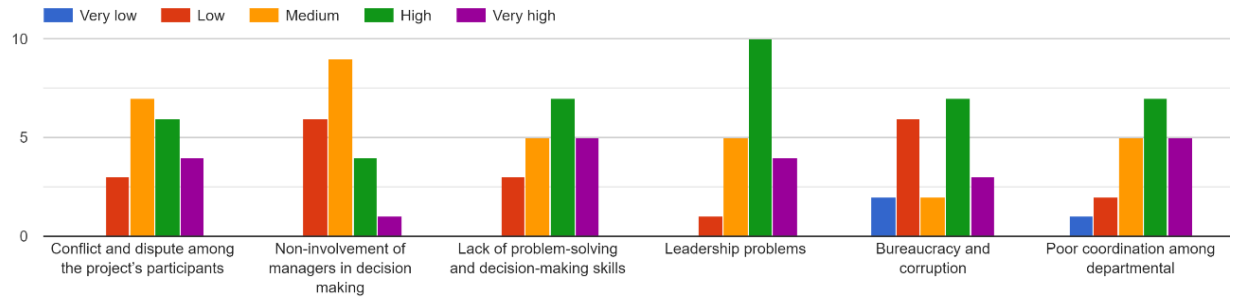
Figure 4.5: Finance related factors of distress



The interview held with top manager of the contractors disclosed that, Payments sent by the consultant to be approved and paid to the contractor, were not approved on time and the ones which were approved were not released on time which caused cashflow problems on the projects.

4.4.6 Organizational

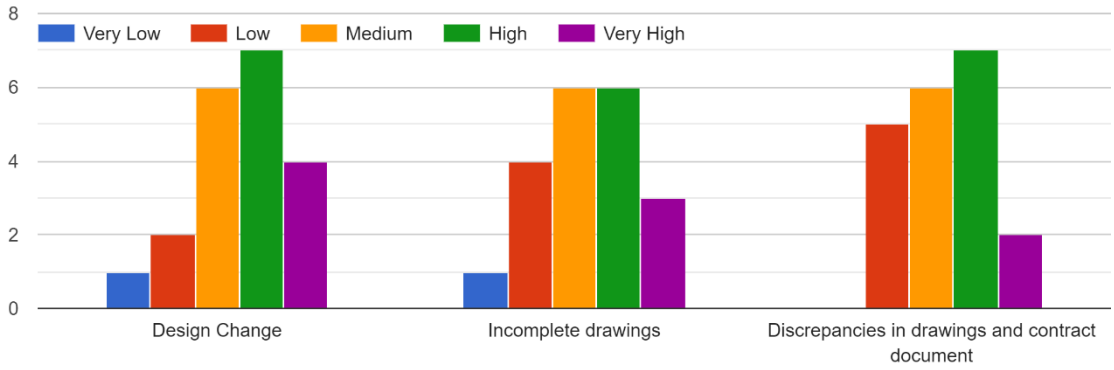
Figure 4.6: Organizational related factors of distress



There were significant leadership problems noticed from all key stakeholders of the projects which are the client, the consultant and the contractors. From the client side, only one person was responsible for overseeing the project at the beginning of the projects then later and technical team consisting of various technical experts who volunteered to consult formed. However, many meetings which were held and progress reports submitted to the board were either not addressed on time or never addressed at all.

4.4.7 Design and documentation

Figure 4.7: Design and documentation factors of distress

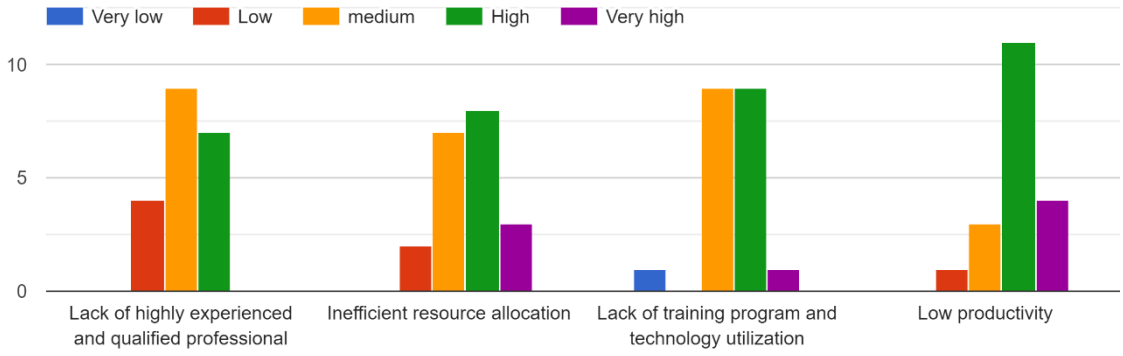


According to the conducted interview, the respondent from the client affirms that, there were two significant design changes in both projects which was initiated by the top management of the client EOTC in order to maximize the functionality of the buildings.

Following the initial design change, incompleteness of drawings, discrepancies among the design and contract documents, Lack of detailed specifications for the design change and lack of complete documentation on overall issues of the projects has been noticed, though most of the problems regarding these issues later resolved by the second revision of the design and contracting of new consultant to the projects.

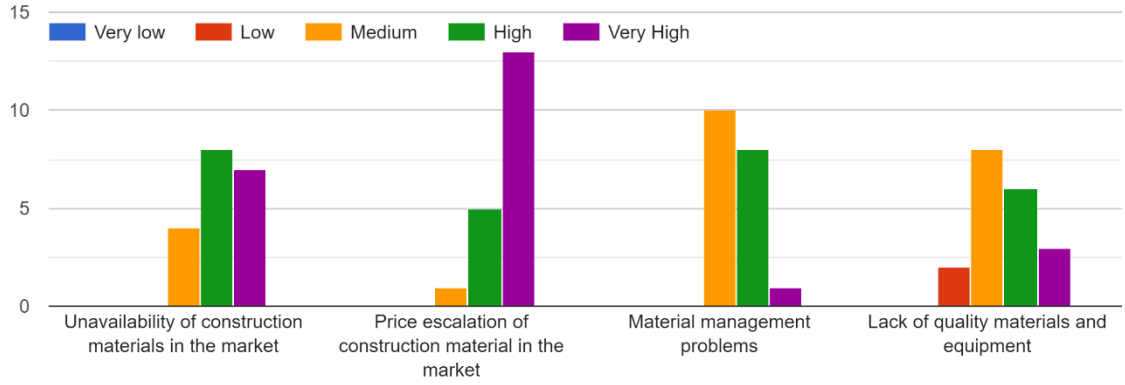
4.4.8 Labor

Figure 4.8: Labor related factors of distress



4.4.9 Material and equipment

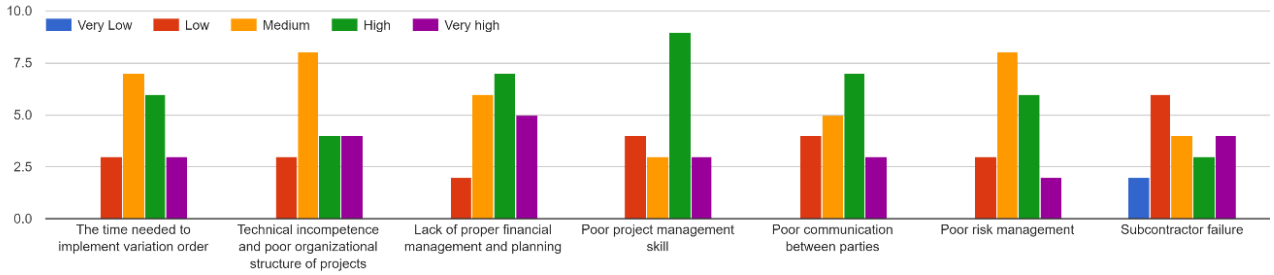
Figure 4.9: Material and equipment related factors of distress



Scarcity or Unavailability of sufficient construction materials specially cement and rebar on the market that followed by price escalation highly impacted the progress of the projects and lead to distress as shown in the figure 4.9.

4.4.10 Management

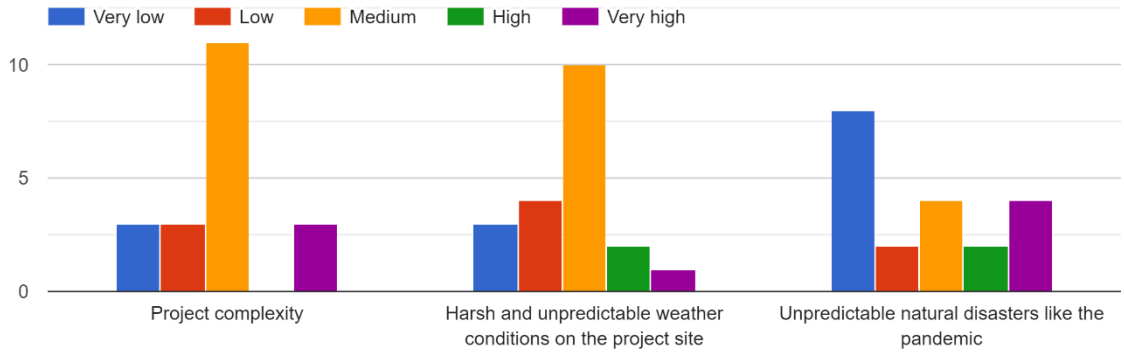
Figure 4.10: Management related factors of distress



Poor project management skill, Poor communication between parties, the time needed to implement variation order, technical incompetence and poor organizational structure of projects, Lack of proper financial management and planning are high contributing factors among management related category.

4.4.11 Project/Environment

Figure 4.11: Project/Environment related factors of distress



Among the project/ environment factors of distress project complexity, harsh and unpredictable weather condition and unpredictable natural disasters like the pandemic contributed moderately to distress of the project.

4.5 The impacts of the occurred distress

The questionnaires surveyed on the impact of the occurred distress were also analyzed in the same manner as the causing factor of distress.

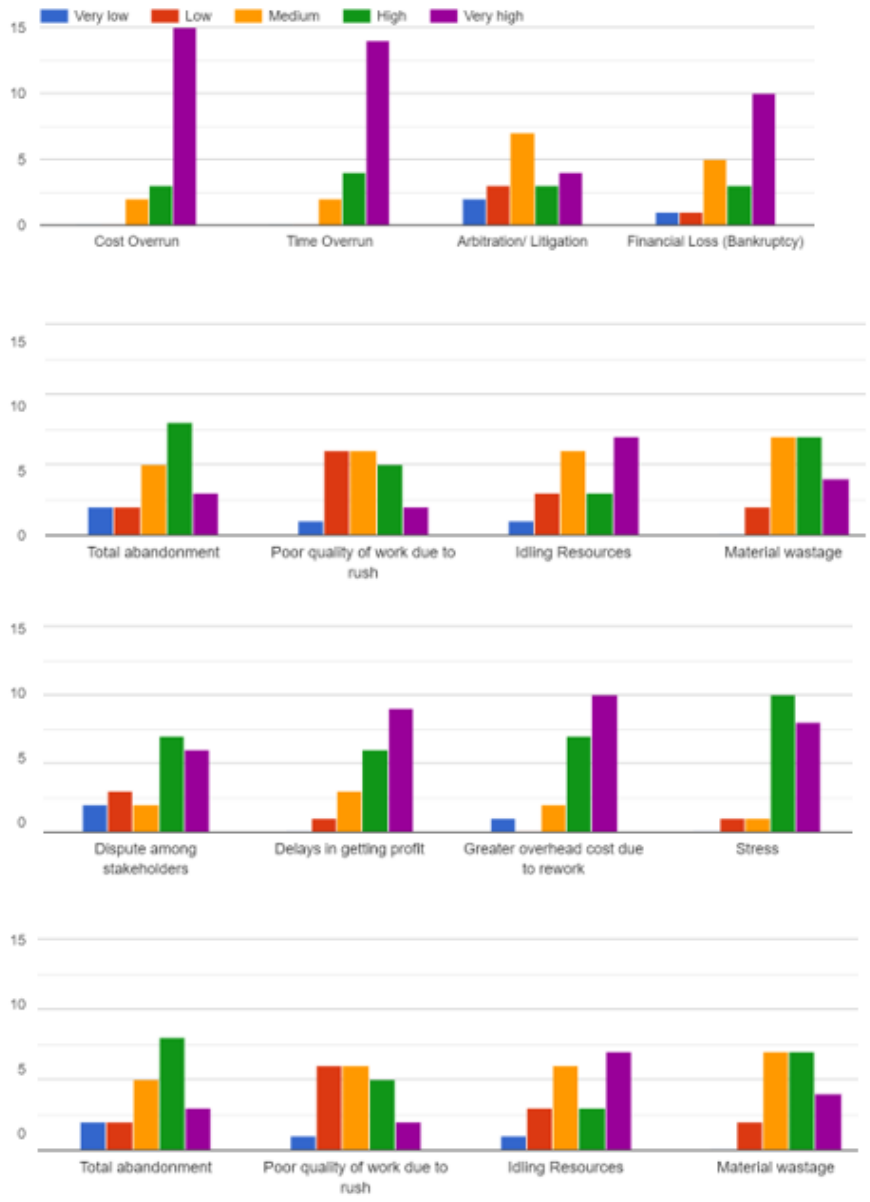
No	Impact of distress	RII	Rank
1	Cost Overrun	0.93	1
2	Time Overrun	0.92	2
3	Arbitration/ Litigation	0.73	9
4	Financial Loss (Bankruptcy)	0.84	6
5	Bad Reputation	0.91	3
6	Professional Turnover	0.68	13
7	Negative Social impact	0.85	4
8	Total Abandonment	0.57	16
9	Dispute among stakeholders	0.7	12
10	Delays in getting profit	0.8	8
11	Greater overhead cost due to rework	0.84	6
12	Stress	0.85	4
13	Total abandonment	0.66	14
14	Poor quality of work due to rush	0.6	15
15	Idling Resources	0.71	11
16	Material wastage	0.73	9

Table 4.8: impact of the occurred distress

Out of the sixteen impact of distress which were analyzed through RII index, the impacts with higher RII value (RII>0.8) are distinguished and listed as follows:

1. Cost overruns with RII = 0.93
2. Time overruns with RII = 0.92
3. Bad Reputation with RII = 0.91
4. Negative social impact with RII = 0.85
5. Stress with RII = 0.85
6. Financial Loss (Bankruptcy) with RII = 0.84
7. Greater overhead cost due to rework with RII = 0.84
8. Delays in getting profit with RII = 0.8

Figure 4.12: Impact of the occurred distress



As shown on figure 4.12, The results obtained from the survey indicated that an overwhelming majority of participants were in concurrence about the seriousness of the impact of Cost and Time overrun.

The project ‘s delay put an adverse impact on the client, the contractor and end users of the projects. While the severity of the cost and time overrun of the projects may differ between stakeholders, all parties involved are affected in some way.

Because of the time overrun, the client failed to meet up with his objectives on time and subjected to cost overruns. The initial casualty of cost overruns is typically as the owner of the project, the owner is bound by the predetermined cost and time frame that has been allocated. Any task that exceeds these limits will result in an increase in both cost and time, which can be a burden to the client.

As it mentioned by the respondents of the interview, not only additional cost is incurred to owner of the project, but also it inhibits the owner to collect the revenue generated from renting the building, if it would have been completed on the intended time interval.

The contractors also suffered from the delay and the cost overruns since their resources are locked up on the projects. Since the price of the works are adjusted in timely manner and compensated for the inflation occurred on the materials, the impact of delay may not be significant as the client.

Bad reputation of the contractors is another impact of distress. Since the performance of the projects beyond poor, the contractors were not invited to participate on multiple projects launched by EOTC.

As the survey and the interview conforms, the negative social impact of the delay and cost overrun of the projects are significant for those church community members who were registered and waiting for housing facility.

The impact of stress also another significant effect which puts a lot of pressure on EOTC's officials, contractor's and consultant's management teams.

The interview also reveals that, due to the termination followed by the distress of the projects, the Performance and advance guarantee bonds claimed by the owner. This led both contractors to incur financial loss at the level which can be called bankrupted.

Because of the repeated stoppage of works with multiple reasons, materials and work items were exposed to damage and reworks were performed by the contractors which led to further financial loss and delay both for the contractors and the client.

4.6 Strategies implemented to mitigate the impacts of distress

The respondents of the survey were asked which prevention and intervention strategies presented on table 4.9 and 4.10 respectively are helpful to mitigate the impact of distress of the projects and their percentages are analyzed using frequency distribution and ranked accordingly.

4.6.1 Preventive strategies implemented

The percentages were ranked from the highest to the lowest and presented on a table 4.9. The preventive distress mitigating factor that scored the highest percentage was considered to be a very highly effective if it were implemented on the two Aroge kera building projects.

No	Preventive strategies	Frequency (N)	Percentage (%)	Rank
1	Thorough estimation of cost and time	15	75.00%	1
2	Building Clear WBS (work breakdown structure)	14	70.00%	2
3	Setting clear scope of the project	13	65.00%	3
4	Using Project planning tools,	13	65.00%	3
5	Resource management plan	12	60.00%	5
6	Implementation of cost benefit analysis,	11	55.00%	6

7	Thorough project planning	10	55.00%	6
8	Setting scope change management	7	35.00%	8
9	Requirements gathering	6	30.00%	9
8	Setting dynamic risk management plan	5	25.00%	10
11	Mile stone trend chart and Earned value analysis	5	25.00%	10

Table 4.9: Preventive strategies

4.6.2 Intervention strategies implemented

The percentages of the listed intervention strategies ranked from the highest to the lowest and presented on a table 4.10. The intervention distress mitigating strategies that scored the highest percentage was considered to be a very highly effective if it were implemented on the two Aroge kera building projects.

No	Intervention strategies	Frequency (N)	Percentage (%)	Rank
1	Proper project planning and scheduling	15	75.00%	1
2	Additional funding and Price adjustment	15	75.00%	1
3	Improving decision making	15	75.00%	1
4	Re-planning and Re-defining the project	14	70.00%	4
5	Improving communication	13	65.00%	5
6	Improving Documentation	13	65.00%	5
7	Amendment of contract document to enhance its effectiveness	13	65.00%	5
8	Replacing the non performing project team	12	60.00%	8
9	Reinforcing strong controlling system	12	60.00%	8
10	Use of Project Management Techniques	12	60.00%	8
11	Financial support system	11	55.00%	11

12	Re-bidding the project	10	50.00%	12
13	Changing management team	10	50.00%	12
14	Proper resource allocation	10	50.00%	12
15	Improving follow up and quality control structure	9	45.00%	15
16	Engaging additional professionals for support	9	45.00%	15
17	Issuance of progressive payment on time	9	45.00%	15
18	Performing root cause analysis and lesson learning,	7	35.00%	18
19	Applying different tools and Technology	6	30.00%	19
20	Providing Adequate Training	2	10.00%	20

Table 4.10: Intervention strategies

Even though, the projects negatively impacted enormously due to the occurred distress caused by multiple reasons. there were support and assistance given to the contractor to minimize the damage.

The interview of the key informants of the owner of the projects disclosed, some of the major recovery strategies implemented on the projects. These are:

- Even though price escalation was not part of the main contract the client has made full price adjustment according to the current market price to facilitate the progress.
- The client has terminated the consultant and hires another consultant that would assist the project better.
- The client has been making financial support by direct purchasing the construction materials

- The Client has formed a group of professional technical team, which give technical assistance to the projects and make continuous follow-up.
- The Client has re-amended the contract twice and omit some of the work items to support the contractor.
- Terminating the non performing contractors, re-bidding the project for selected qualified bidders with good project completion reputation and awarding of the projects.

CHAPTER 5: CONCLUSION AND RECOMMONDATION

5.1 Conclusion

A total of 50 distress factors identified from literature and categorized under 11 broad groups. In order to analyze the data of the questionary survey, gathered from the main stakeholders of the EOTC Aroge kera 1000m2 and 480m2 building projects and to determine the most significant and insignificant factors, RII method of computation conducted and the outcomes are ranked accordingly.

Following that, the factors with RII > 0.8 identified as Economic downturns (inflation), Price escalation of construction material in the market, Unrealistic estimation of cost, Ineffective planning and scheduling and Delays in approval of contractual claims, such as an extension of time and cost are considered as the top significant factors that contributed to the distress of the two Aroge kera projects.

Consequently, findings of the study disclosed that of the 16 impacts of distress identified and analyzed in the same manners as contributing factors of distress 8 major impact of distress are identified. This are Cost overruns, Time overruns, Bad Reputation, Negative social impact, Stress, Financial Loss (Bankruptcy), Greater overhead cost due to rework and Delays in getting profit.

Moreover, the prevention and intervention strategies to mitigate the impact of distress of the projects gathered from literatures are presented, and analyzed using frequency distribution percentage and ranked accordingly.

5.2 Recommendation

Taking all the projects findings into consideration, the researcher therefore recommended the following measures to be implemented in the project.

- Close project follows up and continuous meetings to discuss the problems on hand and setting/planning the way forward for better project implementation to achieve project success is critical.
- Purchasing of materials ahead of time shall be a priority, in order to save the project from further time and cost overrun by significantly minimizing the impact of scarcity and inflation. Also, Proper resource allocation and utilization shall be in place.
- The team's skills and competencies shall be correctly aligned with the projects demand.
- A revised risk management plan and a more finely tuned monitoring system shall be in place, to detect minor trends in schedule or cost variances. If this minor variance detected and the contractor failed to correct it, strong measures shall be taken by the client and consultant of the project.
- The client and the consultant shall be responsive to issues raised by the contractors regarding payment issuance, claim approval, and other contractual issues in a timely manner.

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Appendix

Annex I: Questionaries

SECTION A: GENERAL INFORMATION: Please put (√) as appropriate

1. Gender

   Male ☐ Female ☐

2. Respondent organization /company type:

   Client ☐ Contractor ☐ Consultant ☐

3. Respondents' designation:

   Management level ☐ Project Manager ☐ Site Engineer ☐
   Office Engineer ☐ Site Supervisor ☐ Contract Engineer ☐

   Any other (specify) _____

4. Highest Level of education:

   Master's and above ☐ Bachelor's degree ☐ Diploma ☐

5. Field of study:

   Civil Engineering ☐ Construction Management ☐

   Any other (specify) _____

6. Relevant working experience (years):

   Less than 5 years ☐ 6-10 years ☐ 11-15 years ☐ More than 20 years ☐

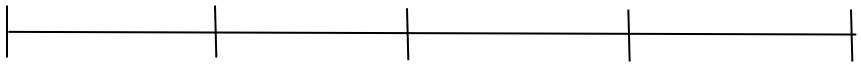
7. Name of the project involved:

   Aroge kera 1000m2 project ☐ Aroge kera 480m2 project ☐ Both ☐

SECTION B: SUBSTANTIVE SECTION

I. **PART ONE:** factors that affect and lead the EOTC's Aroge Kera Building projects into a distressed condition.

Instruction: Based on your experience, kindly indicate (√)**on a scale of 1 to 5** how the under-listed example of the Extent of factors affecting and leading the EOTC's Aroge Kera Building projects into a distressed condition.

Indicator: 

1: Very Low 2: Low 3: Medium 4: High 5: Very High

No	Factors	Scoring				
		1	**2**	**3**	**4**	**5**
	Design and Documentation					
1	Design change					
2	Incomplete drawings					
3	Discrepancies in drawings and contract document					
	Material and Equipment					
1	Unavailability of construction materials in the market					
2	Price escalation of construction material in the market					
3	Material management problems					
4	Lack of quality materials and equipment					
	Labor					
1	Lack of highly experienced and qualified professional					
2	Inefficient resource allocation					
3	Lack of training program and technology utilization					
4	Low productivity					
	Financing					
1	Inadequate funding for the project (Financial Constraint)					
2	Delays in payments of completed works					
3	Cashflow problem					
	Management					

1	The time needed to implement variation order					
2	Technical incompetence and poor organizational structure of projects					
3	Lack of proper financial management and planning					
4	Poor project management skill					
5	Poor communication between parties					
6	Poor risk management					
7	Subcontractor failure					
	Organization					
1	Conflict and dispute among the project's participants					
2	Non-involvement of managers in decision making					
3	Lack of problem-solving and decision-making skills					
4	Leadership problems					
5	Bureaucracy and corruption					
6	Poor coordination among departmental					
	Schedule and Control					
1	No Plan Revision After Significant Change					
2	The lag time between project approval and kickoff					
3	Ineffective planning and scheduling					
4	Lack of updated work schedule and commitment					
5	Poor inspection/supervision of projects by consultants					
6	Inadequate quality assurance/control procedure					
	Contractual Issue					
1	Lack of proper financial management and planning					
2	Contractor selection method (Open bid Procurement)					
3	Bid evaluation (being the Lowest Price)					
4	Unrealistic estimation of cost					
5	Unrealistic contract durations					
6	Delays in approval of contractual claims, such as an extension of time and cost					
7	Poor contract management					
	Scope Changes					
1	Scope and specifications changes					
2	Absence of revised WBS for Significant Change on the scope of work.					

3	Errors during construction (Rework, Repair, and repetition of works)					
4	Additional work, increase in the scope of the work					
	Government Issue					
1	Government regulatory changes and interventions					
2	Economic downturns (inflation)					
3	Political instability					
4	Suspension of works					
	Project Environment					
1	Project complexity					
2	Harsh and unpredictable weather conditions on the project site					
3	Unpredictable natural disasters like the pandemic					

If you have any additional factors affecting and leading the EOTC's Aroge Kera Building projects into a distressed condition, please use the table below to mention them

No	Factors
1	
2	
3	
4	
5	

II. **PART TWO:**

Instruction: Based on your experience, please kindly reflect your opinion on the following questions.

1) What are the impacts of the occurred distress?
   i. _____
   ii. _____

iii. _____

iv. _____

v. _____

2) What Prevention strategies would be useful if implemented to avoid distress on the project?

i. _____

ii. _____

iii. _____

iv. _____

v. _____

3) What intervention strategies would be useful if implemented to mitigate the impact of distress on the project?

i. _____

ii. _____

iii. _____

iv. _____

v. _____

Thank you for your participation!

❖ The link of the questioner on google form is: https://forms.gle/FUyEC4wkXLjK6qUA9

Annex II: Interview Questions

1. What are the factors that lead the project into distressed condition?

2. What are the effects/impacts of the occurred distress?

3. What preventive and intervention strategies would mitigate the negative impact of the distress if implemented?