

**ADDIS ABABA UNIVERSITY SCHOOL OF
COMMERCE
GRADUATE STUDIES
PROJECT MANAGEMENT**



**ASSESEMENT OF PROJECT COST OVERRUN, ITS CAUSE AND
THE MITIGATION MEASURES TO IMPROVE PROJECT COST
PERFORMANCE**

**(A CASE OF ETHIOPIAN SHIPPING AND LOGISTICS SERVICES
ENTERPRISE CONSTRUCTION PROJECTS)**

BY

BIRUKTAWIT TESFAYE

ADVISOR

WORKU MEKONEN (PhD)

**A Research Project Submitted to the School of Commerce, Addis Ababa
University in Partial Fulfillment of the Requirement for the Master of Arts Degree
in Project Management**

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BIRUKTAWIT TESFAYE

Approved By Board of Examiners

Worku Mekonen (PhD)

Advisor

Signature

Date

Internal Examiner

Signature

Date

External Examiner

Signature

Date

Statement of Declaration

I, the undersigned, have carried out the project work entitled – “Assessment of the Cause of Project Cost Overrun and Mitigation Measures to Improve Cost Performance - a case of Ethiopian Shipping and Logistics Services Enterprise Construction Projects” and declare that this is my original work to the partial fulfillment of the requirements for Masters of Arts Degree in Project Management. This paper has not been submitted for any diploma, degree or master’s program in any institution. All the resources used in the paper are acknowledged duly.

Biruktawit Tesfaye

Signature _____

Date _____

Addis Ababa, Ethiopia

Statement of Certification

This is to certify that Biruktawit Tesfaye has carried out the project work entitled – “Assessment of the Cause of Project Cost Overrun and Mitigation Measures to Improve Cost Performance - a case of Ethiopian Shipping and Logistics Services Enterprise Construction Projects” to the partial fulfillment of the requirements for Masters of Art Degree in Project Management. The paper has been done by her and to our best belief; we certify that it has not been submitted to any institution before.

Worku Mekonen (PhD)

Signature _____

Date _____

Addis Ababa University

School of Commerce

Addis Ababa, Ethiopia

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Many praise to the creator and to the author of my life. Dear the Highest God, You have made a way for me and You did it over and over and over again. Thank You Abba!

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Acronyms

CPI	Cost Performance Index
ESLSE	Ethiopia Shipping and Logistics Service Enterprise
IMO	International Maritime Organization
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
SPI	Schedule Performance Index
SPSS	Statistical Package for the Social Sciences

Abstract

The study was conducted to find if any cost overrun exists, to identify factors causing cost overrun and the mitigation measures for the factors causing cost overrun in construction projects of ESLSE. Questionnaire was conducted among the construction experts of the client, the consultant and the contractor. Between the years 2012 – 2018, six mega projects are under construction by ESLSE and these projects are assessed. For the explorative data, Cost Performance Index (CPI) of the selected six projects was calculated. Interview sessions were also conducted with the selected expertise of the enterprise. Statistical Package for Social Scientists (SPSS) version 20 was employed to analyze the data for descriptive statistic. From the project status report of the projects, it is found that the costs of the selected six ongoing projects of ESLSE are under budgeted. The identified top ten causes of project cost overrun from the questionnaire survey are escalation of material cost, change in exchange rate, delayed approval of payment, procurement problems, excessive change orders, unclear and inadequate details in drawing, incomplete drawings, increase in cost of labor, too many scope change and constructive change orders by client and change and mistakes in design documents. As the result suggests, the mitigation measures which are extremely significant to improve cost performance of projects are efficient contract management, site management and supervision, effective project planning, scheduling and control, efficient management, effective project manager, skilled and experienced teams, on time payment, realistic cost estimation, possession of site on date, communication and coordination. It is hoped that the mitigation measures and the recommendation that is propose in this paper can help construction experts, particularly those who manage projects, by overcoming unnecessary causes which increase project cost.

Key words: Cause, Cost Overrun, Construction Project, Factors, Mitigation Measure

Chapter One: Introduction

1.1 Background of the Study

The Project Management Institute Project Management Body of Knowledge (PMBoK) Guide defines a project as “a temporary endeavor undertaken to create a unique product or service”. As one of the project management areas, project cost management includes the process required to ensure the project is completed within the approved budget and consists of resource planning, cost estimating, cost budgeting and cost control (Project Management Institute, 2000)

A Common denominator among organization resources is the cost involved in the utilization. Cost can be defined as the release of value required to accomplish some goal, objective or purpose (Vasista, 2017). Kerzner (2003) noted, time, cost and performance are the constraints of the project and achieving the project with in cost is one of the primary success factors. Lutchman said new and going organizations are generally well rewarded by the market in the form of higher stakeholder confidence and share prices when projects are delivered on budget and on schedule. Failure to get it right the first time results in rework, cost increase, schedule changes and several penalties from shareholders and other stakeholders. On budget and on schedule are powerful announcement to the market to promote and fuel sustained growth of an organization (Lutchman, 2011).

A project cost overrun is one of the worldwide problems. Project management institute quoted the studies on cost overrun and said “a recent study by Aalborg University of 258 major international transport infrastructure projects between 1927 and 1998 found that actual costs were, on average, 28% higher than estimated costs, and that in nine out of ten of these projects, costs were underestimated, resulting in cost overrun (Project Management Institute, 2016)

The transport system along with good infrastructure contributes to the economic growth of a country and the role of shipping sector at the global economic growth is supreme. According to International Maritime Organization (2016) “maritime transport is a necessary complement to and occasionally a substitute for other mode of transport in the economy of a country”. As one of

the major outlay for the countries imports and exports, Ethiopian Shipping and Logistics service Enterprise has been giving service for decades. The majority of the cargo that's imported to Ethiopia is carried by it (2 merkato. com, 2016). To increase its efficiency and effectiveness, it has been conducting many construction projects.

Identifying the factors that affect cost of construction projects is important so that factors affecting cost of construction projects are well identified and efforts can be made to improve the situation. Hence this study aims at finding the cost overrun, the main factors causing it and the mitigation measures that can be taken to improve cost performance in construction projects of Ethiopian Shipping and Logistics Services Enterprise (ESLSE).

1.2 Background of the Organization

As a public enterprise managed by government, Ethiopian Shipping and Logistics Services Enterprise (ESLSE) has gained its current status by merging three independent companies; Ethiopian Shipping Lines S.C, Maritime and Transit Services Enterprise and Dry Port Enterprise in 2011 based on the Council of Ministries regulation No 255/2004 .

The enterprise has a responsibility of rendering sea transport and logistics service to importers and exporters in a more effective and efficient way by reducing transit time, cost and handoffs. It provides Coastal and International Marine Transport services to and from Djibouti Port, through the Ports of: Gulf and Indian sub-Continent, China, Korea, Japan, Singapore, South Africa, and Indonesia. The Shipping Sector provides uninterrupted sea transport service in and around the above ports with own ships as well as via slot chartering of major global carriers. In the year 2016/17 it has moved a total 4,538,722 tons of goods (ESLSE magazine, 2017).

It has three sectors each with its own different service. These are the shipping sector, the freight forwarding sector and port and terminal sector. It owns 11 ships of which 9 are dry cargo ships and two are oil tankers. It has a total capacity of transporting 250987 dry tones and 84300 metric tons of oil at once. The enterprise is rendering service as one of the main sectors by transporting above 94% import goods to the country on its own and on chartered vessels.

As an enterprise with a vision in mind to become preferred and renowned African logistics company by 2020, it has planned and worked on many projects. Multi-purpose building project; Mojo, Dire Dawa, Mekelle, Kombolch, Semera and Kality terminal handling projects are few among many of the enterprise projects. It has its own project management office but projects are handed to contractor organizations, as its main duty is overseeing the works of contractors. It will invite bidders and will transfer the work to the winner.

1.3 Statement of the problem

The shipping and logistics service will serve an economic growth of a country by bringing and forwarding import and export good from and to different ports of the world through water and land transport. As a sector, Ethiopia shipping and logistics service enterprise is giving shipping and logistics services to the country's import and export of goods with the aim of giving irreplaceable role in the economic growth of the country. Its mission is to render world class and competitive shipping and logistics service and thereby contributing towards the rapid economic growth of the country (ESLSE magazine, 2017).

Despite it is the main pillar in the economic growth of the country, as of the preliminary survey conducted at the beginning of this study indicates, construction project cost overruns is one of the problems in past projects of the practitioners. Inefficient performance in shipping sector increase cost of goods. The increase in costs of projects construction means non-economic transport of imports and exports. The qualities of imports and exports would be also affected. The enterprise is incurring additional money because of cost overruns.

In response to this problem, this study will investigate the project cost overrun of the enterprise. The study has planned to examine the costs of construction projects and cause of project cost overrun. By looking into different perspectives and literature, it will try to propose ways to manage project costs and mitigation measures to enhance cost performance of the projects, so that it will contribute to the economic growth of the country.

1.4 Research Question

- Is there any cost overrun in ESLSE construction projects?
- What are the causes of cost overrun in these projects?
- What are the impacts of cost overrun faced by the stakeholder, especially ESLSE?
- What are the mitigation measures for cost overrun?

1.5 Objective of the Study

1.5.1 General Objective

- To assess cost overrun and its cause in construction projects of ESLSE.

1.5.2 Specific Objective

- To rank the causes in terms of frequency.
- To find out the impact of overrun on the stakeholders, especially on ESLSE.
- To identify and recommend measures that could be taken to mitigate against the factors causing the cost overruns

1.6 Significance of the Study

Being the main source of outlay for imports and exports, ESLSE has a high responsibility of rendering service in efficient and effective ways. The projects handled by this enterprise are the means in helping this efficient ways to come true. From the results of this research, factors causing cost overrun and the mitigation measures in construction projects of ESLSE will be determined. Recommendations will be formulated for improving cost performance in construction projects. The results of this study will be used as guidance to all construction practitioners such as clients, consultants and contractors in order to overcome the cost overrun issue in their projects. It would be an important help for ESLSE, as it will continue to manage other projects when remedial measures for each uppermost cost overrun causing factors have been determined, it would be possible to control them. Minimizing and eliminating the cost overrun in construction projects will reduce the conflicts among construction practitioners. It will also help other similar studies by providing a preliminary research stage for them. Above all, controlling and reducing construction cost overrun will minimize the possible increase in the

final construction project cost. Thus, it will directly benefit the construction community and indirectly to the country economically.

1.7 Scope of the Study

The research paper will study the construction projects of ESLSE between the years 2012 - 2018 E.C. The three bodies, the client (ESLSE), the contractor, and the consultant, who participate in the construction of ESLSE projects in these years, will be questioned to find the factors that cause cost overrun in the projects.

1.8 Limitation of the study

The research is limited to construction projects of ESLSE. The respondents are from this construction industry. Hence the result and the recommendation of this paper would appear to be more suitable for construction projects. Also the projects are being executed and their cost performance is measured as an ongoing projects. The cost overrun of finished projects cannot be compared with these ongoing projects. Therefore, when using the data for cost overrun, its cause and mitigation measures on this paper to other projects, caution is required. Finding accurate and reliable data has been the other limitation of the study.

1.9 Organization of the Paper

The paper will present the introduction part of it in chapter one. Background, statement of problem, research question, objectives of the study, significance, scope and limitation will be addressed. Chapter two deals with literature review of the study. Here theoretical and empirical literatures will be reviewed in detail. Chapter three discusses the methodology. The study area, the population, the sample size and techniques, types of data collected and methods of collection and method of data analysis will be discussed. Chapter four will discuss the findings and the result of the study. And Chapter five will finalize the study by giving conclusion and recommendations for other similar projects.

Chapter Two: Literature Review

2.1 Theoretical Review

2.1.1 Cost and Project Cost Management

Cost as defined by Charles T. et al is a resource which is sacrificed or forgone for specific objective or given up to find another thing in exchange and measured usually in monetary units like dollars. Cost for accountants are resource sacrificed or forgone to achieve a specific objective but project cost management manage resources so as to ensure the project to be completed within approved budget (Charles, Srikant & George, 2003). Cost means expense incurred by contractor for labor, material, service, utilities etc plus overheads and contractor's profits (Vasista, 2017). It is an important measure and is a degree to which the general conditions promote the completion of a project within the estimated budget. It is the overall cost that a project incurs from inception to completion (Chan, 2011)

With scope and time, Griham (2010) called cost "one leg of the triple constraints." As it is a limited resource, it must be utilized effectively and efficiently. Project management body of knowledge notes cost to different stakeholders may be measured in different way at different times (Project Management Institute, 2012).

Project cost management includes three major functions called cost estimating, budgeting and cost control (Project Management Institute, 2004). The goal of these functions is to make sure that the project be executed within cost efficient and profitable manner and according to the business principles which is from perspective of the entire company.

These three major functions and sub-functions are described by Kujala, Brady & Putila (2014). They said managing a project costs starts early during the marketing and sales phase of the project when tentative cost estimates are created. During this phase, estimates are iteratively specified to provide accurate and reliable information to be used in tendering and pricing the delivery project. During the project specification phase, a tentative project budget is set, a specification-to-cost approach is exploited to ensure cost-effective specifications and, typically, the letters of intent with the main suppliers are signed. Before the implementation phase, the project budget is created based on the latest cost estimates. In the project planning phase, the resources for the work tasks are allocated, cash flows are planned and typically cost

contingencies are set. During the planning and implementation phases, the actual costs of the project are monitored. In addition, cost estimates and forecasts are constantly updated and then compared with the project budget. In the implementation phase, the project revenues are monitored, invoicing is performed and cost contingencies are released. In some projects, funding is also ensured during the implementation phase. After system delivery, the operating costs of the delivered system are monitored in co-operation with the customer, warranty costs are monitored and a learning loop back to the earlier phases should be created (Kujala, Brady & Putila, 2014).

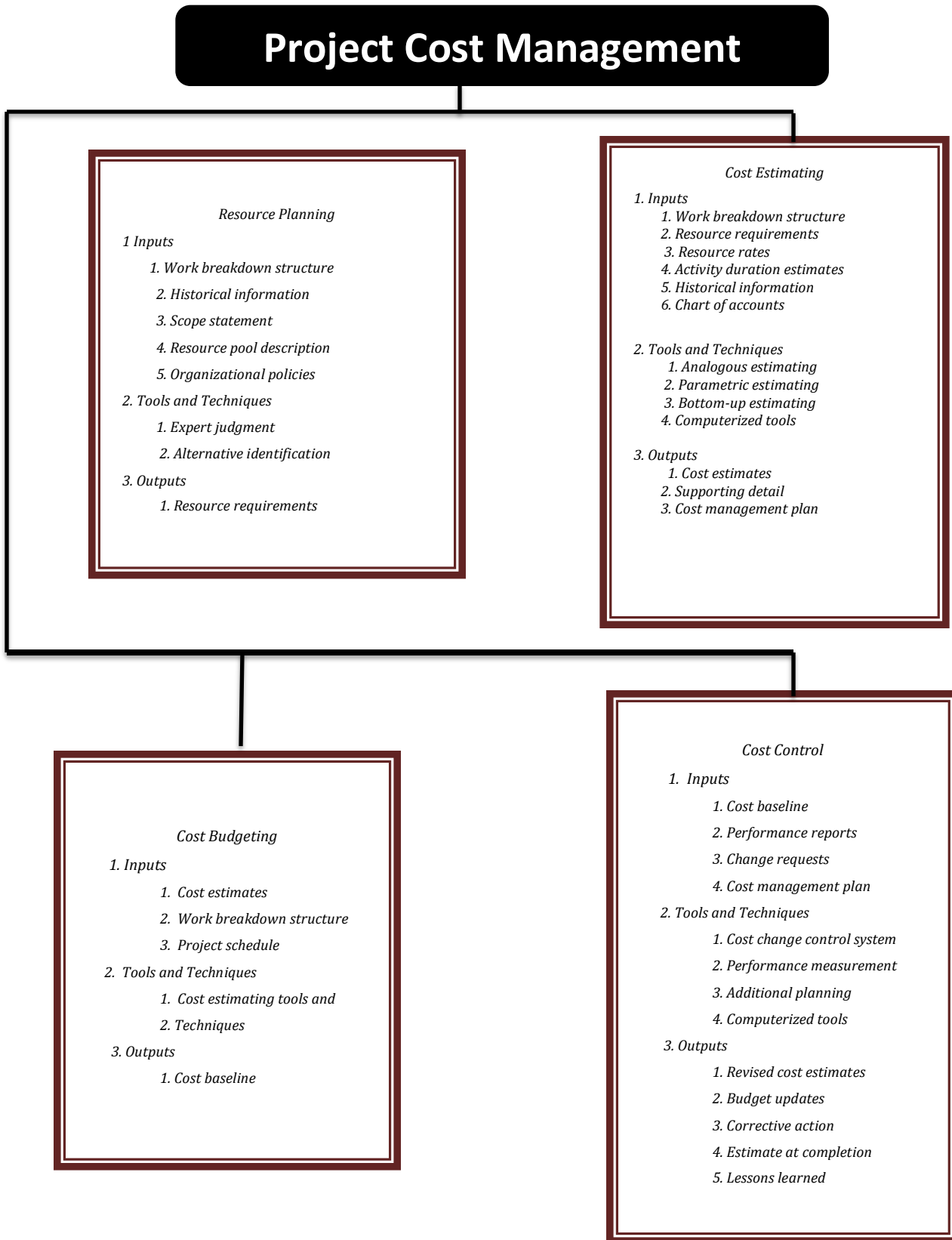
2.1.2 Project Cost Management Process (as Described by PMBOK)

The following section provides a brief look at the project management institution's PMBOK. Project Cost Management includes the processes required to ensure that the project is completed within the approved budget. Figure 1–1 provides an overview of the following major processes:

- 1 Resource Planning—determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
2. Cost Estimating—developing an approximation (estimate) of the costs of the resources needed to complete project activities.
3. Cost Budgeting—allocating the overall cost estimates to individual work items.
4. Cost Control—controlling changes to the project budget.

In many application areas predicting and analyzing the prospective financial performance of the project product is done outside the project. In others (e.g., capital facilities projects), project cost management also includes this work. When such predictions and analysis are included, project cost management will include additional processes and numerous general management techniques such as return on investment, discounted cash flow, payback analysis, and others

Figure 1. 1 Project Cost Management Overview (PMBOK, 1996)



On some projects, especially smaller ones, resource planning, cost estimating, and cost budgeting are so tightly linked that they are viewed as a single process (e.g., they may be performed by a single individual over a relatively short period of time).

Resource planning involves determining what physical resources (people, equipment, materials) and what quantities of each should be used to perform project activities. It must be closely coordinated with cost. For example:

- A construction project team will need to be familiar with local building codes. Such knowledge is often readily available at virtually no cost by using local labor. However, if the local labor pool lacks experience with unusual or specialized construction techniques, the additional cost for a consultant might be the most effective way to secure knowledge of the local building codes.
- An automotive design team should be familiar with the latest in automated assembly techniques. The requisite knowledge might be obtained by hiring a consultant, by sending a designer to a seminar on robotics, or by including someone from manufacturing as a member of the team.

Inputs to Resource Planning

1. Work breakdown structure. The work breakdown structure (WBS) identifies the project elements that will need resources and thus is the primary input to resource planning. Any relevant outputs from other planning processes should be provided through the WBS to ensure proper control.
2. Historical information. Historical information regarding what types of resources were required for similar work on previous projects should be used if available.
3. Scope statement. The scope statement contains the project justification and the project objectives, both of which should be considered explicitly during resource planning.
4. Resource pool description. Knowledge of what resources (people, equipment, material) are potentially available is necessary for resource planning. The amount of detail and the level of specificity of the resource pool description will vary. For example, during the early phases of an

engineering design project, the pool may include “junior and senior engineers” in large numbers. During later phases of the same project, however, the pool may be limited to those individuals who are knowledgeable about the project as a result of having worked on the earlier phases.

5. Organizational policies. The policies of the performing organization regarding staffing and the rental or purchase of supplies and equipment must be considered during resource planning.

Tools and Techniques for Resource Planning

1. Expert judgment. Expert judgment will often be required to assess the inputs to this process. Such expertise may be provided by any group or individual with specialized knowledge or training and is available from many sources including: Other units within the performing organization, consultants, professional and technical associations, industry groups.

2. Alternatives identification

Outputs from Resource Planning

1. Resource requirements. The output of the resource planning process is a description of what types of resources are required and in what quantities for each element of the work breakdown structure. These resources will be obtained either through staff acquisition or procurement.

COST ESTIMATING

Cost estimating involves developing an approximation (estimate) of the costs of the resources needed to complete project activities. When a project is performed under contract, care should be taken to distinguish cost estimating from pricing. Cost estimating involves developing an assessment of the likely quantitative result—how much will it cost the performing organization to provide the product or service involved. Pricing is a business decision—how much will the performing organization charge for the product or service—that uses the cost estimate as but one consideration of many.

Cost estimating includes identifying and considering various costing alternatives. For example, in most application areas, additional work during a design phase is widely held to have the potential for reducing the cost of the production phase. The cost estimating process must consider whether the cost of the additional design work will offset the expected savings.

Inputs to Cost Estimating

1. Work breakdown structure. It will be used to organize the cost estimates and to ensure that all identified work has been estimated.
2. Resource requirements
3. Resource rates. The individual or group preparing the estimates must know the unit rates (e.g., staff cost per hour, bulk material cost per cubic yard) for each resource in order to calculate project costs. If actual rates are not known, the rates themselves may have to be estimated.
4. Activity duration estimates. Activity duration estimates will affect cost estimates on any project where the project budget includes an allowance for the cost of financing (i.e., interest charges).
5. Historical information. Information on the cost of many categories of resources is often available from one or more of the following sources:
 - Project files—one or more of the organizations involved in the project may maintain records of previous project results that are detailed enough to aid in developing cost estimates. In some application areas, individual team members may maintain such records.
 - Commercial cost estimating databases—historical information is often available commercially.
 - Project team knowledge—the individual members of the project team may remember previous actuals or estimates. While such recollections may be useful, they are generally far less reliable than documented results.
6. Chart of accounts. A chart of accounts describes the coding structure used by the performing organization to report financial information in its general ledger. Project cost estimates must be assigned to the correct accounting category.

Tools and Techniques for Cost Estimating

1. Analogous estimating. Analogous estimating, also called top-down estimating, means using the actual cost of a previous, similar project as the basis for estimating the cost of the current project. It is frequently used to estimate total project costs when there is a limited amount of

detailed information about the project (e.g., in the early phases). Analogous estimating is a form of expert judgment.

Analogous estimating is generally less costly than other techniques, but it is also generally less accurate. It is most reliable when (a) the previous projects are similar in fact and not just in appearance, and (b) the individuals or groups preparing the estimates have the needed expertise.

2. Parametric modeling. Parametric modeling involves using project characteristics (parameters) in a mathematical model to predict project costs. Models may be simple (residential home construction will cost a certain amount per square foot of living space) or complex (one model of software development costs uses 13 separate adjustment factors each of which has 5–7 points on it). Both the cost and accuracy of parametric models varies widely. They are most likely to be reliable when (a) the historical information used to develop the model was accurate, (b) the parameters used in the model are readily quantifiable, and (c) the model is scalable (i.e., it works as well for a very large project as for a very small one).
3. Bottom-up estimating. This technique involves estimating the cost of individual work items, then summarizing or rolling-up the individual estimates to get a project total. The cost and accuracy of bottom-up estimating is driven by the size of the individual work items: smaller work items increase both cost and accuracy. The project management team must weigh the additional accuracy against the additional cost.
4. Computerized tools. Computerized tools such as project management software and spreadsheets are widely used to assist with cost estimating. Such products can simplify the use of the tools described above and thereby facilitate rapid consideration of many costing alternatives.

Outputs from Cost Estimating

1. Cost estimates. Cost estimates are quantitative assessments of the likely costs of the resources required to complete project activities. They may be presented in summary or in detail. Costs must be estimated for all resources that will be charged to the project. This includes, but is not limited to, labor, materials, supplies, and special categories such as an inflation allowance or cost

reserve. Cost estimates are generally expressed in units of currency (dollars, francs, yen, etc.) in order to facilitate comparisons both within and across projects. Other units such as staff hours or staff days may be used, unless doing so will misstate project costs (e.g., by failing to differentiate among resources with very different costs). In some cases, estimates will have to be provided using multiple units of measure in order to facilitate appropriate management control. Cost estimates may benefit from being refined during the course of the project to reflect the additional detail available. In some application areas, there are guidelines for when such refinements should be made and what degree of accuracy is expected. For example, AACE International has identified a progression of five types of estimates of construction costs during engineering: order of magnitude, conceptual, preliminary, definitive, and control.

2. Supporting detail. Supporting detail for the cost estimates should include:

- A description of the scope of work estimated. This is often provided by a reference to the WBS.
- Documentation of the basis for the estimate, i.e., how it was developed.
- Documentation of any assumptions made.
- An indication of the range of possible results, for example, \$10,000 ± \$1,000 to indicate that the item is expected to cost between \$9,000 and \$11,000. The amount and type of additional detail varies by application area. Retaining even rough notes may prove valuable by providing a better understanding of how the estimate was developed.

3. Cost management plan. The cost management plan describes how cost variances will be managed (e.g., different responses to major problems than to minor ones). A cost management plan may be formal or informal, highly detailed or broadly framed based on the needs of the project stakeholders. It is a subsidiary element of the overall project plan.

COST BUDGETING

Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance.

Inputs to Cost Budgeting

1. Cost estimates.
2. Work breakdown structure. The work breakdown structure identifies the project elements that costs will be allocated to.
3. Project schedule. The project schedule includes planned start and expected finish dates for the project elements that costs will be allocated to. This information is needed in order to assign costs to the time period when the cost will be incurred.

Tools and Techniques for Cost Budgeting

Cost estimating tools and techniques. The tools and techniques for developing project cost estimates are used to develop budgets for work items as well.

Outputs from Cost Budgeting

Cost baseline. The cost baseline is a time-phased budget that will be used to measure and monitor cost performance on the project. It is developed by summing estimated costs by period and is usually displayed in the form of an S-curve.

Many projects, especially larger ones, may have multiple cost baselines to measure different aspects of cost performance. For example, a spending plan or cash flow forecast is a cost baseline for measuring disbursements.

COST CONTROL

Cost control is concerned with (a) influencing the factors which create changes to the cost baseline to ensure that changes are beneficial, (b) determining that the cost baseline has changed, and (c) managing the actual changes when and as they occur. Cost control includes:

- Monitoring cost performance to detect variances from plan.
- Ensuring that all appropriate changes are recorded accurately in the cost baseline.
- Preventing incorrect, inappropriate, or unauthorized changes from being included in the cost baseline.
- Informing appropriate stakeholders of authorized changes.

Cost control includes searching out the “whys” of both positive and negative variances. It must be thoroughly integrated with the other control processes (scope change control, schedule control, quality control, and others). For example, inappropriate responses to cost variances can cause quality or schedule problems or produce an unacceptable level of risk later in the project.

Inputs to Cost Control

1. Cost baseline.
2. Performance reports. Performance reports provide information on cost performance such as which budgets have been met and which have not. Performance reports may also alert the project team to issues which may cause problems in the future.
3. Change requests. Change requests may occur in many forms—oral or written, direct or indirect, externally or internally initiated, and legally mandated or optional. Changes may require increasing the budget or may allow decreasing it.
4. Cost management plan.

Tools and Techniques for Cost Control

1. Cost change control system. A cost change control system defines the procedures by which the cost baseline may be changed. It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes. The cost change control system should be integrated with the overall change control system.
2. Performance measurement. Performance measurement techniques help to assess the magnitude of any variations which do occur. Earned value analysis, is especially useful for cost control. An important part of cost control is to determine what is causing the variance and to decide if the variance requires corrective action.
3. Additional planning. Few projects run exactly according to plan. Prospective changes may require new or revised cost estimates or analysis of alternative approaches.
4. Computerized tools. Computerized tools such as project management software and spreadsheets are often used to track planned costs vs. actual costs, and to forecast the effects of cost changes.

Outputs from Cost Control

1. Revised cost estimates. Revised cost estimates are modifications to the cost information used to manage the project. Appropriate stakeholders must be notified as needed. Revised cost estimates may or may not require adjustments to other aspects of the overall project plan.
2. Budget updates. Budget updates are a special category of revised cost estimates. Budget updates are changes to an approved cost baseline. These numbers are generally revised only in response to scope changes. In some cases, cost variances may be so severe that “rebaselining” is needed in order to provide a realistic measure of performance.
3. Corrective action. Corrective action is anything done to bring expected future project performance into line with the project plan.
4. Estimate at completion. An estimate at completion (EAC) is a forecast of total project costs based on project performance. The most common forecasting techniques are some variation of:
 - $EAC = \text{Actuals to date} + \text{remaining project budget modified by a performance factor, often the cost performance index. This approach is most often used when current variances are seen as typical of future variances.}$
 - $EAC = \text{Actuals to date} + \text{a new estimate for all remaining work. This approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed, or that they are no longer relevant due to a change in conditions.}$
 - $EAC = \text{Actuals to date} + \text{remaining budget. This approach is most often used when current variances are seen as atypical and the project management team's expectation is that similar variances will not occur in the future.}$

Each of the above approaches may be the correct approach for any given work item.

5. Lessons learned. The causes of variances, the reasoning behind the corrective action chosen, and other types of lessons learned from cost control should be documented so that they become part of the historical database for both this project and other projects of the performing organization.

2.2. Empirical Review

2.2.1 Construction Sector Overview and Cost Management

The construction sector is the most important sector for any country that it provides the infrastructures all economies will be built. It is Europe's largest industrial employer accounting for 7% of total employment and 28% of industrial employment in the EU. It is estimated that 26 million workers in the EU depend in one way or another on the construction sector (Keith, 2008). It is highly dynamic and plays important role in the development of a country (Rahman et al., 2012). It plays a vital role in socio-economic growth of a country and contributes to the overall GDP development of a country, improves quality of life by providing basic infrastructures (Ismail, et al, 2013).

The UK construction activity makes a considerable contribution to the national economy accounting for over 8% of the national gross domestic product (Potts, 2008). In Malaysia it employs approximately 31 million people, accounts for some 6-8% of GDP and after agriculture the largest employment sector in the country (Subramani, et al., 2014). It has contributed an estimated 308 billion to the national GDP in 2011-2012(around 19%) and employment to more than 35 million people to India economy (Anant & Vaibhav, 2016). Worldwide large amount of money are spent on construction development works that provide essential infrastructure and large number of employment opportunities (Ullah, Abdulla, et.al, 2017). In Ethiopia, studies indicated construction industry has 5.6% contribution to the GDP and approaches to the sub-Saharan average, 6% (Zewdu & Aregaw, 2015). The contribution of the industry to the GDP of Ethiopia (Zinabu & Getachew, 2015), is only 3% and this is lower than the Sub-Saharan African average which is 6%. The construction industry trend in the past 10 years shows a yearly growth rate of 12.43 and this shows a share of 5.3% of the country's GDP.

The costs directly related to construction are demolitions, environmental remediation, landscaping, construction costs (materials and installation), overheads (Office costs, phones, accommodation etc), escalation, provisional sums, profits and contingency (Keith, 2008).

The construction industry, in accordance to system of industrial classification used for statistical and government purposes, is defined as industry that includes only companies that are involved with building and civil engineering (Ismail, et al., 2013)

The construction industry plays an important role in the economy since it provides demand for the production of goods and services from other related industries. Activities of the construction are also vital to the achievement of national socio-economic development goals of providing shelter, infrastructure and employment. Though they face chronic problems like low quality and productivity, cost overrun, time overrun, construction waste and other and of these cost overruns is the severe one (Ibid).

Results of some studies have shown that there is interdependence between the construction sector and other economic sectors. Output from the construction industry is a major and integral part of the national output, accounting for a sizeable proportion in the Gross Domestic Product (GDP) of both developed and underdeveloped countries (Ganesan, 2000).

The state of the construction affects the availability of capital, government's decisions since the construction industry is frequently used as a tool by government to manage the local/national economy (Wibowo, 2009). Construction economics deals with methods that enable one to make economic decisions towards minimizing costs and/or maximizing benefits to business organizations. Decisions within the construction are linked with economic and social fields that are associated with: project development, its location, suitability of a particular type of project (Betlejewska & Potkany, 2015).

The performance of construction industry is widely viewed as a useful indicator of the performance of the wider economy. The industry is highly cyclical and experiences booms and busts on a regular basis. The recovery and growth phases of the economic cycle are often characterized by strong demand for construction related services and products. Supply shortages often emerge during these stages, fuelling demand for higher wages which ultimately are passed on to the end purchaser. Construction tender price inflation rates run significantly higher than general inflation during these periods and can at times be multiples of the general inflation rates. Inflation is a particular concern on projects with long construction program durations where an inflation buy-out has not been arranged at contract award stage (Cunningham, 2017).

2.2.2 The Cost Overrun and the Global Trend

Cost overrun can be considered as the difference between actual cost of a project and its cost limit. It occurs when the resultant cost target of a project exceed is cost limits where cost limit of

a project refers to the maximum expenditure that the client is prepared to incur on a completed building project while cost target refers to the recommended expenditure for each element of a project (Rahman et al., 2012). It is a global phenomenon that very rarely projects are finished with in the budgeted cost ((Ismail et al., 2013).

Cost overrun can be termed as budget overrun, cost increase or cost escalation. It is a variance between initially estimated or projected cost and final cost at the completion of the project (Ullah, et.al, 2017). It is defined as the difference between the actual cost and estimated costs. Actual costs defined as accounted costs actually spent, as determined at the time of project completion. Estimated costs are defined as budgeted costs at the time of project approval (Subramani et al., 2014). It is a phenomenon in which the client has to spend more money for the completion of project than the originally estimated i.e the project goes over the budget (Anant & Vaibhav, 2016).

Flyvbjerg et al. (2002) indicates that construction cost overruns are a major challenge, where 9 out of 10 construction projects encounter cost overruns. Moreover, the cost overrun can be as high as 183% more than planned estimated budget.

The study by Ejiaz, Ali & Tahir (2010) concluded that there are numerous factors that caused the delay in construction work and cost overruns in Pakistan. These factors are directly or indirectly related to management, technology, social and financial environment depending upon the circumstances.

The literature from different countries shows that cost overrun is a norm than exception. Venkataraman et al. said it is creating more frustration and anguish to most project managers. The cost overrun is not the case only in innovative development projects but also in routine projects. Initial costs are being very different from final outcomes (Venkataraman & Pinto, 2008). As Hamzah,et al,(2011) said, failure to achieve the targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects and usually, when the projects are delayed, they are either extended or accelerated the time and therefore, invite to the additional cost. They point out the most significant factors. These are low initial cost estimates, unanticipated technical difficulties, lack of or poor scope definition, specification changes, external factors (Venkataraman & Pinto, 2008).

Costs can escalate from lagging labor productivity. The main cause may be fatigue, overexertion and insufficient off time and rest days. Project managers have a responsibility to balance work and off time (Griham, 2010). Project manager looks for ways of reducing costs as cost overrun occurs and the simplest way is to reduce scope. The reduced items are those that are poorly understood (Kerzner, 2013). Project schedule slippages are the greatest for cost escalation. Cost associated with additional labor cost and large holding cost can result from schedule slippage. These holding costs worsened in a heated market and can lead to millions of dollars cost overruns (Griham, 2010).

A successful project is the only project which has accomplished its technical performance, maintained its schedule and remained within the budgetary costs (Aftab, Ismail & Ade, 2012). Ramabodu & Verster (2010) said cost overruns and late time completion is the trend of large construction projects and the factors responsible for that are like underestimation of costs to make the project feasible, scope change at different stage of the project, changed condition and etc. They quote the words of Touran and Lopez (2006) as the longer the project the more prone to cost overruns.

Cost overrun in construction industries is a global phenomenon, though the situation varies from nation to nation. The variation is affected by different factors based on the economy, geographical location and the construction environments of nations. Such factors are construction complexity, the presence of various interest groups such as consultants, contractors, the project owners, end users, financiers, project funding , materials, equipment, economic, climatic environment, political environment etc. (Shambalid, Sakshi & Malik, 2017).

The problem as Flyvbejerg, Holm and Buhl, (2002) conclude from their study, the error of underestimating costs is significantly much more common and much larger than the error of overestimating costs.

Most factors emanate from actions and omissions by both the client and the professional team. In this regard the first step towards minimizing cost overruns may be to deal with the human factors first. The factors that were studied make it difficult to control cost overruns during the construction stage alone. Instead, there should be sufficient planning of the project at the

inception stage. Drawings and other tender documents should be well detailed before going out to tender Chimwaso, (2000).

If imperfect techniques, inadequate data, and lack of experience were main explanations of the underestimations, we would expect an improvement in forecasting accuracy over time. Underestimating the costs of a given project leads to a falsely high benefit-cost ratio for that project, which in turn leads to two problems. First, the project may be started despite the fact that it is not economically viable. Or, secondly, it may be started instead of another project that would have yielded higher returns had the actual costs of both projects been known. Cost underestimation cannot be explained by error and seems to be best explained by strategic misrepresentation, i.e. lying, which is defined in the conventional fashion as making a statement intended to deceive others (Ramabodu & Verster, 2010)

Large-scale projects are often characterised by large cost overruns. Flyvbjerg et al. (2003) conducted an international research of 258 transport infrastructure projects and found that in 86% of the projects under consideration, cost overruns appeared with average cost overruns of 28%. Cost overruns are problematic because they increase the burden on the country's gross domestic product (Cantarelli, Chorus and Cunningham, 2013).

Flyvbjerg et al. (2003) presented results from a database with over 250 large projects from different countries and different time periods. The results are summarized as follows:

- 86% of the projects had cost overruns compared to forecasted costs. The average overrun was 28%.
- The overruns were highest in rail projects with cost overruns of 45%. For roads it was 20%.
- Cost overruns were somewhat lower in Europe compared to North America and other geographical areas.

There was no historical trend. Cost overruns in recent periods have the same magnitude as in earlier periods. A recent Swedish dissertation showed that there were large cost overruns in almost all major infrastructural projects in Sweden during the last decade.

Bent Flyvbjerg answer for why is it the case is: technological factors (unforeseen technical complications), psychological factors (optimism bias, “an inside view” of the project) and political factors (conscious underestimation in early stages in order to get the project started (Flyvbjerg, 2003).

The study from Kujala et al. (2014) concluded that increasing complexity and underestimating complexity are major reasons for cost overruns and time delays in projects. The study of Ismail et al. (2013) concluded three most significant factors causing cost overrun in Malaysia’s constructions and these are fluctuation of prices of materials, cash flow and financial difficulties faced by contractors and poor site management and supervision.

Ruth, Henry and Dan (2014), have found the five most important causes of delays in construction projects in Uganda were change of work scope, delayed payment, poor monitoring and control, high cost of capital and political instability (insecurity) and said the relationship between the factors causing delay and causing cost overrun found to be moderate. They quote the observation of Azhar and Farouqui (2008) as the trend of cost overrun is a worldwide issue but it is worse in developing countries.

Anant & Vaibhav (2016) indicated that the average cost overrun that the respondents experienced in their study in India is, between 10% and 30% of the project’s estimated cost. The top 5 reasons are political situation, fluctuation of prices of material, level of competitors, currency exchange and economic instability.

2.2.3 Mitigation Measures to Improve Cost Performance

Aftab, Ismail & Ade (2012) in their study has found 15 measures to improve cost performance of a construction projects which they classified into 3 categories as proactive, reactive and organization. Proactive measures will help the practitioner to adopt suitable guidelines at the planning stage.

Based on their study Anant & Vaibhav suggested paying due attention to project planning, material price and labor rate to be updated continually, sufficient time to prepare feasibility studies, planning, designs, trying to stay within the scope, constantly track and measure the progress, resource should be ideally available on site, adequate technical and financial

management, sourcing the materials, increase the speed of construction, reduction in the wastage, procurement control, more communication and coordination between project participant during all project phases and top management reactions in positive way to political and environmental changes by means of managerial and financial policies in order to minimize and control cost overrun and time overruns in building construction projects (Anant & Vaibhav, 2016).

Kujala, Brady & Putila, (2014) recommended understanding of and dealing with complexity as an important area in project management, beside the project manager specialized competencies.

2.2.4 Cost Overruns in Ethiopia

The study by Merid concluded that 100% of the construction projects investigated have suffered both time and cost overruns, that the time overruns ranges from 13% to the maximum of 181% and the cost overrun ranges from minimum 1% to maximum 47% of the contract amount. The top main significant cause of time and cost overruns are less emphasis to planning, poor contract management and poor pre-planning process (Merid. 2016).

In another study by Ashebir, Wubishet & Murad (2017), 18 road construction projects are studied. They found that the top six rated factors for cost overruns are material price fluctuation, cost underestimation, delay in supply of raw material, inadequate review of contract documents, lack of performance of project cost from the client's, consultant's and contractor's perspective. They summed the magnitude of cost overrun among the selected projects extends from 4.16% to 83.2%, while the average magnitude of cost overrun is nearly 21.52% (Ashebir, Wubishet & Murad, 2017).

The research by Werku identified 88 key factors causing delay in Ethiopia construction industries and the main critical factors are difficulties in financing projects by contractor, escalation of the material price, ineffective project planning, scheduling or resource management, delay in progress payments for completed works, lack of skilled professionals in the field of construction management in the organization, and fluctuating labor availability season to season /Seasonal labors availability.

This study shows that in Ethiopia only 8.25% projects have been finished to the original targeted completion date. The remaining 91.75% delayed 352% of its contractual time (Werku, 2016).

As per the contractor's response in their study, the top five factors that causes cost overrun in construction projects are poor planning, fluctuation of price of materials, poor productivity, inflationary pressure and project financing in descending order (Zinabu & Getachew, 2015).

An academic study on 24 projects showed that 80% of the projects were experiencing the cost overrun in Ethiopia (Jennifer, 2009). More than 80% of the construction projects are run over budget and delayed (Thillai, 2013). Furthermore, the industry still largely relies upon labor intensive on-site activities.

The influential causes of delay investigated by Tsegay & Hanbin (2017) are corruption, unavailability of utilities at site, inflation/price increases in materials, lack of quality materials, late design and design documents, slow delivery of materials, late in approving and receiving of complete project work, poor site management and performance, late release budget/funds, and ineffective project planning and scheduling successively as unique to the Ethiopian construction project. The critical effects of delay they investigated are cost overruns, time overrun, contract termination, arbitration, and litigation sequentially.

Chapter Three: Research Methodology

3.1 Research Design and Approach

The main research design selected is an exploratory research methodology using both primary and secondary data. It is explanatory because it was initiated from practical problems and tries to find whether there exists cost overrun or not. It is also a descriptive research design that it tries to find the factors that are causing cost overrun in the construction projects of ESLSE. Descriptive research describes what is, and is concern with the condition or relationships that exist, practices that prevail, processes that are ongoing, or trends that developing (Manuel and Mendel, 1990). The research design will seeks to explore and describe the current states of the cost overrun, what cause it and what the stakeholders think about the mitigation measures.

3.2 Data Type and Source

Primary and secondary data were collected to find the factors that cause cost overrun in ESLSE projects. Information from the three bodies who involve in the construction of these projects: the client, the consultants and the constructors were collected and assessed. As for the primary data, questionnaire was distributed and collected. Interview was also done with the functional managers in the organization. The enterprise policy, plans, reports, publications, historical information and the magazines were used to collect the secondary data.

- Qualitative research design - Report study and interviews

Different types of projects which are being performed by ESLSE, with their contract and actual costs are included. The data is found from the monthly status report of the projects. This helps to identify the difference between the contract amount and the actual cost, i.e the cost overrun of the projects.

An in-depth interview session was also carried out with different functional managers of the ESLSE in order to identify the factors for cost overrun and their mitigation measures.

- Quantitative Research Design - Questionnaire survey

A Questionnaire survey was conducted to determine the critical factors of cost overrun in construction projects in ESLSE.

The questionnaire form has three parts i.e. Part A, part B and part C. In Part A, personal information of the respondent (i.e. gender, work experience, organization they work, the position they have and the cost overrun in past projects) were asked. Part B aim to identify the factors of cost overrun in ESLSE construction projects. Part C deals with the respondent's agreement for mitigation measures for cost overrun.

3.4 Target Population

The population of this study is all construction projects took by ESLSE from the year 2012 to 2018. The major projects handled within those years are six and they are taken to identify cost overrun in the enterprise. The projects executed by ESLSE with in those years and the participants are the focus of the paper. The major projects within those years, as defined by the enterprise, are included.

3.5 Sample size

The research took all 65 main participants which are in different position in the organizations. Since the respondents of the questionnaire are small and manageable, the researcher used census type of survey design and simply took all respondents in the project. The functional managers, the consultants, the project managers, the architects and the engineers in those projects were taken and have given their ideas. The aim of the questionnaire was to identify the cost overrun, common factors that cause it and the mitigation measures to improve cost performance of the projects.

3.6 Data Collection Method

The primary data was collected by questionnaires, which is distributed to the appropriate professionals who work on the projects. The respondents had a chance to ask for clarification to unclear points on the questionnaire. Interview was done with the selected functional managers. Publications, historical information and the enterprise magazines are used to collect the secondary data.

3.6 Operation of Study Variables

The study variables are actual cost and estimated cost, because these variables express the cost overrun. Cost overrun is measured as the actual cost minus the estimated cost. Cost overrun is described as the ratio of the change in the original contract amount to the original contract award amount. For the ease of comparison, the cost overrun can be converted into a percentage value. Mathematically it can be expressed as (Endut et al., 2005):

$$\text{Cost overrun} = \frac{\text{Final Contract Amount} - \text{Original Contract Amount}}{\text{Original Contract Amount}}$$

Actual cost, according to Nida Azhar (2008) defined as a real record of the financial expenditure costs at the time of project completion. Whereas the estimated cost defined as budgeted or calculated construction cost at the time of formal decision to construct.

In addition the construction projects are office building, ware house and garage projects and their costs are measured in Birr.

3.7 Data Analysis

This study primarily used two separate methods to analyze the collected data to identify the top rated factors among all three parties that affect the project cost performance. A descriptive approach to direct interpretation of the report study and survey results to identify the magnitudes and the top rated influencing factors based on content analysis and percentage of mean score respectively.

The data obtained from the survey was analyzed using SPSS version 20. The mean score together with standard deviation were used in order to rank the factors for cost overrun and the mitigation measures. The output of the analyzed data is presented using tables, and simple percentage for further interpretation.

In addition, one of the several indices which are used to monitor a project progress, the cost performance index (CPI) was calculated for the projects to see their cost status CPI measures cost efficiency accomplished to-date.

The CPI is given by the formula:

$$\text{CPI} = \text{EV} / \text{AC}$$

Where EV is earned value

AC is actual cost

When $\text{CPI} > 1$ is under cost or under budget

$\text{CPI} < 1$ is over cost or over budget

$\text{CPI} = 1$ is on cost or on budget

A questionnaire of 50 questions for cause of cost overrun, and 16 questions for mitigation measures were carefully designed from the reviewed literatures on project cost overrun. The Likert scale of 1 – 5 was applied to the factors for cost overrun and it is 1– not significant, 2 – less significant, 3 – significant, 4 – highly significant and 5 – extremely significant. In addition, 1- not effective, 2- slightly effective, 3 – effective, 4 – very effective, 5 – extremely effective were employed for the effectiveness of the measures. Its classification and the 5 categories are listed in the appendixes.

3.8 Validity and Reliability

Validity of a research is the degree to which it measures what it is supposed to measure (Paul C., 2009). To check the validity, a preliminary questionnaire based on the literature reviews was pre tested on a small sample population. This was mainly to check and to ensure that the wording of the question is not ambiguous (Royer & Zarlowski, 2001). The questionnaire was sent to a total of 65 construction professionals and 55 professionals duly completed and returned the

questionnaire. The overall response rate was 85%, which can be a good representative of the population.

The reliability, as measured by Cronbach alpha estimates the internal consistency of the concepts. The reliability of the items for client factors, consultant factors, contractor factors and external factors were assessed and the alpha coefficient ranges from 0.822 to 0.965 which is greater than the cutoff point. i.e. 0.6, as supported by other researchers.

Chapter Four: Data Presentation, Analysis and Interpretation

4.1 Personal Profile of the Respondents

This part of the paper will discuss the respondent's general information in terms of gender, educational background, the organization they are employed, their position and their experience in construction projects.

Table 4. 1 Demographic Detail of Respondents

Variable	Frequency	Percent	Cumulative Percent
Gender			
Male	46	83.6%	83.6
Female	9	16.4%	100
Total	55	100%	
Educational Background			
Master's Degree	5	9.1%	9.1
Bachelor's Degree	46	83.6%	92.7
Diploma	2	3.6%	96.4
Other	2	3.6%	100
Total	55	100%	
Employee Organization			
Client	14	25.5%	25.5
Consultant	10	18.2%	43.6
Contractor	31	56.4%	100
Total	55		

Position in Organization			
Engineer	32	58.2%	58.2
Project Manger	7	12.7%	70.9
Consultant	10	18.2%	89.1
Other	6	10.9%	100
Total	55		

Experience in Organization			
Less than one year	3	6%	6
From 1 to 5 years	35	64%	70
From six to ten years	10	18%	87
From 11 to 15 years	7	13%	100
Total	55		

As the above table shows, 83.6 % of the respondents are male, while 16.4% are female. This shows that the majority of the respondents are male in the construction projects of ESLSE.

It also shows 84% of the respondents have bachelor degree, 9% have master's degree, 3% diploma and 4% others. Most of the respondents (96%) have an educational background of diploma and above. This shows the respondents reading and writing skills which increases the validity of the questionnaire.

The respondents which are employee of the client organization are 14(26%), of the consultant organization are 10(18%), of the contractor organizations are 31(57%). Most work is done by the contractor organization and the more the number of the respondents from this, the more the validity of the responses for the causes of cost overrun.

As it can be seen from the table 58% (32) of the respondents are engineers, 13% (7) are project manager, 18% (10) are consultants and the rest 10% (6) are others. The engineers and the project

managers which have a cumulative percent of 70% are the main actors which have a direct relation with the costs of the projects. So it can be said that their response has a significant meaning to the study.

The above table also shows experience of the respondents in construction projects. As it shows 6%(3) persons have less than one year of experience, 64%(35) have from one to five years of experience, 18%(10) have from six to ten years of experience and the rest 13%(7) have from 11 to 15 years of experience. The above experience shows that majority of the projects are handled by people who have more experience, this can increase the validity of assessment of the cause of cost overrun in those projects.

4.2 Results of Report Study

Before analyzing the factors for cost overrun in construction projects, desk study was done to assess the average cost overrun of ESLSE construction projects. The following table shows the different projects, their performance and their cost status as of the current time.

Table 4. 2 Capital Projects Status

No	Name of Project	Date of Commencement	Contract Completion Date	Contract Amount(Inc. Variation)/Birr	Status of Payment Todate	Payment Todate (%)	Accomp. Todate (%)
1	Phase 2	20Oct/12	3Mar/14	643,697,121.28	519,646,183.64	80.73	96.93
2	Phase 3	13May/14	18Mar/16	501,479,994.41	222,866,548.70	44.44	83.46
3	Garaje and work-shop	26Jul/16	13Mar/18	28,371,610.86	11,757,096.39	41.44	60.97
4	Modjo G+5 building	28Jul/16	4Sep/18	302,973,415.60	50,855,310.78	16.79	23.78
5	Warehouse 3 and 4	WH3 29Oct/2015 WH4 04Jan/2016	10Oct/17	179,491,676.16	94,756,912.76	52.79	98.49
6	Multi-purpose building	21-Sep -15	12Nov/17	490,718,672.82	95,755,025.37	19.51	52.25

Source ESLSE project works status report (as of April/2018)

The above table shows the ongoing projects which are executed by ESLSE. All the projects are construction projects. Even though cost and time are interrelated and can have a direct relationship, the schedule performance (SPI) of the projects, which is calculated by using the budgeted planned value by to date, is not performed and it is beyond the aim of this paper. However, the commencement date and completion date (table 4.3 above) shows an overview of the schedule overrun. Four of them are far beyond their schedule (Phase 2, Phase 3, Warehouse 3 & 4 and Multi-purpose building) and two of them (Garaje and workshop, Modjo G+5 building) is towards their completion date but only 61% and 23% is accomplished as of to date respectively.

Table 4. 3 CPI of the Selected Six Projects

No	Name of Project	CPI of the projects	Interpretation of CPI
1	Phase 2	1.20	Under budgeted
2	Phase 3	1.88	Under budgeted
3	Garaje and work-shop	1.47	Under budgeted
4	Modjo G+5 building	1.42	Under budgeted
5	Warehouse 3 and 4	1.87	Under budgeted
6	Multi-purpose building	2.68	Under budgeted

One of the several indices used to monitor a project progress is Cost Performance Index (CPI). It measures the cost efficiency of a work accomplished to date. As it is given by the formula in section three of this paper, the CPI of the 6 projects of ESLSE is computed. The above table 4.4 shows that the CPI of all the projects are greater than one, which is interpreted as the projects are under budgeted. Regarding this finding, the top people who oversee the projects were asked and their opinion is as follows:

- Cost overrun is a norm and it ranges between 20 – 25% in the projects they accomplished in the past.

- Most of the construction works consume much of the costs at the end of the works. The structural project cost is much lesser than the finishing cost of the project. The actual cost at the completion will determine if there exists cost overrun or under budgeted cost. Therefore, contrary to what is seen in table 4.8 above, the accomplishment (expressed in %) couldn't indicate that the projects are under budgeted.
- Payment is made as lump sum. A lump sum contract is the traditional means of procuring construction, and still the most common form of construction contract. Under a lump sum contract, a single 'lump sum' price for all the works is agreed before the works begin (Douglas, 2009). The payment is distributed over a period of time per the works performed.

4.3 Cause of cost overrun

The other aim of the questionnaire was to find the factors which are responsible for cost overrun. The respondents have identified the factors which they think are most significant factors to cost overrun. They have also been given a chance to identify the specific factors of the parties to cost overrun. The following sections will deal the factors with the responsible parties. The parties distinguished from the literature reviewed are the clients, the consultants, the contractors and the external factors.

4.3. 1 The Client specific factors

The client is the organization which is the owner of the project, in this paper it is ESLSE. The questionnaire has 9 lists of client specific factors which the respondents from the three parties have ranked their agreement from extremely significant to not significant.

As the table below shows (table 4.5), the factors which the respondents agree for client responsibility are ranked accordingly.

Table 4. 4 Mean Score and Rank for Cause of Cost Overrun for Client Specific Factors

	Cause	Mean	Rank	Std. deviation
I	Client			
1	Too many scope changes and constructive change orders	2.4182	1 st	0.91674
2	Slow response from the client organization	2.3091	2 nd	1.33156
3	Incomplete design at the time of tender	2.2909	3 rd	1.18122
4	Poor contract management by client	2.2000	4 th	1.22323
5	Payment delays by the client	2.1818	5 th	1.36206
6	The client's improper bidding process	2.0909	6 th	1.55483
7	Fraudulent practices and kickbacks	1.7273	7 th	1.00838
8	Poor communication and coordination with contractors	1.7273	8 th	1.25395
9	Confusing and ambiguous requirement of client	1.5455	9 th	1.06837
	Overall mean	2.0546		

NB: the mean column is measured by degree of agreement by interval in 5 – Likert scale to the items 1- not significant, 2- slightly significant, 3 – significant, 4 – very significant, 5 – extremely significant.

The mean for each factor are compared with the overall mean. Those factors which have more value than the overall mean (from serial no. 1 to 6) are articulated more extremely significant for cost overrun than the others below the overall mean (from serial no 7 to 9) which are less significant for cost overrun). They have agreed too many scope changes and constructive changed orders, slow response, incomplete design at the time of tender, poor contract management, payment delay and improper bidding process as the extremely significant factors of the client for cost overrun.

4.3.2 The Consultant specific factors

Table 4. 5 Mean Score and Rank for Cause of Cost Overrun for Consultant Specific Factors

	Cause	Mean	Rank	Std. deviation
II	Consultant			
1	Delayed approval of payments	2.6182	1 st	1.16255
2	Excessive change order	2.4909	2 nd	1.21522
3	Unclear and inadequate details in drawing	2.4727	3 rd	1.08619
4	Incomplete drawing	2.4727	3 th	1.05153
5	Changes and mistakes in design documents	2.4000	4 th	.99256
6	Long waiting time for approval of drawing and materials samples	2.3455	5 th	1.20521
7	Failure to approve updates schedule on time	2.2364	6 th	1.31886
8	Mistakes and discrepancies in contract documents	2.0727	7 th	1.01570
9	Inadequate experience of consultant	2.0727	7 th	1.35885
10	Poor site supervision	2.0545	8 th	1.40657
11	Poor contract management	1.8182	9 th	1.09021
12	Delay in performing inspection and testing	1.5636	10 th	1.03214
13	Fraudulent practices and kickbacks	1.5455	11 th	1.03312
	Overall mean	2.1664		

NB: the mean column is measured by degree of agreement by interval in 5 – Likert scale to the items 1- not significant, 2- slightly significant, 3 – significant, 4 – very significant, 5 – extremely significant.

Table 4.6 shows the respondents agreement of the factors for cost overrun to consultant specific factors. The values which are ranked as extremely significant by the respondents are ranked from 1st to 7th (serial no. 1 to 7) and the rest are taken as less significant (serial no 8 to 13), as the mean value of each of these factors are less than the overall mean.

Delayed approval of payments, excessive change order, unclear and inadequate details in drawing, incomplete drawing, changes and mistakes in design documents, long waiting time for approval of drawing and materials samples and failure to approve updates schedule on time are the consultant specific factors for cost overrun.

4.3.4 The Contractor specific factors

From the literatures reviewed the factors which can be contractor specific factors are depicted in table 4.7. The respondents have been given the questionnaire to rank the factors which they agree are the top factors and based on their agreement the extremely significant factors are from 1 to 11(as of the serial no) and from 12 to 19 are less significant, as their mean are less than the overall mean.

Table 4. 6 Mean Score and Rank for Cause of Cost Overrun for Contractor Specific Factors

	Cause	Mean	Rank	Std. deviation
III	Contractor			
1	Procurement problems	2.5091	1st	1.21522
2	Deficiencies in cost estimation and preparation	2.4000	2 nd	1.43501
3	Poor project management	2.3636	3 rd	1.35214
4	Poor project planning, scheduling and control	2.2727	4 th	1.28315
5	The ability of the organization to manage risk	2.2182	5 th	1.11705
6	Insufficient number of equipment	2.1636	6 th	1.42418
7	Lack of timely decision and corrective actions	2.1455	7 th	1.20828
8	Construction mistakes and defective works	2.0909	8 th	1.29490
9	Poor contract management	2.0909	8 th	1.35089
10	Failure to utilize tools to manage the project symmetrically	2.0909	8 th	1.37804
11	Poor site management and supervision	2.0545	9 th	1.31118
12	Weak communication and coordination between project parties	2.0364	10 th	1.34665
13	Inappropriate construction methods & using obsolete technology by the contractor	2.0182	11 th	1.11373
14	Poor efficiency of supervision by the contractor's staff	1.9636	12 th	1.26145
15	Inadequate experience staff and poor labor productivity within the project team	1.9455	13 th	1.29698
16	Lack of consultation with the client	1.7636	14 th	1.13796

17	Disputes on site	1.6364	15 th	1.06046
18	Bureaucracy at the work place	1.6182	16 th	1.19398
19	Fraudulent practices and kickbacks	1.4909	17 th	1.13648
	Overall mean	2.0459		

NB: the mean column is measured by degree of agreement by interval in 5 – Likert scale to the items 1- not significant, 2- slightly significant, 3 – significant, 4 – very significant, 5 – extremely significant.

The listed contractor specific factors are procurement problems, cost estimation deficiencies, poor project management, poor project planning, scheduling and control, problem in managing risk, insufficient equipment, lack of timely decisions and corrective actions, construction mistakes and defective works, poor contract management, failure in utilizing tools, and poor site management and supervision.

4.3.4 The External factors

Table 4. 7 Mean Score and Rank for Cause of Cost Overrun for External Factors

	Cause	Mean	Rank	Std. Deviation
	External factors			
1	Escalation of material prices	2.9273	1 st	1.31733
2	Change in exchange rate	2.8545	2 nd	1.26810
3	Increase in the cost of labor	2.4364	3 rd	1.19820
4	Unforeseen ground condition during construction	2.0909	4 th	1.32319
5	Lack of utilities: power, water, communication	1.7455	5 th	1.22048
6	Effect of weather	1.6909	6 th	0.94031
7	Changes in laws, regulations and taxes	1.6000	7 th	1.08184
8	Political factors	1.2909	8 th	1.11675
9	Accident on site	1.2364	9 th	0.88115
	Overall mean	1.9858		

NB: the mean column is measured by degree of agreement by interval in 5 – Likert scale to the items 1- not significant, 2- slightly significant, 3 – significant, 4 – very significant, 5 – extremely significant.

The above table shows the respondents agreement to the external factors for cost overrun. As their response, the extremely significant factors are escalation of material prices, change in exchange rate, increase in cost of labor and unforeseen ground conditions during the construction of the project (which are from serial no. 1 to 4) and the rest 5 factors: lack of utilities, effect of weather, changes in laws, regulation and taxes, political factor and site accident are less significant as their mean is less than the overall mean.

4.3.5 The top causes of cost overrun as of the questionnaire survey

After comparing each factor with respect to the responsible parties, all the 50 factors on the survey questionnaire were compared. Table 4.9 discusses these top causes.

Table 4. 8 The Top Causes of Cost Overrun

No	Cause	Mean	Rank	Factor
1	Escalation of material prices	2.9273	1 st	External
2	Change in exchange rate	2.8545	2 nd	External
3	Delayed approval of payments	2.6182	3 rd	Consultant
4	Procurement problems	2.5091	4 th	Contractor
5	Excessive change order	2.4909	5 th	Consultant
6	Unclear and inadequate details in drawing	2.4727	6 th	Consultant
7	Incomplete drawing	2.4727	7 th	Consultant
8	Increase in the cost of labor	2.4364	8 th	External
9	Too many scope changes and constructive change orders by client	2.4182	9 th	Client
10	Changes and mistakes in design documents	2..4000	10 th	Consultant

As the above table shows, the top causes of cost overrun are escalation of material cost, change in exchange rate, delayed approval of payment, procurement problems, excessive change orders, unclear and inadequate details in drawing, incomplete drawings, increase in cost of labor, too many scope change and constructive change orders by client and change and mistakes in design documents.

We can say that escalation of material price and change in exchange rate as a national problem which will cause cost overrun not only in construction projects but also in other projects. The same is true for labor cost increase. As more people are equipping themselves, the demand for an educated and experienced labor is increasing. This confirms Kerzner (2003) points that the highest challenges of executives in the next decades would be escalation of factors for salaries and raw materials. These external factors are beyond the control of the parties who are involved in the construction. But they should apply contingency plans in their estimates, as that will assist in minimizing the effect of the external factors.

On the other hand, as can be seen from the table, change orders, inadequacy of the designs and their excessive changes and approval of delayed payment by the consultant organization is contributing highly to the cost overrun.

This design change order agrees with the interview result. As it is put in section 4.3.6 below, design change is one of the factors for cost overrun. Public enterprises' design is done by Ethiopian Construction Design and Supervision Works Corporation. And the design changes are beyond the control of the client organization.

4.3.6 Interview Results

The outcome of the interviews with the three professionals who oversee the projects was generally in agreement with the ranking of the factors causing cost overrun as well as the mitigation measures.

- Project cost overrun in past projects – in the interview, the interviewees agreed about the occurrence of cost overrun in all projects they performed and on average it ranges from 20 to 25%.
- Cause of cost overrun - all interviewees agreed that design change and delay payment (client factors); poor efficiency of the contractor, poor project management, poor quality materials, unskilled and inexperienced team members (contractor factors); labor and material price escalation and inflation (external factors) as a critically top problem in causing cost overrun.

- The interviewee revealed that design changes happen because ESLSE projects are different. The operation and the construction are done at once and that is causing a change in design.

As they have pointed out the impact of cost overrun on ESLSE are:

- Cost overrun means incurring additional money which will lead to inefficient service.
- It also means a non- economic transport of imports and exports
- It will affect the quality of good which are imported and exported.
- The reputation of the sector will be bad and will invite more competitors, which means losing its profit.
- As a whole, it can be said, the contribution of the sector to the growth of the national economy, which is extremely significant, will be minimal.

4.4 The Mitigation Measures to Cost Overrun

This part consists of discussion and results of mitigation measures to cost overruns. The mitigation measures were taken from the literatures reviewed (Awolesi J. et al (2015); Chavan G. et al (2015)).

Table 4. 9 Mean Score and Rank of Mitigation Measures to Cost Overrun

		Mean	Rank
	Mitigation Measures		
1	Efficient contract management, site management and supervision	3.6000	1 st
2	Effective project planning, scheduling and control	3.4727	2 nd
3	Efficient management	3.4182	3 rd
4	Effective leadership on part of the project manager	3.3818	4 th
5	Skilled and experienced consultants, contractors and their team members	3.2545	5 th
6	Timely payment by the client	3.2545	5 th
7	Realistic cost estimation	3.2364	6 th
8	Timely possession of site	3.2182	7 th
9	Efficient communication and coordination	3.1818	8 th
10	Proper bidding process	3.1455	9 th
11	Use appropriate and effective equipment for construction	3.0909	10 th
12	Timely and reasonable procurement	3.0909	10 th

13	Appropriate requirement and proper feasibility study should be provided by client	3.0364	11 th
14	Appropriate site supervision	3.0000	12 th
15	Risk management during project execution	2.6364	13 th
16	Dispute settlement on site	2.5455	14 th
	Overall mean	3.1602	

NB: the mean column is measured by degree of agreement by interval in 5 – Likert scale to the items 1- not effective, 2- slightly effective, 3 – effective, 4 – very effective, 5 – extremely effective.

After calculation the mean score of each mitigation methods, the result is found out as indicated in the above table. Accordingly, Table 4.10 indicates the mean score and rank of the main or top mitigation measures to cost overruns in ESLSE construction projects.

The top mitigation measures as the respondents agree are those from serial no 1 to 9 (table 4.11). They have said efficient contract management, site management and supervision, effective project planning, scheduling and control, efficient management, effective project manager, skills of teams, on time payment, realistic cost estimation, possession of site on date, and communication and coordination as the extremely significant factor to mitigate cost overrun. The other which are ranked from 9th to 14th are less significant when analyzing the data, as their mean is smaller than the overall mean. But those less significant factors have their own contribution to cost overrun and should not be neglected as the analysis has put.

Chapter Five: Conclusion and Recommendation

This part of the paper will conclude the results of the findings and will give a recommendation for future works.

5.1 Summary

The aim of the paper was to assess if any cost overrun exist, why it exists and what are the measures that can be taken to lessen the effect of cost overrun in ESLSE construction projects. By providing solutions, it was planned to be a help to construction projects of ESLSE and other organizations, to help academicians by being a preliminary stage, and when decreasing the effect of cost overrun, to contribute to the national economy indirectly.

To find the cost overrun and the factors for its cause, explanatory and descriptive research design was used. By using both qualitative and quantitative data, it tried to explore the cost overrun and the factors for the selected six project of ESLSE. Assessing the cost overrun was done through review of the reports of ESLSE, the qualitative data.

After the qualitative data, the quantitative data was collected through questionnaire survey. Questionnaire was distributed to the concerned 65 professionals who have a direct relation with the projects. The professionals were the client (ESLSE), the consultants and the contractors. The people who work in those places were asked about their opinion and 55 has filed and returned the questionnaire.

5.2 Conclusion

From the CPI of the selected six projects, it was found that the projects are under budgeted. Regarding this case, interview was done with the top personnel's who overrun the projects. They have confirmed that cost overrun is a norm and the result of the review is contrary to the reality because in construction work much of the cost is on the finishing of the projects and payment is made based on lump sum. So to find the actual cost performance of the projects, they should be finished and the payment should be done. As a young enterprise it is running projects and they are not yet finished. Nevertheless, the project overview shows a schedule overrun.

As the respondents have put the top factors for cost overrun are escalation of material cost, change in exchange rate, delayed approval of payment, procurement problems, excessive change orders, unclear and inadequate details in drawing, incomplete drawings, increase in cost of labor, too many scope change and constructive change orders and mistakes in design documents.

From the respondent point of view, the main mitigation measures are efficient contract management, site management and supervision, effective project planning, scheduling and control, efficient project management, effective project manager, skilled and experienced teams, on time payment, realistic cost estimation, possession of site on date, communication and coordination.

5.2 Recommendation

Based on the study the researcher recommends the following:

- The design and drawing of ESLSE project should be made in detail and at once so then costs associated with design change and order changes could be minimized, if not avoided.
- Efficient contract management, site management and supervision should be developed.
- The management of projects and sites should be enhanced.
- The planning, scheduling and controlling of projects should be as effective as possible.
- Project manager should update themselves to the present day reality and should lead the projects accordingly.
- Project managers should give due attention to the project team, as the group is as strong as its members.
- Payment should be made to the contractors in due time so as to avoid financial problems.
- Realistic cost estimation must be made by the concerned bodies, as cost increase is a reality in today's world.
- The communication between the client, the consultant and the contractors should be efficient and they should coordinate with each other to avoid delay and cost overrun.
- During the planning and estimation escalation of material price should be kept in mind.

5.3 Suggestion for Further Research

- > While this study focused only on the cost overrun factors and their mitigation measures, further research could include time overrun factors, their correlation with cost overrun factors and also mitigation measures for time overrun.
- > Further study should be done on ESLSE completed projects.
- > The result of this paper is on construction projects and other studies should be done on other projects so as to see and compare the factors for cost overrun.

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Appendix 1

Questionnaire

Dear Sir/Madam,

I am a graduate student of School of Commerce, Project Management Program. I am conducting a research about **“Cause of Project Cost Overrun in ESLSE Construction Projects and Mitigation Measures to Improve Cost Performance”**, which I had chosen as a topic to conduct research on it for my master’s project.

Hence, I request you kindly to fill up this questionnaire which will be of immense help in my study. Please take a look at the required information and try to answer correctly and accurately.

I thank you for your valuable time and efforts and I want you to know that the information you provide will only be used for academic purpose.

**Yours Sincerely,
Biruktawit Tesfaye**

**Graduate Student,
School of Commerce
Email: tesbiru@yahoo.com
Advisor: Dr. Worku Mekonen**

Please indicate your answers.

Section one: Basic attribute of the performer

- 1) Your gender Male _____ Female _____

- 2) Your Educational background
 1. Master's Degree
 2. Bachelor Degree
 3. Diploma
 4. Other(please specify) _____

- 3) Please indicate the type of organization you are employed:
 1. Client
 2. Consultant
 3. Contractor
 4. Other (please specify) _____

- 4) Please state your position in the organization which you work.
 1. Manager
 2. Engineer
 3. Project Manager
 4. Consultant
 5. Other (please specify) _____

- 5) How many years have you been working in construction projects?
 1. Less than 1 year
 2. 1-5 Year
 3. 6 to 10 years
 4. 11 to 15 years
 5. Over 16 years

- 6) In your professional career, what is the average percentage level of cost overrun in your past projects?
 1. 0 – 10%
 2. 11% - 20%
 3. 21% - 30%
 4. 31% - 40%
 5. More than 40%

Section two: Factors influencing Cost Overrun

Please indicate the significance rate of the following factors by circling the appropriate number in the box. (N.B- Numbers symbolize the following:

- 1 – Not significant 2 – Slightly significant 3 – Moderately significant
 4 – Very significant 5 – Extremely significant

1. Client factors

1	Confusing and ambiguous requirement of client	1	2	3	4	5
2	The client’s improper bidding process	1	2	3	4	5
3	Payment delays by the client	1	2	3	4	5
4	Too many scope changes and constructive changed orders by client	1	2	3	4	5
5	Slow response from the client organization	1	2	3	4	5
6	Fraudulent practices and kickbacks	1	2	3	4	5
7	Poor contract management by client	1	2	3	4	5
8	Poor communication and coordination with contractors	1	2	3	4	5
9	Incomplete design at the time of tender	1	2	3	4	5

Other (please specify) _____

2. Consultant Factors

1	Changes and mistakes in design documents	1	2	3	4	5
2	Delayed approval of payments	1	2	3	4	5
3	Failure to approve updates schedules on time	1	2	3	4	5
4	Long waiting time for approval of drawing and materials samples	1	2	3	4	5
5	Poor site supervision	1	2	3	4	5
6	Unclear and inadequate details in drawing	1	2	3	4	5
7	Poor contract management	1	2	3	4	5
8	Mistakes and discrepancies in contract documents	1	2	3	4	5
9	Fraudulent practices and kickbacks	1	2	3	4	5
10	Incomplete drawings	1	2	3	4	5
11	Excessive change orders	1	2	3	4	5
12	Inadequate experience of consultant	1	2	3	4	5
13	Delay in performing inspection and testing	1	2	3	4	5

Other (please specify) _____

3. Contractor Factors

1	Inadequate experience staff and poor labor productivity within the project team	1	2	3	4	5
2	Lack of consultation with the client	1	2	3	4	5
3	Failure to utilize tools to manage the project symmetrically	1	2	3	4	5
4	Lack of timely decision and corrective actions	1	2	3	4	5
5	Poor contract management	1	2	3	4	5
6	Poor project planning, scheduling and control	1	2	3	4	5
7	Bureaucracy at the work place	1	2	3	4	5
8	Poor site management and supervision	1	2	3	4	5
9	The ability of the organization to manage risk	1	2	3	4	5
10	Weak communication and coordination between project parties	1	2	3	4	5
11	Disputes on site	1	2	3	4	5
12	Insufficient number of equipment	1	2	3	4	5
13	Poor efficiency of supervision by the contractor's staff	1	2	3	4	5
14	Inappropriate construction methods & using obsolete technology by the contractor	1	2	3	4	5
15	Construction mistakes and defective works	1	2	3	4	5
16	Fraudulent practices and kickbacks	1	2	3	4	5
17	Deficiencies in cost estimation and preparation	1	2	3	4	5
18	Poor project management	1	2	3	4	5
19	Procurement problems	1	2	3	4	5

Other (please specify) _____

4. External Factors

1	Unforeseen ground condition during construction	1	2	3	4	5
2	Accident on site	1	2	3	4	5
3	Effect of weather	1	2	3	4	5
4	Lack of utilities: power, water, communication	1	2	3	4	5
5	Increase in the cost of labor	1	2	3	4	5
6	Political factors	1	2	3	4	5
7	Change in exchange rate	1	2	3	4	5
8	Escalation of material prices	1	2	3	4	5
9	Changes in laws, regulations and taxes	1	2	3	4	5

Other (please specify) _____

Appendix 2

Please indicate the effective rate of the following mitigation measures by circling the appropriate number in the box. (N.B- Numbers symbolize the following:

- 1- Not effective 2- Less effective 3 - Effective
 4 - Most effective 5- Extremely effective

What do you suggest to mitigate cost overrun? Please circle your answer

1	Appropriate requirement and proper feasibility study should be provided by client	1	2	3	4	5
2	Proper bidding process	1	2	3	4	5
3	Timely payment by the client	1	2	3	4	5
4	Timely possession of site	1	2	3	4	5
5	Efficient contract management, site management and supervision	1	2	3	4	5
6	Efficient communication and coordination	1	2	3	4	5
7	Effective project planning, scheduling and control	1	2	3	4	5
8	Appropriate site supervision	1	2	3	4	5
9	Skilled and experienced consultants, contractors and their team members	1	2	3	4	5
10	Effective leadership on part of the project manager	1	2	3	4	5
11	Dispute settlement on site	1	2	3	4	5
12	Use appropriate and effective equipment for construction	1	2	3	4	5
13	Timely and reasonable procurement	1	2	3	4	5
14	Realistic cost estimation	1	2	3	4	5
15	Efficient management	1	2	3	4	5
16	Risk management during project execution	1	2	3	4	5

Other (please specify) _____

Thank you for your valuable time and efforts!

