JIMMA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

JIMMA INSTITUTE OF TECHNOLOGY

FACULITY OF CIVIL AND ENVIRONMENTAL ENGINEERING

CONSTRUCTION ENGINEERING AND MANAGEMENTCHAIR

Assessment on Performance of Least-Bidders on Ethio-Telecom Construction Projects

A research is submitted to school of graduate studies of Jimma University in partial fulfillment of the requirements for the degree of Master of Science in Construction Engineering and Management

By: Deraje Reggasa Gari

SEPTEMBER, 2021

JIMMA, ETHIOPIA

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DECLARATION

I declare that this research entitled "**Assessment on Performance of Least-Bidders on Ethio-Telecom Construction Projects**" is my own original work, and has not been submitted as a requirement for the award of any degree in Jimma University or elsewhere.

Deraje Reggasa Gari	_____	_____
Candidate	Signature	Date

As research Advisor, I hereby certify that I have read and evaluated this thesis paper prepared under my guidance, by Deraje Reggasa entitled "**Assessment on Performance of Least-Bidders on Ethio-Telecom Construction Projects**" and recommend and would be accepted as a fulfillingrequirement for the Degree Master of Science in Construction Engineering and Management.

Engr. Alemu Mosisa (Asst. Professor)	_____	_____
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Co-Advisor	Signature	Date

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ABSTRACT

Ethiopian construction industry participants have long recognized that accepting the lowest price bid does not guarantee maximum value.For the success of any construction project time, cost, quality, and safety performance are the fundamental criteria. More than 50% of theEthio-telecom construction projects are awarded using lowest bidder bid awarding system and most of the contractor of the projects fails to complete and handover the project to the client asper the agreement. Consequently, most of the project face huge amount of time and cost overrun. The other Ethio-telecom construction projects are awarded by fixed price invitation methods almost 98% of the construction project completed with the give time and price, which was awarded by fixed price system. This study focuses the first stated awarding system and tried to analyze the performance of least bidder contractors under Ethio-telecom projects. In this study other factors responsible for impacting the time, cost, safety, and quality performance of Ethio-telecom construction projects were also analyzed. The research has adopted descriptive type of research design and the probability sampling was used to identify the target population; and the target populations were the number of construction projects which was completed in the last five years. The sources of data for this research were primary and secondary data. The primary data were gathered formally through a questionnaires and direct interview of stakeholders which are working in the construction projects. And, the secondary data was gathered through reviewing, examination of documents, reports and records of published documents. Relative importance Index was used to analyze the data. The findings of study revealed that, in average 48.80% of construction projects were time overrun and only 51.20 % of project could achieve completion within contract duration. The amount of time overrun varies between 21.85-80.00%. Cost overrun was in between 0-25% as agreed by respondents with an average of around 10%.The major contributors of this poor performance related to cost are identified and ranked based on their relative importance index (RII) accordingly, Unfair estimation of project contract period (RII=0.808), Lack of proper supervisions (RII=0.806), and Poor scheduling during construction (RII=0.794) were top three factors. Similarly, factors related to time performance were identified and ranked, accordingly, Selection of lower grade of contractor (RII=0.930), Poor human resource management (RII=0.850), and Lack of proper work planning, and scheduling (RII=0.812) were top three factors. Generally, from this study it can be concluded that, the contractor's performance under lowest bidder bid awarding system was poor in both cost and time context. Hence, Ethio-telecom as client recommended is changing bid warding system to effectively perform the projects progress since it is crucial for development of our country.

Keywords: *Construction industry, Cost performance, Ethio-telecom, Time performance*

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ACRONYMS

ALT	Abnormally Low Tender
EBP	Ethiopian Building Proclamation
EIA	Environmental Impact Assessment
EOT	Extension of Time
ERA	Ethiopian Road Authority
FIDIC	International Federation of Consulting Engineers
GPS	Global Positioning System
ITB	Instruction to Bidders
KPMG	Klynveld Peat Marwick Goerdeler
MDB	Multilateral Development Banks
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PPA	Public Procurement Agency
PQP	Poor Quality Performance
QP	Quality Performance
SA	Saud Arabia
SDB	Standard Bedding Document
TQM	Total Quality Management

ABREVIATIONS

cum	Cumulative
ff.	Following
No	Number
Proc.	Proclamation
Reg.	Regulation

CHAPTER ONE

INTRODUCTION

1.1. Background

Numerous researches have outlined the issue of poor time and cost performance of construction projects worldwide. Any construction projects could satisfy the three famous performance criteria: completing projects on time, within budgeted cost and quality standard. A successful project is the only project which has accomplished its technical performance, maintained its schedule, and remained within budgetary costs. Project management tools and techniques play an important role in the effective management of a project. Construction time, cost and quality are fundamental considerations in project management and regarded as most important parameters for measuring success of any project. Poor performance of time and cost can lead to a significant amount of time and cost overrun which is global phenomenon (Aftab et al., 2012).

Achieving a value-based procurement approach is a challenge, particularly for the Ethiopian public sector clients who are limited in their ability to evaluate the competitive bids based solely on the low-bid award system. In today's world construction industry is one that has a special role in seek for development. We can say that there is no development sector into which construction does not enter. The construction industry plays a key role in building economic infrastructure like roads, railways etc.; in expanding social infrastructure like schools, hospitals, etc.; and in expanding factories. To bring about fast growth in any economic sector, a strong and efficient construction industry is called for. Because of such a high contribution, the construction industry has a major influence on the economic growth of a country (Aftab, et al, 2012).

Bid and Procurement issues are widely related to the construction industry and its participants so that striving to improve the procurement of construction by the public sector in particular is in the best interest of both the community and the construction industry. Currently, the public sector procurement of construction is largely based on the lowest bid award system. The customary practice of awarding contracts to a lowest bidder was established to ensure the least cost for completing a project. In public construction works,

this practice is almost universally accepted since it not only ensures a low price but also provides a way to avoid fraud and corruption (Ahmed, 2013).

In developing country, such as Ethiopia construction industry is increasing vastly. To engage to the construction or have to started especially in public construction should pass the bid system which is mainly used as a bid system called lowest bid awarding system (Aftab, et al 2012).

In Ethio-telecom procurement of construction is largely based on the low bid award system. It is important to review and evaluate the current performance of the contractor who awarded by least bidder awarding method. This study analyzed the performance of the least bidder contractors under Ethio-Telecom projects.

1.2. Statement of the problem

In a study of 8,000 projects, (Frame, 2007) found that only 16% of the projects could satisfy the three famous performance criteria: completing projects on time, within budgeted cost and quality standard, while in a global study on cost overrun issues in transport infrastructure projects covering 258 projects in 20 nations (Flyvbjerg, et al., 2003) concluded that 9 out 10 projects face cost overrun. In the current economic environment, it is increasingly likely that construction organizations will submit abnormally low tenders to win new work. Persisting problems of inferior quality of constructed facilities, high incidence of claims and litigation, and frequent cost and schedule overruns have become the main features of Ethiopian public construction works contracts (Laychluh and Abebe, 2012).

Other developing country construction industry participants have long recognized that accepting the lowest price bid does not guarantee maximum value. Achieving a value-based procurement approach is a challenge, particularly for the Ethiopian public sector clients who are limited in their ability to evaluate the competitive bids based solely on the low-bid award system. Therefore, this study was investigated the performance (time, cost, quality and safety) of contractors who are awarded by lowest bidder bid awarding method in Ethio-Telecom projects.

1.3. Research Questions

- What are the cost performances of the contractors under Ethio-telecom projects?

- What are the time performances of the contractors under Ethio-telecom projects?
- What are the quality and safety performance factors of the contractors under Ethio-telecom projects?

1.4. Research Objectives

1.4.1. General Objective

The main aim the study was to assess the performance of least bidder contractors in Ethio-telecom projects.

1.4.2. Specific Objectives

The specific objectives of this research were:

- To investigate the cost performance of the contractors under Ethio-telecom projects
- To investigate the time performance of the contractors under Ethio-telecom projects
- To assess the quality and safety performance of the contractors under Ethio-telecom projects

1.5. Scope and limitation of the Study

The scope of the study is to assess the performance of least bidder contractors and it will be limit to Ethio-telecom projects construction projects. Also, it faced with the difficulties of not getting all respondents on time, were busy and tight with the routine job to reply the questionnaires on time, due to pandemic (covid 19) it was difficult to make interview and formal discussion as much as needed.

1.6. Significance of the study

In Ethiopia public construction projects bid awarding system is frequently based on the lowest bidding system. The method of procurement of construction works has a significant role in the successful completion of the project. In this research, the performance of public owned construction projects awarded on the least bidder bid evaluation and contract award system will be assessed. The finding from this research work will forward suggestions and recommendations that can help to performance of the contractors.

CHAPTER TWO

LITERATURE REVIEW

2.1. General

Construction industry has continuously been developing for the last decades. Particularly, the development gained speed due to both increase on the number of investors in the area and rise of participation rate of local contractors on international tenders. In the procurement process, a standard practice for many organizations who are interested in using the competitive nature of bidding is to keep procurement costs low. The competitive bidding process for awarding construction contracts is typically based on the low bid method. According to this method, the construction firm submitting the lowest bid receives the right to the construction contract i.e. contract is awarded to the responsive and compliant bidder that is willing to fulfill the terms of the contract for the lowest value.

2.2. Definition of Lowest Bidder Bid

Lowest bidder bid selection technique is a competitive, closed bid system where selection is based only on the price presented to the owner. This is the traditional procurement method in use with traditional delivery methods, where design documents are at or near 100% complete (Molenaar et al., 2001).The price presented by the selected firm is the basis for the contract price of the project. Low bid procurement is the most common procurement procedure used for selecting a contractor for procurement of works in Ethiopian public construction projects. This simplest procurement procedure relies only on selecting the contractor that provides the lowest responsive price. Low bid procurement allows a multiple contractor to submit a price for the completed design documents, and the procuring entity only has to compare the total price submitted by the contractors to award the project(Ahmed, 2013).

2.3. Draw Back and Opportunity of Lowest Bid Award System

Currently, all the public projects in Ethiopia for procurement system using lowest bid award system. The low bid award system fosters competition amongst contractors attempting to secure the project. This competition can have both positive and negative effects for the client. There are also definite benefits to the low-bid award system. Promoting competition amongst contractors is a clear benefit to the process. It compels the contractors to lower their costs, usually through innovation, to ensure they win bids and maintain their profit margins. In

addition, the process is beneficial specifically to the public sector because of the transparency, an important criterion of public policy (Photios, 1993). But Competitive low bid method has been highly criticized for its negative impact on disputes/claims, coordination, quality control and project duration. Most of the projects have been suffering in material and equipment shortages. Manpower shortage was also encountered in many projects (Ahmed, 2013).

The major drawback of the low-bid method is the possibility of awarding a construction contract to a contractor that submits either accidentally or deliberately, an unrealistically low bid price. Often, such an occurrence works to the owner's and contractor's detriment by promoting disputes, increased costs, and schedule delays (Ioannou and Leu, 1993). If a contractor submits a bid that is significantly lower than the client's estimate and the other bidders, it is difficult to understand how that contractor could complete the job profitably (Carr, 2005).

Furthermore, awarding contracts based only on the lowest bid runs the risk of poor performance by this contractor during the project life, as unrealistic offers can lead to the financial inability to carry out the required work. This result in management and supervision problems on behalf of the client and claims and disputes on behalf of the contractor and corresponding completion delays (Binyam, et al, 2016).

Generally, allowing projects to be awarded based on the least price has inherent flaws. Delays in meeting the contract duration, increment of the final project cost due to high variations, tendency to compromise quality, and adversarial relationship among contracting parties are the major drawbacks associated with responsive low bid award procedure (Thomas, 2009). Moreover, the low-bid award system encourages unqualified bidders in the competition and in contrary it discourages qualified contractors to participate (Photios, et al, 1993).

2.4. Legal Aspects

The Federal Government of Ethiopia has statutes requiring submission of competitive bids for construction projects. This statute requires public organizations to award such contracts to the "lowest responsive bidder." The word "responsive" is inserted to require that a successful

bid must also be adequately responding to the requirements of the project as specified. While it is not too difficult to determine whether a bid is responsive because responsiveness is evaluated basedon the documents submitted by contractors, it takes considerable amount of time and effort to ascertain whether a bid is responsible. "Responsible" generally refers to the apparent low bidder's quality, fitness, and capacity to perform the proposed work satisfactorily. "Responsible" means more than simply financially responsible (PMI 1987).

2.5. Evaluation of Bids

2.5.1. Determining the Successful Bid

According to the methodology defined in the Public Procurement Proclamation and Directive, the Public Body shall select the successful Bid by applying substantially responsive to the professional, technical, and financial qualification requirements, technically compliant in relation to the technical specifications. The lowest evaluated Bid shall be the bid offering better economic advantage ascertained on the basis of factors affecting the economic value of the bid (Herbsmanand Ellis, 1992).

2.5.2. The Bid with the Lowest Price

The criteria should be fulfilled for the bid awarding using lowest price according to standard biding document for the procurement of works for national competitive bidding are examining to confirm that all documentary evidence establishing the Bidders' qualifications requested in ITB Clause 23 have been provided, confirming the bids comprise all mandatory documentary evidence establishing the Bidder's qualification the public body will rule on the legal, technical, professional, and financial admissibility of each bid, classifying it as compliant or non-compliant with qualification requirements set forth in the Bidding Document, analyzing the bids' technical conformity in relation to the technical specifications, classifying them technically compliant or non-compliant, evaluating Bids that have been determined to be substantially responsive with rectification of nonconformities and omissions in bids, if any, examining all Bids to ascertain whether there are any arithmetic errors in computation and summation, notifying Bidders on adjusted calculation errors and request bidders to confirm that they accept the correction of the calculation error within the time limit of three days from the receiving of the notification, and awarding of the contract the Bidder whose Bid has been determined to be substantially responsive to the Bidding Documents and with the lowest price.

2.5.3. Evaluation and Comparison of Bid Price

According to standard bidding document, the financial evaluation, the highest point shall be given to the lowest priced Bid, and conversely, the lowest point shall be given to the highest priced Bid; among technically qualified Bids, the points given to other Bidders shall be determined depending on their price offers and the bid that is found to be responsive to the technical requirements and with the lowest evaluated price. (Article 43 (8a) proclamations no. 649/2009).

2.5.4. Alternative Methods of Procurement

In Ethiopia open bidding, request for proposals, two stage tendering, restricted tendering, request for quotation, and direct procurement are the alternative methods used for public procurement procedures.

2.5.5. Alternative bid Awarding Methods

Bidding procedures are mainly negotiated and competitive. Mostly, the other methods are either variant of, or somewhat between these two significant types. In competitive method, the work is awarded to the lowest- bidder, if the bidder is proved to be a responsive one. In negotiated method of procurement, the cost is discussed and negotiated with selected constructor. Some modifications have been proposed for minimizing the concerns and implications of these two extreme types, and tried in many countries. In this research, Competitive Lowest Bidding Method (Price-basis), Competitive Average Bidding Method (Price-basis), Multi Parameter Bid Method (Basing on quality, time, price and "other" factors), Negotiated Bid Method (Competitive), and Negotiated Bid method (Non-Competitive) contract award methods are studied and considered.

2.5.6. Competitive Lowest Bidding Method (Price-basis)

In the procurement process, a standard practice for many organizations who are interested in using the competitive nature of bidding is to keep procurement costs low. The competitive bidding process for awarding construction contracts is typically based on the low bid method. According to this method, the construction firm submitting the lowest bid receives the right to the construction contract i.e. contract is awarded to the responsive and compliant bidder that is willing to fulfill the terms of the contract for the lowest dollar value. Currently, the public sector procurement of construction is largely based on the lowest bid award system.

The customary practice of awarding contracts to a lowest bidder was established tonsure the lowest cost for completing a project. In public construction works, this practice is almost universally accepted since it not only ensures a low price but also provides a way to avoid fraud and corruption (Irtishad, 1993).

For the procedure to be fair and workable, it is required to have a clearly defined criterion to help the bid evaluating officials determine whether bids are responsive, and the bidders seem to be responsible. In the competitive lowest-bidding method, the prequalified and responsive bidder who submits the least bid, meeting the specifications must be winner of the contract.
Competitive Average Bidding Method (Price-basis)

One of the variations of the competitive lowest bidding method of awarding construction works is based on the principle that the bid closest to average of all the bids is considered to be the best bid, and not the one which is minimum or maximum. Tenders who are bid far lower than the average are considered unrealistically underbid. The bids which are greatly higher than the mean are considered unrealistically overbid. On the basis of this principal some methods are evolved and these are generally known as European Methods (Irtishad, 1993). Generally, the best contractor based on the average-bidding method is the bidder whose bid satisfies a particular correlation with mean of all the bids. For average bidding method, different measures are used for calculation of the average, or use different criterion for evaluating the best bid. But point to remember is that this method takes into account the price only (Herbsmanand Ellis, 1992).

For example, some countries use typical arithmetic average while few use weighted average. This method is mostly used in Taiwan. Another approach of obtaining the average includes the elimination of all the bids which differ largely (more than a specified percentage) or the outliers and then the mean of the remaining bids is calculated. The winner could be the one whose price is nearest to the mean, or the other whose bid price is closest but less than the average. This method is widely used for construction projects in Italy (Photios, 1993).In Europe, a formula to calculate a realistic offer from a number of competitive bidders was developed which is known as “Danish” system. This system right away rejects the highest

and the lowest offers and rest of the bids are considered only (Irtishad, 1993). The formula is like the PERT and stands as shown in equation (2.1).

$$NA = \frac{NL + 4A + NH}{6} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (2.1)$$

Where: NA= New average, NL= New low, NH= New high, A=Average of all offers

The first bid which is above this NA is then treated as rational, reasonable, and acceptable. The method is not effective unless the minimum number of bidders is eight and this is the key limitation of Danish system.

The fundamental idea of the average bidding method is that the best bid is the one closest to a defined average, neither the minimum nor the maximum. These competitive cost- based average bidding methods are mainly used to make sure that the selected contractor is the basic principle is that the bidders should get a reasonable and practical cost of their work. It is assumed that with a fair price, the contractor would ensure quality needs of the project, would finish on schedule, and will not have any adverse relationship with the client, consultant and engineer. Responsible to minimize project failure, avoid disputes and construction claims (Benyam et al, 2016).

2.5.7. Multi Parameter Bidding Method

This is a model based competitive bidding which not only on caters for cost but also considers other parameters as proposed by Herbs man and Ellis; they named it the multi-parameter bidding procedure (Herbsman et al., 1992). They suggest that the major parameters should be cost, time and quality with minor parameters on the discretion of the client. The amount of time proposed in the bid to complete the project can have an impact on cost. For example, a construction company which can complete a building project three months earlier than its closest bidder may save the owner some additional rent cost. By factoring this cost saving in the bidding process, a better reflection of the total costs can be estimated. Similarly, the impact of better quality may also be included in the contract award decision. The costs of repair and maintenance are directly associated with the quality of the built facility being constructed. In Multi Parameter Bidding Method, estimation of quality may be calculated by the kind of materials and type of equipment proposed to be used, the past performance of the main contractor and the subcontractors which are proposed in the

bid. In Multi Parameter Bidding Method, time and quality parameters are assigned a maximum number of attainable points. The bids are then evaluated and ranking is made basing upon these points, as well as the bid cost (Azman, et al, 2018).

Some other parameters may also be included in the model as desired by the owner. Other factors may include safety records, past working experience with client, history of disputes and claims, defect rectification history etc. In this method a "total combined cost "will come up after applying all these factors (Tarricon, 1993). The total combined costs of all the bids are then compared to pick the best bidder.

2.5.8. Competitive Negotiated Bidding

At times it becomes necessary to obtain bids from a selected group of builders who possess known technical, managerial, and financial capacity to complete a multi-dimensional complex project. Some classified projects may also require only those contractors who can perform work at some specific place. In such circumstances, competitive price-based open bidding may not be suitable. On the other hand, single-source negotiation method is very hard to put into practice in public sector as this may lead to allegations of corruption and favoritism. To stay away from these problems with single source negotiated bidding many organizations and clients are using variations that include features of both competitive and negotiated methods (Azman, et al, 2018).

To modify pure negotiated method, increase in the number of construction companies/contractors to negotiate with, provides multiple options for selecting amongst the contractors. In few cases, based on previous experience or reference, some companies which are well known to be professional and competent to complete a construction project, are contacted by the owner or client (Irtishad, 1993). The owner may negotiate a tender with the most qualified company for professional services at compensation which the organization determines are fair, competitive, and reasonable. In making such decision, the public body must conduct an analysis of the price of the professional services needed in addition to their complexity and scope (Cliff, 2012).

2.5.9. Non-Competitive Negotiated Bidding

The non-competitive negotiated procedure is essentially the process of negotiating a bid with a single source, usually a preselected contractor. For this reason, it is also known as sole-source negotiation. The cost to be paid, and the product or goods to be procured by the owner are normally the items of negotiation. The firm, that is known to be prequalified and having expertise, can be chosen without any notification or tendering advertisement. This saves additional effort, time, and money but chances of favoritism and corruption are increased (Crowley, 1995).

Different countries have different rules and regulations regarding direct procurement, but mostly these rules are similar in nature. In most of the cases, when there are no competitors available for technical reasons or if the required product can only be provided or constructed by one contractor/organization, noncompetitive negotiated bidding method is adopted. Also, when there is a need of similar service or repetition of works from a firm, this method may be adopted. In Pakistan, for some classified projects or for projects which have security concerns due to geographical location of the project site, this method is adopted.

Direct procurement is usually common in the form of variations or change orders in the construction industry. This method is very common in new construction projects in the private sector like housing, commercial buildings, private schools, hospitals, and industries etc. However, in government construction projects, it is almost nonexistent (Aftab, et al, 2012).

2.6. Construction Project Performance

2.6.1. Cost based performance

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 exceeds its 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. In the study, the authors found cost overrun data from five regions (Africa, America, Asia, Europe, and Middle East), consisting of 16 countries (Ethiopia, Ghana, Nigeria, Uganda, India, Korea, Malaysia, Netherlands, Norway, Portugal, Turkey, United Kingdom, Kuwait, Pakistan, Palestine, United States), totaling 26

publications. Table 2 shows the percentages of projects by region that are over budget and the average over budget amount compared to the original cost (Alfredo, et al., 2016). According to Table 2.1, 68% of projects from those 5 regions have cost overruns. Of the 68%, project budgets are overrun on average by 23%.

Table 2.1: Cost Overrun by Regions (Alfredo, et al., 2016)

Region	Over budget (%)	Over budget amount (%)
Africa	69	29
N. America	98	28
Asia	59	16
Europe	50	29
Middle East	65	15

2.6.2. Time based performance

Schedule delay can be defined as late completion of works as compared to the planned schedule or contract schedule. It occurs when the progress of a contract falls behind its scheduled program (Memon, 2012). In the study, the authors found schedule delay data from five regions (Africa, America, Asia, Europe, and Middle East) consisting of 17 countries (Ghana, Nigeria, Tanzania, Uganda, Hong Kong, India, Jordan, Korea, Malaysia, Portugal, Turkey, United Kingdom, Kuwait, Oman, Palestine, Saudi Arabia, United States), totaling 31 publications. Table 3 shows the percentages of projects by region that are over schedule and the average delay amount compared to the original schedule. Like the cost overrun performance information, Table 2.2 shows similar schedule performance information for most regions. On average, 74% of projects experience delay. Of the 74%, project duration is delayed 42% greater than the original scope. Interestingly, Europe and Africa have the highest percentage of project delay amount, despite Europe being more geographically and economically developed.

Table 2.2: Schedule Delay Performance Metrics by Regions (Alfredo, et al., 2016)

Region	Project Delayed (%)	Delay amount (%)
Africa	75	53
N. America	98	37

Asia	68	37
Europe	53	55
Middle East	79	30

2.6.3. Safety based performance

Most studies contained Safety Elements reported that many of the Safety Elements are more general in nature and tend to not be easily measured, such as: safety policy, safety organization, inspecting hazardous conditions, plant and equipment maintenance, safety promotion, high risk times, organization collective values, individual competence and management behavior. These are all important general Safety Elements, but they need to be formatted in such a way as to be measurable to use the implementation of Safety Elements as a possible predictor of a safe working environment (Cliff Dunlap, 2012).

A study of the Egyptian construction industry concluded that safety programs applied by contractors operating in Egypt were less formal and the accident insurance costs were fixed irrespective of the contractor's safety performance (Hassaneinand Hanna, 2008). There are only two safety performance measures which are applied for the construction sector as a whole: a frequency measure and a severity measure (The Egyptian Labor Law 1981). The frequency measure is based on the number of accidents. A severity measure, on the other hand, is based on the number of lost days.

Therefore, it was not always effective in improving safety performance if a basic safety infrastructure was not in place. In contrast, a national policy program, Improving Occupational Safety, implemented in the Netherlands to increase the business community's knowledge and awareness of job site hazards, not only reduced job site incidents, but also enhanced enthusiasm and safety responsibility among both employers and employees (Oh and Sol, 2008).

Contractors should also encourage their project managers to develop safety incorporated project plans. They should also recommend not rely on pre-construction health. Such plan should be continuously revised and updated according to the changed site conditions. They should have a Project Emergency Plan to ensure that all members of the project's

management are able to respond to a major emergency quickly and systematically. There are many factors which can affect the safety performance as the safety at work is a complex phenomenon, and the subject of safety performance in the Construction industry is even more complicated to understand. Given below are many factors which could affect the safety performance in Egyptian construction sites. The conceptual framework in Figure 2.1 shows the factors and sub-factors (Riham El-Nagar, 2015).

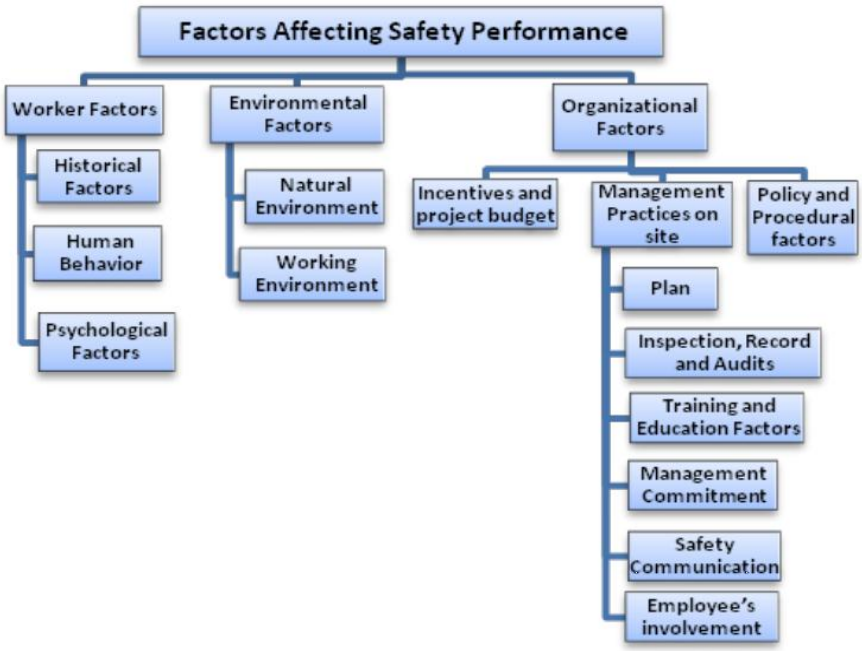

Figure 2.1: The conceptual framework (Source: Riham El-Nagar, 2015)

2.7. Ethiopian context construction safety

The other important obligation of the contractor is related to safety; the concept of safety must be understood very broadly; It may relate (including the heritage environment) to the safety aspects of natural environment, human environment, built environment, and utilities environment (PPA, 2011).

Natural Environment

The natural environment may include both the biosphere (plants, animals & microorganisms) and the physical environment (water, soil, and air). Such obligation of the contractor embedded into two broad environmental objectives: to ensure sustainable development and to ensure environmental safety (by preventing environmental pollution). The obligation of the contractor is both contractual and legal: it is contractual as per Clause 4.18 of MDB-

FIDIC; it is legal as per all the applicable laws of Ethiopia enacted for the protection of the natural environment. If the road construction project were subject to environmental impact assessment (indeed it is), the first obligation rests with the employer like ERA (as proponent of the project) to undertake such environmental impact studies with a view to secure environmental clearance for the project under consideration from the competent federal or regional regulatory institutions. The contractual & legal obligation of the contractor, in this regard, being thus to implement the mitigation measures developed & approved in such EIA document including based on such environmental management plan. The protection of the heritage or cultural environment, as the legacy of the past generation, is part of such EIA study & approval process.

Human Environment

The human environment may have three dimensions. the labor & staff of the contractor or contractor's personnel as defined, see Clause 1.1.2.7, Clause 4, 6.7 MDB-FIDIC; the employer personnel; see as defined; see Clause 1.1.2.6 cum 18.3 MDB-FIDIC; the general public; see the relevant applicable laws. The safety obligation of the contractor as to its staff and labor (its personnel broadly) is both contractual and legal; see the contract of employment cum the applicable laws and regulations; for its own staff & labor; and contractual as related to its subcontractors; see Clause 4 MDB-FIDIC. The safety obligation of the contractor as to the employer's personnel is contractual; see Clause 1.1.2.6 cum. Clause 18.3 MDB-FIDIC. The safety obligation of the contractor towards the general public is legal; the Civil Code shall apply as related to its extra-contractual liability (Article 2027-2161 of the Civil Code; plus, also Proc. No. 624/2009 as related to building projects)

Built Environment

The built environment may encompass the dimensions of permanent works under construction by the contractor, any neighboring structure or work proximate to the road project under construction, any road or bridge or any other work or structure off the project site, the property of the contractor on site intended for the execution of the permanent works (i.e., the construction materials & equipment's/plant), the property of the employer brought to the project site for the execution & completion of the permanent works, ensuring safety to the permanent works under construction is the clear contractual obligation of the contractor;

see Clause 4.8 cum. Clause 18.2 MDB-FIDIC, ensuring safety to the neighboring structures, if any, is the legal obligation of the contractor, as well as; see Civil Code Article 2027 ff. cum. Building Proc. No. 624/2009, ensuring safety of the road & bridges and any other work or structure (in the country) is the contractual and legal obligation of the contractor; see Clause 4.14, 4.15 cum 4.16 MDB-FIDIC cum. Civil Code Article 2027 ff. cum. Building Proc. No. 624/2009, ensuring safety to its property & the property of the employer is mainly contractual but also legal, and ensuring the safety of the property of other persons is mainly legal but also contractual; see Clause 18.3 MDB-FIDIC; and Article 2027 of the Civil Code.

Utilities Environment

Public utilities may have the dimensions of water supply network, wastewater network, electric power network, and telecommunications network. Ensuring safety to such utility lines is the legal obligation of the contractor. The employer is also expected during planning & design phase to secure complete and adequate information (like benchmarks) as to their location & specific alignment and to give due consideration in the design document. The following applicable laws may apply to establish the legal liability of the contractor and/or the employer, Power and Telecommunications networks: Proc. No. 464/2005 cum the Civil Code Article 2027 ff. cum. Proc. No. 624/2009 (EBP) cum Reg. No. 243/2011 (building regulation). Water supply networks and/or any hydraulic structure and wastewater networks: Proc. No. 10/1995 cum. Civil Code Article 2027 ff. cum. Proc. No. 624/2009 (EBP) cum Reg. No. 243/2011. The construction method statement meant for ensuring safety & serves as risk management tool at the construction project site; see Clause 4.1 MDB-FIDIC: the contractor is expected to ensure the safety of its construction operations.

Construction is one of the most dangerous industries due to its unique, dynamic, and temporary nature. Since construction industry is a key element of progress and development for countries, the success of construction companies should begiven special attention. The strength and success of any construction company lies in the effective management of safety, productivity, quality, health and the environment, in addition to marketing and finance and this simply indicates that safety performance in a project is just as much a measure of the success of that project as are measures of time, quality and cost (Amir et al., 2018). On one hand, delivery of construction project does not emphasize merely time, cost, quality as

performance criteria, clients, should also broaden their concern to advocate site safety with regard to the importance of human being (Jitwasinkul and Hadikusumo, 2011).

2.8. Factors Affecting Quality management in construction industries

Stated that quality can be assured by identifying and eliminating the factors that cause poor project performance found that the project manager's competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project. Lack of contractor experienced topped the quality related cause of project failure. Every contractor and construction firm has the intention to offer the best quality services, but many obstacles can pop up along the way to interrupt these plans. A single mistake is all it takes to trigger a series of events that can lead to expensive rework and more serious penalties if the structure's safety is compromised. Improving construction quality management starts with an understanding of the factors that can impact both safety and quality (Azman et al., 2018).

Damaged and Low-Quality Materials

Too much water or sand in a concrete mix, lumber cut from undersized trees and improperly graded steel can all result in widespread construction quality issues. Not only do these materials fail early, but they also create construction safety hazards by reacting unpredictably during the building process. Workers are often hurt when sparks are generated during cutting when they're not expected or as a structure collapses due to a lack of weight-bearing ability

Supplier and Vendor Failures

Even when the materials themselves aren't to blame for a quality issue, problems with suppliers and vendors can raise costs and lower quality levels. Replacing the requested building supplies with other brands and materials that don't offer the same quality can result in unhappy clients and time-consuming rework requests. Set clear expectations with all suppliers and perform random checks to verify they're still adhering to the contract. Finding new vendors may feel like

Subcontractor mishandling

According to some studies, over half of construction defects can be attributed to human error. If a subcontractor hires employee without the right skills and fails to train them, workmanship errors occur that can go unnoticed for years

Failure to Document Changes and Practices

Some quality issues aren't directly related to a mistake or design change, but rather to the lack of documentation of the change.

Last Minute Changes

When essential features are still being engineered or discussed at late stages in the construction process, these last-minute changes often lead to serious quality issues. For example, a last-minute change in the design of the tie rod supports for a suspended walkway led to a deadly collapse at the Kansas City Hyatt Regency in July 1981

Scope Creep

Construction projects often start out much simpler and smaller than the finished project. So how does a basic bridge or retail center turn into a multi-lane highway or a three-story mall? This kind of unplanned expansion is often referred to as scope creep.

Miscommunication between Teams

Studies of the construction industry in Saudi Arabia show that project managers feel that communication issues are the number one cause of quality issues. As one of the fastest growing construction sectors in the world, concerns common to the industry in SA are largely universal. Miscommunication leads to misapplication of new techniques, mismatched materials, and a lack of secondary and tertiary testing to discover existing problems.

Complexity of Designs

Unnecessary complexity is the enemy of high-quality work. While some level of complexity is unavoidable in cutting edge infrastructure and commercial construction projects, designers should minimize complex techniques and unusual features whenever possible. Simplified designs are also more affordable, offering the construction firm a better profit margin even while they're producing the highest quality work.

Lack of Project Management System

A project management system determines the ideal intervals for testing the work completed so far for errors and omissions. Without a management system or plan for quality control and assurance, most construction firms wait far too long to perform essential checks on their work. Implementing a project management system based around mobile apps is a flexible and fast way to bring current projects under control.

Ignored Audits and Testing

Some construction companies stick strictly to their third-party testing and auditing plans yet ignore the results of the tests and continue on with flawed designs or existing quality issues. This is often due to a lack of proper designation for quality control, causing reports to bounce from project manager to lead engineer without a clear workflow for addressing the material. Determine who's responsible for reading the audit and test reports

2.9. Quality improvement

There is no single definition of quality improvement and no one approach appears to be more successful than another. However, there are a number of definitions that describe quality improvement as a systematic approach that uses specific techniques to improve quality. The most important ingredient in successful and sustained improvement is the way in which the change is introduced and implemented (Pheng and Teo, 2004)

According to ISO 9000:2000 Quality improvements is "Part of quality management focused on increasing the ability to fulfill quality requirements." Empirical studies on quality management in construction have shown that various quality improvement practices are common among nonresidential builders and developers. Most of these practices have been collectively grouped under a successful management philosophy termed, "Total Quality Management" or TQM.

2.9.1. How to Ensure Construction Quality

Pheng and Teo, (2004) described the following 10 steps to ensure the quality of construction on the next project.

Start with the Right Workers

It's no secret that the construction industry and trades are experiencing a labor shortage. Research from 2019 found that skilled trade workers are difficult to find "with 80 percent of contractors reporting last year that they had difficulty hiring craft workers and 35 percent said they believed it would become harder in the coming year." Carpenters, concrete workers, pipe layers, sheet metal, and iron workers were among the most difficult to find but nearly all categories were at or above 50 percent of contractors unable to find quality skilled workers. When starting your project, make sure you have the most qualified players on your teams. Assign the right people to the right jobs and ensure your supervisors or foremen are

clear on the quality expectations. Give them authority to manage their crews as needed to adhere to those expectations.

Invest in Technology

Research by KPMG found that technology isa key to success for the construction industry in the future. They identified three segments of the construction industry when it comes to technology: For some construction companies, doing this may seem intimidating or even impossible. Some of the common reasons we see are fear of how to convince their workforce to get onboard and concern about it being difficult to adopt, among other reasons.

However, technology doesn't have to be a complete overhaul of your processes. Rather, you can ease into it with a simple time-tracking solution that simplifies payroll and scheduling, for example, and then gradually increases to include job management, GPS tracking, and reporting. The most important thing is to invest in a technology that has five-star customer support so you're not left hanging when you have questions or need help. The right company will understand construction needs which are unique from other industries

Use the Right Materials

Once you have your contract and understand what your customer expects; make sure you don't compromise on materials. Check that all materials incorporated into the structures and buildings meet the quality requirements and the project specifications. Ensure that you order materials of the correct specifications. For example, make sure your electrician knows what type of Romex to bring for the specific job they're doing. Check the materials when they arrive to ensure that they aren't damaged and that they're of the correct specification. Reject items which are damaged or aren't correct and advise the supplier immediately, then mark the items clearly as being non-compliant so they aren't accidentally used.

Ensure Safety and Compliance

Not only do proper safety and compliance policies keep your workers safe, but they prevent inadequate work or improper work from being done on your project. For example, a tired worker is more likely to take a shortcut here and there or even forget something entirely. So use a reliable time-tracking method to ensure they take the required breaks and don't do too much overtime

Check and Check Again The old saying

"If you want something done right, do it yourself," can't apply to owner/managers on-site, all the time. You have your hands full with tons of other things to do from paperwork to new job estimates. Sure your supers or foremen understand what's expected but if you're not there to check on each stage, you may end up with construction deficiencies that will need even more work in the next year or two. That means it's worth it to check in now and again to make sure everything is the way it should be and address issues that might have slipped through the cracks. Keep communication in mind, as well. Managing subs is a major challenge, so having proper communication as well as checks and balances in place will help a ton. Make sure you've sent the correct needs and specifications to your sub(s). For example, if your framing team set the joists at a certain measurement, the plumbing contractor would need to know so they can provide the correct mounts for drains that run under the house. You wouldn't want them to show up with the incorrect materials and be forced to delay the project.

Protect Completed Work:

It's the bane of a contractor's existence weather. But things happen and we can't control it. Even careless subcontractors can cause damage to finished surfaces where possible surfaces that can easily be scratched or damaged should be covered by timber, cardboard, or other materials until the work is complete. Some products arrive in plastic wrappings and these wrappings should be left in place until the section is ready for handover.

Avoid Scope Creep

Even some of the industry's largest companies can get swept away with scope creep. When your client makes change after change, before you know it, the scope of the project has ballooned to an unreasonable level and you have workers cutting corners and using lower quality materials. Talk with all of the stakeholders about the scope and make sure everyone is on board. It's important to understand the client's quality standards and specifications. These standards should usually be clearly stated in the construction document and in the project specifications and construction drawings.

Audit and Test

From time to time, tests must be done as part of the contractor's quality management plan, or as part of the project's or the client's quality management plan. These tests are to ensure that items or structures have been constructed correctly. Sometimes tests fail. This means that the

work must be redone. What's important is to designate the right people to the right quality control so you don't have a confusing workflow that has the wrong people auditing the wrong things at the wrong times. Reports become lost, tests get ignored, and work remains substandard.

Repair Deficiencies Immediately

As mentioned with testing and auditing, make sure you have a concrete policy to address deficiencies whether it be level of craftsmanship or inadequate materials. If left too long, deficiencies will become ignored and result in more work later on.

Have Supplier and Vendor Expectations from the Start

One of the main causes of projects running over time is the reliable delivery of supplies and materials. Make sure you work with vendors and suppliers you are familiar with and who have a good reputation. Make sure before proceeding with them, that they will be able to fulfill the needs you'll have for your project, to the end. Some things can't be controlled, there should be a process in place for what to do in the event of a delay and your vendors and suppliers should be able to clearly understand what is expected.

2.10. Quality based performance

Quality is one of the main factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations of the project participants. Quality, cost, and time have been recognized as the main factors concerning the client. However, for the majority of projects, the cost and time parameters are the main preoccupying factors for construction project (Meindl,1990).

According to (Meindl, 1990) Quality management is the act of overseeing all activities and tasks that must be accomplished to maintain a desired level of excellence. This includes the determination of a quality policy, creating and implementing quality planning and assurance, and quality control and quality improvement. Quality management system is defined as "all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance and quality improvement within the quality system.

Quality Performance (QP) is a management tool which aims at giving necessary information to identify quality improvement opportunities which is geared towards cost reduction and

quality improving (Abdul, 2011). The Project Management Institute (PMI, 1987) explains that QP is the calculation of achievement used to measure and manage project quality. However, the perception of poor quality performance of Ghanaian small scale contractors has turned out to be of great concern to stakeholders (Taskforce Report, 2007). Poor quality performance (PQP) has potentially reduced the level of employment rate, influenced the completion time of projects due to re-work and ultimately pushing client's budget beyond reach. Factors affecting quality performance are inevitable but when identified and knowing the significance of them, steps would be taken to curb the menace. Contractor quality performance is critical to the success of any construction project since improved contractor quality performance leads to increase client satisfaction, an improvement in the reputation of contractor and hence competitiveness in the market (Tengan et al., 2014).

One of the pillars of construction project is executing the works as per the quality parameters or requirements specified in the contract. The quality performance obligation of the contractor is related to those quality parameters specified in the contract in terms of materials, plant, and workmanship: in case of Plant, see Clause 7.1 (a) MDB-FIDIC; in case of Materials, see Clause 7.1 (c) MDB-FIDIC; in case of Workmanship, see Clause 7.1 (b) cum Clause 6.1 MDB-FIDIC. The quality performance obligation of the contractor has been specified in detail in the Technical Specification. Deviation from the quality parameters by the contractor may lead to the issue of defects in construction. Defects may relate to workmanship; material; equipment; design; or sub-surface or geological factor of the project site.

Defect as related to the severity of its impact could be structural defect, functional defect; the former is very serious Defect as related to construction may encompass two relevant time horizons, contractual period, and legal period. The contractual horizon as related to defect is related to performance period & defects liability period. In case of performance period, the defect being identified, notified & remedied; the Engineer has direct power to ensure quality through various measures: testing; retesting by ordering demolishing & re-work and so forth. Up on completion of the project, tests on completion have to be undertaken by the contractor; the Engineer, under the contract, has broad power to ensure the quality of works; see Clause

9 of MDB-FIDIC, 2010; like requiring multiple retesting & reduction of the contract price; or requiring multiple retesting & rejection of the works. During the defects liability period remedial works are going to be executed based on the snag list and/or on those defects found & recorded during such period for which the contractor is responsible under the contract. Performance period and defects liability period are separated by the issuance of takeover certificate by the Engineer, the contractual period and the legal period (which constitutes the warranty period) separated by the issuance of defects liability certificate or final acceptance or taking of possession of the works by the employer.

2.11. Summary

Different countries have different rules and regulations regarding bid evaluation, but mostly these rules are similar in nature. Bidder selection system in Ethiopia are mainly based on the price quotation the contractors provide to participate in the bid process, and the price which will be evaluated and obtained least will be the one who is responsible for the construction of the project. However, allowing projects to be awarded based on the least price has inherent flaws. Delays in meeting the contract duration, increment of the final project cost due to high variations, tendency to compromise quality, and adversarial relationship among contracting parties are the major pitfalls associated with responsive low bid award procedure (Thomas., 2009). However, selecting a contractor based solely on price greatly diminishes the significance of important such as criteria, time, and quality. Low bid price as the sole award criterion encourages unqualified contractors to submit bids (Herbsman and Ellis, 1992) along with bidders that submit a very low bid with the intent of recovering their losses through change orders and claims, also known as predatory bidding (Crowley and Hancher, 1995). Low bid is not necessarily the best value. Therefore, the project cost, time, safety, and quality performances with respect to least bidder award are not deeply investigated which this research specifically fills as a gap.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1. Study Area

In this study, the performance of lowest bidder contractors in Central part of Ethiopia, Addis Ababa City, in Akakai Kalty sub city, and North of Ethiopia Amhara Region Ethio-telecom construction projects was studied.

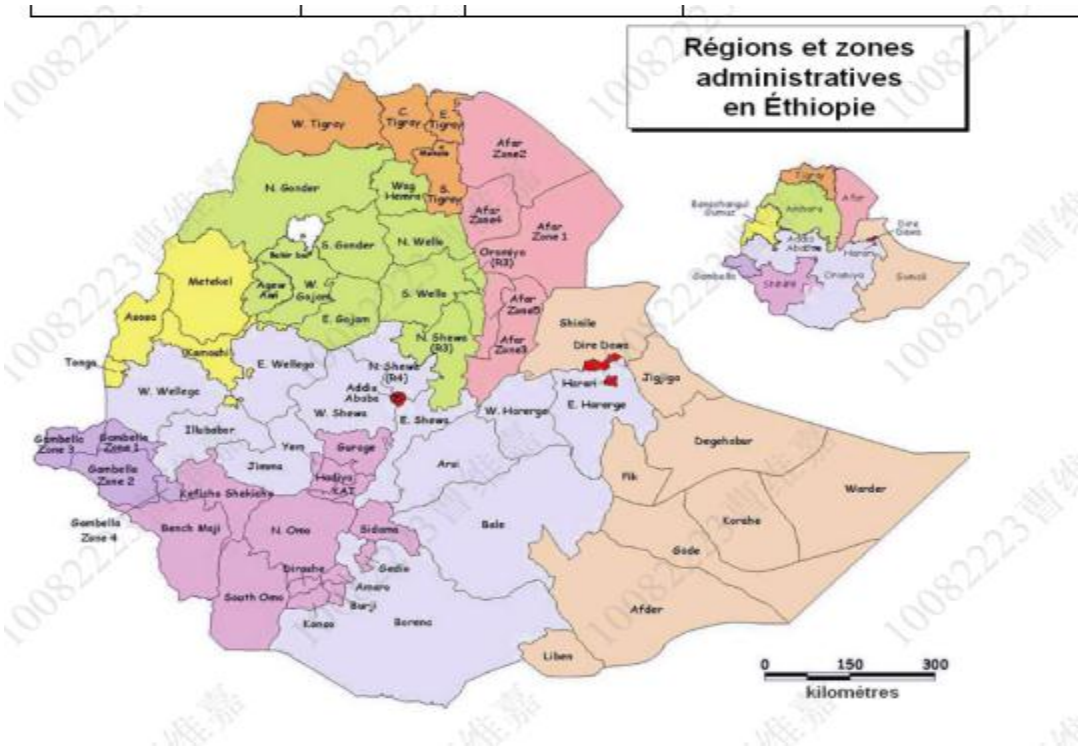

Figure 3.1: Ethiopian map which show the study area (Google map)

3.2. Research Design

Descriptive type of research design was used to analysis the question of the research. The study examined the situations to establish what can be predicted to happen again under the same circumstances. Depending on the type of information sought, people could be interviewed, questionnaires distributed, visual records made, even sounds and smells recorded. The important thing is that the observations are written down or recorded in some way, in order that they can be subsequently analyzed.

3.3. Study Variables

3.1.1. Dependent Variable

- Performance

3.1.2. Independent Variables

- Cost, time, quality and safety

3.4. Population and Sampling Method

The study was conducted in Ethio-telecom construction projects. Therefore, the target population was the number of construction projects which was completed in the last five years and will be completed in near future. The study was used probability sampling. Since each element of the population has an equal and independent chance of being included in the sample which means a sample selected by randomization method; therefore, was a simple random sampling.

3.5. Source of Data

The sources of data were the representative contractors, consultant, and client. Both primary and secondary data was used to achieve the aim of this study. Primary data was gathered formally through a questionnaires and direct interview of stakeholders while Secondary data was gathered through reviewing, examination of documents, reports and records of published documents.

3.6. Data Collective Procedure

The study was followed the following data collection procedure:

- A clear definition of the problem being studied and research question
- Literature review assessment
- Variable identifications
- Data collection, analysis, and case assessment
- Conclusion and recommendation

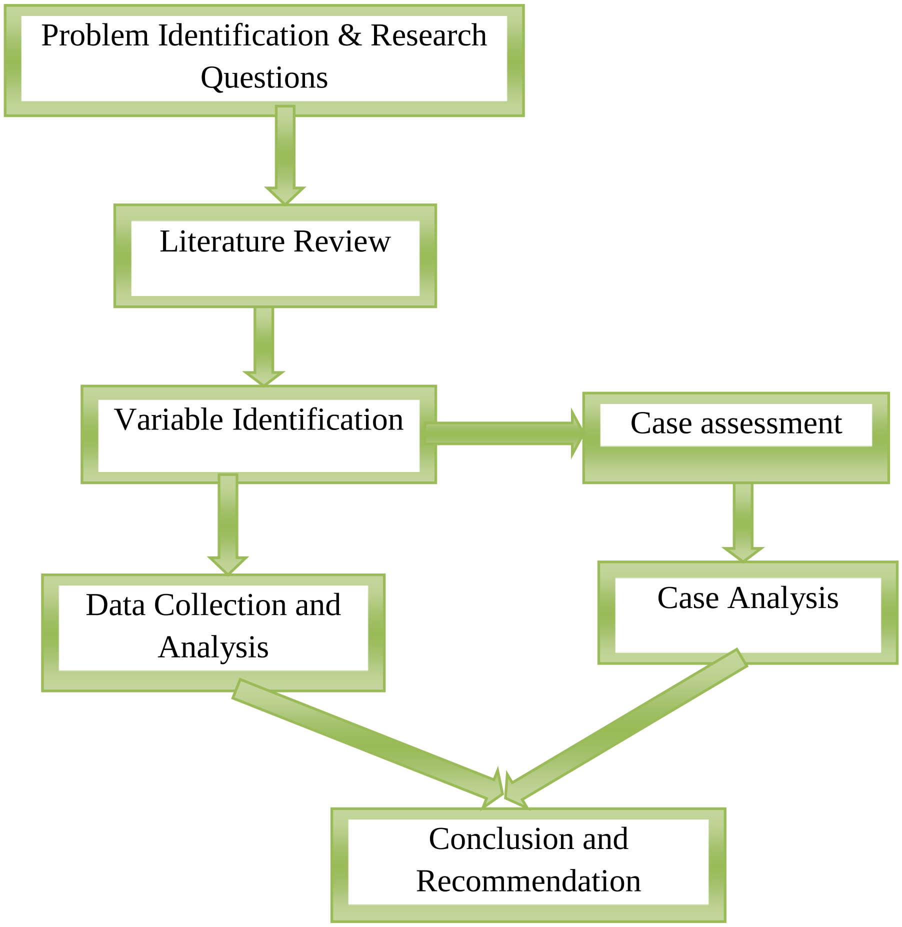

Figure 3.2: Study design

3.7. Data Presentation and Analysis

The data obtained was presented through diagrams, tables, and in written forms, so that the information required was clarified and easily understandable. Hence, data was analyzed by using descriptive analysis method. The data obtained from questionnaires and interviews was processed which involves simple statistical approach, the data collected through pre-tested structured questionnaire was categorized and analyzed. The data was tabulated, analyzed and interpreted using Excel sheet. Most of the findings were presented in the form of tables, pie charts and bar graphs to clearly illustrate the result and to help to easily understand. The five-point scale was converted to a Relative Importance Index (RII) for each individual factor using the following formula. The data received in the second questionnaire was analyzed by Relative Importance Index (RII) method.

$$\text{Relative importance index (RII)} = \frac{\Sigma W}{HxN} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. (3.1)$$

Where W is the total weight given to each factor by the respondents, which ranges from 1 to 5 and is calculated by an addition of the various weightings given to a factor by the en/tire respondent, H is the highest ranking available (5 in this case) and N is the total number of respondents that have answered the question.

To achieve the research objectives both of qualitative and quantitative methods of data analysis was applied. In order to analyze the questionnaires quantitative the study was used simple descriptive statistics such as frequency, tables, and percentage. Also, the qualitative explanation was employed for key informant interview responses and open-ended questions which were analyzed thematically.

3.8. Data quality assurance

The quality of the data was assured by using validated structured questioner. Data collectors were trained intensively on the study, objective of the study, confidentiality of the information, informed consent and interview technique. The data collectors were work under close supervision of the researcher to ensure adherence to correct data collection procedures and reviews the filled questioner at the end of data collection every day for completeness.

3.9. Ethical Consideration

According to Creswell (2003) under ethics of research, the following parts need to be considered. During the identification of the research problem, it is important to identify a problem that will benefit individuals being studied. In developing the purpose statement or the central intent and questions for a study, proposal developers need to convey the purpose of the study that will be described to the respondents. As anticipate data collection they need to respect the respondents and the sites for research.

Other procedures during data collection involve gaining the permission of individuals in authority (gatekeepers) to provide access to study respondents at research sites. Researchers need to respect research sites so that the sites are left undisturbed after a research study. Researchers also need to anticipate the possibility of harmful information being disclosed during the data collection process.

Analysis and Interpretation: In anticipating a research study, consider the following:

- How the study will protect the anonymity of individuals, roles, and incidents in the project.
- Data once analyzed, need to be kept for a reasonable period of time. This is to protect leakage of information/raw data
- In the interpretation of data, researchers need to provide an accurate account of the information.
- Considering the above recommendations and other procedures, formal letter was obtained from JiT Post Graduate and Research Program office and submitted to respondents (contractors, consultants, Clients/owner and other civil engineer professionals who have experiences in building construction projects) for the remaining interviews the formal letters was also be used. Before starting data collection the purpose of the study was explained to all respondents and informed consent was obtained

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

The chapter present data analysis and findings from the interview, site observation and survey questionnaire. It begins with descriptive analysis of the demographics' variables of participating firms and respondents. The main statistical methods and tools used were relative importance index. Data collected from the questionnaires were tabulated and analyzed according to their ranking on relative importance index. Charts were created, where appropriate, in support of the descriptive analysis to clarify their status.

4.2. Demography and respondents' profiles

4.2.1. Respondent information

A total of 130 questionnaires were distributed to the contractors, consultants and clients representatives. Among the distributed a total of 70 questionnaires were returned constituting 53.85 % response rate. Figure 4.1 shows the breakdown of the number of response received from the selected organizations.

Table 4.1: Respondent information

S/N	Firm's role	Questionnaires distributed	Questionnaires returned	Respond (%)
1	Client	70	50	
2	Consultant	30	15	
3	Contractor	50	25	
	Total	130	70	53.85

4.2.2. Role of respondents in the organization

The role of respondent in the organizations was represented in the survey. Considering the current positions in the construction industry, 42% were site engineers, 44% office engineers, 2% were project managers, 6% were supervisors, and 6% were other civil engineer professionals.

Table 4.2: Position of respondents in the organization

S/N	Job Title	Position (No)	Position (%)
1	Site engineer	21	44
2	Office engineer	22	42
3	Project manager	1	2
4	Supervisor	3	6
5	Other	3	6

4.2.3. Academic Qualification of Respondents

Concerning professional backgrounds of respondents, Table 4.3 shows that, academic qualifications of respondents comprised of bachelor's degree 76% and master degree 24% and there were no qualifications below degree or above master's degree.

Table 4.3: Academic Qualification of Respondents

S/N	Educational Level	Acc. Rank (No)	Acc. Rank (%)
1	Diploma	0	0
2	Degree	38	76
3	Master's degree	12	24
4	Doctorate degree	0	0

4.2.4. Area of Respondents' Profession

Table 4.4 shows that, the professionals working on contract management is 26.73%, design is 15.27%, construction is 50% and management is 8%.

Table 4.4: Area of experience of the respondents

S/N	Area of work	Profession (No)	Profession (%)
1	Design	8	15.27
2	Construction	24	50
3	Management	4	8
4	Contract management	14	26.73

4.2.5. Experience of Respondents

Table 4.5 shows that, 50%of respondents had worked in the construction industry less than 5 years, 42% between 6-10 years, 6% between 11-15 years and 2% between 21-30 years.

Table 4.5: Experience of respondents

S/N	Duration of Experience	Experience (No)	Experience (%)
1	0-5	25	50
2	6-10	21	42
3	11-15	3	6
4	16-20	0	0
5	21-30	1	2

4.3. Factors of cost on underperformance of construction projects

Generally, competitive low bid method has been highly criticized for its negative impact on contractor's profit, disputes/claims, coordination, quality control and project duration. As it was shown on Table 4.6, the major contributors of this poor performance related to cost are identified from different recently published journals. Accordingly, ten main factors are identified and ranked based on their relative importance index (RII) accordingly: Unfairestimation of project contract period (RII=0.808), Lack of proper supervisions (RII=0. 806), and Poor scheduling during construction (RII=0.794) are top three factors.Aftab et al, 2012 concluded that, Poor time and cost performance are major problems faced by today's construction industry. They conclude that 92% of construction projects in Malesia were overrun and only 8% of project could achieve completion within contract duration.

Table 4.6: Factors of cost on underperformed construction projects

S/N	Causes	SDV	RII	Ranks
1	Under estimation of project costs	0.66	0.775	4
2	Unfair estimation of project contract period	0.65	0.808	1
3	Conflict among team members.	1.083	0.690	9
4	Poor scheduling during construction	0.75	0.794	3

5	Lack of proper work planning and scheduling	0.96	0.762	6
6	Selection of lower grade of contractor	0.83	0.631	10
7	Lack of proper supervisions	0.97	0.806	2
8	Rework due to improper quality and mistakes	0.84	0.765	8
9	Reluctance in timely decision by project manager.	0.65	0.752	7
10	Ignorance of appropriate planning tools and techniques by project manager.	1.11	0.766	5

4.4. Cost performance of construction projects

The cost performance of the construction projects was shown in Table 4.7. Even though projects are under performed; it was more effective when compared with time, since almost all projects are under performed in context of time (contract duration) as it was shown in Table 4.9. From ten projects five of them were going well without cost-over run as shown in Table 4.7. From this it can be conclude that the contract administrator was sensitive to project cost than project time. The amount of cost overrun was in between 0-25% as agreed by respondents with an average of around 10%. The study conducted by Binyam, et al, 2016 on Evaluation on the Performance of Lowest Responsive Bid Contract, they conclude that, current bid awarding method of Ethiopia, competitive least bidder. This leads the bidder not to get adequate profit; this pushes them to use poor quality of local construction materials, delay and cost over-run. Finally, this work provides valuable information to the Ethiopian government, clients, consultants and contractors and other stakeholders who desire to improve bidding methods. Also, in a survey conducted in the Oromia Regional State, by (Mosisa, L, 2006) reveals that, the non-existence of real competition during the contractor selection; excessive time overruns; compromising quality; and escalation of the final project cost of the estimated cost were the major problems associated with the existing approach of delivering projects.

Table 4.7: Cost performance of construction projects

S/N	Project Name	Cost over-run (%)	Completion stage (%)

1	Construction of Cafeteria, Guard house, Site work and Septic tank	0.43	90
2	Kosober fence work	0.00	17
3	Construction of Kosober G+4 Shop	24.48	86
4	Construction of G+4 standard shop	19.66	98.11
5	Construction of G+4 Shop	25.03	23.5
6	Construction of 3B+G+Mez+5 regional office building	0.00	28.15
7	Construction of Akaki Rigid Pavement	0.00	100
8	Construction of Fork lift shade and rigid pavement	0.00	75
9	3B+G+M+5 Regional office	2.75	17
10	Construction of G+4 standard shop	18.57	96.7
Average		9.92	

4.5. Time related performance of the contractors

The major contributors of this poor performance related to time were shown in Table 4.8. Ten main factors are identified and ranked based on their relative importance index (RII) accordingly. The selection of lower grade of contractor (RII = 0.930), Poor human resource management (RII = 0. 850), and Lack of proper work planning, and scheduling (RII = 0.812) are top three factors.

Table 4.8: Time related causes of underperformed construction projects

S/N	**Causes**	Mean	SDV	RII	Ranks
1	Less estimation of project costs	1.82	0.93	0.773	7
2	Unfair estimation of project contract period	1.9	0.67	0.773	5
3	Conflict among team members.	1.73	0.62	0.761	9
4	Poor scheduling during construction	2.09	0.9	0.808	4
5	Lack of proper work planning and scheduling	2.18	0.93	0.812	3
6	Selection of lower grade of contractor	2.27	0.62	0.93	1
7	Poor human resource management	2.2	1.11	0.85	2

8	Lack of supervisions	1.73	0.75	0.761	9
9	Rework due to improper quality and mistakes	1.82	0.94	0.773	7
10	Reluctance in timely decision by project manager	1.9	0.9	0.780	6

4.6. Performance of construction projects

Projects are completed as per the original contact time with their average time over-run of 48.80% as shown in Table 4.9. Even though the progress of the project is less than 10%, delay was observed in some projects. It may not be difficult to assume how these projects will be delayed when their progress reaches 100%. So Ethio-telecom should check the bid process. Binyam, et al, 2016 conclude that, the major causes of poor performance of projects are by itself the system evaluation method of awarding, poor scheduling, and programming during construction, missed and change of design, inviting a number of projects at once particularly for lower grade contractors. And the major causes of poor performance of lowest responsive bidders are financial problem, lower grade contractors, inviting several projects once and lesser project estimation. These problems may lead to the failure of the project as well as difficult to keep the given time, cost and quality in the construction industry.

Generally, many studies outlined the issue of poor time and cost performance of construction projects worldwide which will support the finding of this study work. In a study of 8,000 projects, (Frame, 2007) found that only 16% of the projects could satisfied the criteria of completing projects on time, within budgeted cost and quality standard, while in a global study on cost overrun issues in transport infrastructure projects covering 258 projects in 20 nations (Flyvbjerg, et al., 2003) concluded that 9 out 10 projects face cost overrun. Time and cost overrun has been reported as major problems globally. According to (Aftab et al., 2012), Malaysian construction industry is also facing these problems significantly. In a survey of delay practices in Malaysian construction industry found that 87% of the respondent reported that they have encountered delays in their projects with overrun in time of 10-40% of contract duration while in study of MARA large projects. They concluded that construction projects encountered an overrun with average of 23.74% of contract duration.

Table 4.9: progress of the projects (source, Ethio-Telecom)

S/N	Project Name	Time over-run (%)	Completion stage (%)
1	Construction of Cafeteria, Guard house, Site work and Septic tank	68.67	90
2	Kosober fence work	48.67	17 days delay
3	Construction of Kosober G+4 Shop	21.85	86 days delay
4	Construction of standard shop	30.59	98.11
5	Construction of G+4 Shop	41.11	23.5
6	Construction of 3B +G+Mez+5 regional office building	63.42	28.15
7	Construction of Akaki Rigid Pavement	44.44	100
8	Construction of Fork lift shade and rigid pavement	80.00	75
9	3B+G+M+5 Regional office	51.10	17
10	Construction of G+4 standard shop	37.78	96.7
Average		48.80	

4.7. Quality and safety performance of contractors

4.7.1. Quality performance of the contractors

Contractor's performance in respect to quality of works and quality of materials were identified for the projects under the study. The results show that the quality of works for most projects (82%) is good. Similarly, the quality of materials is also good for most projects (85%). In contrast, the progress of most projects (48.80 %) time over-runand(9.92 %) of cost over-run were discovered. According to Laychluh (2012), Competitive low bidding (Price-Based): Although it is generally accepted that competitive low bid method saves taxpayers money and thus protects public interest, this traditional method has recently been criticized lately for promoting inferior quality, causing too many change orders, furthering adversarial relationships, time overrun, and increasing overall cost of the project. The Construction extension to PMBOK 3rd edition includes Safety planning, Perform Safety Assurance and Perform Safety Control. Thus, the overall the Safety management process maturity of the

contractors is found at basic level with a degree 2.37 an equivalent value from previous research. The research conducted by (W/Kidan, 2017) found out that rating value indicates there is an average of 77 % performance of project safety management in the industry. It is less than the average practice project management. Hence, this project management knowledge practice is poorly practiced.

Table 4.10: Factors influencing the quality performance of projects

Factors		RII	Rank
I. Worker Factors			
1	Historical Factors	0.537	1
2	Human Behavior Factors	0.4	2
3	Psychological Factors	0.385	3
II. Environmental Factors			
1	Natural Environment	0.528	1
2	Working Environment	0.457	2
III. Organizational Factors			
1	Incentives Factors and Project Budget	0.468	4
2	Policy Factors and Procedures Factors	0.414	5
3	Management Practices on site	0.557	3
4	Safety Training	0.571	2
5	Management Commitment	0.583	1

4.7.2. Safety performance of contractors

As safety becomes important to a construction industry, it is important to have a reliable measure for safety performance. Safety performance measures should give an indication of how well a construction project is doing in the area of safety. Such a measure should also provide an indication of when the level of safety performance is changing.

Table 4.11: Factors influencing the safety performance of projects

Factors		RII	Rank
I. Contractor Related Factors			
1	Poor Planning and control techniques	0.514	6

2	Lack of management commitment to continual quality improvement	0.657	1
3	Lack of training on quality for staff	0.5	7
4	High Level of competition	0.457	8
5	Lack of Management leadership	0.529	5
6	High number of competitors	0.557	4
7	Poor financial control on site	0.457	8
8	Lack of previous experience of contractor	0.6	2
9	Resource wastage on site	0.445	9
10	Lack of technical and professional expertise and resources to perform task	0.586	3
II. Consultant Related Factors			
1	Poor Monitoring and feedback	0.6	2
2	Inefficient teamwork among stakeholders	0.629	1
3	Lack of coordination between designers and contractors	0.514	6
4	Lack of On-Site project manager/ supervisor/ clerk of works	0.445	10
5	Inadequate project knowledge	0.486	8
6	Poor Information and communication channels	0.474	9
7	Lack of employee commitment and understanding	0.528	4
8	Unskilled manpower	0.5	7
9	Timely decision by the owner or his engineer	0.57	3
10	Commitment of all parties to the project	0.524	5

The percentage of contractor's exercise safety process according to standards is shown in Figure 4.10. The finding implies 13% of the contractors perform little or no safety management; the other 30% perform only 1 out of 3 safety management processes that are expected to be performed. Majority responses of contractors are exercised at the institutionalizing process to adopt project safety management more formally. According to FIDIC 2010 the human environment may have three dimensions: The labor & staff of the contractor or contractor's personnel as defined; Clause 1.1.2.7 cum Clause 4 cum 6.7 MDB-FIDIC; The employer personnel; see as defined; see Clause 1.1.2.6 cum 18.3 MDB FIDIC;

and the general public.The safety obligation of the contractor as to its staff & labor (its personnel broadly) is both contractual & legal; the contract of employment (applicable laws & regulations); for its own staff & labor. However, the safety of the projects on which this research conducted has not meet safety requirements. Even some of the contractors are not aware of the safety obligation.

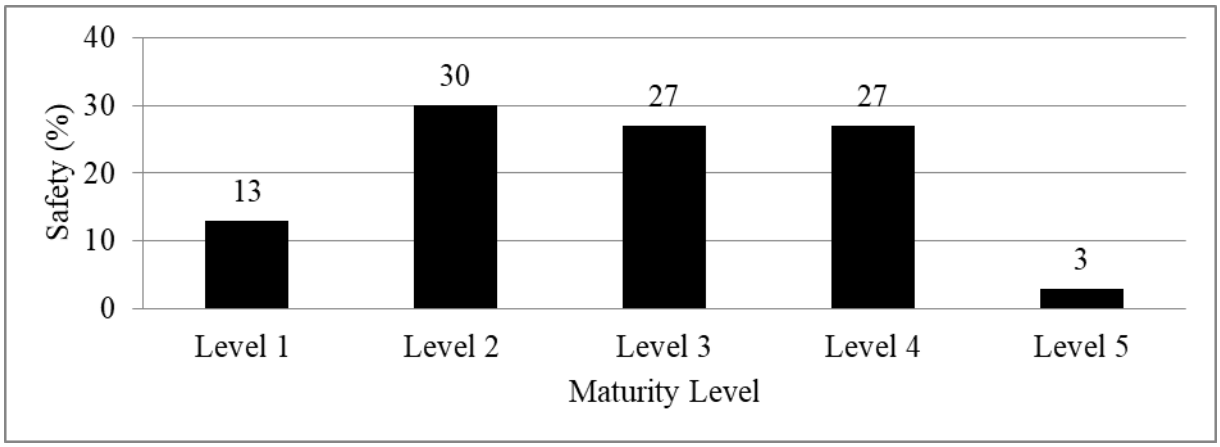

Figure 4.1: Maturity Level of Project Safety Management

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Performance measurement in construction industry remains critical tool for effective contract administration of the project delivery in both developed and developing countries. However, in developing countries where most construction project are delivered by lowest bidder bid award system they find themselves confronted with cost, time and quality performance which it is believe that it presents a mechanism for privilege of robust construction industry these countries. The objective of this study was to investigate the performance of Ethio-Telecom projects which are awarded by lowest bidder awarding system. The research has identified the cost, quality, and time related performance of the projects. The finding from this study concludes based on the selected projects for this study. Accordingly,

- On average 48.80% of construction projects were exposed to time over-run and only 51.20 % of project could achieve completion within contract duration.
- The amount of time over-run was varied from 21.85% to 80.00%.
- The amount of cost over-run was varied from 0 to 25% as agreed averagely by 10% of respondents.
- The results show that the quality of work for most projects is good by 82%. Similarly, the quality of materials of most projects is also good by 85%.
- The major contributors of poor performance related to cost were identified and ranked based on their relative importance index (RII) accordingly. Unfair estimation of project contract period (RII=0.808), lack of proper supervisions (RII=0. 806), and poor scheduling during construction (RII=0.794) are top three factors.
- Also, factors related to time performance were identified and ranked accordingly. Selection of lower grade of contractor (RII = 0.930), poor human resource management (RII = 0.850), and lack of proper work planning, and scheduling (RII = 0.812) are top three factors.

5.2. Recommendations

Based on the result of the study, the following recommendations were forwarded as remedial measure and solution.

- The contractors should carefully assess the market situation and apply for bid as the project will not expose to un-expected cost variation.
- The consultant should carefully evaluate the effectiveness of the work plan or schedule submitted by the contractor as it will within the project time duration proposed by the client.
- The client should quickly pay any payment requested by contractor for completed works as it will not factor for material provision.
- The consultant should give an attention to material quality checking during construction as it will not happens an effect on quality of work.
- There must be a strong cooperation among client, consultant and contractor as an idle will not happen on man power.
- The contactor should include in his or her work plan and schedule the daily execution of work for each worker in the company in terms of quantity.
- There must be clear evaluation criteria on daily work execution and man power on site.
- There must be clear evaluation criteria for professionals working on contractor's side.
- The way of material preparing and handling on site is forwarded as future study.
- Human safety management system of contractors as future study.
- Many project running challenge of contractors on project duration as future study.
- Developing appropriate bidders awarding technique for Ethiopian construction project procurement is forwarded as future study.

REFERENCES

Abdul, R. R. (2011), Quality management in construction, CRSPress. Taylor and Francis group: ISBN- 13:978-1-4398-3872-3 (Ebook-PDF)

Aftab Hameed Memon, Ismail Abdul Rahman, and Ade Asmi Abdul Azis (2012), Time and Cost Performance in Construction Projects in Southern and Central Regions of Penisular Malaysia.

Ahmed, I. (2013). Alternative Bid-Evaluation and Contract-Award Systems, Department of Construction Management, College of Engineering and Design, Florida International University, Miami, Florida.

Amir Mohammadia, Mehdi Tavakolana and Yahya Khosravib (2018) Factors influencing safety performance on construction projects: A review

Azman, N. S., Ramli, M. Z., & Zawawi, M. H. (2018), Factors affecting quality management of construction project using industrialized building system: A review, International Journal of Engineering and Technology (UAE), 7(4), 307–311.

B. Flyvbjerg, M. K. S. Holm, and S. L. Buhl (2003), How common and how large are cost overruns in transport infrastructure projects? Transport Reviews, vol. 23, pp. 71-88.

Binyam Letarge, Emer T. Quezon and Yolente C. Macarubbo (2016) Evaluation on the Performance of Lowest Responsive Bid Contract and the Quality of Materials Used on Governmental Building Projects in Jimma Town, International Journal of Scientific & Engineering Research, 7 (12)

Carr, P.G. (2005), Investigation of Bid Price Competition Measured through Prebid Project Estimates, Actual Bid Prices, and Number of Bidders,Journal of Construction Engineering and Management,131(11), 1165-1172.

Cliff Dunlap, December (2012), A safety elements model for the building construction industry, Doctoral Thesis in Department of Engineering Science, Louisiana State University and Agricultural and Mechanical College

Crowley, L.G., and Hancher, D.E. (1995), Risk Assessment of Competitive Procurement, Journal of Construction Engineering and Management, 121(2), 230-237.

E. G. Sinesilassie, S. Z. S. Tabish & K. N. Jha (2017), Critical factors affecting cost performance: a case of Ethiopian public construction projects, International Journal of Construction Management.

Hassanein, A. G., and Hanna, R. S. (2008), Safety Performance in the Egyptian Construction Industry, J. Constr. Eng. Manage, 134 (6), 451-455.

Herbsman, Z., and Ellis, R. (1992), Multi-parameter bidding system Innovation in contract administration, ASCE Journal of Construction Engineering & Management, 118(1), 142-150

J. D. Frame (1997), Establishing project risk assessment teams, in Managing risks in projects, K. Kahkonen and K. A. Artto, Eds.: E & FN Spon, London.

Lema Mosissa (2006), Alternative Project Delivery Methods for Public Constructions: Cases in Oromiya Region, September

Laychluh and Ababe Dinku (2012) performance study of lowest bidder bid awarding system in public construction projects, Addis Ababa University.

Meindl, H. (1990). Total quality management (TQM), Band-Und Flechtindustrie.

Memon, A., Rahman, I., & Azis, A. (2012), Time and Cost Performance in Construction Projects in Southern and Central Regions of Peninsular Malaysia, International Journal of Advances in Applied Sciences.

Molenaar, Keith R. and Douglas D. Gransberg (2001), Design-Builder Selection for Small Highway Projects, Journal of Management in Engineering, American Society of Civil Engineers, 17(4), 214-223.

Mosissa, L. (2006). Alternative Project Delivery Methods for Public Constructions, Cases in Oromiya Region.

Nicholas Walliman (2011), Research methods -the basics, Taylor & Francis e-Library, 9-13

Oh, J.I.H. and Sol, V.M. (2008). The policy program improving occupational safety in the Netherlands: An innovative view on occupational safety. Safety Science, 46(2), 155-163.

Pheng, L. S., & Teo, J. A. (2004), Implementing Total Quality Management in Construction Firms, Journal of Management in Engineering, 1(8)

Photios G. Ioannou, Ann Arbor Sou-SenLeu (1993), Average-Bid Method-Competitive Bidding Strategy: ASCE Journal of Construction Engineering and Management, 119(1).

Proclamation no. 649/2009), Project Management Book of Knowledge: Glossary of Terms. PMI 1987

Riham El-nagar, 2015 continued, Development of a Safety Performance Index for Construction Projects. Master Thesis. Faculty of Engineering, Mansoura University, Egypt

Tarricon, P. (1993) Deliverance, J. Civil Engineering.

Tengan Callistus, Anzagira Lee Felix, Kissi Ernest, Balaara Stephen, and Anzagira Che Andrew (2014), Factors Affecting Quality Performance of Construction Firms in Ghana: Evidence from Small–Scale Contractors. Civil and Environmental Research 5(1)

W/Kidan, Befkadu (2017) the practice of project management in Ethiopian real estate industry and its contribution to project success: The case of selected company in Addis Ababa

APPENDICES

JIMMA UNIVERSITY

JIMMA INSTITUTE OF TECHNOLOGY

SCHOOL OF GRADUATE STUDIES

FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING

CONSTRUCTION ENGINEERING AND MANAGEMENT CHAIR

Date: _____

Subject: Request to respond to a questionnaire for MSc thesis work

Dear Respondent,

Thank you for agreeing to participate in this research study. My name is **Deraje Reggasa**. I am MSc candidate at Jimma University, Jimma Institute of Technology, Faculty of Civil &; Environmental Engineering. For the fulfillment of my MSc degree in Construction Engineering, I am working research on the topic of **Performance Evaluation of Least Bidders on Construction Projects: A case study of Ethio -Telecom.**

The objective of this survey is to collect information toanalyze the performance of least bidder contractors under Ethio-telecom projects. Your feedback is needed to help better understanding of performance of contractors Ethio-telecom projects.

Your Participation in this research survey is completely voluntary and there are no direct benefits for your participation, but I appreciate your time and effort. The survey includes three open-ended questions which are intended not to take more than 15 minutes of your time. Questions can be skipped, and you can stop at any point. There are no foreseeable risks to your participation. To protect your confidentiality, no names or company affiliation will be collected. If you have any questions regarding the questionnaire you can contact **Deraje Reggasa**(+251930105208) at reggasadereje@gmail.com or Alemu Mosisa (Assistant Professor) at alemu.mosisa@ju.edu.et.

Appendix A: Respondent Information

Instruction: Give your response by writing your Personal and organizational profile.

Your firm's Role (owner, consultant, contractor, academia, supplier)	
Your Job Title/Position:(site/office engineer, project manager, supervisor, other)	
Your education level (Diploma**,** Degree, Master's Degree, Doctorate's Degree.)	
Area of experience (educational, design, Construction, management, procurement)	
Years of experience:	

Appendix B:Questionnaires for contractor

Performance Evaluation of Least Bidders on Construction Projects: A case study of Ethio - Telecom

Part One: General questionnaire for contractor

1. Classification of Contractors in building works:

☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ Less 5th

2. Title of position of respondent

☐ Contractor ☐ Project manager ☐ Site engineer

☐ If others, (specify) _____

3. Experience years' respondent

☐ Less than 3years ☐ 3 to 5 years ☐ 6to 10 years ☐ More than 10 years

4. Experience years of the organization in constructions:

☐ Less than 3years ☐ 3 to 5 years ☐ 6to 10 years ☐ More than 10 years

5. Number of projects the organization executed in the last five years.

☐ Less than 5 ☐ 5 to 10 ☐ 10 to 15 ☐ More than 22

6. Profit the organization earned from the executed projects during the last five years (in million ETB):

☐ Less than 1 ☐ 1to 3 ☐ 4to 6 ☐ More than 6

7. From your experience, how do you rate in percentage the quality of projects executed by the lowest bid system?

☐ 0%-25% ☐ 25%-50% ☐ 50%-75% ☐ 75%-100%

8. From your experience, how do you rate in percentage the project cost in lowest bid system when projects are exposed to change?

☐ 0%-25% ☐ 25%-50% ☐ 50%-75% ☐ 75%-100%

9. How much percent defects are observed from the built facilities within the warranty period?

☐ 0%-25% ☐ 25%-50% ☐ 50%-75% ☐ 75%-100%

10. How do you rate the overall performance of these projects as compared to other design build (DB) projects?

☐ Excellent ☐ Good ☐ Fair ☐ Poor

11. How much (%) fair and transparent of bidding procedure were made in the construction industry of Ethiopia?

☐ 0%-25% ☐ 25%-50% ☐ 50%-75% ☐ 75%-100%

12. What sort of information your organization is seeking to obtain from contractors to prepare the evaluation list in the system of LBBA?

Sort of information	Rank (1 to 7)
Financial stability	
Technical & management ability	
Experience	
Health and safety	
Reputation	
Culture experience	
For other reasons, please specify	

13. At what level the assessment of contractor selection process take place in List Bid Bidder Awarding System? (tick one or more)

☐ Technical department and engineering ☐ Financial department

☐ Project management team ☐ High managerial level (director)

☐ Independent consultant ☐ A committee consist of (1, 2, 3, 4)

☐ Other reasons, please specify

Part Two:Challenges of Lowest bidder bid selection system of public construction projects

1. List of challenges of LBBAS for the study are mentioned below. From your experience, please tick the appropriate cell by indicating how much you agree to listed challenge that you are facing in the construction industry specifically in Ethio-Telecom.

   (1) Very law (2) Low (3) Somewhat (4) High (5) Very high

S/N	Challenges of Lowest bidder bid selection system	Scale of challenges				
		1	2	3	4	5
1	Lack of project information on past performance for contractors', quantity of recently contracted work and their financial situation					
2	Imprecise and ambiguous contract documentation may cause a contractor to make a serious omission of cost estimation.					
3	Increasing number of contractors and competition makes bidders quote low prices to win the bid and remain in business.					
4	Utilization of ideal resources, machines, equipment and vehicles enforces contractors to bid in low price in construction business of public sector					
5	Manual work and favorable location of site may affect the bid price.					
	If there is no manual work, then lower is the bid price and					
	If the new site is adjoining with current site of contractor, this can be a big factor for low bid.					
6	Nature of work (lower bid in earthwork and simple structure than that of major structural works).					

7	Contractors' perception on variation. Contractors initially go for abnormally low bid with the intention of recovering their losses through change orders and claims.					
8	Contractors' classification is not accurate					
9	Absence of complete detail design, specification and contract document for projects.					
10	Weak contract administration of client leads to poor quality works					
11	Lack of experience of staffs in tendering					
12	Inflexibility/bureaucratic process used in the current government purchasing system					
13	Absence of site visit and understanding of scope of work in detail before bid for contractors.					
14	Shortcomings in professional contractors					
15	Contractors' target of increasing annual turnover in low bid					
16	Absence of using PPA or FIDIC Standard Forms of Contracts					
17	Occurrence of discriminatory and non-quantifiable criterion in evaluating tenders for projects.					
18	Accessibility of minutes/records of proceeding projects to tenderers					
19	There was exclusion of tender(s) on the basis of corruption, collusion, and false declarations.					
20	Favoritism and corruption cannot be avoided if negotiated bid procedure is used.					

Part Three: Impact of LBBAS (Lowest Bidder Bid Awarding System)

1. Lists of impact of LBBAS for the study are mentioned below. From your experience, please tick the appropriate cell by indicating how much you agree to listed impacts which influence construction projects in Ethio-Telecom.

(1) Very law (2) Low (3) Somewhat (4) High (5) Very high

S/N	Impact of LBBAS	Scale of Impact				
		1	2	3	4	5
1	Lengthy delays of projects					
2	Re-tendering for projects several times					
3	Select of inefficient contractors					
4	Failed Projects					
5	Shortages in resources (labors, equipment, materials, etc.)					
6	Increased disputes and claims between contracting parties					
7	Underachievement in project performance					
8	Financial loss for owner					
9	Financial loss for contractor					
10	Change in project scope					
11	Failure to achieve the project objectives					
12	Long tendering durations may cause the withdrawal of contractors due to increasing price changes					
13	Increase in maintenance, replacement and operational costs					
14	Stress on the public services such as water, sanitation, electricity and transportation					
15	Serious question on public safety					
16	Financial difficulty in effective contract management					
17	Delay on project completion (more severe than cost)					
18	Searching loop holes for omitting some items or quantities of work					
19	Cost overrun					
20	Increasing number of dispute					
21	Increasing number of claims					
22	Increasing number of change request/orders					
23	Chances of illegal work					
24	Evasion of social contribution and tax					
25	Unsatisfactory quality of work					

26	If other, please specify:					

Part Four: Compare lowest bidder bid selection system with different bidding alternatives

1. From your experience, which methods of bid are used mostly in your selecting procedure of contractor for project award?

☐ The Average Bid Method ☐ Low Bid Method ☐ Negotiated bidding

☐ If other, please specify _____

2. Which type of bidding system can bring positive changes as compared to the lowest bidding?

☐ Competitive Negotiated Bidding

☐ Non-Competitive Negotiated Bidding

☐ Multi Parameter Bidding Method (based on price and other factors)

☐ Competitive Average Bidding

3. How do you describe your organization's bid evaluation procedure?
   A. Based on bid price only
   B. Based on bid price and responsiveness
   C. Based on bid price, responsiveness, and other factors,
   D. (Please specify): _____
4. From your experience, on the contractor side in which methods of bid you are mostly involved for project awarding?

☐ The Average Bid Method ☐ Low Bid Method ☐ Negotiated bidding

☐ If other, please specify _____

5. Are you satisfied with the bid evaluation procedure currently in use in your organization?

   A. Yes B. No C. Some what

Prioritize the following lists of bid methods by giving high concern in terms of qualitative, technical and sustainable aspects of the tender submission as well as price when reaching an award decision as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}).

Bid Methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

6. Prioritize the following lists of bid methods by hitting the stated objective of the project in terms of best performance, more secured and less risk when reaching an award decision and on construction phase as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}).

Bid Methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

7. Prioritize the following lists of bid methods in terms of difficulty to understand how contractors could complete the job profitably as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}).

Bid Methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and other factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

8. Please indicate the frequency of your organization's work awarded under the following project delivery and bid-award methods (%).

S/N	Indication of project delivery and bid-award methods	0%to 25%	25% to 50%	50% to 75%	75% to 100%
1	Competitive method of awarding contract to the lowest responsive bidder				
2	Negotiation with one or more preselected contractors)				
3	Request for proposal/request for qualification inviting proposals from contractors for prequalification and/or negotiation.				
4	If Other, Please specify				
5					

Appendix C: Questionnaire for owner

Performance Evaluation of Least Bidders on Construction Projects: A case study of Ethio - Telecom

Part One: General

Name of the employer: _____

Project name: _____

1. Status of the project.

Description	Values	Remark
Date of signature		
Contractor value main agreement (ETB)		
Supplementary agreement (ETB)		
Variation (ETB)		
Total amount (ETB)		
Contract time (Days)		

Completion date		
Additional time given		
Extension of time given		
Revised completion date		
Time elapsed (Days)		
Time elapsed (%)		
Work planned (%)		
Work executed (%)		

2. Summary of financial evaluation of Bidders

Name	**Corrected bid amount (ETB)**	**Remark**
Bidder 1		
Bidder 2		
Bidder 3		
Bidder 4		
Bidder 5		
Bidder 6		
Bidder 7		
Bidder 8		
Bidder 9		
Bidder 10		
Engineers Estimate		
Clients Estimate		

Please fill only the first 10 least bidders if the number of renderers is greater than 10.

3. The contract was awarded to the lowest bidder because one or more of the following:

(x or √)

Description	Remark
It is a government practice	
The contractor was pre-qualified	

The offer was close to our estimate	
It was a reasonable competitive offer (No large difference from others)	
The contractor was the most competent	
The client (yourself) had good experience with the contractor	
The contractor was classified	
If others, please specify:	

4. Which requirements you prefer to improve the lowest bid awarding system?

   _____

   _____

   _____

5. Major difficulties encountered during the construction process.

Encountered difficulties	**Yes**	**No**	**Unknown**
Shortage of material			
Shortage of equipment			
Shortage of cash			
Shortage of man power			
Employer Interference			
Design/Drawing related			
Supervision Related			
Other's			

6. Evaluation of contractor's performance

Evaluation requirement	**Excellent**	**V. Good**	**Good**	**Fair**	**Poor**
Quality of work					
Adherence to construction and specification					
Organization					
Activity work follow-up and submission					

Cooperation with owner					
Progress of work					

7. What sort of information your organization is seeking to obtain from the contractors to prepare the evaluation list in the system of LBBA?

(1) Very law (2) Low (3) Somewhat (4) High (5) Very high

Basic Criteria's					
	1	2	3	4	5
Financial stability					
Technical & management ability					
Experience					
Health and safety					
Reputation					
Culture experience					
For other reasons, please specify					

8. How much percentage of fair and transparent of bidding procedure was made in the construction industry of Ethiopia?

☐ 0%-25% ☐ 25%-50% ☐ 50%-75% ☐ 75%-100%

9. At which level the assessment of contractor selection process take place in Lowest Bidder Bid Awarding System? (tick one or more)

☐ Technical department and engineering ☐ financial department

☐ Project management team ☐ High managerial level (director)

☐ Independent consultant ☐ By a committee member

☐ Other reasons, please specify

Part Two:Challenges of Lowest bidder bid selection system of public construction projects

2. List of challenges of LBBAS for the study are mentioned below. From your experience, please tick the appropriate cell by indicating how much you agree to listed challenge that you are facing in the construction industry specifically in Ethio-Telecom.

   (1) Very law (2) Low (3) Somewhat (4) High (5) Very high

S/N	Challenges of Lowest bidder bid selection system	Scale of challenges				
		1	2	3	4	5
1	Lack of information for contractors' past performance, quantity of recently contracted work and their financial situation.					
2	Imprecise and ambiguous contract documentation may cause a contractor to make a serious omission in calculating costs.					
3	Increasing number of contractors and competition makes bidders quote low prices to win the bid and remain in business					
4	Utilization of their ideal resource machine, equipment and vehicles enforces contractors to bid in low price in construction business of public sector					
5	Manual work and favorable location of site may affect the bid price.					
	If no manual work, lower is the bid price and					
	If the new site is adjoining to current site of the contractor, it can be a big factor for low bid.					
6	Nature of work (lower bid in earthworks and simple structures than in major structural works).					
7	Contractor's perception on variation. Contractors initially go for abnormally low bid with the intention of recovering their losses through change orders and claims					
8	Contractors' classification is not accurate					

9	Absence of details of design, specification and contract document for projects.					
10	Weak contract administration of client leads to poor quality of work assumption which is not to be maintained.					
11	Lack of experience of staff in tendering					
12	Inflexibility/ Bureaucratic process used in the current government purchasing system					
13	Absence of site visit and no understanding of scope of work in detail before bidding by contractors.					
14	Shortcomings in professional contractors					
15	Contractors have to bid low to increase annual turnover					
16	Non-use of PPA or FIDIC Standard Forms of Contracts					
17	Using discriminatory and non-quantifiable criterion for evaluating tenders of projects.					
18	Accessibility of minutes/ records of proceedings project to tenderers					
19	There was exclusion of tender(s) on the basis of corruption, collusion, and false declarations.					
20	Favoritism and corruption cannot be avoided if negotiated bid procedure is used.					

Part Three: Impact of LBBAS (Lowest Bidder Bid Awarding System)

2. Lists of impact of LBBAS for the study are mentioned below. From your experience, please tick the appropriate cell by indicating how much you agree to listed impacts that influence to the construction in Ethio-Telecom.

(1) Very law (2) Low (3) Somewhat (4) High (5) Very high

S/N	Impact of LBBAS	Scale of Impact				
		1	2	3	4	5
1	Lengthy delays for projects					

2	Re-tendering for projects several times					
3	Select of inefficient contractors					
4	Failed Projects					
5	Shortages in resources (labors, equipment, materials, etc.)					
6	Increased disputes and claims between contracting parties					
7	Underachievement in project performance					
8	Financial loss for owner					
9	Financial loss for contractor					
10	Change in project scope					
11	Failure to achieve the project objectives					
12	Long tendering durations may cause the withdrawal of contractors due to increasing price changes					
13	Increase in maintenance, replacement and operational costs					
14	Stress on the public services such as water, sanitation, electricity and transportation					
15	Serious question on public safety					
16	Financial difficulty in effective contract management					
17	Delay on project completion (more severe than cost)					
18	Searching loop holes for omitting some items or quantities of work					
19	Delay on project completion (more severe than cost)					
20	Cost overrun					
21	Increasing number of dispute					
22	Increasing number of claims					
23	Increasing number of change request/orders					
24	Chances of illegal work					
25	Evasion of social contribution and tax					
26	Unsatisfactory quality of work					
27	If other, please specify:					

Part Four: Comparison of Lowest Bidder Bid selection system with different bidding alternatives

1. From your experience which methods of bid are used mostly in your selecting procedure of contractor for the project award?

☐ The Average Bid Method ☐ Low Bid Method ☐ Negotiated bidding

☐ If other, please specify _____

9. How do you describe your organization's bid evaluation procedure?
   E. Based on bid price only
   F. Based on bid price and responsiveness
   G. Based on bid price, responsiveness, and other factors,

(Please Specify): _____

10. From your experience, on contractor side in which method of bid you are mostly involved for the project awarding?

☐ The Average Bid Method ☐ Low Bid Method ☐ Negotiated bidding

☐ If other, please specify _____

11. Are you satisfied with the bid evaluation procedure currently in use in your organization?

A. Yes B. No C. Somewhat

12. Prioritize the following lists of bid methods by giving high concern in terms of qualitative, technical and sustainable aspects of the tender submission as well as price when reaching an award decision as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

13. Prioritize the following lists of bid methods by hitting the stetted objective of the project in terms of best performance, more secured and less risk when reaching an award decision and on construction phase as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

14. Prioritize the following lists of bid methods in terms of difficult to understand how that contractor could complete the job profitably as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

15. Prioritize the following lists of bid methods in terms of attractiveness for owner cost expenditure as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

16. Prioritize the following lists of bid methods interims of good coordination between parties as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	

Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

17. Prioritize the following lists of bid methods interims of quality controlling of the work as (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th})

Bid methods	Rank
Competitive Low Bidding (Price-based)	
Competitive Average Bidding (Price-based)	
Multi Parameter Bidding Method (Based on price and "other" factors)	
Competitive Negotiated Bidding	
Non-Competitive Negotiated Bidding	

18. Please indicate the frequency of your organization's work awarded under the following project delivery and bid-award methods (%).

S/N	Indication of project delivery and bid-award methods	0%to 25%	25% to 50%	50% to 75%	75% to 100%
1	Competitive method of awarding contract to the lowest responsive bidder				
2	Negotiation with one or more preselected contractors)				
3	Request for proposal/request for qualification inviting proposals from contractors for prequalification and/or negotiation.				
4	If other, Please specify				
5					