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Investigation of Least Cost Contract Practice in Public Building Construction Projects, the Case of Bahir Dar City

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INVESTIGATION OF LEAST COST CONTRACT PRACTICE IN PUBLIC BUILDING CONSTRUCTION PROJECTS, THE CASE OF BAHIR DAR CITY

By

Gizachew Zelalem Nigat

January 2020

Bahir Dar, Ethiopia

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A Thesis Submitted to the School of Research and Graduate Studies of Bahir Dar Institute of Technology, BDU in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering (Construction Technology and Management) in the Faculty of Civil and Water Resource Engineering.

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Bahir Dar, Ethiopia

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this thesis work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation or fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged in partial fulfillment for the requirements of the award of a Master of Science Degree in Civil Engineering (Construction Technology and Management) under supervision of my research advisor Asregedew Kassa Woldesenbet, Ph.D., P.E.

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Place: Bahir Dar

This is to certify that the above statement made by the researcher is correct to the best of my knowledge and belief. This thesis has been submitted for examination with my approval as a university advisor.

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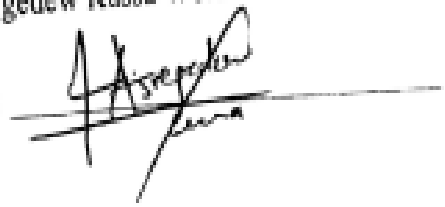
Advisor's Signature: 

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THESIS APPROVAL SHEET

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DEDICATION

I would like to dedicate this Research work to my family mainly to Enat Kassie, My Mother for everything she did to my life.

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ABSTRACT

Contract award and its management is a fundamental task in the execution of public construction projects in the construction industry. In Ethiopia, public-owned construction projects mostly used the least cost contract award system as a procurement and contract approach but it was traditional. Hence, the benefit of the contract award system should show effective performance with respect to the three construction parameters; cost, quality, and time. Different research was conducted to address the challenges of improving the contract award method, there is still a gap in improving contract approaches. Thus, the researcher came up with a research problem in the practice of the least cost contract in public building construction projects. The objective of this study is to investigate the practice of least cost contract and design a framework for the contract award system by taking public building construction projects in Bahir Dar city as a case study. The study adopted a questionnaire survey, interview, and case study research methodology to collect data from construction stakeholders involved in public projects with main participants including clients, contractors, and consultants. The study also analyzed the collected data using the average index of the Likert scale, Microsoft-excel, and SPSS application. The study finding indicated that the least cost contract of public building construction projects in Bahir Dar city was inadequately performed for the effective accomplishment of project cost, time, and quality parameters and different factors affecting the effective implementation of the least cost contract system were identified. As a result, the thesis found out low performance during execution and lest cost contract award system was the impact of the current contract awarding approach in public building construction projects. In line with this, the practice of other contract approach was investigated with respect to the current contract approach. Thus, the investigation of a conceptual contract award framework adaptation in public building construction project was a mandate to the effective achievement of project parameters.

Keywords: *Contract, Contract Award, Least Cost, Contract Framework, Public Building, Construction, Projects*

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LIST OF ABBREVIATIONS

ABV-Average Bid Value

ACWP/AC-Actual Cost Work Performed

ANRS-Amhara National Regional State

BAC-Budgeted at Completion

BCWP/EV-Budgeted Cost Work Performed

BCWS/PV-Budgeted Cost Work Schedule

BOT-Build Operate Transfer

CM-Construction Management/Manager

CPI-Cost Performance Index

CSI-Cost Schedule Index

CV-Cost Variances

DBB-Design Bid Build

DB-Design Build

EAC-Estimate at Completion

ETC-Estimate to Complete

ETTC- Estimated Time to Completion

EVM-Earned Value Management

EVR- Earned Value Report

FIDIC- International Federation of Consulting Engineers

GMP-Guaranteed Maximum Price

PPA-Public Procurement Agency

SPI-Schedule Performance Index

SPSS-Statistical Package for Social Science

SV-Schedule Variances

TCCPI- To-Complete Cost Performance Index

TCSPI-To-Complete Schedule Performance Index

VAC-Variances at Completion

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1. INTRODUCTION

1.1. Background of the Study

The construction industry is one of the largest industries in the world, which involves various participants and activities in planning, design, construction, operation, and administration. It plays a vital role in the national economy, including the development of residential housing, office, commercial and retail buildings, industrial plants, and the replacement, maintenance, and restoration of the nation's infrastructure and other public facilities. Hence bidding and contract awarding management issues are integral parts of the construction industry and its participants. In particular, bidding and procurement management of public building constructions are the main emphasis of both the government and the construction industry participants (Yousef S., 2009; Solomon S., 2015).

The least cost contract system management is one of the processes in the accomplishment of the contractual agreement for implementation, administration, and execution of projects, whereby contract award management is made in the provisions decided during a planning phase. It involves selection based on tender evaluation recommendations using the least cost and signing of contractual agreement followed by the administration for contractual implementation, progress tracking, changes, claims, and disputes administrations. This process is commonly practiced in our country Ethiopia for the tendering and contract awarding process of different public construction projects (Wubishet J., 2011).

Procurement, bid, and the least cost contract award management issues were directly related to the construction industry, its participants, and activities to improve procurement and contract management of public building construction projects. The practice of awarding contracts to a least-bidder was established to ensure the least cost for completing the construction project. In public construction projects, this practice is universally accepted not only for ensuring the least price but also for providing a way to avoid fraud and corruption in the process of bidding and contracting. In line with the least bid procurement or contract, award system has long-standing legal precedence, promoted open competition, and fair playing fields through evaluating by

organizing the tender evaluation committee and evaluate the bid in the presence of the bidders and clients (Shumank D., 2017).

Despite the benefits, this method of contract award system has various problems with respect to cost, time and quality of construction projects. Hence, these problems are the main constraints of the public building construction projects and the management systems of the least cost contract. Mostly the deviations due to various reasons can occur during the execution and completion phase of the construction project. The least cost bidding system has a limitation of focusing on the least price, which provides the contractors to care about cutting bid prices to the possible maximum extent instead of concentrating on quality-enhancing measures. There is a lower probability of awarding for the best performing contractors who will deliver the highest quality construction projects.

As a result, the least bid system may not result in the best value for the expended money, the best performance during and after construction has been completed. Moreover, the least bid contract award approach tends to promote more adversarial relationships rather than cooperation among contractors, designers, and project clients. Hence the objective of the study was intended to investigate the least cost contract practice and factors affecting effective implementation of the current contract approach in public building construction projects in Bahir Dar city in terms of project cost, time, and quality.

1.2. Statement of the Problem

The least cost contract is one of the traditional contract award systems practiced worldwide and it does not necessarily reflect the true cost, time and quality of public building construction projects at construction stages (Tariq H., 2015). Moreover, this type of contract does not provide a value-based procurement approach for public sectors which concerns the construction of large scale projects with the need for an advanced construction system rather than the cost of the project. Construction stakeholders have to go to recognizes that accepting the least bid price does not guarantee effective performance with respect to the construction parameters. Persisting problems of lower quality of constructing facilities, high incidence of

claims and litigation, frequent cost and time overruns have become the main features of the least cost contract approach (Shumank D., 2017).

Most project owners prefer to select contractors based on competitive tendering to get the least possible offers. This tendering system directly affects the cost of construction projects as well as time and quality management on public building construction projects. In the Ethiopian construction industry, the least cost contract is adapted as a mandatory procedure for government-owned projects (PPA., 2006).

The least cost contract is also practiced in the government-owned building construction projects of Amhara National Regional State (ANRS) in general and in Bahir Dar city the capital of (ANRS) in particular. The above-mentioned issues affect the effectiveness of construction projects in the area, and the influence of this contract management is progressive throughout construction phases.

The practice of the least cost contract adversely affects the construction stakeholders to make the decisions without the transparency and accountability principles, since the contractor falls in a tension of winning the bid, fixing the cost with reasonable quality, and increasing profitability. Thus, this study was done to investigate the practice of the least cost contract award system in public building construction projects of Bahir Dar city with project cost, time, and quality parameters.

1.3. Research Questions

- What is the effect of the least cost contract practice in public building construction projects performance?
- What are the factors affecting the effective implementation of the least cost contract in public building construction projects in terms of project cost, time, and quality?
- What are the measures to be taken for the effective implementation of contract award in public building construction projects in terms of project cost, time, and quality?

1.4. Objectives of the Study

1.4.1. General Objective

The main objective of this study is to investigate the least cost contract practice in public building construction projects in Bahir Dar city in terms of project cost, time, and quality.

1.4.2. Specific Objectives

- To assess the least cost contract practice in public building construction projects.
- To identify factors affecting the effective implementation of the least cost contract in public building construction projects.
- To investigate a contract award conceptual framework that serves in public building construction projects in Ethiopia.

1.5. Scope of the Study

This study has focused mainly on public building construction projects which are located in Bahir Dar city, the capital of Amhara National Regional State (ANRS). In addition, the study is limited to the impact of the least cost contract in government-owned building construction projects in terms of cost, time and quality parameters.

1.6. Significance of the Study

The results of this study are expected to provide numerous advantages through investigating the effect of the least cost contract for the parties involved in public building construction projects, especially for the construction players such as clients, contractors, governmental offices, and engineers or consultants.

In addition, the outcome of this study was expected to be used as a framework for contract award system in different public building construction projects in Bahir Dar city for bid preparation, contract award, and delivery of projects. Furthermore, it can be used as a reference material for upcoming related research studies.

1.7. Limitation of the Study

Even though the study has accomplished the objectives by taking reasonable measures, there was the hiding of some public construction project information related to cost, time, quality, and construction disputes in the case study was un-avoidable limitation.

1.8. Organization of the Study

Chapter 1 discusses the background of the study, a statement of the problem, research question, objectives, scopes, significance, limitation, and organization of the study. In line with this, Chapter 2 describes various works of literature relating to the thesis topic, which a researcher had gone through. Chapter 3 discusses various elements of the research methodology. Chapter 4 presents the results and discussion. Chapter 5 incorporates conclusions and recommendations with regard to the findings of the study. Lastly, bibliography and appendices are included.

2. LITERATURE REVIEW

2.1. Introduction

The construction industry in Ethiopia plays a great role in the socio-economic development and it contributes 4.8% to the gross domestic product (GDP) of the country. Thus, on average grew at about 22.7% per annum during the first three years of the first transformation plan. It implies that the construction industry has a significant contribution to the national economy through its forward and background linkage (Meseret E., 2017).

A study conducted in Ethiopia in Oromia regional state, non-existence of real competition during tendering and 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 and contract management of the least cost contract award system in construction projects (Lema M., 2006).

Completing tendered public construction contract projects within a predefined time, cost, and quality constraints is a primary aim for all public construction stakeholders mainly for clients, contractors, consultants, and project managers. Although these constraints play a significant role in the success of a construction project and their importance is ranked according to the specific requirements of each client and/or construction projects. Private clients place historically more importance on the quality and cost of the construction project. Recently, according to the European Union and National Infrastructure Programs, strict dates have been set for project completion and losing funding if project deadlines were not met and time factor has become extremely important for the public sector (Sergios L., 2012).

In public projects, quality cannot be compromised and tender selection procedures employed by clients during project tender ensure that all eligible tenders are capable of achieving the minimum quality standards defined in the tendering and contract document specifications. It guaranteed after the contract award through a strict quality control procedure is not negotiable. For this reason, in most cases, the public client's award is based on the least price only. In most cases, the client's contract award system is based on the least price only. In the least cost contract management system

punishments were expected for time deadline is disordered and contract cost of the project and quality is not control in public construction projects (Solomon S., 2015).

In the case of a tender without pre-selection clients relay on confidence on registered, experienced, and eligible contractors, instead of re-evaluating each tenderer status nearer to construction contract award of public building projects. This may face situations where the awarded contractor is not capable of completing the public building construction project either technical or financial reasons in projects. On the other hand, pre-selection procedures can become complicated in particular when many criteria are to be evaluated and their results are often based on subjective analysis. Furthermore, the time required to complete the tender would be excessive and execution is unproductive of the public construction project. Hence, the required time for a prequalification can be substantially reduced with the use of strict on non-subjective participation in financial and technical criteria that can be quantified and easily evaluated (Sergios L., 2012).

Generally, in order to ensure fair competition and transparency; the instruction distinguishes clearly between selection and contract award criteria of public building construction projects. The selection criteria of the bidder financial and technical capacity to complete the project and the specified instruction are not allowing the use of selection criteria during the contract award phase in construction. Prior to opening the technical and financial bid documents the instruction specifically determines the sole situations in which a bidder would be excluded from the bid in the least cost contract award system (Laychluh M., 2012).

2.2. Project Delivery

The project delivery systems have a great impact on project accomplishment and construction quality; it implies that no project delivery system option is perfect, one option may better be suited than another based on the unique requirements of particular projects (Park J. and Kawk H., 2016). The contract delivery system of the construction projects is the approach of project owners, project regulators and financiers determine the assignment of responsibilities of the stakeholders along the construction process and determined during the basic planning phase of the construction project.

According to (Wubishet J., 2007; Airport Consultants., 2012) construction project delivery systems are basically categorized into two comprehensive areas in the construction industry and it should align to the least cost contract awarding system.

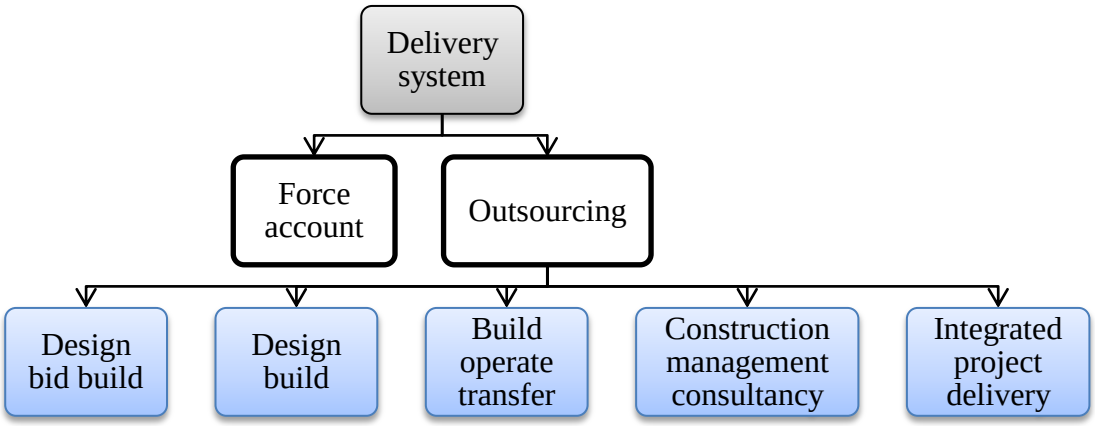

Figure 2.1 Contract delivery system

2.2.1. Force Account

The delivery system is when project owners themselves to carry out the project and often such a system is encouraged when the project owners rely on that there is a reasonable benefit in project cost, time, and quality issues in construction projects. Lack of capacity from the private sector to undertake very huge and technologically new projects, public companies do commence such projects through this construction delivery approach.

In addition, it is often used when construction projects are small and places are remote such that reaching them is difficult and they are not attractive enough to call the attention of bidders. Hence, construction projects are spatially scattered and maintenance is to be done by this delivery system in the construction industry.

2.2.2. Outsourcing

2.2.2.1. Design-Bid-Build

In regard to design, bid build delivery system after project owners prepared the basic planning that identifies construction project programs and calls upon the participation of design and/or consultants. The consultant will carry out the design together with the necessary tender documents which will be the basis for tendering to selected

bidder. Using tender documents, the contractor is nominated to perform the construction projects.

2.2.2.2. Design-Build/Turnkey

The design build delivery system is a response to the problems associated with the force account and design bid build delivery system. It reduces the numbers of procurement processes engaged and bid only one procurement process and a single contractor to provide the entire design and construction project implementation.

The scale of design depends on the extent to which the owner has already commissioned design work. The contractor's design input varies from one contract to another, ranging from the mere detailing of a fairly comprehensive design to a full design process, including proposals, sketch schemes, and construction information of the contract.

2.2.2.3. Build Operate Transfer (BOT)

Build operate transfer is a form of procurement and contract delivery approach that encourages public-private partnership; in which a private company agrees to finance, design, construct, operate for a certain period and transfer the facility to the project owner. The typical build operates transfer project contract is the process whereby a government grants the allowance to a project development company to develop and operate the public sector. Build operate transfer project involves a potentially complex contractual structure and defect liability period will be incorporated in the contract in order to ensure the quality of the construction project during transfer.

2.2.2.4. Construction Management Consultancy

This delivery system is a reply to problems associated with design-build and build, operate transfer where the project owner was not well represented for its benefit and the problem of disintegration between planning and implementation of projects. Under construction management consultancy, the owner contracts separately, with a design consultant and the construction project manager. The owner acquires the management services of the construction manager, in most cases a general contracting construction firm early in the design phase.

Project management is the overall management by, or on behalf of, the owner of all aspects of a project from its inception through design, construction, and usage of the

projects. Construction management consultancy at free as agent and construction management at risk as a constructor. This distinction determines the contractual approach to the construction of public construction project management.

2.3. Types of Contract

The contract is a written agreement between or among two or more construction parties, whereby each party promises to do or not to do something and agrees to terms; conditions and warranties set out in the contract. A written or spoken agreement between two or more parties intended to be enforceable by law in the public building construction projects. The purposes of a contract are to enforce by law and bind conditions between or among the parties to agree to procure construction contract projects to clearly show the terms, conditions, rights, and obligations.

The remedial measures in case of nonperformance which needs to identify special risks and their treatment and to clearly show handling provisions for price, completion time, requirements variations adjustment systems, changes in cost, legislations and their dispute resolution mechanism (Proclamation Agency., 2009; Achenef F., 2012). Similar to that of methods of tendering and delivery systems; types of construction contracts have a direct impact on the contract management of public construction projects. Based on payment provisions; contract types are applicable to the prevailing specific project conditions and largely the interest of the project owner.

2.3.1. Lump-Sum (Fixed Price Contract)

A lump-sum contract is the most basic form of agreement between the contractor and the project owner. It will require that the contractor agrees to provide specified construction projects with a fixed price without any variations adjustments. The owner is essentially assigning all the risk to the contractor, who in turn can be expected to ask for a higher markup in order to take care of unforeseen contingencies.

A contractor under a lump sum agreement will be responsible for the proper project execution and will provide its own methods to complete the construction project. This type of contract usually is developed by estimating labor costs, material costs, adding a specific amount that will cover the contractor’s overhead and profit margin. When the actual costs of labor and materials are higher than the estimated cost of the project, the profit of the contractor would be reduced; when the actual costs of the project

were lower, the contractor profit gets more. Even though the cost to the owner is the same and a lump sum contract is suitable when the scope and schedule of the project are sufficiently defined to allow the contractor to fully estimate project costs. The contractor is fully responsible to quantify the volume of the project based on the given specifications and drawings. Overestimating the volume of project works will result in losing the project. Contractors are advised to enter into this kind of construction contracts when the bidder has sound previous construction experience of similar technical and contractual nature (Taishi O., 2006).

2.3.2. Lump-Sum and Escalation

Lump-sum and escalation contracts are basically the same as that of the lump sum contract except it includes allowances for price escalations. This type of construction contract contains a provision whereby the contract value can be adjusted based on the specified price indices included in the contract. This type of construction contract typically reduces the risk to the contractor during periods of high inflation. The presence of price escalation provision also benefits the owner in terms of getting the least tender prices for the project. Thus, in order to have competent tender prices, the bidder shall not account contingencies for price escalations in their tender prices in lump sum fixed price and escalation contracts (Tadesse Y., 2006).

2.3.3. Lump-Sum and Schedule Rate

This is another form of lump-sum contract, but it incorporates unit prices of different activities which will help to manage variation and claims during the execution of the project. Moreover, the contractor shall not account contingencies for additional works and claims; however, contingencies for price escalation of materials, labor, and equipment shall be considered in the tender price (Tadesse Y., 2006).

2.3.4. Lump-Sum with Escalation and Schedule Rate

The lump-sum with escalation and schedule rate contract minimizes the inclusion of contingencies in tender prices by contractors. In this contract, contractors shall not account contingencies in their tender prices for additional project works and claims as well as price escalations. Moreover, price escalations, variation works, and claims are

better handled in this type of contract during the execution of the construction project (Tadesse Y., 2006).

2.3.5. Unit Rate/BOQ/ Admeasurement

In a unit price contract, the project would be performed is broken into various parts, usually by the construction profession. This contract type is based on expected quantities of items that are counted in the project in addition to their unit prices. The final price of the project depends upon the quantities required to carry out the project. Unit price contracts are sometimes used for an entire major construction project but were frequently used for agreements with subcontractors which involve accurate identification of different types of items. The construction contract is priced based on the bill of quantities whereby estimated quantities of certain well-defined work items and fixed unit prices of each of these defined work items are agreed upon. The estimated quantities may increase or decrease during the execution of the project and the contractor is obliged to accept these variations without additional costs as far as these variations in quantity are within the agreed limits with the owner.

The unit rate contract is the most commonly used for all public and governmental projects whereby the estimated quantities and specifications of works are well known in advance. Therefore, in this type of contract, contractors shall focus mainly on the cost analysis of each unit of work stated in the bid documents rather than the total cost of the project as in the case of a lump-sum fixed-price contract. The cost estimator shall also consider anticipated price escalations in the future and include these contingencies in his unit cost analysis. Moreover, estimated quantities are given by the owner in the bidding documents, it is usually advisable to cross-check these estimated quantities with the given drawings and specifications to establish a proper cost for the project (Taishi O., 2006).

2.3.6. Unit Rate and Escalation

The unit rate and escalation contract are generally the same with unit rate contract, except it contains a provision for price escalations based on specified price indices. Such provisions reduce the risk of the contractor during periods of rapid inflation and it also benefits the owner in terms of getting the least tender prices in such a way contractors usually add large contingencies for price escalations. In this type of

contract, contractors are not advised to consider future price escalations in their unit cost analysis to develop a better competent tender price (Tadesse Y., 2006).

2.3.7. Schedule Rate Contract

Basically, the schedule rate contract is established only agreed unit prices of the intended work items without estimating quantities of the works. In this type of contract, detailed work specifications and general drawings are usually used during tendering. Moreover, in schedule rate contract there is no need for detailed drawings which are detailed drawings that can be prepared after the award of the contract, which gives the opportunity to carry out detail designs and construction of the project at the same time shortening the overall completion of the project. The drawback of the schedule rate contract was the total cost of the project can only be known upon completion of the project and the owner does not even have the revealing cost of the project as that of the unit rate contract. Schedule rate contract doesn't contain a provision for price escalation whereby the contractor may increase his construction cost estimates including contingencies for future price escalations of labor, materials and equipment's, clearly defined and detailed technical specifications shall be prepared in advance and issued with the bidding documents to contractors participating in the tender.

The very difficult to evaluate and select a better offer from different tender offers in the absence of an estimated bill of quantities. In the schedule rate contract, the contractor's cost estimator shall focus on the cost analysis of each unit of work given in the schedule of items. The contractor shall also consider anticipated price escalations in the future and include these contingencies in his unit cost analysis (Taishi O., 2006).

2.3.8. Schedule Rate and Escalation

The scheduled rate and escalation contract are a continuation of the schedule rate contract, except it contains a provision for price escalation based on specified price indices. In this type of contract, contractors are not advised to consider future price escalations in their unit cost analysis to develop a better competent tender price (Taishi O., 2006).

2.3.9. Cost-Plus Percentage of Cost with Guaranteed Maximum Cost

The shortcoming of cost plus a percentage of cost contract is the owner doesn't know the total cost of the project before its completion. In this regard, the cost plus percentage of cost with guaranteed maximum cost contract resolves this problem in such a way the contract is based cost plus percentage of cost contract but a fixed maximum cost of the project is agreed upon. If the cost of the project exceeds the guaranteed maximum cost, the contractor absorbs these excess costs.

In this way, a ceiling project price is established; in which the owner is assured that this ceiling project cost will not be exceeded. This type of contract has similar weaknesses as that of cost plus fixed fee contract as compared to the cost plus percentage of cost contract, except the contractor will insist on a higher guaranteed maximum cost instead of a higher fixed fee (Taishi O., 2006).

2.3.10. Target Cost Incentive

Target cost incentive contract is designed to provide an incentive for the contractor to reduce the overall total costs of the project. The target cost incentive contract is usually applied in combination with cost plus a percentage of cost with guaranteed maximum cost. In the application of target cost incentive contract, there are different incentive mechanisms such as applications of variable percentages of cost depending on the total actual cost of the project with the cost plus percentage of cost contract and excess cost-sharing with the contractor, in case the contractor completed the project less than the guaranteed maximum cost, cost plus percentage of cost with guaranteed maximum cost and cost plus fixed fee with guaranteed maximum cost contracts (Tadesse Y., 2006).

2.3.11. Cost-Plus Contract

A cost-plus contract is an agreement that involves the client's consent to pay the complete cost of material and labor in addition to the amount for contractor overhead and profit. This contract type is favored where the scope of work is highly indeterminate in addition to the types of labor, material, and equipment being similarly uncertain in nature. There are three key types of cost-plus contracts which are cost plus a fixed percentage, cost plus fixed fee and cost plus fixed fee with

guaranteed maximum price contract is applicable in the construction projects (Taishi O., 2006).

2.3.12. Incentive Contract

Compensation is based on the contractual performance according to an agreed target budget, schedule, and quality of the project. The two basic categories of incentive contracts are fixed-price incentive contract was preferred when contract costs and performance requirements are reasonably certain and cost reimbursement incentive contracts provide the initially negotiated fee to be adjusted later by a formula based on the relationship of total allowable costs to total target project costs. This type of contract specifies a target cost, a target fee, minimum and maximum fees, and a fee adjustment formula. After project performance, the fee payable to the contractor is determined in accordance with the specified formula (Wubishet J., 2007).

2.3.13. Guaranteed Maximum Price Contract

A guaranteed maximum price contract is a type contract where the contractor is compensated for actual costs incurred plus a fixed fee subject to a ceiling price. The contractor is responsible for cost overruns unless the GMP has been increased by formal change orders such as the additional scope of the client, not price overruns, errors, or omissions of the project. Savings resulted from cost underruns are returned to the project owner. This is different from a lump sum contract where cost savings are typically retained by the contractor and essentially become additional profits. Sometimes, savings are shared between the owner and the contractor as an incentive to keep construction project costs down (Wubishet J., 2004).

2.4. Methods of Tendering

According to (Solomon S., 2015), the method of tendering directly affects the cost of construction projects as well as costing techniques to be adapted. Moreover, the quality of works and construction time required is also indirectly affected as a result of the tendering methods adopted by the owner. Depending on this the ensuring methods are mostly implemented in the construction industry.

Table 2.1 Methods of tendering

Bases	**Things Procured**	**Bidders' Coverage**	**Geographical Coverage**	**Procurement Awareness**	**Procurement Steps**
Types	Goods Services Works	Competitive Negotiated	International Regional National Local	General procurement notice Specific procurement notice	Single Two staged Prequalification Post qualification

The public construction procurement categories can be classified into two competitive and negotiated to tender when bidders' coverage is taken as a basis for classification. Thus, the following diagram illustrates the bid qualification procedure of the public construction industry.

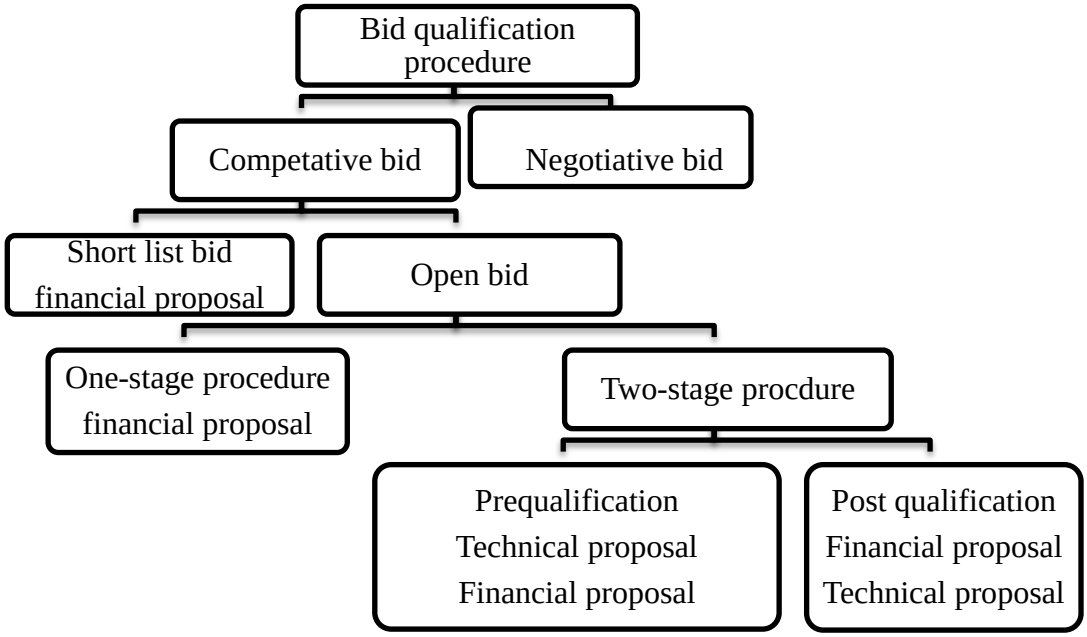

Figure 2.2 Bid qualification procedure (Source: Wubishet J., 2007)

2.4.1. Open Tendering

The basic variance of open and shortlist competitive bidding is the addition of qualifying criteria beyond eligibility imposed on the procurement of competitive bidding. Open tendering is adapted usually for governmental construction projects. Agreeing on offers to be submitted to the owner due to the long list of contractors and not know each other; and the owner might obtain the least possible construction cost estimates due to the tight price competition among a long list of contractors (Solomon S., 2015; Addis M., 2014).

The tender evaluation will take a long time usually in months incurring additional overhead costs to the owner and extending unnecessarily the commencement time of the intended public project accountability would be questioned. In regard, the submitted tender price is too low and the contractor is losing money; then the contractor tries to reduce the quality of works and submit enormous claims in an attempt to recover the realized loss; which usually results in deterioration of the relationships among the contracting parties. It is also very normal that qualified and experienced contractors may not participate in the tender knowing that the competition will be very tight with unknown contractors of their financial and technical capacity in the construction projects (Abraham A., nd).

In general, in open tendering the contractors' construction cost estimates shall be very accurate not to lose the project and not lose money on the project due to the tight mainly of financial competition among a long list of contractors.

2.4.2. Shortlist Tendering

Limited bidding was limited numbers of eligible bidder are invited to participate in the bid. Commonly shortlisting is done based on the bidder's past performance, the workload at present, the presence of a bidder in the locality of the projects, knowledge of the similar types of works before and the financial and technical capabilities of the contractors.

Furthermore, the listing shall take into account the renewal of licenses of the contractors and the specific requirements of the client. In such tendering, bidders cannot be rejected

as non-responsive for being unqualified technically. In this type of procurement; the cost of projects might be higher than expected public building construction project cost.

Unlike open tendering, the selective tendering gives the opportunity for contractors to know their competitors and previous experience of these competitors will greatly help the contractor in determining the construction cost estimation strategy of the intended project.

2.4.3. Negotiated Tendering

Negotiated tendering is the direct appointment of an eligible bidder that can be exercised by construction project owners. The nomination of this direct invitation is usually based on a good performance, associate with the project owner, and supplementary agreements. This tendering is exceptionally exercised when the project under consideration is very urgent and needs special skill whereby the required skill is rarely available. This type of tendering is that the price offered can usually be higher than the competitive bidding.

Negotiation tenderer is usually applied when a specific contractor owns special managerial and unique technical skills. Moreover, it is also applicable in urgent works such as dam repair works whereby it requires to be maintained in a very short period of time before total failure occurs. The benefits of negotiation tendering were the contractor can participate starting from the design stage contributing his experience for better quality and performance of works, it allows early commencement and completion of projects with a better understanding of the contracting parties (Solomon S., 2015).

2.4.4. Geographical Coverage

These type of procurement methods was generally instigated for three major factors which are local capacity, financial sources, and globalization. When projects could not be carried out by local capacity; project owners are forced to make tendering out of their localities. The policies of the financial sources of the projects dictate the type of tendering geographically.

The donor the financed projects are often practicing international or regional tendering. The world trend of globalization and the principles of free trade and trade

liberalization also encourages international tendering. In practice, preference margins in the range of 7.5-10% are applied to local, national and regional tenderers, which imply that tender offers higher than 7.5 % will be given preference to encourage local participation (Wubishet J., 2004).

2.4.5. Procurement Steps

The procurement can be made using a single or two-staged tendering process in construction projects. It related to whether the tender packaging for submission separately and their evaluations are staged for a single or two steps when invitations are made. Often two-staged biddings are made for the submission of technical and financial proposals separately and their evaluations one after the other.

According to Ethiopian procurement regulations, single or two-stage tendering shall be enforced to use in the project. The qualification of tendering can also be based on prequalification or post-qualification processes. Prequalification is an internationally accepted practice in procurement management; it would normally be required for the civil construction contract of which its nature and cost is large and complex. So far in Ethiopia, there is no regulation on such applications but practiced based on project owners, regulators and financier's enterprises. It is a procedure in which eligible bidders are invited to provide evidence of their ability to perform the project required by the client.

Prequalification is desirable because it enables the client to establish the competence of bidders successively evaluated. A prequalification can be of two types; the first is when companies are already considered qualified during their licensing requirements which entitled them for a single-stage tendering process. For such types of tendering, the most important tender evaluation criteria become the least priced bid.

The second is when two-staged tendering is used to prequalify tenderers for their technical competency. Once bidders qualify for the tender, either the least priced bidder or the least evaluated bidder based on the weighted average of the technical and financial scores will be recommended for award the construction project (Wubishet J., 2004).

2.4.6. Serial Tendering

Serial tendering is more applicable when the owner has a continuing construction program of similar projects such as housing projects, schools, health centers and so on. Contractors are invited to participate in a tender with the basic understanding that successful contractors will enter into a series of contracts with the same conditions contained in the tender. in regard to this least tender prices can be obtained, when the competition is open to all bidders; it allows the owner and the contractor to program works in advance with more confidence. It generally creates a better relationship between the owner and the contractor in such a way contractors usually contribute advice in the planning of future works and it allows the contractor more time to plan, organize and coordinate his resources and experience for the next projects enabling a more efficient way of performing the future contracts.

The weakness of serial tendering is that it has the tendency of reducing work available under competition to other contractors. In this type of tendering, contractors should also consider future economic factors such as cost of materials, types of machinery and manpower in the future as a series of projects will be executed with the current cost of the projects (Abraham A., nd).

2.5. Factors Affecting the Execution of Least Cost Contract

According to different scholars, it is clearly shown that the factors affecting the execution of the least cost contract low and nonperformance in public building construction projects as shown in the following Table 2.2.

Table 2.2 Cause nonperformance of least cost contract system

No	Major reason for low and nonperformance projects	(Tariq H., 2015)	(Wubishet J., 2004)	(Solomon S., 2015)	(Sergios., 2012)
1	Severe competition among contractors		✓		
2	Low pricing			✓	
3	Inaccuracy of estimates	✓			
4	Shortage of time in preparing bids		✓		
5	The performance history of your company on		✓		

	previous projects				
6	Other factors beyond your control				✓
7	Least cost				
8	Corrupted system		✓		
9	Contractors capacity			✓	
10	Types of contract		✓		✓
11	Delivery system			✓	
12	Project scope/type of work		✓		✓
13	Level of the accuracy of the estimates prepared during the tendering				✓
14	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)	✓			✓
15	Lack of effective and efficient project cost management system	✓			
16	Technical difficulties (construction methods)	✓			✓
17	Escalation of materials, labor and subcontractor prices				✓
18	Work change orders/variation orders		✓		
19	Problems related to contract document /Drawings, specifications, conditions of contracts/	✓			
20	Delays due to design changes or other reasons related to the client and/or consultant			✓	
21	A significant deviation in labor productivity between standard (assumed) and actual		✓		
22	Weather conditions				✓

According to different scholars, it is clearly shown that the factors affecting the least cost tendering are shown in the following Table 2.3.

Table 2.3 Factors affecting during least cost contract awarding

No	Factors during the least cost tendering	(Tariq H., 2015)	(Wubishet J., 2004)	(Solomon S., 2015)	(Sergios., 2012)
1	Size of the project		✓		
2	The volume of work at hand (monetary value of projects)	✓			
3	Stage of projects at hand (active projects and projects near completion)		✓		
4	Location of the project under consideration		✓		
5	Available company's expertise and equipment's			✓	
6	The similarity of the project with previously undertaken projects			✓	
7	Not to be idle / not to make resources idle		✓		
8	Least cost contract awarding system		✓		✓
9	The management system of cost, time and quality at the construction stage				✓

According to different scholars, it is clearly shown that the sources for the least cost tender preparation are identified as shown in the following Table 2.4.

Table 2.4 Sources of least cost contract tender system

No	Sources for the least cost tender preparation	(Tariq H., 2015)	(Wubishet J., 2004)	(Solomon S., 2015)	(Sergios., 2012)
1	Tendering documents		✓		
2	Material prices	✓			
3	Labor rates	✓			
4	Labor productivity		✓		
5	Standard equipment costs			✓	
6	Equipment productivity			✓	
7	Standard Site overhead costs		✓		
8	Company overhead costs				✓
9	Risks	✓			✓
10	Project location			✓	
11	Skilled labor availability	✓			✓
12	Historical data of similar works			✓	
13	Site visits	✓	✓		
14	Construction method statements		✓		
15	Statuary regulations			✓	
16	Subcontractor prices		✓		

2.6. Contract Award System

The bidding methods of construction projects are basically grouped into two which was a competitive and negotiated system. Most of the other procedures are either

variation or somewhere between these extreme categories of tendering. In Ethiopian practices, the competitive and open tendering approach is implemented in public building construction projects (Wubishet J., 2004).

The construction contract award system criteria refer to the specific contract project and result in the determination of the best bid from the selected capable bidders. As European Union contract management legislation expects the opportunity of the bidder to justify their offers and obligations to the client through communication to the commission the reasons for their rejection in the bid. In the case of the most economically advantageous construction contract offer can be evaluated based on various sub-criteria price, completion period, cost-effectiveness, quality, profitability and technical merit of the project. Furthermore, public building clients must be extremely careful when employing subjective criteria in the contract management and award procedures. The subjectivity criticism of the competitors may apply to the courts, thus causing delays, which may lead to funding problems and loss of the projects. Subjective criteria are qualitative criteria that cannot be funded easily quantified scored and nonsubjective criteria are expressed in numerical values directly by the bidder and require no evaluation by the client's and bidder selection committee (Sergios., 2012).

Regarding the award criteria used; the common experience that the great majority of construction contracts are awarded based on the least price offered. Nevertheless, it can be argued that the final choice of a contractor based solely on the least price does not guarantee the delivery of the required project outcome in terms of cost, time and quality. As it shows that most public clients ignore the fact that the same organization performs differently in a dissimilar project (Wubishet J., 2004).

Awarding contracts by the least bid run the risks 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 results in management and supervision problems on behalf of the client claims, and disputes on behalf of the contractor and corresponding completion delays. Studies argued that efficient contract bid evaluation strategies should involve five more groups of criteria; pertaining to financial soundness, technical ability, management capability, and health and safety

performance of contractors should be a mandate of the public building (Sergios., 2012).

In a pure competitive method, the contract is awarded to the least-bidder, if the bidder is found to be responsive. In the pure negotiated method, the price is negotiated with a selected contractor. To minimize the shortcomings of these two extreme types, modifications have been proposed and tried in many countries use the following contract award system are considered the least cost contract awarding system (Price based), competitive average bidding (Price based), multi-parameter bidding method (Based on price and "other" factors) (Laychluh M., 2012; Sergios., 2012).

2.6.1. Least Cost Contract Award (Price-Based)

According to (Procurement A., 2006; Wubishet J., 2007) there are also contractors who use the engineer's estimate as their absolute basis and try to fix the project construction cost estimate to be equivalent to the lower margin of the bidding criteria as compared to the engineer's estimate. However, the Engineer's project construction cost estimate itself is not reliable as the local consultant's cost estimation practice is at a similar level with that of the local contractor.

As a matter of fact, most public projects use the following bid evaluation criteria in evaluating the financial proposals of the bidding contractors. In the last five years, bid offers below and above twenty percent 20 percent of the engineer's estimate shall be considered as non-responsive and shall not be considered for further evaluation, but nowadays according to Ethiopian and Bahir Dar city contract awarding practices below 20 percent is considered as a responsive bidder and can win the bid (Procurement A., 2006).

When the number of responsive contractors was three and above, 25 percent of the engineer's estimate and 75 percent of the bidders' average shall be taken as the final adjusted project estimate. However, when the number of responsive contractors is only two, 33 percent of the engineer's estimate and 67 percent of the bidders' average shall be taken as the final adjusted project estimated cost. Moreover, if the number of responsive contractors is only one, 50 percent of the engineer's estimate as well as 50 percent of the bidder's estimate shall be taken as the final adjusted project estimate.

A bid-offer below or above 15 percent of the adjusted project estimate shall not be considered for the contract award. The local construction cost estimation practice clearly indicates that the local knowledge and experience of construction cost estimation of the local contractors and consultants were very poor and on top of all other managerial, economic, political and social are factors (Procurement A., 2006).

This poor construction cost estimation practice has contributed to its own negative impact on the national economy as well as the development of the local construction industry. It implied that most local contractors are delivering poor quality and delayed projects as well as suffering bankruptcy. There are also cases whereby projects are executed at excessively higher construction costs from time to time (Wubishet J., 2007).

2.6.2. Nearest to the Average of All Bids Received

According to (Laychluh M., 2012), an owner tries to avoid low bidders who have not studied the contract carefully and do not have enough experience and also avoids overestimated bids. In this system, once the owner has received all offers, he or she performs a simple mathematical calculation to find the average bid value, all of the participants' offers are summed and divided by the total number of bids received.

ABV = Sum of offers/Total number of bids…… Eqn. 1

To award the contracts, the owner looks for the nearest offer to the average bid value of the project estimated cost.

2.6.3. Limited by Average Bids and Owner's Estimate

In this system, owners also use their own resources and experience to estimate the project cost. To award the bid, the owner reviews all of the participating offers and looks for the offer nearest to the average bid value, but which, at the same time it does not exceed the estimated cost by the owner.

The owner estimate cost is greater than the offer of the successful bidder and less than or equal the of ABV bidder. The offer that satisfies these two requirements is the successful bidder in the bid. This is different from the previous system because the successful bid is between the owner's estimate and the average bid. This indicates the

seriousness of the offer and the contractor understands the project contract documents. Another similar practice is considering only bids that are within a certain range above and below the engineer's estimate. In this system, the least responsive bid within the range gets the award.

According to proclamation no. 649/2009, this method of competitive bidding is the standard method for awarding public-owned construction contracts in Ethiopia currently practiced.

2.6.4. Competitive Average Bidding (Price-Based)

As the study conducted in European methods and (Wubishet J., 2004; Laychluh M., 2012) a variation of the competitive least bid method of awarding contracts is based on the principle that the best bid is the bid which is closest to the average of all bids and not the bid which is highest or lowest. Bids that fall too far below the mean are considered to be unrealistic underbid. Bids that are much higher than the average are considered to be unrealistically overpriced. Methods based on this principle are very common and known, in general, as European methods.

$$NA = [(NL + 4A + NH)/6] \quad \text{……Eqn. 2}$$

Where:

NA = new average;

NL = new low;

NH = new high; and

A = average of all offers.

The bid, which is first above this new average is then treated as realistic and acceptable in the public construction projects. The major shortcoming of this method is that it is not effective unless the number of submitted bids is eight and more. The basic philosophy behind the average bidding procedure is that the best bid is the one closest to some average, not the lowest, not the highest. These competitive prices-based average bidding methods are used mainly to ensure that the contractor is responsible, to avoid contractor failure and to reduce disputes and claims in the construction industry.

2.6.5. Multi-Parameter Bidding Method (Based on Price and Other Factors)

A model of competitive bidding that is based not only on cost but also on other parameters was proposed was suggest that the major parameters should cost, time and quality. The amount of time a contractor proposes to take to complete the project may have a major impact on costs. For instance, a contractor who can complete a building four months prior to his closest competitor may save the employer additional rent monies. Thus, by factoring this cost-saving in the bid process and a more accurate reflection of total costs can be calculated.

Similarly, the impact of the quality of the project can also be included in the award decision. The long term costs of maintenance and repair are directly related to the quality of the constructed facility being built. In the multi-parameter bid method, estimates of quality may be measured by the type of materials proposed to be used, the previous experience and the past performance of the general contractor and the proposed subcontractors. Under the multi-parameter bid method, time and quality concerns are each assigned a maximum attainable number of points in the bid evaluation.

The bids are then reviewed and ranked based upon these factors as well as upon the contract cost of the project. Bidders' proposed project duration and past performance related to the quality of finished the projects, safety records can be factored into coming up with a total combined cost in this method. The total combined costs of all the bidders are then compared to select the best bid in the evaluation of the construction tendering (Herbsman Z. and Ellis R., 1992). According to (Henry O., 2014) regarding the weight of project cost, time, and quality would be considered for time 48-50, for cost 28-30, and 19-20 in percent.

2.7. Contract Awarding Practice

According to (Proclamation Agency., 2009), the outcome of the tender phase is the agreement of a contract between the client and contractor to construct the project. Infrastructure projects are by definition complex with a degree of associated uncertainty and unpredictability. Thus each contract will include different mechanisms for dealing with obligations in relation to challenging events or surprising discoveries and may be open to interpretation.

Contracting practice for the client; operating under the governance umbrella and is how it ensures that they meet their own obligations and manage the contractor in providing their service. Ensuring each party meets its contractual obligations and that the asset is constructed safely, on time and to the contract performance is significantly impacted by the client's contract approach, types of contract and delivery system of the project (Wubishet J., 2004).

Foundations for good contract and governance is generally thought that the most difficult task of delivering public infrastructure is the construction itself. However, the foundation of successful construction at the least cost for the required outcome is established when appointing the contractor for the project (National Audit Office., 2016).

Effective governance and contract framework will serve the interests of both the client and the contractor in dealing with these situations in the contract. Hence the foundations of good and effective contract and governance were considering the following approach. The business case outlines the project work needs and the proposed solution should provide a clear project definition and carefully developed project budget given that it directly impacts the quality of the tender documentation; tender process and the subsequent negotiations leading to contract award. The business case should have developed the client have to undertake significant work to develop appropriate tender documentation. However, poor quality tender documentation is issued to the market, there is a high probability that the contract may not the most suitable contractor. The common understanding between the client and contractor is low and the expectation gap is greater at contract award and it leads to a high probability of disputes and expenditure variances as the project progresses (Wubishet J., 2011).

2.7.1. Contract Award Practice

The tender process in the tender phase is the client establishes its expectations with the contractors. The contracting parties must share a deep understanding of the expected project requirements, successful tender, and the agreed contract terms and conditions. The tender requirements should set the client's expectations for the

structure and quality of governance and contract management arrangements (Wubishet J., 2007).

Having a sufficient understanding of the contractor's approach to delivering the project and specific aspects of their bid during the preparation of tender documentation and the tender process is a very important task in the contract. Establishing a governance and contract management framework was aligned to the contract needs and communicating with bidders prior to the contract award.

Good government strategy and high-value repeat to the client is the usual practice that the contractor will engage in governance and contract management activities with a positive attitude. It should be approached with an attitude that goes beyond the single project or program but considers the possibility of future projects and relationships. The attitude can be established in the repeated relationship between the client and contractor; then the probability of establishing very effective governance and contract management arrangement would be high.

The capability of public officials cannot outsource their public accountability and they must have the capacity and capability to manage contracts and deliver projects successfully. They may engage specialist advisers to support them in undertaking this duty, however, the accountability remains with the public official. Bidder requirements for public and contract management must be addressed in the tender phase requirements to provide a solid foundation for the construction phase setting expectations from the earliest stage. The relationship is effective when both the client and contractor can cooperate to achieve mutual success and deliver a successful project according to the intent of the contract. The degree of effectiveness of the relationship between the contracting party is partly driven by the government and contract management arrangements, but equally important is the team culture and mindset of the client and contractor establishes and understanding how this relationship affects project future opportunities to work together (Sergios L., 2012).

A contract will never be perfect as complex projects will always present unanticipated events and outcomes that must be addressed to achieve project success. In addition, the client and contractor will have differing interpretations of the contract and how those events should be treated based on their perspective. An effective relationship between the contracting parties established in the tender phase and built on as the project progresses is the foundation of effective project outcomes as a shared

understanding of intentions. Commitments are clear to all to provide the platform for early identification of misunderstandings and areas for clarification. When there is a need for a variation, contract change, sound communication, and effective relationship allow projects performed smoothly (Wubishet J., 2007)

2.7.2. Contract Award Processes

The contract manager plays a key role established by the client; accountable for the overall management of the contract. Ideally, the contract manager, his role is not undertaken by the project director and should commence in the tender phase with involvement in the negotiations leading to the contract award. The contract manager should have a high degree of understanding of the contractor's commercial offer and contract terms and conditions. The contract manager should be supported by specialist skills such as cost estimators and legal specialists as appropriate (Australian Government., 2015).

The contract framework provides the environment for the commercial relationship to be effective and to achieve project success. Clients will establish the governance framework and document it as a requirement in the tender process, according to their specific control requirements. However, outside of these specific requirements, there are a number of good practices that can be applied to any governance framework that will position the contract management team for success. Both the client and contractor embracing hard decisions striving for a no adversarial relationship, but not avoiding the unavoidable hard decisions where interests diverge, empowered and timely decision making promoting peer-to-peer personal relationships where decisions are resolved (Australian National Audit Office., 2012).

At the least possible organizational level in a timely manner, keeping it real encouraging monthly face to face on-site meetings of the most senior forum for the resolution of matters. The rapid resolution, providing a resolution path gives access as necessary to a senior executive to the project. The contract management team and conducting regular performance monitoring and assessments capturing, using project performance, in particular, contractor performance, assessments as a tender criterion for awarding future contract it will help improve the project outcomes (Australian Government., 2015).

Construction contract management is the management of its processes, stakeholders, and performances along with the planning, implementation, monitoring and evaluation cycle of the project management. The principal aim of the contract management project was classified into the following charts.

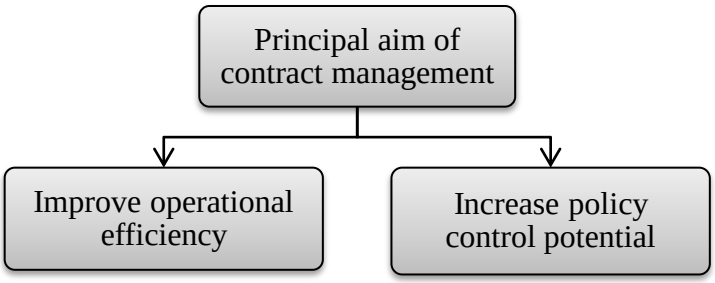

Figure 2.3 Principal aim of contract management (Source: Wubishet J., 2007)

Overall, the problems identified by the preliminary study pointed to the need for increased freedom of action in the performance of tasks, budget guarantees based on multi-year agreements, the establishment of stronger target and result related requirements. The idea was that a result-based contract should be negotiated to define both the rights and the obligations of the projects.

In other words, the contracts would be based on a something for something principle, the agency would promise to meet certain increased efficiency requirements formulated in terms of specific results, in return for which it would receive a certain freedom of action with regard to task performance plus a budget guarantee for a number of years (Peter K., 2000).

The contract management process can be idealized into three major management processes.

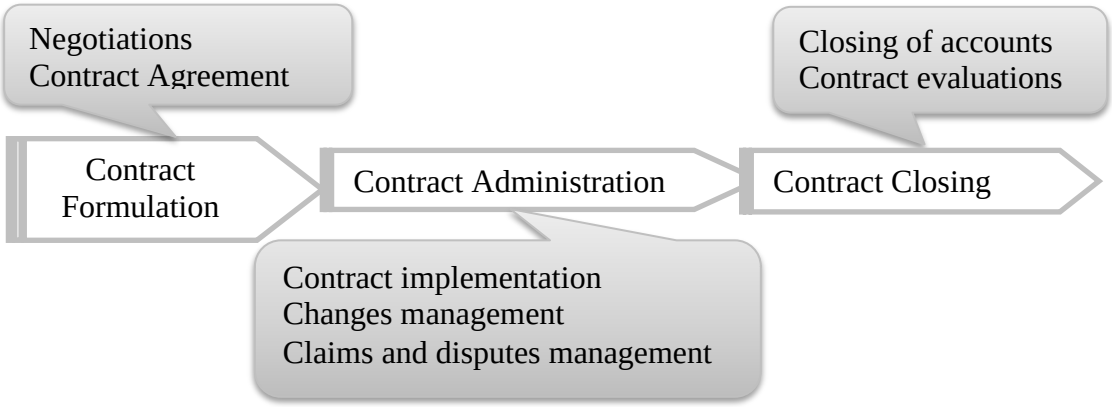

Figure 2.4 Contract award processes (Source: Wubishet J., 2007)

During engineering estimation, most of the construction projects underestimate or overestimate the project cost. In line with this the least-bidder and the client respectively after the sign, the contract faces various financial and change order problems during the execution of the project works. Evermore, these problems are also trying to solve without any transparency and accountability.

Thus it leads the stakeholder to try to solve these challenges through unfair and corruption practices this the main challenge in the least cost contract award system (Tariq H., 2015; National Audit Office., 2016).

2.8. Least Cost Contract and Its Process

The least cost contract award system is the way of obtaining the required construction project. Thus the construction procurement consists of single, two-staged, and prequalification and post-qualification tendering. Prequalification is desirable because it enables the employer to establish the competence of companies subsequently evaluated. The least priced bidder or the lowest evaluated bidder based on the weighted average of the technical and financial scores will be recommended for award. Award of contract is performed to be substantially responsive to the bidding documents and offer the lowest evaluated cost (Wubishet J., 2007).

The client desires to disorder through these new trends and invites acceptable bidders, it is necessary to clarify and develop predetermined selection criteria and the objective of the pre-qualification and bid evaluation processes (Tariq H., 2015).

2.8.1. Least Cost Contract Process

The construction contract has two sub-processes such as negotiation and signing of the contract agreement. Negotiation is the process by which project owners together with their professional representatives' deal with the recommended winner on the requirements of the tender exclusively, which will become the basis for construction contractual agreements. Post qualification is a tendering type where financial evaluation is carried out first and rank bidders on the basis of their offer for the tender price. Thus the technical evaluation would be done after the financial evaluation. However, technical evaluation is performed step by step starting from the least financially

evaluated bidder until technically or cumulatively qualified bidder is determined. The benefit of this approach is not to lose the least financially evaluated bidder and to save time during technical evaluations. However, post-qualification approaches often choose to fix evaluators on financial results and be locked and biased for the success of technical evaluations (Tariq H., 2015; PPA., 2006).

According to (Wubishet J., 2007) the benefits of the least cost contract award system are categorized in two ways. The first benefit is for the client advantages of the least cost contract award system includes protect the employer against unqualified bidders, quicker evaluation for only prequalified bidders, ensure award to least evaluated not lowest, bidder, assess the level of interest shown by bidders and show competency and methods of implementation. The second benefit is for bidder advantages of the least cost contract award system are save bidders from the cost of preparing bids, assure prequalified bidders for their bid considerations, reduce low balling bidders from participation and make bidders be better planned.

There are unambiguous benefits and distinct drawbacks of the least bid awarding system. It compels the contractors to lower their costs, usually through innovation and modernization, to ensure they win bids and maintain their profit margins. 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 least bid award procedure. Moreover, the least-bid award system encourages unqualified bidders in the competition and on the contrary it discourages qualified contractors to participate (Tariq H., 2015).

Table 2.5 Qualifying of least cost in Ethiopian practices

Procedure	Employer (consultant)	Contractors
Procurement document (Tender document preparation)	Letter of invitation, instruction to bidders, conditions of contract and drawings, bill of quantities, forms, formats, and schedules, etc.	Check eligibility, check competitive adv., collect information and decide to participate.
Issuance of tender documents (Tendering phase)	Advertisement or invitation, project scope, location, source of finance, issue, submission and opening dates of tenders.	Request and obtain the tender documents.
Clarification and site visit (Tendering phase)	Arrange a date and time for pre-bid submission meeting, send all clarifications to all bidders, arrange a date and time for a site visit and prepare and issue addenda for all clarifications.	Request and obtain clarifications, request and visit site and acknowledge receipt of all clarifications
Submission of the offer (Tendering phase)	Receive offers, record date and time of receipt and reject late offers	Complete and submit offers together with relevant information.
Opening of tender (Tender evaluation phase)	Open tender in the presence of relevant attendee and announce and record tenderers and all offer information	Attend the tender opening ceremony
Evaluation of tenders (Tender evaluation phase)	Review conformity and completeness of tender, evaluate alternative tenders and deviations, reject substantially non-responsive and non-conforming tender approval by regulators and financier.	Provide clarification if requested
Selection and award recommendation (Tender evaluation phase)	Select the least qualified and evaluated bidder, propose awarding recommendations, decide if further negotiation is required or not.	

2.8.2. Least Cost Contract

A contract is an integral part to conduct public building construction projects and contracting activity ranges from straightforward procurements. The government is a significant purchaser of works, goods, and services. Hence, these purchases comprise

thousands of transactions and involve millions of birr annually and the government has in place a range of legislation and related policies that set out the framework for contracting construction projects and manage it.

The framework provides a summary of legislation and policy that can impact on contracting activities and the management of the least cost contract award system management in public buildings. The construction contract development phase is critical to achieving the outcomes sought by the acquiring entity and it also lays the foundation for the effective management of the contract. Contract development can start at various points in the procurement cycle, in many cases, a draft contract will be part of the request for tender, while in other cases contract development may only commence later in the cycle. Thus effective contract starts up and ongoing management of the contract, it is beneficial to draft a contract management framework.

The frameworks generally included key personnel, assistance provided to the contractor, liabilities, indemnities, commonwealth, payments, confidential information, penalties, incentives, conflict of interest, securities, guarantees, contract variations, subcontracting, termination, contract end dates, dispute resolution, change arrangements, insurance, warranties, fitness for purpose and intellectual property rights of public project (Australian National Audit Office., 2012).

Good contract management practice and framework should consist of market management, planning governance, people, administration, relationship, performance, payment, risk, contract development, contractor development and contractor relationship management in four categories such as strategy, structure, resources and development delivery. Contract management success and the activities undertaken are strongly affected by what has happened during the tendering or contract award phase. Contract management insights and emerging best practice outline some of the broader issues that influence the contract lifecycle (National Audit Office., 2016).

Thus public contract management and framework were essential that there is a single point of accountability for the construction project. A single point of accountability provides clarity as to who is responsible and allows timely and consistent treatment of issues as they arise. Typically, the role held by a client who provides the authority to make all necessary decisions to ensure the timely progress of the project. Managing

changes to cost, time and quality of the contract in any complex infrastructure project, there will be some changes to the contract required after contract award arising from any of the following changes in expected site conditions, change in availability of specified materials, value engineering and change in the requirements of the client and external systemic events that impact on the project.

The contract framework should provide a process for tracking the realization of a contracted risk, as well as the management of contract and an unplanned event. This will include considering how these events affect the overall risk profile, the allocation and the pricing of that allocation. The client's preferred process for determining how the occurrence of an unplanned event is dealt with set out in the tender documentation. Framework for performance assessment and continuous improvement, the processes, procedures that provide for the conduct, capture of performance assessment between the client, contractor and the resulting plans to resolve emerging issues and improve performance. In line with this process and responsibilities for undertaking contract management planning, collecting information related to the contract and analyzing the information collected for the project (Tariq H., 2015).

2.9. Public Building Project Controlling Mechanisms

From different scholars, it is understood that the public building construction project cost and time are controlled by using earned value management techniques. Thus the budgeted cost of work scheduled (BCWS), represents an initial estimate for planned work and the typical information provided on project budgets and produced by project cost estimating is considered. It is provided by quite well-established procedures to evaluate planned project costs and has been incorporated by earned value management to enhance the set of tools their practitioners are able to offer in their contract consulting and management work. It is based on a project breakdown structure that does not necessarily follow the set of operations that would flow on-site. Contract and site planning will inform the expected amount of budgeted and time work that should be accomplished according to progress elapsed schedule. Depending on this the contract cost and time the public projects executed and controlled through measuring, analyzing and finally reporting the status of the project parameters and

make decisions, this the common trend of public building construction contract management system (PMI., 2011).

Table 2.6 EVM forecasting techniques (Source: PMI., 2011)

Terms	Formulas	Interpretation in EVM
CV	BCWP-ACWP	Cost variance
SV	BCWP-BCWS	Schedule variance
VAC	BAC – EAC	Variance at completion
CPI	BCWP / ACWP	Cost performance index
TCCPI	$TCCPI = \frac{BAC - BCWP}{BAC - ACWP}$	To complete the cost performance index
SPI	BCWP / BCWS	Schedule performance index
TCSPI	$TCSPI = \frac{BAC - BCWP}{BAC - BCWS}$	To complete the schedule performance index
CSI	SPI * CPI	Cost schedule index
EAC	$EAC = \frac{ACWP + (BAC - BCWP)}{CPI}$	Estimate at completion
ETC	EAC – ACWP	Estimate to complete
ETTC	$ETTC = \frac{ORGINALDURATION\,(OD)}{SPI}$	Estimate time to complete
% Schedule at Report Date	BCWS / BAC * 100	Schedule records
% Complete	$\%Compelete = \frac{BCWP}{BAC} * 100$	Status in the percentage of the project at the reporting date
% Spent	$\%Spent = \frac{ACWP}{BAC} * 100$	Status in the percentage of cost at the reporting date

2.10. Lesson's Learnt of the Literature Review

From the literature review, it can be concluded that, in the least bidding contract award method, the prequalified and responsive bidder who submits the least bid, meeting the specifications is the winner of the contract. Its implications and concerns

are generally accepted such that the least bidding system is expected to save public money and protect the public interest but this conventional method has been criticized.

Mainly on inferior quality, incorporation of any changes or change orders, the establishment of negative relationships among stakeholders, schedule overruns and increasing cost of the overall project during the construction phase. Hence, selecting a contractor based solely on price greatly diminishes the significance of the importance of the aforementioned criticism.

Least bid price as the sole award criterion encourages unqualified contractors to submit bids 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. In line with the above issues, it can be seen that there is not well-defined contract management and contract management framework when cost overrun through changes, schedule delays and quality problems faced when construction is performed.

Therefore, the least cost contract awarding system shall be designed to perform the specified public building construction projects based on specified cost, schedule and required quality. Hence, the management of this system with the aforementioned criticisms is also another challenge.

From these, the least cost contract award system requires the establishment of the least cost contract management framework in a public building construction project to sustain the above critical issues.

Thus different research was conducted using different sources from published and unpublished documents as a reference to identify the research gap. Hence, researchers are selected and the gap from the researchers has been shown clearly using in the following Table 2.3.

Table 2.7 Gap identified from the researchers

No.	Author's	Title	Research gap identified
1	Shumank D., 2017	A review of contract award to the lowest bidder in Indian construction projects via case-based approach	This does not focus on the basic factors that affect the effective implementation of the least cost contract management system.
2	Laychluh M., 2012	Performance study of lowest bidder bid awarding system in public construction projects	The thesis also limited the performance of the lowest bidder which is focused on the lowest cost bid performance on public and private construction projects. Additionally, it does not focus on the basic factors that affect effective implementation and practices of the least cost contract management system on public building specifically, it incorporates the private and public projects.
3	Tariq H., 2015	Effects of lowest bidding bid awarding system in public sector construction projects	The thesis is discussed about the effects of the lowest contract award system it indicates that it does not focus on the least cost contract management system. Hence, it does not clearly show the factors that affect effective implementation and practices of the least cost contract management system on public building specifically and not suggest new adjustments on contract systems in public building construction projects.

3. METHODOLOGY

3.1. Introduction

This chapter contains the research approach, the type of data required for the investigation, and the assessment of this study. It also describes the sampling procedures, techniques, data collection, processing, and data analyzing methods of the thesis.

3.2. Study Area Description

The study was focused on public building construction projects found in Bahir Dar city, the capital of Amhara National Regional State (ANRS) in Ethiopia.

Figure 3.1 Bahir Dar city map (Source: Map Carta)

3.3. Sampling Techniques

The samples are selected depending on their direct exposure and involvement in public building construction and contract management activities in the construction industries. The number of clients in public building construction projects in Bahir Dar city was twenty. In the city a total of 59 construction projects were under execution; hence the total of the population was 59.

The samples compiled from the population are estimated by a simplified formula to calculate the sample size. This formula is to calculate the sample sizes is shown below by considering a 95% confidence level and level of precision; p=5% is assumed (Glenn D., 2013).

$$n = \frac{N}{1+N(e^2)} \quad \text{..... Eqn. 3}$$

where; n=the sample size

N= the Population size, and

e=the level of precision. Using this formula, the sample size is determining as

$$n = \frac{N}{1+N(e^2)} = 59/1+59(0.05)^2 = 51$$

However, the population size is less than 100 hence for getting enough data all 59 public building construction projects were taken as the research sample sizes and as a result, the sample size is considered to be 59.

In the interview data collection methods, a total of 20 responses; 7 from contractors, 7 from consultants and 6 from owners was obtained.

3.4. Methods of Data Collection

The construction projects in the study area were similar in terms of construction types, methods of awarding of public buildings, contract management system, contract types, contract delivery systems and relatively working experiences of professionals at the site level. The following were the methods used in collecting the research data from the study area.

3.4.1. Questionnaires

In order to collect the relevant data all, the stakeholders of a total of 59 questionnaires were distributed for the participants. Hence the three main contracting stakeholders in the projects were the main participants in which 20 questionnaires were distributed to contractors, 20 to project owners and 19 for consultants. To check the validity of the questionnaire and interviews a pilot study was done by distributed to the construction professional. The validity is through a pilot study to the extent to which a test measures what the researcher actually wishes to measure the questionnaire was tested and comments for the questions which were not clear were reviewed and corrected.

3.4.2. Interviews

In order to check the relevancy of the responses in the questionnaire, semi-structured interviews were conducted for 20 stakeholders based on their willingness.

3.4.3. Documentations

In addition, contract documents were used as a source of data for the respective public building construction projects to conduct a case study analysis. This document would be collected from public building projects and have to be investigated thoroughly, which would be very important in identifying the frequent problems related to the least cost bid.

3.5. Methods of Data Analysis

After gathering data through questionnaires, interviews and case study descriptive method was applied in analyzing the collected data. In order to have a ready to use data the SPSS, Excel tables and graphs were used. An average index method was also used to indicate the relevance of the parameters under consideration. The average index of a Likert scale of five ordinal measures of agreement towards each statement 1, 2, 3, 4 and 5 would be used to calculate the score for each factor that is used to determine the relative ranking.

The questionnaire would be analyzed using the average index method for quantitative results to present the results based on their ranks (Al-hammed et.al., 1996; Abdi M., 1997).

The average index calculated as the results of the weight assigned for each response multiplies with members of respondents divided by numbers of respondents.

$$\text{Average index}=\frac{\sum aixi}{\sum xi} \quad \text{……..……Eqn. 4}$$

Where:

ai=a constant resembling the weight for i or the weight assigned for each response,

xi=the variant resembling the frequency of respondents for i or members of respondents. i= 1,2,3,4, and 5 is resemble as below.

1=the answer frequency for “strongly disagree” relevant to 1;

2= the answer frequency for “disagree” relevant to 2;

3= the answer frequency for “neutral” relevant to 3;

4= the answer frequency for “agree” relevant to 4 and

5= the answer frequency for “strongly agree” relevant to 5.

In order to identify the stakeholder's level of satisfaction with the questionnaire, the average index method is used together with a five-skill defined category; the category follows:

1=strongly disagree,

2=disagree,

3=neutral,

4=agree and

5=strongly agree.

Average points are then classified by using the following method.

1= “strongly disagree” $1.00 \leq$ average index < 1.50,

2= “disagree” $1.50 \leq$ average index < 2.50,

3= “neutral” $2.50 \leq$ average index < 3.50,

4= “agree” $3.50 \leq$ average index < 4.50 and

5= “strongly agree” $4.50 \leq$ average index ≤ 5.00.

3.6. Research Design

The study procedures undergone to reach in the findings were conducted as shown in the following flow chart.

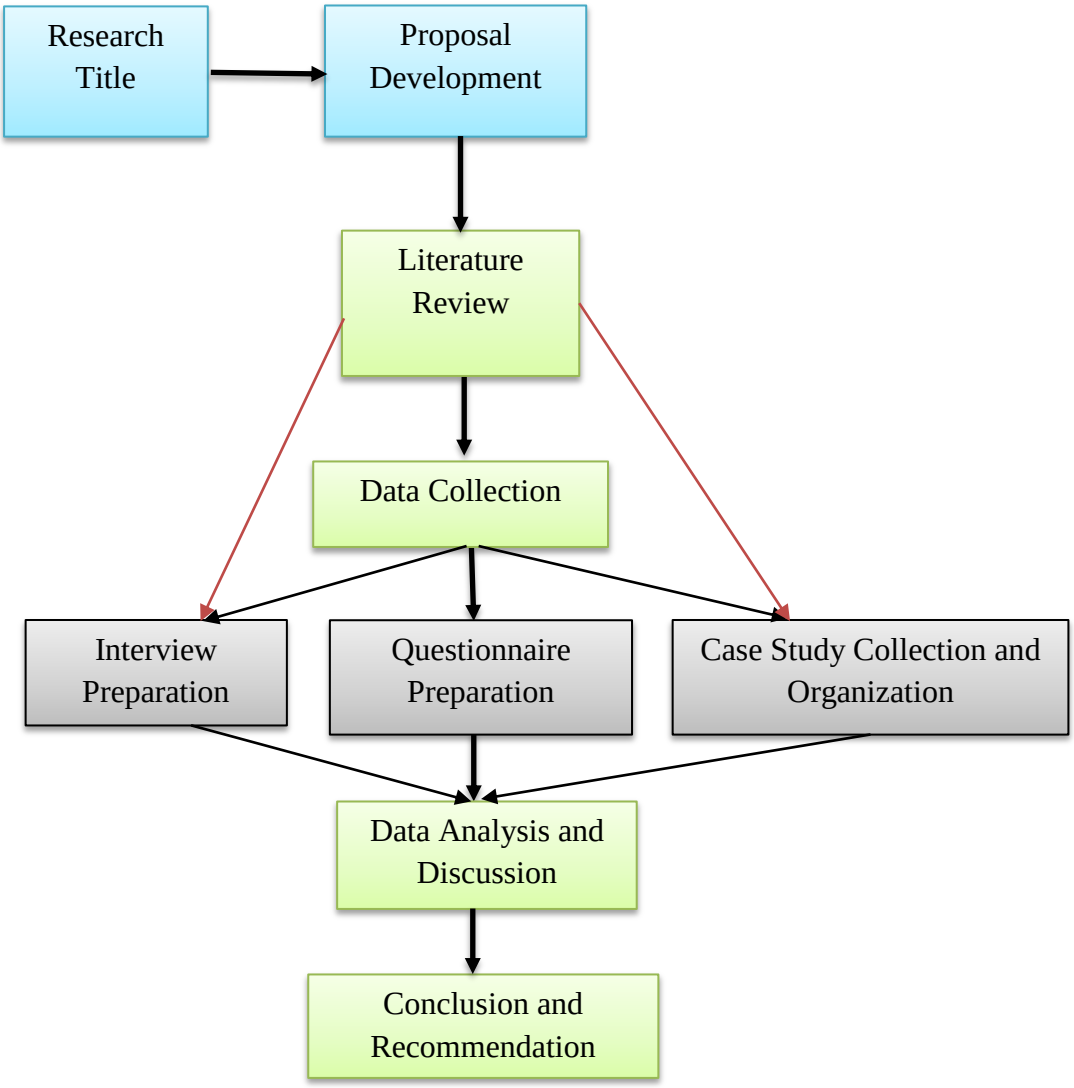

Figure 3.2 Flowchart of Research Methodology

3.7. Validity and Reliability of the Research

Validity was the principles underlying representational of research were based on the fact that a matter of trustworthiness and dependability that the researcher and the different stakeholders placed. To ensure the validity of the research, the questionnaire healed developed and given to experts to score the relevance and content validity of each question in providing an answer to the study. After which a content validity index will be computed the number of items declared the validity of items in the questionnaire (Mohammad Z., 2013).

The respondents' responses from the sample were checked for consistency on some of the questions they responded to and the interview was used to cross-check data collected through questionnaires. To avoid error in coding, rechecking was executed and validity was concerned with whether the findings were really about the researcher investigation (Rajab I., 2014).

The main requirements of this research process were the reliability of data and its findings. Thus, in the main, reliability deals with the consistency, dependability, and reliability of the results obtained from research. Reliability has to do with the accuracy and precision of the measurement of research and it refers to the extent to which the data collection techniques and analysis procedures will yield consistent findings.

Thus the reliability of the data was tested using SPSS version 21 to calculate the Cronbach's alpha coefficient of internal consistency of the variables which were used in the questionnaire. The coefficient of reliability gives the true score percentage of the associated particular variable which can be driven from a composite score of the items in that variable. The reliability coefficient of the scale was established by Cronbach's Alpha method using the SPSS package.

Therefore, the normal range of Cronbach's coefficient alpha values between 0.0 and 1.0 based on this, alpha for Likert scale questions (Stephenie, 2017; Yalew E., 2017).

The result ensures that the questionnaire is reliable as using the following equation shows the reliabilities of each item given by the clients, contractors and consultants respondents and hence it is calculated using SPSS and the following formula.

$$\alpha = \frac{k}{k-1}\left(1 - \sum si^2 / sx^2\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Eqn. 5}$$

Where:

k=Number of items

si=Each variable difference

sx=Total difference

Table 3.1 Reliability ranks using Cronbach's alpha

Cronbach's alpha (%)	**Reliability ranks**
$\alpha \geq 90$	Excellent
$90 > \alpha \geq 80$	Very good
$80 > \alpha \geq 70$	Good
$70 > \alpha \geq 60$	Acceptable
$60 > \alpha \geq 50$	Questionable
$\alpha < 50$	Unacceptable

And the agreement between the ranking of any two groups, for any given number of factors needed to be tested. Spearmen correlation analysis was used to test such agreements and this method was a commonly used tool for measuring the association. The expression for calculating the spearmen correlation coefficient was as follows and its interpretation was using the following guide for the absolute value of the stated items in the questionnaires.

$$Rs = 1 - [(6 * \sum D^2)/(N(N^2 - 1))] \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Eqn. 6}$$

Where:

Rs=Spearmen correlation

D= Difference between ranking for each group

N=Number of factors

0.00-0.19 "very weak"

0.20-0.39 "weak"

0.40-0.59 "moderate"

0.60-0.79 "strong"

0.80-1.0 "very strong"

4. ANALYSIS AND DISCUSSION

4.1. Introduction

The results and discussions of the study categorized into three parts based on the objectives of the research and these divisions used to address each objective based on their character in construction projects.

Thus, the first portion presents the results and the findings of the questionnaires, the case study, and the interview result that assess the least cost contract.

The second part of the results and discussions incorporates finding directed to questionnaires, the case study, and interviews focused on identifying factors affecting the effective implementation of the least cost contract.

Furthermore, the third part of the research was focused on forwarding suggestions on the contract framework which suits public building construction projects in Bahir Dar city.

4.2. Questionnaires Response Rate

A total of 59 questionnaires were distributed and 50 of the respondents returned the questionnaires. From these 20 of the questionnaires distributed to clients, 18 of the questionnaires were collected and found to be completed. Additionally, from the 19 questionnaires distributed to respondents of consultants 15 questionnaires were returned and 15 of them were valid. Furthermore, to the contractors, 20 questionnaires were distributed 17 questionnaires were returned and all are valid responses and completed.

As shown in Table 4.1 below a response rate of 84.7% was received for conducting the analysis and discussions of the study. In addition to 20 interviews were conducted and 20 responses 100% were compiled successfully.

The collected questionnaires have checked the reliability and validity of the data filled by the respondents. 50 questionnaires were found to be complete for data analysis and interpretations, which makes a valid response rate of 100% succeeded.

Table 4.1 Questionnaires distribution, returned and response rate

No	Respondents Category	Distributed Questionnaire	Responses Returned	Responses Rate (%)	Valid Responses	Valid Rate (%)
1	Client	20	18	90	18	100
2	Consultant	19	15	79	15	100
3	Contractor	20	17	85	17	100
	Total	59	50	84.7	50	100

4.2.1. Respondents Profile

4.2.1.1. Work Experience of Respondents

In this section, only professional staff of clients, contractors, and consultants were purposely made to participate in this research. This was due to the fact that the questionnaires and interviews requirement of the respondents with a good educational background on construction industry-related knowledge and experience in the field in order to get relevant information for the study.

In order to understand the respondent's knowledge and experiences, the questionnaires included questions on their work experience and background knowledge. This could guarantee the majority of the respondents have enough knowledge and work experience about the subject matter to give significant data for the study.

This also indicated that all other things being similar and get a true reflection on the investigation of the least cost contract system management practices in public building construction projects.

As shown in Table 4.2 the questions were answered by the experienced construction project professionals in the construction projects. In regard to this 41.2% of the contractor's working experience was in between 10-15 years, 55.5% of the clients were 5-10 years, and 60% of the consultants were 1-5 years.

It revealed that most of the respondents have adequate working experience in public building construction projects awarded by the least cost contract.

Table 4.2 Respondents working experience

No.	Working experience	Contractors		Clients		Consultants	
		Frequency	%	Frequency	%	Frequency	%
1	1-5 years	4	23.5	3	16.7	9	60
2	5-10 years	6	35.3	10	55.6	4	26.7
3	10-15 years	7	41.2	5	27.7	2	13.3
4	15-20 years	0	0	0	0	0	0
5	20 years	0	0	0	0	0	0

4.2.1.2. Respondents' Educational Background

In this research, the educational background of all the consultants, contractors and clients were construction engineering and related fields of study. Thus, all respondents have Civil Engineering, Construction Technology & Management, Construction Engineering and Management, Construction Management, Construction Technology, and Architecture backgrounds.

4.2.1.3. Reliability of the Study

The study results ensured that the questionnaires were reliable as shown in Table 4.3 of each item given by the respondents. The normal range of Cronbach's coefficient alpha values between 0.0 and 1.0 or 0% and 100% based on this, alpha for Likert scale questions (Stephenie, 2017; Yalew E., 2017).

Hence the Cronbach alpha or coefficient alpha results greater than or equal to 90% of shows the question is excellent reliability; results greater than or equal to 80% of and less than 90% of ranked as very good. Thus indicating that the research questionnaire's reliability laid in excellent and very good for the significance, quality, and relevance of this research questionnaire.

Table 4.3 Reliability statistics of questionnaires survey by the respondents

No.	Cronbach alpha, Coefficient alpha	Contractor	Client	Consultant
1	For 5 contract delivery system	0.93	0.9	0.91
2	For 13 types of contract	0.98	0.94	0.97
3	For 9 major reason for low-performance public building projects	0.98	0.94	0.9
4	For 9 factors of least cost tendering	0.98	0.9	0.99
5	For 13 major factors for nonperformance under the least cost contract award	0.87	0.95	0.98
6	For 16 sources of least cost tender preparation	0.99	0.95	0.9
7	For 11 elements of contract manageme nt framework	0.9	0.8	0.98
8	For 5 changes to the contract required after contract award	0.9	0.8	0.9
9	For 9 Activates in construction contract framework	0.97	0.9	0.8
10	For 5 contract award system	0.92	0.89	0.95

4.2.1.4. Validity of the Study

Likewise, validity of the study regarding to correlation based on the respected average index rank of contract delivery system, types of contract, major reason for low-performance projects, factors during the least cost tendering, major factors for nonperformance under least cost contract award, sources for the least cost tender preparation, elements of good contract management framework, changes to the contract required after contract award, and activates in construction contract framework were investigated as shown in Table 4.4.

Thus depending on the result of the relationship of the questionnaire respondents were weak, moderate, strong and very strong from lowest to highest correlation. It revealed

that most of the questionnaire respondents laid on strongly and very strongly interrelated of the study. Spearman's coefficient was greater than or equal to 80% of were the relation of the respondents on the questionnaires ideas very strongly related while 78% of were strongly and 54% of were moderately related. Additionally, on the correlation of factors during the least cost tendering result were 38% of were ranked as weakly; it was indicated that the ideas rise at this point between the respondent's s common understanding were weakly related.

Table 4.4 Correlation test on the factors of least cost contract system

Summary of correlation test on the ranking of contract delivery system				
Groups	**Spearman's Coefficient**			**Relation of the respondents**
	Contractors	Clients	Consultants	
Clients	0.86			Very strong
Consultants		0.94		Very strong
Contractors			0.8	Very strong
Summary of correlation test on the ranking of types of contract				
Clients	0.97			Very strong
Consultants		0.85		Very strong
Contractors			0.9	Very strong
Summary of correlation test on the ranking of the major reason for low-performance				
Clients	0.78			Strong
Consultants		0.80		Very strong
Contractors			0.54	Moderate
Summary of correlation test on the ranking of factors during the least cost tendering				
Clients	0.40			Moderate
Consultants		0.45		Moderate
Contractors			0.38	Weak
Summary of correlation test on the ranking of major factors for non-performance				
Clients	0.79			Strong
Consultants		0.8		Very strong

Contractors			0.70	Strong
Summary of correlation test on the ranking of sources f least cost tender preparation				
Clients	0.97			Very strong
Consultants		0.95		Very strong
Contractors			0.78	Strong
Summary of correlation test on the ranking of elements of good contract management framework				
Clients	0.95			Very strong
Consultants		0.93		Very strong
Contractors			0.86	Very strong
Summary of correlation test on the ranking of changes to the contract required after contract award				
Contractors and clients	0.79			Strong
Contractors and consultants		0.94		Very strong
Clients and consultants			0.83	Very strong
Summary of correlation test on the ranking of activates in construction contract framework				
Clients	0.96			Very strong
Consultants		0.89		Very strong
Contractors			0.84	Very strong
Summary of correlation test on the ranking of types of contract awarding systems				
Clients	0.84			Very strong
Consultants		0.9		Very strong
Contractors			0.74	Strong

4.3. Analysis and Discussion of Results

In this part, the least cost contract system management practices, factors affecting effective implementation and conceptual contract management framework design have been analyzed and discussed.

4.3.1. Questionnaire Analysis and Discussion

4.3.1.1. Delivery System and Types of Contract

Table 4.6 shows the responses on the methods of public building construction projects delivery system, in which design bid build (DBB) is ranked first with an average index of 3.8, 3.7, and 3.9 from contractors, clients, and consultants. Construction management (CM) delivery system is ranked second from contractors with an average index of 3.6 while design-build was ranked second from the opinion of clients and consultants with an average index of 3.3 and 3.7. In addition, construction management (CM) was ranked third from clients and consultants with an average index of 3.1 and 3.5.

Hence, as the three main public building construction stakeholders in Ethiopia implement that design bid builds, design-build, and construction management project delivery system approaches were investigated as mostly practice in public building project delivery systems. However practically according to PPA 2006 and Ethiopian public projects mostly practices design bid build delivery systems.

Table 4.6 Construction contract delivery system

No	Construction contract delivery system	Contractor		Client		Consultant	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Force account	2.7	5	2.1	6	2.7	6
2	Design bid build	3.8	1	3.7	1	3.9	1
3	Design build/Turnkey	3.3	3	3.3	2	3.7	2
4	Build operate transfer	3.2	4	2.9	5	3.3	4
5	Construction management (At fee &Risk)	3.6	2	3.1	3	3.5	3

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

As shown in Table 4.7 shows the responses on the types of public building construction contract, in which unit rate/BOQ/admeasurement is ranked first with average index of 4.6, 4.3, and 4.5 and lump sum is ranked second with an average index of 3.51, 3.62, and 3.52 from contractors, clients, and consultants. In addition, lump-sum with escalation and schedule rate was ranked third in the responses from consultants with an average index of 3.16 and unit rate and escalation ranked third with an average index of 3.28 and 3.18 from contractors and client's responses.

Hence, it revealed that the three main public building construction, stakeholders argue unit rate/BOQ/admeasurement, lump sum, lump sum with escalation and schedule rate, unit rate and escalation was investigated as mostly practice in public building construction projects. Even though in Ethiopia public building construction projects mostly practiced types of the contract were BOQ, unit rate and lump sum.

Table 4.7 Types of construction contract

No	**Construction types of contract**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Lump sum (fixed price contract)	3.51	2	3.62	2	3.52	2
2	Lump sum and escalation	2.9	6	2.8	6	2.9	5
3	Lump sum and schedule rate	3.0	5	2.9	5	2.9	5
4	Lump sum with escalation and schedule rate	3.2	4	3.16	4	3.16	3
5	Unit rate/BOQ/ Admeasurement	4.6	1	4.3	1	4.5	1
6	Unit rate and escalation contract	3.28	3	3.18	3	3.08	4
7	Schedule rate/Item rate contract	2.81	7	2.8	6	2.9	5
8	Schedule rate and escalation	2.72	8	2.72	7	2.72	6
9	Cost plus percentage of cost with GMC	2.4	11	2.5	10	2.4	8
10	Target cost incentive contract	2.34	12	2.34	11	2.34	9
11	Cost plus contract	2.6	9	2.52	9	2.5	7
12	Incentive contract	2.32	13	2.3	12	2.3	10
13	Guaranteed Maximum Price	2.55	10	2.6	8	2.5	7

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

4.3.1.2. Performance of Least Cost Contract Cost Management

As can be observed in Figure 4.1 on the practice of project cost management of the least cost contract method 38.8% of clients, 26.6% of consultants and 29.4% contractors argue that the performance of projects is less than 25%. Fifty percent of the clients argue that the performance of projects is between 25%-50% while 26.6% and 11.7% of consultants and contractors respectively agree to that. 11.1% and 52.9% of consultants and contractors respectively rely on that their performances range between 50%-75%. Whereas 5.5% of clients, 33.3% of consultants, and 5.8% of contractors believe that their performance ranged between 75%-100%.

It indicated that the performance of the least cost contract system project cost was poorly practiced and managed in public building construction projects in Bahir Dar city.

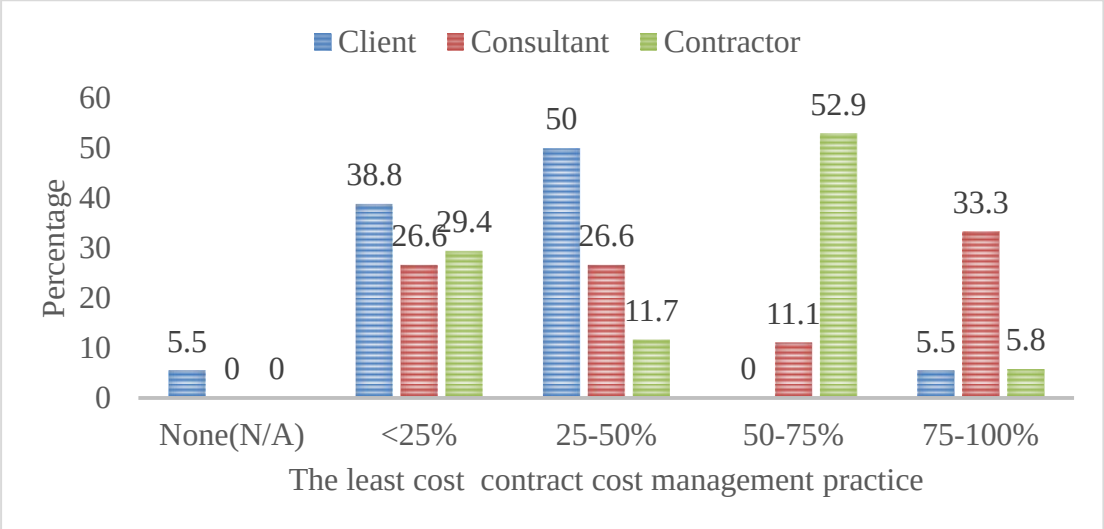

Figure 4.1 Cost management practice of the least cost contract

4.3.1.3. Performance of Least Cost Contract Time Management

As shown in Figure 4.2 associated with the practice of project time in construction contract management through the least cost contract method 50% of clients, 20% of consultants and 17.6% of contractors argue that the performance of projects is less than 25%. 46.6% of the contractors argue that the performance of projects is between 25%-50% while 29.4% of consultants agree to that 44.4% of clients, 33.3% of consultants, and 11.7% believe that their performances range between 50%-75%.

5.5% of clients and 41.1% of contractors believe that their performance ranged between 75%-100%.

In line with this, the performance of the least cost contract system of the project schedule was inadequately practiced and managed. It revealed that the clients, consultants, and contractors manage effectively and give more value for the time of the projects starting from the commencement date of the projects to accomplish the projects without delay of the project.

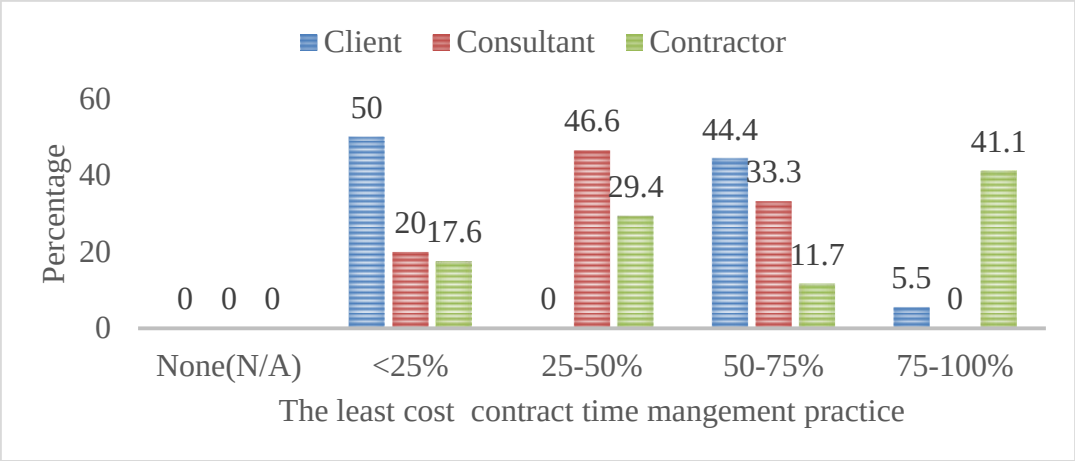

Figure 4.2 Schedule management practice of the least cost contract

4.3.1.4. Performance of Least Cost Contract Quality Management

As shown in Figure 4.3 on the management practice of public building construction projects of quality through the least cost contract method 22.2% of clients, 26.6% of consultants and 5.9% contractors argue that the performance of projects is less than 25%. 50% of clients argue that the performance of projects is between 25%-50% while 20% and 11.7% of consultants and contractors respectively agree to that. 5.5%, 23.5% of consultants and contractors, believe that their performances range between 50%-75%. 5.5% of clients, 46.6% of consultants, and 58.8% of contractors believe that their performance ranged between 75%-100%.

It discovered that the quality management practice of consultant and contractor was 75%-100% and the client was between 25%-50%. It implies that consultant and contractor quality was moderately practiced in the quality of the project achievement of projects.

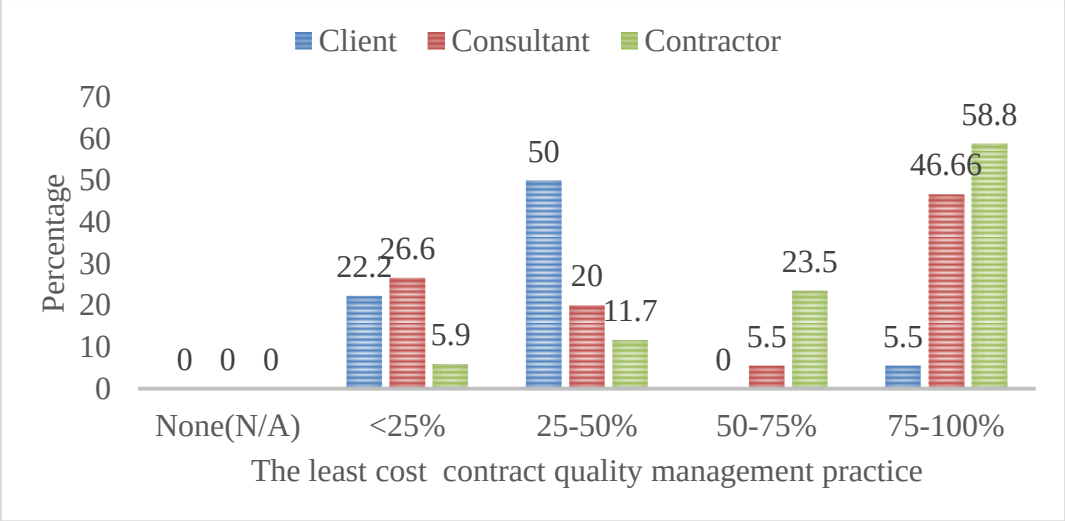

Figure 4.3 Quality management practice of the least cost contract

4.3.1.5. Cumulative Performance of Least Cost Contract Management

In overall, the investigation is shown in Figure 4.4 the practice of public building construction projects in terms of project cost, time, and quality of projects through least cost contract was 44.4% of clients, 26.6% of consultants, and 11.7% contractors argue that the performance of projects is less than 25%. 33.3% of clients, 13.3% of consultants, and 17.6% of contractors argue that the performance of projects is between 25%-50%. 5.5% and 41.2% of clients and contractors respectively believe that their performances range between 50%-75% while 11.1% of clients, 60% of consultants, and 29.4% of contractors believe that their performance ranges between 75%-100%.

Regarding the cumulative practice of cost, time and quality clients and contractors achieved less than 25% and 50%-75% respectively. This revealed that the clients' and contractors' practices were poorly managed by the public building construction projects associated with the three-parameter.

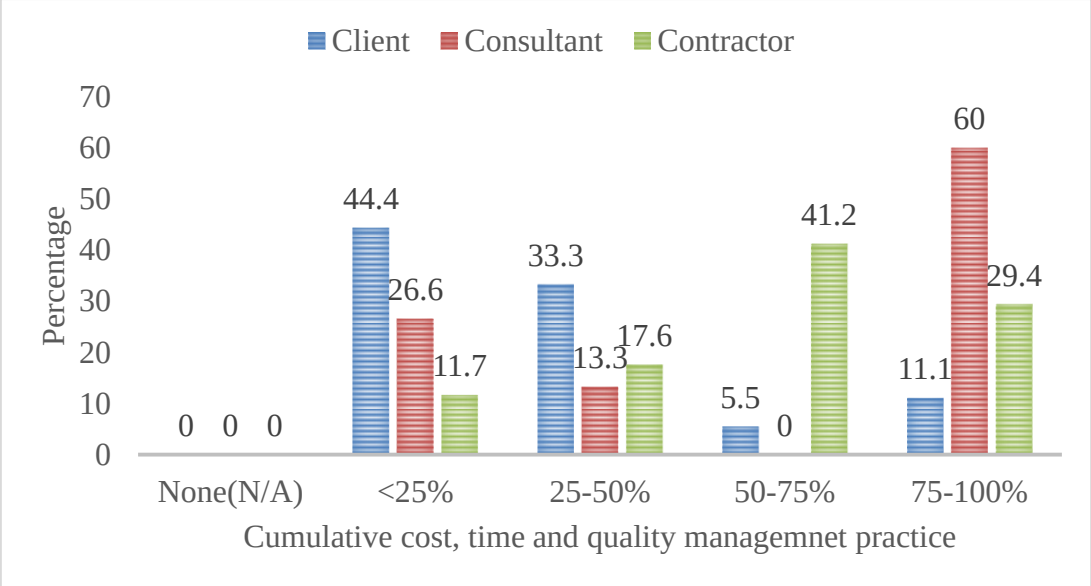

Figure 4.4 Cumulative management practice the least cost contract

4.3.1.6. Project Executed in the least Cost Contract

In aggregate, as can be observed in Figure 4.5 on the number of projects executed through the least cost contract system 5.5% of clients argue that their projects are not performed by this system while 11.1% of clients and 17.7% of consultants applied this system for less than 15 projects. 6.7% of consultant and contractors argue that use this system 16-29 of public building construction projects; while 5.5% of clients, 13.3% of consultants, and 11.8% of contractors are used this system for 30-50 projects while 77.7% of clients, 80% of consultants, and 64.7% of contractors used least cost contract award system for more than 50 public building construction projects.

In regard to this most of the public building construction projects were implemented through the least cost contract awarding system. It revealed that this system mostly used in the public building construction projects but it was shown that its achievement was weak with respect to cost, time, and quality of projects.

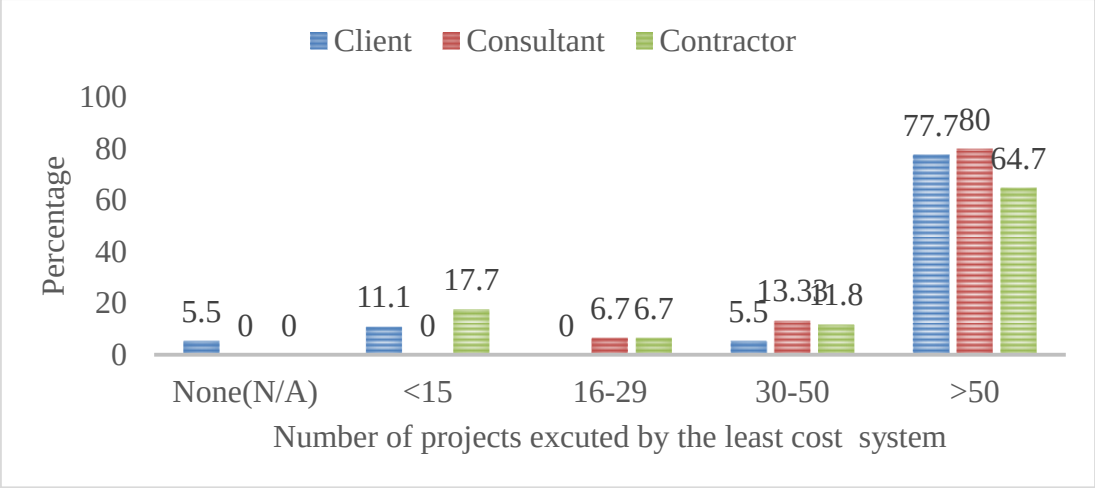

Figure 4.5 Public building projects executed by the least cost contract

4.3.1.7. Factors Affecting Execution of Least Cost Contract

As investigated from in Table 4.8 shows the responses on major factors affecting the effective implementation of the least cost contract system in public building construction projects in Bahir Dar city in which least cost, corrupted system, and low pricing is ranked first with an average index of 3.9, 4.1 and 4.2 from contractors, clients, and consultants respectively. Low pricing and the corrupted system are ranked second with an average index of 3.8 from contractors and while the contractor's capacity and low pricing ranked second with an average index of 4 from clients. In addition, the corruption and contractor's capacity ranked second from consultants with an average index of 4.06.

Moreover, contractor's capacity and inaccuracy of estimates ranked third from contractors with an average index of 3.6 while severe competition among contractors/bidders, performance history of your company on previous projects and inaccuracy of estimates ranked third with an average index of 3.5 from clients argue to that. Furthermore, severe competition among contractors/bidders and shortage of time in preparing bids ranked third in the responses from contractors with an average index of 3.6.

It revealed that the low pricing, corruption, contractor capacity, severe competition among contractors, least cost system, inaccuracy of estimates, and shortage of time in biddings were leading low performances of the least cost contract system. Hence these factors were the main challenge on effective implementation of the least cost contract system management in public building construction projects.

Table 4.8 Reasons for low performance of projects

No	A major reason for low-performance projects	Contractor		Client		Consultant	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Severe competition among Contractors	3.2	5	3.5	3	4	3
2	Low pricing	3.8	2	4	2	4.2	1
3	Inaccuracy of estimates	3.6	3	3.5	3	3.4	7
4	Shortage of time in preparing bids	2.9	7	3.3	4	4	3
5	The performance history of the company on previous projects	3	6	3.5	3	3.9	4
6	Other factors beyond your control	3.5	4	3.4	4	3.5	6
7	Least cost	3.9	1	3.4	4	3.9	4
8	Corrupted system	3.8	2	4.1	1	4.06	2
9	Contractors capacity	3.6	3	4	2	4.06	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

The investigation accompanied with factors of the least cost contract tendering in public building construction projects in Bahir Dar city shown in Table 4.9 the responses in which management system of cost, time and quality at construction stage, stage of projects at hand (active projects and projects near completion), and least cost contract awarding system is ranked first with an average index of 4, 4.3, and 4 from contractors, clients, and consultants. Location of the project under consideration is ranked second from contractors and consultants with an average index of 3.9 while size of the project, volume of work at hand (monetary value of projects), not to be idle / not to make resources idle, least cost contract awarding system, and Management system of cost, time and quality at construction stage was ranked second from clients with an average index of 4.1.

In addition to, Volume of work at hand (monetary value of projects), Stage of projects at hand (active projects and projects near completion) was ranked third in the responses from contractors with an average index of 3.3 while available company's expertise and equipment's clients responses too with an average index 4 and

management system of cost, time and quality at construction stage, available company's expertise and equipment's, and size of the project ranked third with an average index of 3.5.

It discovered that the factors ranked from first to third on the least cost contract tendering system were the main factors affecting effective implementation on the least cost contract system.

Table 4.9 Factors affecting the least cost system tendering

No	**Factors of least cost tendering**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Size of the project	3.7	4	4.1	2	3.5	3
2	Volume of work at hand (monetary value of projects)	3.8	3	4.1	2	3	7
3	Stage of projects at hand (active projects and projects near completion)	3.8	3	4.3	1	3	6
4	Location of the project under consideration	3.9	2	2.9	4	3.9	2
5	Available company's expertise and equipment's	3.5	6	4	3	3.5	3
6	Similarity of the project with previously undertaken projects	2.8	8	3.9	4	3.4	4
7	Not to be idle / not to make resources idle	3.2	7	4.1	2	3.1	5
8	Least cost contract awarding system	3.6	5	4.1	2	4	1
9	The management system of cost, time and quality at the construction stage	4	1	4.1	2	3.5	3
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

4.3.1.8. Company's Profit Margin of the Project

As shown in Figure 4.6 associated with number of projects practice on the company's profit margin of the project contract through the least cost method was 11.76% of contractors argue is less than 3% and 5.88% of contractors argue that the practice is between 4-7% while 16.76%, 13.33%, and 11.76% clients, consultants, and contractors agree the practices was between 8-10%.

27.78%, of clients, 13.33% of consultants, and 29.41% of contractors believe that their performances range between 11-15%. 55.5% of clients, 73.33% of consultants, and 41.18% of contractors believe profit margin practices above 15%.

It revealed that their achievements in profit margin on public building construction projects in Bahir Dar city were greater than 15% of the project performances. It indicated that most contracting party's profit plan is greater than 15%, hence their performance considered as the companies plan in good conditions.

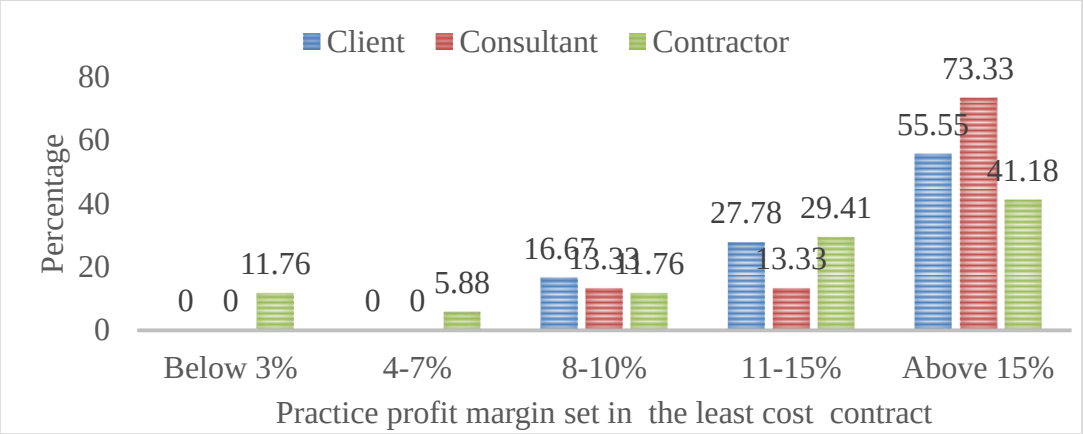

Figure 4.6 Practice of profit margin by the least cost contract

As shown in Figure 4.7 the average profit obtained from executing and completed projects procured through the least cost method 44.44% of clients, 26.67% of consultants, and 58.82% of contractors argue it is less than 50%. 16.67% of clients, 20% of consultants, and 35.29% of contractors argue that the practice is between 50-75% while 53.33% of consultants and 5.89% of contractors believe that the execution is between 75-100%. In addition, 38.89% of the clients the practices were greater than 100%.

This indicated that profit obtained from executing and completed projects procured through the least cost method from clients and contractors were mainly measured less

than or equal to 50% while consultants argue it achieves 75-100% of the project performance and it mainly indicates that the practice requires adaptations.

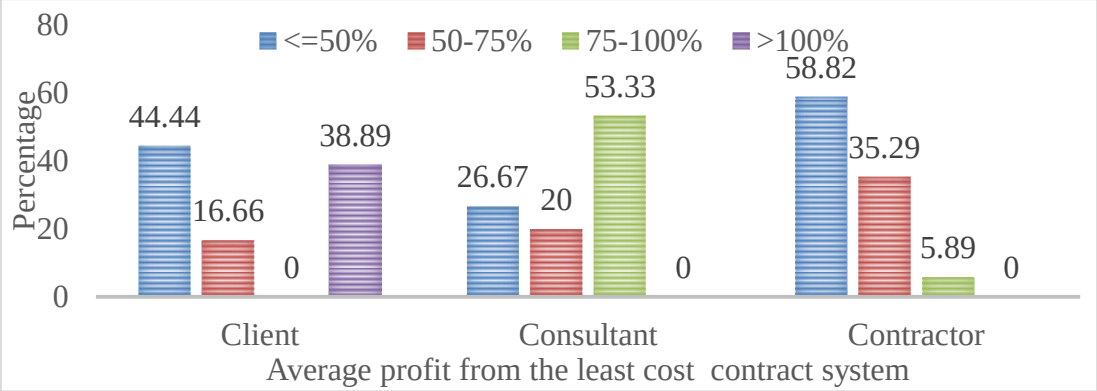

Figure 4.7 Proportion of the expected profit amount so far in Bahir Dar city

4.3.1.9. Factors for Nonperformance of Least Cost Contract

As shown in Table 4.10 shows the responses on the types of public building construction contract in which delays due to design changes or other reasons related to the client and/or consultant, inadequate financial planning (Budgeting, financial plan, cash flow forecast), and lack of effective and efficient project cost management system is ranked first with an average index of 4.2, 4.5, and 4.5 from contractors, clients, and consultants. Lack of effective and efficient project cost management system, escalation of materials, labor and subcontractor prices, and Problems related to contract document/Drawings, specifications, conditions of contracts/ was ranked second from contractors with an average index of 4. The delivery system ranked second with an average index of 4.4 from clients while types of contract and level of accuracy of the estimates prepared during the tendering ranked second with an average index of 4.2 from consultant's responses. Lastly, delivery system, lack of effective and efficient project cost management system, and delays due to design changes or other reasons related to the client and/or consultant ranked third with an average index of 3.8, 4.2, and 4.1 from contractors, clients, and consultants believe.

Hence, as the three main public building construction, stakeholders argue that the items ranked from first to third were the major factors for nonperformance under the least cost contract award system.

Table 4.10 Major factors of non-performance of least cost contract project

No	Major factors for nonperformance of the least cost contract award	Contractor		Client		Consultant	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Contract types	3.5	5	3.9	6	4.2	2
2	Delivery system	3.8	3	4.4	2	4	4
3	Project scope / type of work	3.5	5	4	5	4	4
4	Level of the accuracy of the estimates prepared during the tendering	3.2	7	4	5	4.2	2
5	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)	3.6	4	4.5	1	4	4
6	Lack of effective and efficient project cost management system	4	2	4.2	3	4.5	1
7	Technical difficulties (construction methods)	3.4	6	3.6	8	4	4
8	Escalation of materials, labor and subcontractor prices	4	2	4.1	4	3.9	5
9	Work change orders/variations	3.5	5	3.9	6	3.4	7
10	Problems related with contract document/Drawings, specifications, conditions of contracts/	4	2	3.7	7	3.8	6
11	Delays due to design changes or other reasons related to the client and/or consultant	4.2	1	4	5	4.1	3
12	Significant deviation in labor productivity between standard (assumed) and actual	3.5	4	3.7	7	4	4
13	Weather conditions	2.6	8	3.6	8	4	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

As clearly shown in Figure 4.8 on companies have their own standard construction contract framework for projects procured through the least cost contract method 44.4% of clients, 20% of consultants, and 41.18% of contractors agree that public building construction projects have their own contract award system framework. On the contrary 55.58% of clients, 80% of consultants, and 58.82% of contractors respond that they have not their own framework to execute the public building construction projects procured through the least cost contract award system in Bahir Dar city.

It revealed that more than 65% of the public building construction projects were have not their own standard contract awarding approaches they only conducted through the current system of contract award.

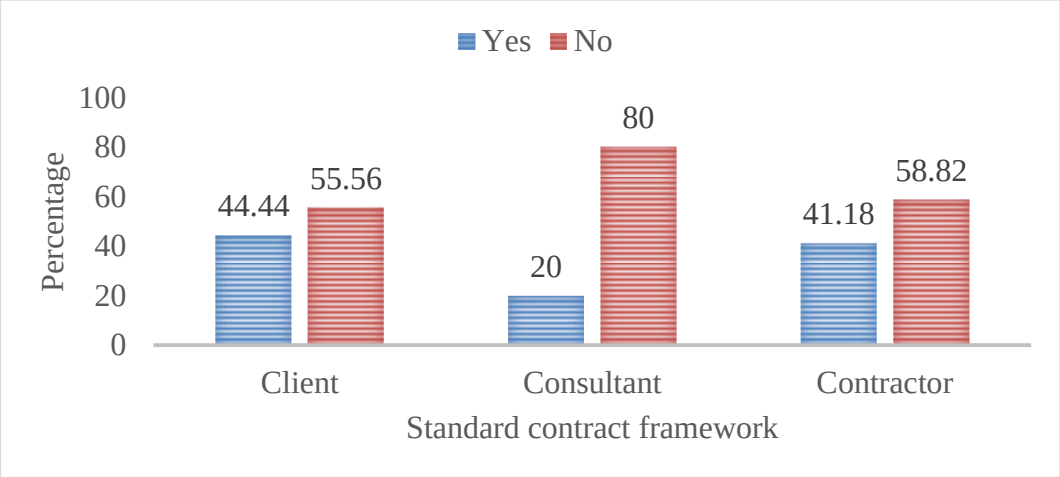

Figure 4.8 Companies response on standard contract framework practice

In Figure 4.9 companies' practice of their framework for preparing tendering contract management for projects procured through the least cost method 61.11% of clients, 33.33% of consultants, and 70.59% of contractors were used. Whereas 38.89% of clients, 66.67% of consultants, and 29.41% of contractors were not used.

It revealed that 45% of the public building construction projects on average were not used their own framework for preparing tendering/construction contract management for projects procured through the least cost method.

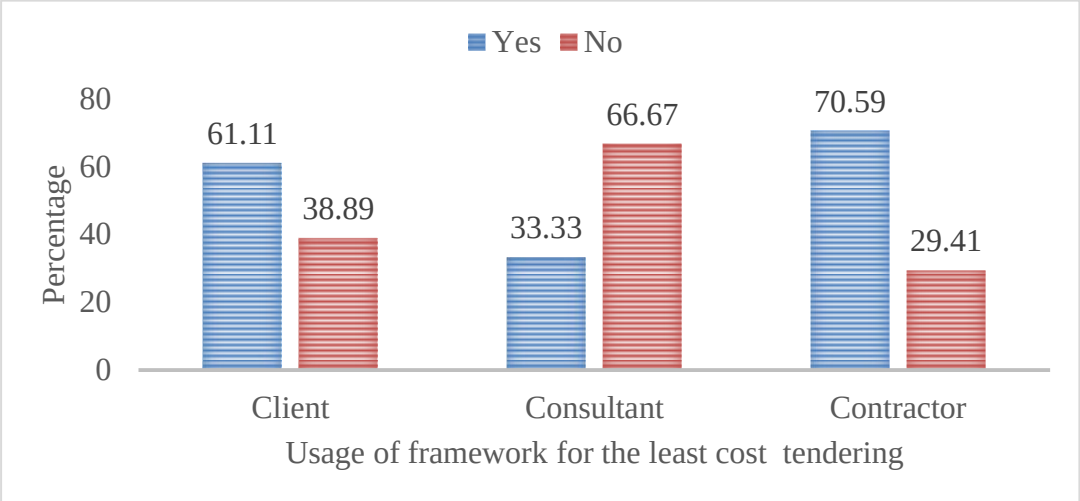

Figure 4.9 Usage of framework for tendering

The investigation shown in figure 4.10 on frequencies of checking the performance of the project that was awarded through the least cost method on their project was 16.67% of clients, 46.67% of consultants, and 82.35% of contractors was evaluate the projects monthly. Whereas 11.11% of clients and 11.67% of contractors were checked their performance quarterly while 33.33% of clients and 53.34% of consultants twice a year. Likewise, 38.89% of clients and 5.88% of contractors agree that the projects were checked yearly.

It revealed that most clients' and consultants' frequencies of evaluating the performance of the projects are quarterly and one in a year indicated that the performance evaluation of clients and consultants is inadequate. While 82.35% of contractors check the performance of the projects monthly it indicates that the progress ranked in good for projects.

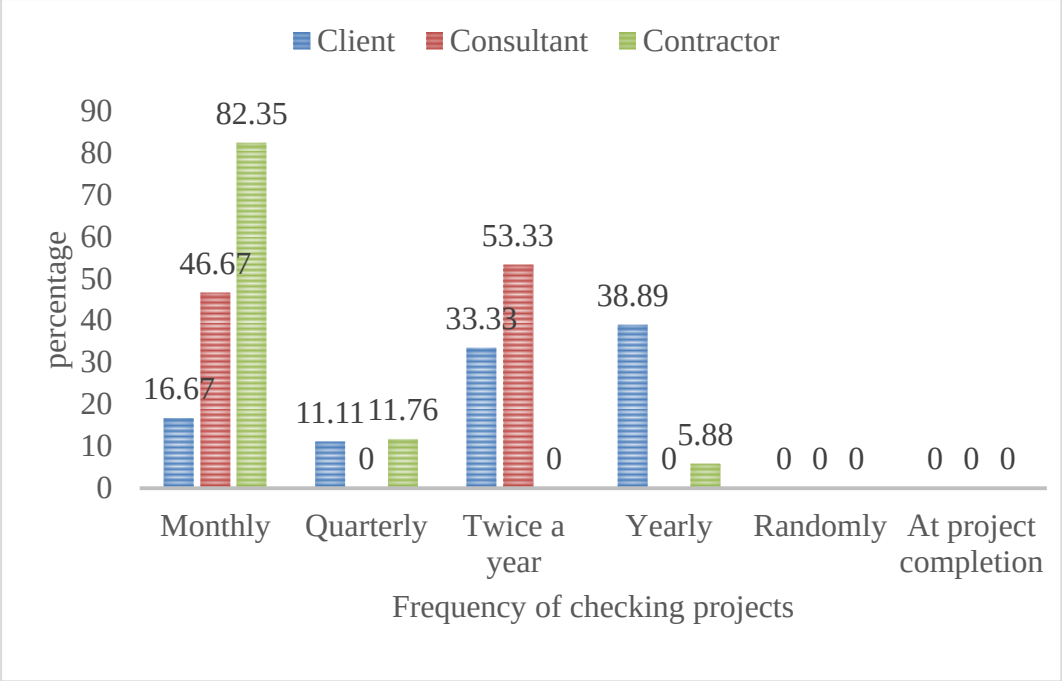

Figure 4.10 Frequency of checking the performance of project

As can be observed in Figure 4.11 on companies' had a standard system for accounting (tracking, recording and controlling) project cost for projects procured through the least cost method 66.67% of clients, 40% of consultants, and 64.71% of contractors have their own cost controlling mechanizes. Whereas 33.33% of clients, and 60% of consultants, and 35.29% of contractors have not cost controlling system.

It revealed that 43% of the three main players have not cost tracing systems in projects awarded through the least cost approaches.

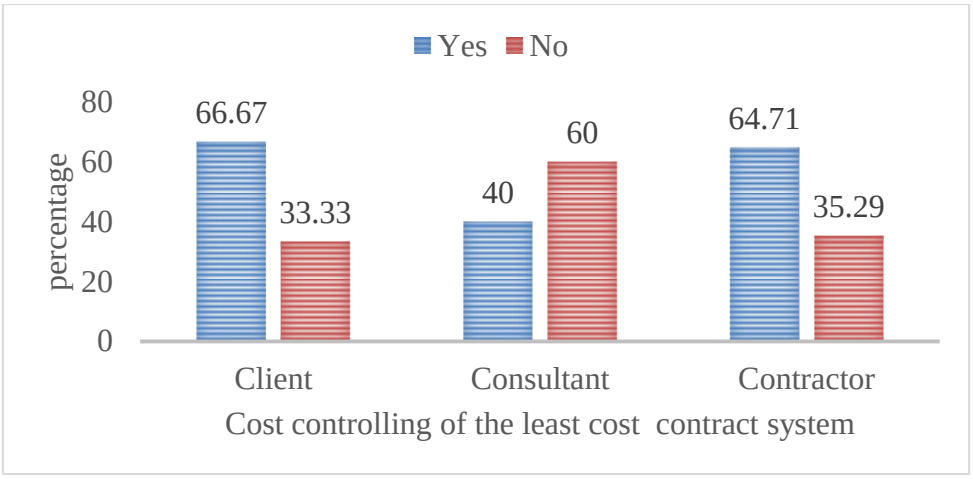

Figure 4.11 Standard system for controlling project cost

As can be observed in Figure 4.12 on companies' had a standard system for accounting (tracking, recording and controlling) project time for projects procured through the least cost method 44.44% of clients, 46.67% of consultants, and 82.35% of contractors have used of their framework for controlling the project schedules. Whereas 55.56% of clients, and 53.33% of consultants, and 17.65% of contractors have not their framework for controlling the project time.

It revealed that 42.2% of the three main players have not timed controlling systems in public building construction projects awarded through the least cost approach.

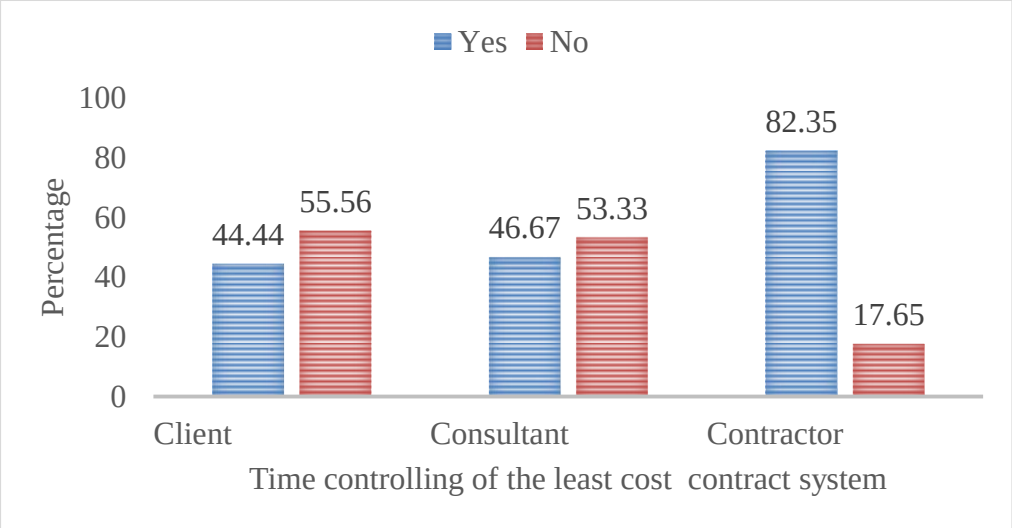

Figure 4.12 Standard system for controlling project time

The study also attempts to investigate in Figure 4.13 on usage of a standard system for accounting (tracking, recording and controlling) project quality of the least cost contract in Bahir Dar city public building construction projects respondents respond that 50% of clients, 46.67% of consultants, and 76.47% of contractors have used their framework for controlling the project quality. Whereas 50% of clients, and 53.33% of consultants, and 23.53% of contractors have not their framework for controlling the project quality.

It revealed that 42.3% of the three main players have not quality tracing systems in public building construction projects awarded through the least cost approaches.

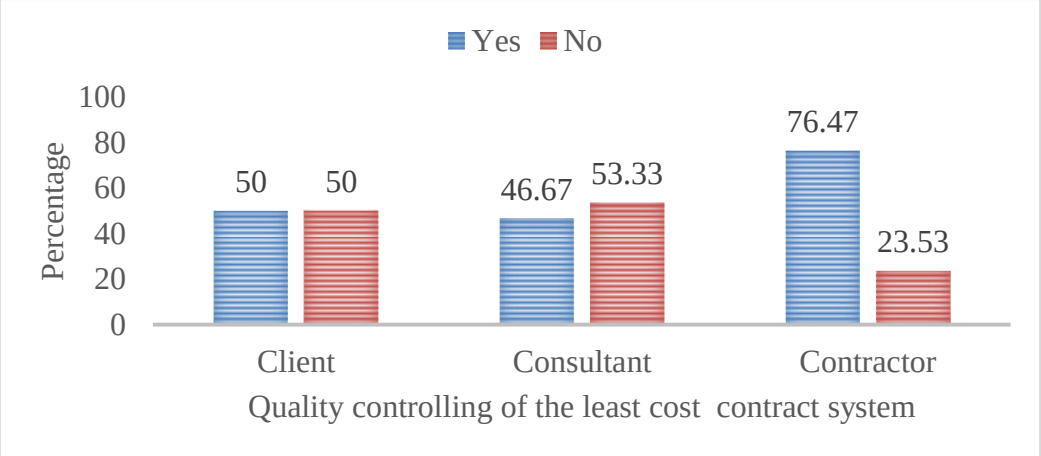

Figure 4.13 Standard system for controlling project quality

As shown in Figure 4.14 investigation on the satisfaction with the bid evaluation procedure and contract management of the least cost contract in Bahir Dar city public building construction projects 16.67% of clients, 20% of consultants, and 17.65% of contractors argue that this system satisfied. While 33.33% of clients, 33.33% of consultants, and 46.05% of contractors do not satisfied with the least cost contract awarding systems. Additionally, 50% of clients, 46.67% of consultants, and 35.3% of contractors agree that the system is somewhat satisfied. It clearly understands that this contract awarding system is not indicated a good approach.

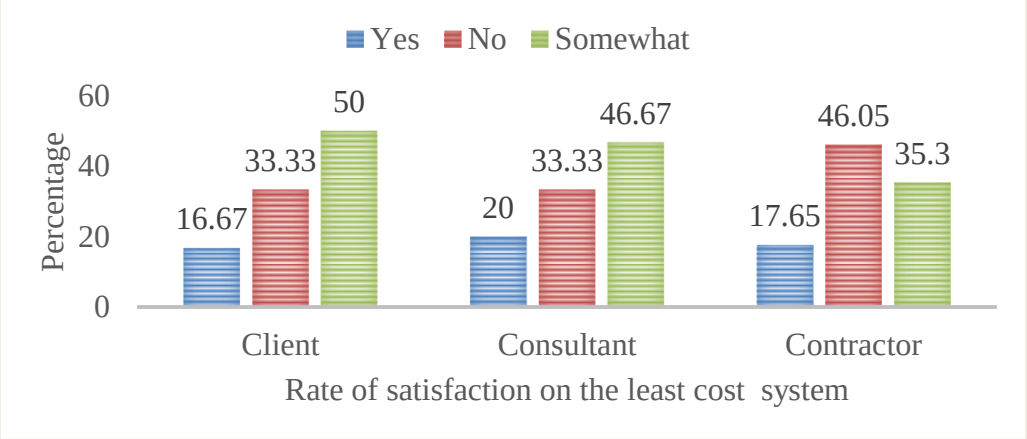

Figure 4.14 Respondents satisfaction on the least cost contract

In Table 4.11 shows the elements of good contract system management for contract in public building construction projects in which administration/management and contractor development is ranked first with an average index of 4.5 and 4.4

contractors and consultants while administration/management, performance, risk, and contractor relationship is ranked first from clients with an average index of 4.4. In addition, performance and payment are ranked second from contractors with an average index of 4 while market management, contractor, and contract development ranked second from clients with an average index of 4.3. Likewise, performance, market management, and contractor relationship from consultant ranked second with an average index of 4. Market management and contract development ranked third from contractors with an average index of 3.9 and payments are ranked third from clients with an average index of 4.2 while payment and stakeholders are ranked third from consultants with an average index of 3.9.

It clearly understood that elements of good contract system management framework ranked from first to third is considered as good system elements for mange contract.

Table 4.11 Elements of good contract system conceptual framework

No	**Elements of good contract management framework**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Market management	3.9	3	3.9	6	4	2
2	Planning governance	3.8	4	4.3	2	3.6	5
3	People/Stakeholder	3.7	5	4.1	4	3.9	3
4	Administration/Management	4.5	1	4.4	1	3.4	6
5	Relationship	3.5	6	4	5	3.6	5
6	Performance	4	2	4.4	1	4	2
7	Payment	4	2	4.2	3	3.9	3
8	Risk	3.7	5	4.4	1	3.8	4
9	Contract development	3.9	3	4.3	2	3.3	7
10	Contractor development	3.8	4	4.3	2	4.4	1
11	Contractor relationship	3.5	6	4.4	1	4	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

In Table 4.12 shows changes to the contract required after contract award in public building construction projects in which change in expected site conditions, change in

requirements of the client/investor, and external systemic events (not project risks) that impact on the project is ranked first from clients with an average index of 4.3 while change in requirements of the client/investor and change in expected site conditions ranked first from contractors and consultants with an average index of 4.1 and 3.9 respectively. Value engineering is ranked third from contractors and clients with an average index of 3.8 and 3.9 while the change in availability of specified materials and external systemic events (not project risks) that impact the project is ranked third from consultants with an average index of 3.6.

It clearly understood that changes to the contract required after contract award ranked from first to third are considered to a management contract.

Table 4.12 Contract changes after awarding

No	**Changes to the contract required after contract award**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Change in expected site conditions	3.3	5	4.3	1	3.9	1
2	Change in availability of specified materials	3.9	2	4.2	2	3.6	3
3	Value engineering	3.8	3	3.9	3	3.3	4
4	Change in requirements of the client/investor	4.1	1	4.3	1	3.8	2
5	External systemic events (not project risks) that impact on the project	3.4	4	4.3	1	3.6	3
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

In Table 4.13 activates in the least cost construction contract framework should have in place a range of legislation and related policies that set out the contract management framework in which managing resources, performance management, and planning, establishing and executing contract administration is ranked first from contractor, clients, and consultants with an average index of 4.1, 4.2, and 4.6 respectively. Behaving ethically and planning, establishing and executing contract

administration is ranked second from contractors with an average index of 4 while managing resources, behaving ethically, keeping records, and relationship management ranked second from clients with an average index of 4.1 and specifying responsibilities ranked second from consultants with an average index of 4.3. Additionally, specifying responsibilities and establishing governance and contract management team is ranked third from contractors and planning, establishing and executing contract administration ranked third from clients with an average index of 4 while behaving ethically and keeping records is ranked third from consultants with an average index of 4.1.

It revealed that changes to the activities in the construction contract framework ranked from first to third is considered to manage the contract award system in public building construction projects.

Table 4.13 Activities in construction contract conceptual framework

No	**Activities in construction contract framework**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Managing risks	3.4	5	3.4	6	3.9	5
2	Managing resources	4.1	1	4.1	2	3.8	6
3	Behaving ethically	4	2	4.1	2	4.1	3
4	Keeping records	3.8	4	4.1	2	4.1	3
5	Specifying responsibilities	3.9	3	3.9	4	4.3	2
6	Establishing governance and contract management team	3.9	3	3.8	5	4	4
7	Planning, establishing and executing contract administration	4	2	4	3	4.6	1
8	Relationship management	3.8	4	4.1	2	3.9	5
9	Performance management	3.8	4	4.2	1	3.5	7
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

Table 4.14 shows the contract awarding systems in which multi-parameter bidding method and limited average bids and owners estimate is ranked first from contractors

with an average index of 3.7 and multi-parameter bidding method from clients raked first from clients with an average index of 3.94 while limited average bids and owners estimate ranked first from consultants with an average index of 4.2. In addition, the nearest to the average of all bid received, limited average bids and owners estimate, and multi-parameter bidding method is ranked second from contractors, clients, and consultants with an average index of 3.65, 3.8, and 3.6. Competitive average bidding contract award system from contractors ranked third with an average index of 3.4. Likewise, nearest to the average of all bid received system ranked third from clients and consultants with an average index of 3.6 and 3.5.

Hence, as the three main public building construction, stakeholders argue that ranked from first to third was investigated as a public building construction project contract award system.

Table 4.14 Public building contract awarding system

No	**Contract awarding system**	**Contractor**		**Client**		**Consultant**	
		Average index	Rank	Average index	Rank	Average index	Rank
1	Least cost system	3.2	4	2.67	5	2.67	5
2	Nearest to the average of all bid received	3.65	2	3.6	3	3.5	3
3	Limited average bids and owners estimate	3.7	1	3.8	2	4.2	1
4	Competitive average bidding	3.4	3	3.4	4	3.47	4
5	Multi parameter bidding method	3.7	1	3.94	1	3.6	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree							

4.3.2. Interview Analysis and Discussion

The participant was asked how do you check the performance of cost, time and the quality of your public building construction projects that are awarded by the least cost contract. It clearly understands that the public building construction project cost and time mostly evaluated and managed through earned value management (EVM). The

quality of the projects was also inspected and controlled through testing before the construction works permitted.

Regarding on how cost, time and quality of the least cost contract awarded system ma nagement practices in your project/company. The interviews show on cost, time, and quality of the least cost contract awarding system management practices in public building construction projects were weak as contracting parties reflect. It revealed that reports and tests were used as project cost, time, and quality controlling mechanism. From this, it can be understood that project planning was not compliant with work performed.

Respecting what kinds of cost, time and quality management framework/control method is implemented during over cost, delay, and not fulfilling the quality of your project work. The interviews can understand that the cost, time and quality of public building construction projects were not used management framework to manage variance of cost, delay, and non-compliance of construction quality.

From the professional person, how do you examine the practice of the least cost contract management in public building construction projects in Bahir Dar city. The contractors, clients, and consultants reacted that sometimes the quality of projects was not fulfilled the planned work should be rejected and mostly taking remedial measures. Likewise, the time and cost of the public building can be negotiated with parties without the contract agreement. Additionally, the interviews on ways of management of the cost, time, and quality through least cost contract award system quality managed simply conducting quality testing whereas time and cost are managed through progressive supervision using earned value management.

Regarding how do you assure the quality, time and cost of public building construction projects through the least cost contract. the contractor, client, and consultant of public building construction projects interview to identify the management of cost, time and quality of those projects they revealed that the management of these construction parameters in the least cost system was weak and mostly the problems are solved through simple negotiation between construction parties. So strict cost, time and quality management set by assign specific weights to the parameters and decisions are also done on time to save project duration and cost of the projects.

From what is your recommendation about cost, time and quality management system that is awarded by the least cost contract public building construction projects Bahir Dar city. The performance cost, time and quality management in the least cost contract contractor, client, and consultant were interviewed it remarkably shows that the responsible body should prepare valid and enforceable management systems for public building construction projects in the Bahir Dar city.

The interview asks the participant do you believe that the project through the least cost contract award system is well performed and what are the factors affecting the methods in terms of cost, time and quality. If not how you rectify the problems of this system. They responded that factors affecting the least cost contract awarding system were the contract awarding system, contractor's capacity, corrupted system, unpredicted price fluctuation, the political, and environmental issues throughout the project life. Regarding the performance was mostly not well achieved in terms of project cost, time, and quality; hence to rectify these problems contract awarding should be changed and public building construction projects fully managed on the project cost, time, and quality.

They ask do you believe that the least cost contract award system is effective in public building construction projects. regarding this, all interviews revealed that there is no effective in public building construction projects awarded by the least cost contract award system.

Regarding what are the types or alternative of contract awarding system in public building construction projects that you as professional you recommend for the effective accomplishment of projects in specified cost, time, and quality. They responded to that competitive average bid system. nearest to an average of all bid received system, limited to average bid and Owners estimate system, and multi-parameter bid system were different types of public building construction projects contract award systems.

Respecting to what do believe about the weight given for cost, time, and quality of multiple tender evaluations. As clearly shown from this adopting a contract award framework in public building construction projects to sustain effective and efficient accomplishment of projects. From the interviews, questionnaire, and case study on multiple contracts clearly understands that the result assigns for project time 50%,

quality 20%, and cost 30% during evaluation; it indicates that time and quality should contain more tender evaluation value to award the projects. The analysis and discussion also clearly show limited average bids and owners estimate by applying the evaluation plus or minus 15% of the estimated project costs could be applied in public building contracts award system.

4.3.3. Case Study

The purpose of the case study is to get information and strengthen the data from the interviews and questionnaires related to the least cost contract. Hence the case study planed to investigated in addition to questionnaires and interviews with different external factors. The case study to investigate the practice of the least cost contract awarding system in public building construction projects is conducted as shown in Table 4.15 and 4.16.

Project=G+2 office building construction projects,

Consultant=Amhara road and construction supervision Enterprise

Client=Agriculture Research Centre,

Contractor=Amhara region urban development and construction, Amhara building works Enterprise

Project duration=540 calendar days and

Project budgeted cost=51,700,809.55.

Current states of the project=62.7% and at 540 calendar days from the start date of the projects.

Table 4.15 Current states of the project

Terms at current states	Figure
Budgeted at completion (BAC)	51,700,809.55
Budgeted work cost performed (BWCP)	32,416,407.59
Budgeted cost work schedule (BCWS)	51,700,809.55
Actual cost work performed (ACWP)	30,005,000.00 at 540 calendar days

As clearly shown in Table 4.16 the case study with respect to cost variance was +2, 411,407.59 and schedule variance was -19,284, 401.96. Thus in regard to this project, the total variance at completion of the projects was 6, 062, 474.4 ETB. It indicated that the project was not accomplished at a specified cost and schedule. Hence form

the interviews, case study, and questionnaires the least cost contract was not adequate for the effective achievement of public building construction projects.

Table 4.16 Case study on least cost contract

Terms	**Formulas**	**At 540 calendar**
CV	BCWP-ACWP =32,416,407.59-30,005,900	2,411,407.59
SV	BCWP-BCWS=32,416,407.59-51,700,809.55	-19,284,401.96
VAC	BAC – EAC=51,700,809.55- 45,638,335.15	6,062,474.4
CPI	BCWP / ACWP=32,416,407.59/30,005,000	1.08
TCCPI	$TCCPI = \frac{BAC - BCWP}{BAC - ACWP} =$ (51,700,809.55-32,416,407.59)/ (51,700,809.55-30,005,000)	0.89
SPI	BCWP / BCWS =32,416,407.59/51,700,809.55	0.63
TCSPI	$TCSPI = \frac{BAC - BCWP}{BAC - BCWS} =$ (51,700,809.55-32,416,407.59)/ (51,700,809.55-51,700,809.55)	-
CSI	SPI * CPI=0.63*1.08	0.68
EAC	$EAC = \frac{ACWP + (BAC - BCWP)}{CPI}$ [30,005,000+(51,700,809.55-32,416,407.59)]/1.08	45,638,335.15
ETC	EAC – ACWP=45,638,335.15-30,005,000	15,633,335.15
ETTC	$ETTC = \frac{ORGINALDURATION\,(OD)}{SPI}$ =540/0.63	854
% Schedule Report Date	BCWS / BAC * 100 =51,700,809.55/51,700,809.55*100	100
% Complete	$\%Compelete = \frac{BCWP}{BAC} * 100$ =32,416,407.59/51,700,809.55*100	62.7
% Spent	$\%Spent = \frac{ACWP}{BAC} * 100$ =30,005,000/51,700,809.55*100	58.04

4.4. Conceptual Contract Award Management Framework

From the investigation shown that the least cost contract was the common award system in most public building construction projects. The conceptual framework in Figure 4.15 on contract awarding in public building construction projects is investigated. This framework implemented to provide an effective and efficient contract awarding platform through a predictive framework to sustain the dynamics of cost, time, and quality in the least cost contract system.

Construction project changes, the knock-on effects due to rework that because cost overrun, delay, quality problems, disruption, and possible degradation of public building construction project accomplishments. Having the aforementioned problems of the traditional contract awarding system was the main indication of searching other alternative ways in public building construction industries.

As a result, construction practitioners can adopt the conceptual framework for well-informed decision making at the point of cost, time, and quality changes requested at the public construction contract implementation. Thus, the impacts can be imagined at an early stage in order to minimize the problems of the contract to potential claims and disputes at the implementation and the end of the project. As a consequence, having this contract awarding system framework for the project managers, clients, consultants, contractors, and all public building construction stakeholders implemented to forecast the dynamics of the parameters; in addition to the professional honesty to work until the end of the construction projects.

The framework was design based on the questionnaires, case study, and interview outputs on the public building construction contract awarding and management practices. During the contract award system; the process of the framework was used with respect to the situation in the public building construction projects that occurred and could be managed effectively in terms of the three construction parameters.

Hence, in regard to these, the following contract management monitoring mechanism and/or framework was designed for the effective implementation of public building projects in the construction industry.

From the investigation of the questionnaire, case study, and interviews revealed that the least cost contract award system was not the one which was not an effective approach in public building construction projects in Bahir Dar city. Accordingly, it clearly is shown that the modification of the contract award system was a mandate to the acquired effective accomplishment of public building projects according to the specified cost, time, and quality. From the analysis, it clearly understands that there are different contract award systems were investigated in public building construction projects to adopt in terms of least cost system.

Thus based on the rank during rating the relevance of adopting contract award system ranked from first to third was nearest to the average of all bid received system (NAABRS), competitive average bid system (CABS), multi-parameter bid system (MPBMS), and the limited average bid and owners estimate system (LABOES). Then it can also categorize into two based on cost and multi-criteria in contract requirements.

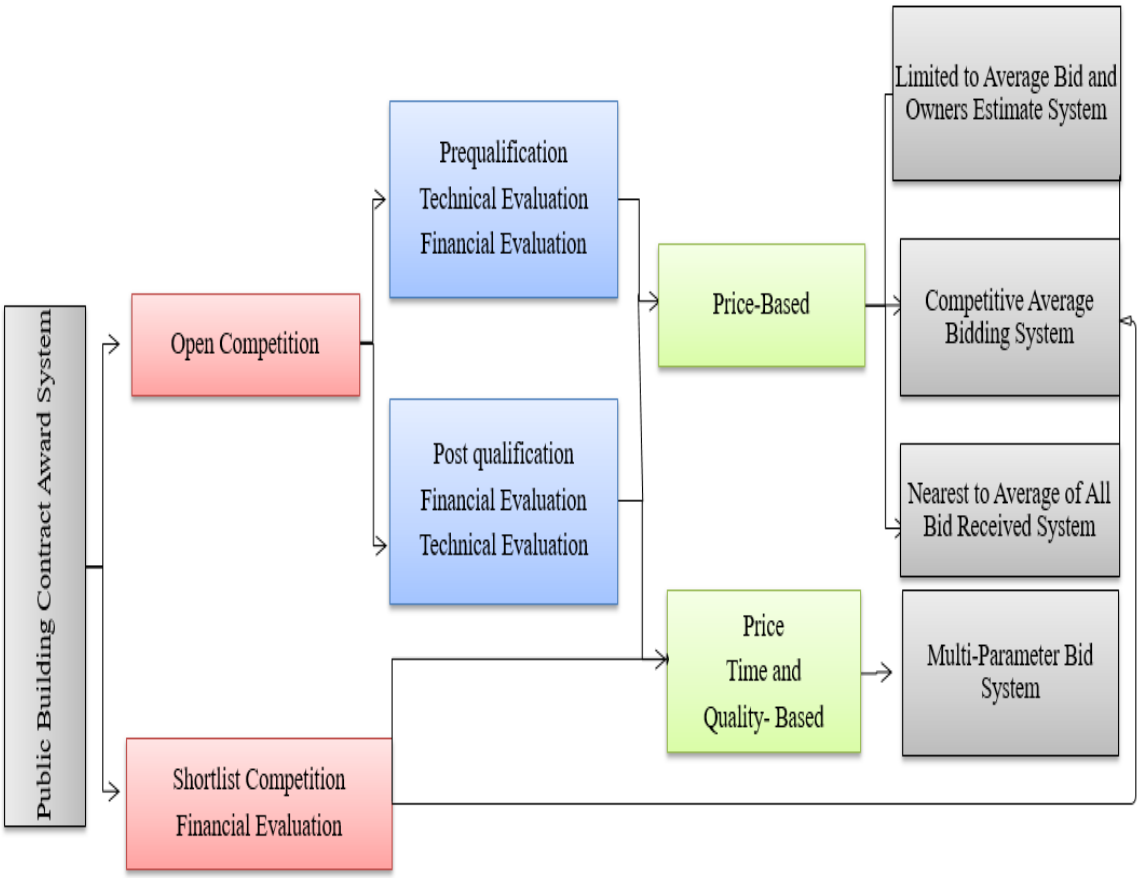

Figure 4.15 Conceptual contract award management framework

4.4.1.1. Work Flow of the Conceptual Framework

From the conceptual framework in Figure 4.15 clearly understood that limited to average bid and Owners estimate system, multi-parameter bid system, competitive average bid system, and nearest to average of all bid received system contract awarding systems was investigated and were ranked from first to third. Hence it is clearly shown that these systems could be used as an alternative based on the situation of public projects, types of contracts, delivery systems of the project, the number of parameters required by the projects adopts based on the considerable procedures. Competitive average bid system and nearest to an average of all bid received system contract awarding systems mostly inline on bid cost of the bidders only so in this part limited to average bid and Owners estimate system and multi-parameter bid system with the predictive ways of implementation is investigated for public building construction projects.

4.4.1.1.1. Limited by Average Bids and Owner's Estimate

To award the bid by limited by average bids and owners estimate, the owner reviews all of the participating offers and looks for the offer nearest to the average bid value. The evaluation and adoption of this bid are based on the following procedures in public building construction projects.

1. Bidders are invited to offer the price for all works based on the types of the contract specified by the owners or legal representatives and competition is made among them based on their offer. In addition to the price bidder's past performance, equipment, and professional person of the contractor/bidder has been evaluated when the completion is open but technical evaluation is not required when the competition shortlist.
2. Eligible to participate in the process of bidding are those who are registered by the revenue office regarding taxes a contractor is supposed to submit his offer in two copies.
3. A contractor is supposed to submit his offer into two copies, one "original" and one "copy" before the expiry of the bid submission date. The bid box is opened, prospective bidders or their legal representatives will win the process and all participants have the right to see every one offer.

4. Each package is opened in front of the bidders and here the presence and amount of bid bond are checked and considered.
5. Carry out arithmetic checks on the correctness of the total prices of the projects. Arithmetic check depending on the questionnaires and interview output, only bidders with the offer in the range of plus or minus fifteen percent of the engineering estimate are considered and taken. The engineering estimate is set by the client and contractors with price below 15% and above 15% of the engineering estimate are regarded as non- responsive and shall be rejected and their bid bond returned. After the arithmetic check and the responsiveness, the selection of best bidders is conducted according to the following procedures.
6. The first estimate made by the clients of the project estimate is the sum of 50% of the estimation by the consultant and 50% of the estimation of the public building representative.
7. The average prices offered by responsive contractors for the project is calculated.
8. An estimate is arranged by taking the of 25% the engineering estimate and 75% of the average estimate.
9. The baseline is calculated by taking 15 % of the arranged project cost.
10. Then the winner of the bid is the contractor whose offer is the least beyond the baseline.
11. Now the client sends a letter of acceptance to the successful bidder informing that he has won the project for the stated sum.
12. The contractor must show up in 15 days after notification to sign on the contract agreement for specified public projects.
13. The other contractor can be notified that their offer has not been successful, but for the bid validity, their bid bond will not be returned until the successful contractor responds in the time specified and signs on the document.
14. Furnishes the performance bond with the successful bidder and when the winner fails to sign the agreement on the period specified the clients have full right to penalization on the bid bond and invites one contractor from the losers.
15. When all contractors fail to sign the agreement their bid bond will be taken by the owner and the owner has full right to prepare another bid.

4.4.1.1.2. Multi-Parameter Bidding Method

A multi-parameter bidding method system in public building is not considered only on cost but also considered the time and quality of the project. To adopt a multi-parameter bidding system the following steps could be applied.

1. The amount of time a contractor proposes to take to complete the project has a major impact on costs. Hence, a contractor who can complete a project prior to his closest competitor save the owner additional rent monies. Thus, by factoring this cost-saving in the bid process and a more accurate reflection of total costs can be calculated.
2. The impact of the quality of the project can also be included in the award decision. The long term costs of maintenance and repair are directly related to the quality of the constructed facility being built. Here the bid evaluation of project quality carried out through ordering the bidders submits the rate analysis of each work activity with materials specification at evaluation. Hence, estimates of quality are measured by the type of materials proposed to be used, the previous experience, the past performance of the bidder, and the proposed subcontractors.
3. Project time and quality concerns are each assigned a maximum attainable number of points in the bid evaluation which is the weight factors given for the project time estimated as 0.45-0.50 and quality 0.15-0.20 out one of sum cost, time, and quality.
4. The bids are then reviewed and ranked based upon these factors as well as upon the contract cost of the construction project. Bidders' proposed project duration, past performance related to the quality of finished the projects, safety records can be factored into coming up with a total combined cost in this method.
5. The total combined costs of all the bidders are then compared to select the best bid in the evaluation of the construction tendering.
6. Now the client sends a letter of acceptance to the successful bidder informing that he has won the project for the stated sum. The contractor must show up in 15 days after notification to sign on the contract agreement.

7. The other contractor can be notified that their offer has not been successful, but for the bid validity, their bid bond will not be returned until the successful contractor responds in the time specified and signs on the document.
8. Furnishes the performance bond and the winner fails to sign the agreement on the period specified the clients have full right to forfeit the bid bond and invites one contractor from the losers.
9. When all contractors fail to sign the agreement their bid bond will be taken by the owner and the owner has full right to prepare another bid.

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Construction contract award management was the most challenging work in the construction industry. Hence this study started with the main objective of investigating the least cost contract management practice in public building construction projects in Bahir Dar city. Based on the results from the analysis and discussion, the following major conclusions have been drawn.

- The study finding indicated that the client's and consultant's project cost and time were poorly practiced and contractors reasonably manage with respect to a contract agreed upon. Likewise, the client's project quality performance was weakly practiced as cost and time; while consultants and contractors rationally managed or practiced the quality of the project with respect to a contract agreement.
- It was clearly shown that the delivery system and types of contracts can be practiced in the least cost contract were design bid build; construction management, unit rate/BoQ/admeasurement, and lump sum respectively. However, most current public building project practiced delivery system and types of the contract were design bid build and unit rate/BoQ/admeasurement/lump sum respectively. In parallel, most clients, consultants, and contractors were executed more than 50 public buildings construction projects done by the least cost contract.
- It was shown that the major factors affecting the least cost contract were identified as contract awarding system, contractor's capacity, corruption on the system, unpredicted price fluctuation, the political, and environmental issues throughout

the project life, size of the project, volume of work at hand, stage of projects at hand, location of the project under consideration, available company's expertise and equipment's, idle of resource's, and management system of cost, time, and quality at construction stage.

- The findings show that the achievements of profit were on public building construction projects awarded by the least cost contract in Bahir Dar city was greater than 15% of the project's performances.
- It was obviously shows that most of the clients, contractors, and consultant's have not their own contract framework to manage the public building construction project cost, time, and quality. As can be observed from companies' frequencies of checking the performance of a project that is awarded through the least cost contract on their project were clients check quarterly, monthly, twice a year, and yearly. Likewise, consultants were checked monthly and twice a year; contractors were yearly, quarterly, and monthly respectively check the performance of the projects.
- From the study results on the satisfaction of bid evaluation procedure and contract awarding in Bahir Dar city public building construction projects were mostly couldn't satisfy on the least cost contract.
- It was clearly understood from the research was that managing resources, behaving ethically, keeping records, specifying responsibilities, establishing governance and contract management team, planning, establishing and executing contract administration, relationship management, and performance management were the activities in public construction contracts conceptual framework development.
- Additionally, the study was investigated from the interview that, quality of public building construction project was conducted through quality testing and measuring; however mostly the quality of projects has not fulfilled the specification due to this the work was rejected and variation has occurred. Likewise, the case study and interview understood that the cost and time of the project were managed through supervision and using earned value management. However, as the respondent thought that the project cost and time were negotiated without considering the contract agreement.

5.2. Recommendation

5.2.1. General Recommendation

This study was concerned about averting the contract award system management of problems that may impact the objectives of the contract and to obtain the broadest contract management coverage. In order to achieve the contract objectives, the following recommendation is proposed.

- The clients were recommended a well-prepared contract document that should be offered to the bidder to procurement and contract public building construction projects.
- The clients were recommended to reinforce the contract management requirement by employing experienced and professional consultants; collaboration with other concerned contractors to implement the contract framework for construction to be used by all construction stakeholders.
- Design and supervision professionals were recommended to protect their professionals by providing adequate professional contract management coverage for the professional services by delivering their legal liabilities arising from their professional error, omissions, and negligence of their employees in the contract.
- The consultant's companies in collaboration with the clients and contractor's were advised to use a conceptual contract framework for their projects.
- While contractors and consultants are mainly responsible for the successful contract of construction projects; so they can provide their expertise to assist problems endeavor in recognizing effective management of problems and reducing the probability of occurrences of such problems.
- In order to reduce incidents project cost, time, and quality; consultant's and/or client's and contractor's were recommended to take an active attitude to assist the project to control these construction parameters according to the contract agreement.
- Consultant companies were suggested to assign experienced and ethical engineers who were familiar with the contractual duties and ability to solve to prevent construction contract dynamics using the contract awarding framework.
- As part of contract management, it was recommended that visiting project sites at the early stage and throughout the construction period rather than only when

problems arise should be mandated. Therefore, the contractor's and client's will be effective with the chance to keep in close with the contract throughout the public building projects.

- Contractors are suggested to be innovative and have the ability to negotiate with the clients and consultants to ensure the contract.
- The least cost contract was weakly practiced/performed in the construction contract; hence it was recommended that the client's and/or consultant's should adopt limited to average bid and owners estimate system, multi-parameter bid system, and nearest to average of all bid received contract awarding systems for their projects alternatively.
- Public contractors were a government organization and lead by the bard represented from the political party of the country and sometimes they directly contract projects without any competition. Whereas the privet contractors are profit-generating organizations, from this the public bodies suggested that they should free from any political issues to the privet contractors were free competent with public contracting parties.

5.2.2. Recommendation for Future Research

This research has been identified the practices, factors that affect the effective implementation of the least cost contract and suggested a conceptual contract framework for the contract award system in public building construction projects in Bahir Dar city.

Hence the researcher would like to suggest for future research studies that relate to the investigation of the least cost contract practices in public building construction projects are developing a system for construction contract uncertainties in public building construction for the effective accomplishment of public construction projects.

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APPENDIX

A. Questionnaire Survey

Bahir Dar University

Bahir Dar University Institute of Technology

School of Research and Graduate Studies

Faculty of Civil and Water Resource Engineering

Dear Bahir Dar City Construction Project Professionals:

This questionnaire survey is part of a research conducted for fulfilling the requirements of an MSc Degree in Civil Engineering (Construction Technology and Management) at Bahir Dar Institute of Technology, Bahir Dar University. The main objective of this thesis is to investigate the performance of the least cost contract award system management practice in public building construction projects in Bahir Dar City.

Therefore, I need your generous ideas (help) in filling out this survey for the success of

the study. The questions below are related to your experience and your company/agen cy/Organization's experience in the construction industry. Please indicate by filling the blank or putting a mark in the appropriate box or table. Any data or information provided in the survey is solely used for the academic purpose of the research under consideration and is kept confidential. If you have questions related to this, please contact me with:

Gizachew Z. +251-09-18-54-60-36

Email-gizaenet23@gmail.com

I Thank You in Advance, for Your Invaluable Time, Cooperation and Feedback!!!

1. BACKGROUND

1.1. What is your occupation, relative to the construction industry/Company?

- □ Contractor
- □ Client
- □ Consultant
- □ Other, please specify_____

1.2. What is your professional background?

- □ Construction Project Manager
- □ Construction Techno. & Management
- □ Civil/Structural Engineer
- □ Architect
- □ Other, please specify_____

1.3. How many years you are experienced in your Profession?

- □ 1-5 years
- □ 6-10 years
- □ 10-15 years
- □ 15-20 years
- □ >20 years

2. PUBLIC BUILDING CONSTRUCTION PROJECT PERFORMANCE

2.1. Which project delivery method, has your company involved in the public building construction project works in Bahir Dar city, most of the time?

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree

No	**Construction contract delivery system**	**1**	**2**	**3**	**4**	**5**
1	Force Account					
2	Design Bid Build					
3	Design-Build/Turnkey					
4	Finance/Build Operate Transfer					
5	Construction Management (At fee and At-Risk)					

Other, please specify and rate_____

2.2. Which type of contract do you encounter often?

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	Construction contract types	1	2	3	4	5
1	Lump-sum (Fixed-price contract)					
2	Lump-sum fixed price and escalation contract					
3	Lump-sum fixed price and schedule rate contract					
4	Lump-sum fixed price with escalation and schedule rate					
5	Unit rate/BOQ/ Admeasurement contract					
6	Unit rate and escalation contract					
7	Schedule rate/Item rate contract					
8	Schedule rate and escalation contract					
9	Cost-plus percentage of cost with GMC					
10	Target cost incentive contract					
11	Cost Plus Contract					
12	Incentive contract					
13	Guaranteed Maximum Price Contract					

Other, please specify and rate

_____

2.3. Please give a fair indication of the performance of projects procured through the least cost method, performance in terms of the cost of the project in your company.

□ ≤ 25% □ 25-50% □50-75% □75-100% □ None (N/A)

2.4. Please give a fair indication of the performance of projects procured through the least cost method, performance in terms of the time/schedule of the project in your organization.

□ ≤ 25% □ 25-50% □50-75% □75-100% □ None (N/A)

2.5. Please give a fair indication of the performance projects procured through the least cost method, performance in terms of quality of the project in your company.

□ ≤ 25% □ 25-50% □50-75% □75-100% □ None (N/A)

2.6. Please give a fair indication of the performance of public building projects procured through the least cost contract award method in your company in Bahir Dar city.

□ ≤ 25% □ 25-50% □50-75% □75-100% □ None (N/A)

2.7. On average, how many public building construction projects executed by least cost tender offer, does your company submit or bid in Bahir Dar city annually.

□ ≤ 15 □ 16-29 □ 30-50 □ ≥ 50 □ None (N/A)

2.8. If your success/performance rate is low, what do you think are the major reasons? Assign the level of influence for those listed below and identify, if there are others.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	A major reason for low-performance projects	1	2	3	4	5
1	Severe competition among contractors					
2	Low pricing					
3	Inaccuracy of estimates					
4	Shortage of time in preparing bids					
5	The performance history of your company on previous projects					
6	Other factors beyond your control					
7	Least cost					
8	Corrupted system					
9	Contractors capacity					

Other, please specify and rate_____

3. PUBLIC BUILDING CONSTRUCTION PROJECT FACTORS AFFECTING EFFECTIVE IMPLEMENTATION OF LEAST COST CONTRACT

3.1. Which of the factors listed below are considered important factors, by your company, when deciding to submit the least cost tender offer for a project? Rate the level of importance.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	Factors during the least cost tendering	1	2	3	4	5

1	Size of the project					
2	The volume of work at hand (monetary value of projects)					
3	Stage of projects at hand (active projects and projects near completion)					
4	Location of the project under consideration					
5	Available company's expertise and equipment's					
6	The similarity of the project with previously undertaken projects					
7	Not to be idle / not to make resources idle					
8	Least cost contract awarding system					
9	The management system of cost, time and quality at the construction stage					

Other, please specify and rate _____

3.2. What percentage/performance of the construction cost is your profit margin?

□ Below 3% □ 4-7% □ 8-10% □ 11-15% □ Above 15%

3.3. In average terms, what proportion of the expected profit amount, do you obtain from the public building construction projects you have completed so far in Bahir Dar city?

□ ≥100% □ 100-75% □ 75-50% □ ≤ 50%

3.4. If you do not obtain the profit you expected most of the time, what are the major factors or reasons, in your option? Assign a level of importance.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	Major factors for non-performance under Least cost contract award	1	2	3	4	5
1	Contract Types					
2	Delivery System					
3	Project scope/type of work					
4	Level of the accuracy of the estimates prepared during the tendering					
5	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)					

6	Lack of effective and efficient project cost management system					
7	Technical difficulties (construction methods)					
8	Escalation of materials, labor and subcontractor prices					
9	Work change orders/variation orders					
10	Problems related to contract document /Drawings, specifications, conditions of contracts/					
11	Delays due to design changes or other reasons related to the client and/or consultant					
12	A significant deviation in labor productivity between standard (assumed) and actual					
13	Weather conditions					

Other, please mention and rate_____

4. PUBLIC BUILDING CONSTRUCTION PROJECT THE LEAST COST CONTRACT IN GENERAL

4.1. Does your company have its own standard construction contract framework?

□ Yes □ No

4.2. Do you use a framework for preparing tendering/construction contract management?

□ Yes □ No

If you do, please list their names and state, in brief the advantages you have gained.

_____

4.3. How frequently do you check the performance of a project?

□ Monthly □ Quarterly □ Twice a year □ Yearly □ Randomly □ At project completion

4.4. Do you have a standard system for accounting (tracking, recording and controlling) project cost/expenses?

□ Yes □ No

If you have, please provide a brief description of the system with, the inputs and output_____

_____

4.5. Do you have a standard system for accounting (tracking, recording and controlling) project time/schedule?

□ Yes □ No

If you have, please provide a brief description of the system with, the inputs and output_____

_____

4.6. Do you have a standard system for accounting (tracking, recording and controlling) project quality?

□ Yes □ No

If you have, please provide a brief description of the system with, the inputs and output_____

_____

4.7. Are you satisfied with the bid evaluation procedure of the least cost contract awarding in Bahir Dar city public building construction projects?

□ Yes □ No □ Somewhat

5. PUBLIC BUILDING CONSTRUCTION PROJECT THE LEAST COST CONTRACT MANAGEMENT FRAMEWORK

5.1. Good contract management practice and its framework will include management in four categories such as strategy, structure, resources and development delivery. Assign a level of influence.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	**Elements of good contract management framework**	**1**	**2**	**3**	**4**	**5**
1	Market management					
2	Planning governance					
3	People/Stakeholder					
4	Administration/Management					
5	Relationship					
6	Performance					
7	Payment					
8	Risk					
9	Contract development					
10	Contractor development					
11	Contractor relationship					

Other, please specify and rate_____

5.2. Managing changes on Cost, Time and Quality to the contract of public building construction project, there will be some changes to the contract required after contract award arising from any of the following. Assign level of influence.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree

No	**Changes to contract required after contract award**	**1**	**2**	**3**	**4**	**5**
1	Change in expected site conditions					
2	Change in the availability of specified materials					
3	Value engineering					
4	Change in requirements of the client/investor					
5	External systemic events (not project risks) that impact on the project					

Other, please specify and rate _____

5.3. Public building construction projects have in place a range of legislation and related policies that set out the contract management framework. It provides a summary or a reference that can impact on construction contracting activities. In addition to, there are a number of matters that need to be addressed throughout the construction contract management cycle of developing the contract, formalizing the contract, entity arrangements for managing the contract, managing the contract and ending the contract. So please assign a level of influence.

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	**Activates in construction contract framework**	**1**	**2**	**3**	**4**	**5**
1	Managing risks					
2	Managing resources					
3	Behaving ethically					
4	Keeping records					
5	Specifying responsibilities					
6	Establishing governance and contract management team					

7	Planning, establishing and executing contract administration					
8	Relationship management					
9	Performance management					

Other, please specify and rate _____

5.4. Please assign your argument on the following types of contract awarding system in public building based on their effectiveness on your projects?

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

No	**Types of contract awarding system**	**1**	**2**	**3**	**4**	**5**
1	The least cost system					
2	Nearest to average of all bid received					
3	Limited average bids and owners estimate					
4	Competitive average bidding					
5	Multi-parameter bidding method					

5.5. Any other comments: please attach additional pages, if necessary

Thank You for your cooperation!!!

B. Interview Questionnaires

1. How do you check the performance of cost, time and the quality of your public building construction projects that are awarded by the least cost contract?

   _____

   _____

   _____

   _____

2. How cost, time and quality of the least cost contract awarded system management practices in your project/company?

   _____

   _____

   _____

   _____

3. What kinds of cost, time and quality management framework/control method is implemented during over cost, delay and non-quality of your project works?

   _____

   _____

   _____

   _____

4. As professional person how does you examine the practice of the least cost contract management in public building construction projects in Bahir Dar city.

   _____

   _____

   _____

   _____

5. How do you assure the quality, time and cost of public building construction projects through the least cost contract?

   _____

   _____

   _____

   _____

6. What is your recommendation about cost, time and quality management system that are awarded by the least cost contract public building construction projects Bahir Dar city?

_____

_____

_____

_____

7. Do you believe that the project through the least cost contract award system is well performed in terms of cost, time and quality? If not how you rectify the problems of this system?

_____

_____

_____

_____

8. What are the alternative contract award system in construction industry you aware?

_____

_____

_____

_____

9. Do you believe that least cost contract award system is effective in public building construction projects?

_____

_____

_____

_____

10. What are the types of contract awarding system in public building construction projects that you as professional you recommend for effective accomplishment of projects in specified cost, time, and quality?

_____

_____

_____

_____

11. What do believe about the weight given for cost, time, and quality of multiple tender evaluation?

_____

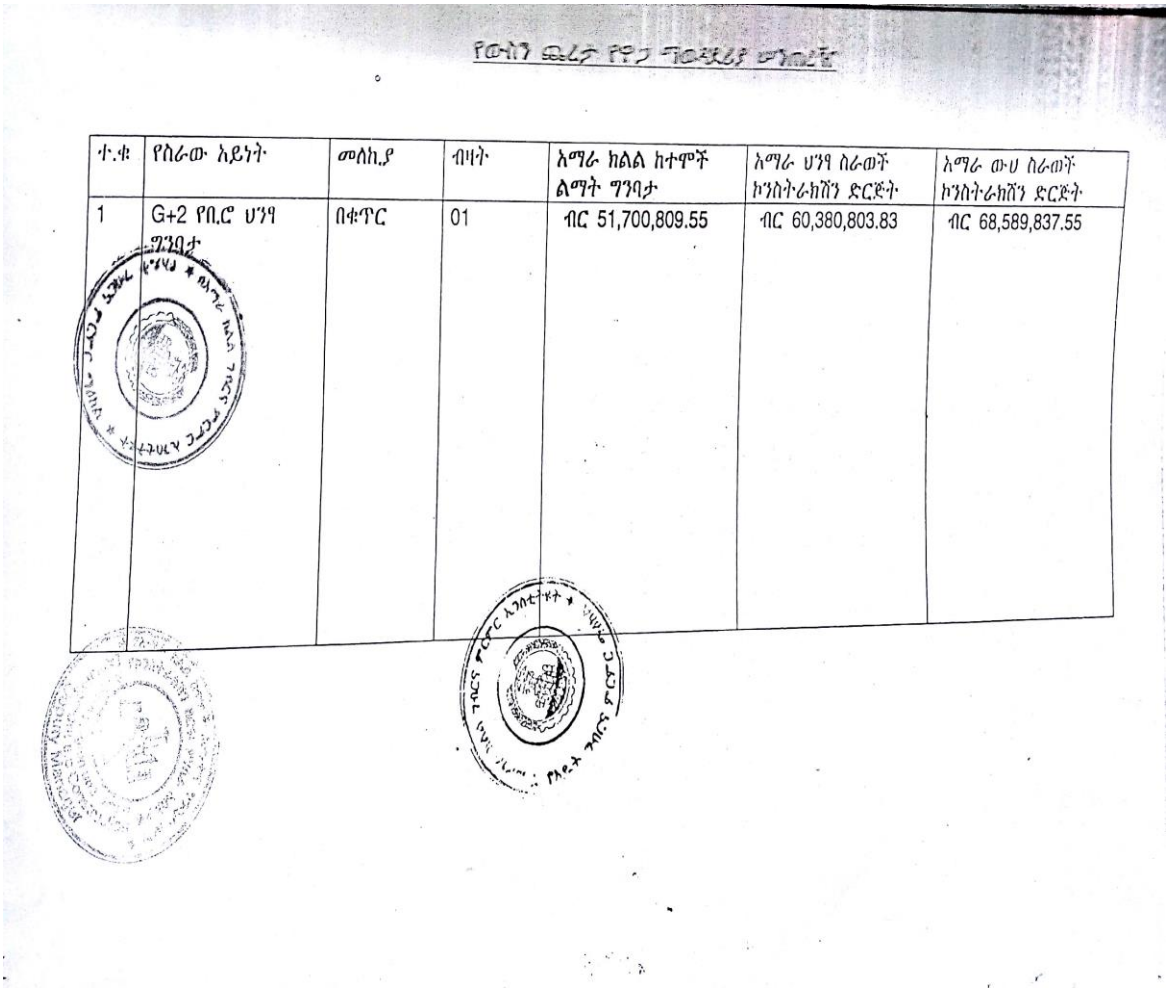
_____

_____

_____

Thank You for Your Cooperation!!!

C. Case Study Sample



የውስን ጨረታ የዋጋ ግምገማ ሠንጠረዥ

ተ.ቁ	የስራው አይነት	መለኪያ	ብዛት	አማራ ክልል ከተሞች ልማት ግንባታ	አማራ ህንፃ ስራዎች ኮንስትራክሽን ድርጅት	አማራ ውሀ ስራዎች ኮንስትራክሽን ድርጅት
1	G+2 የቢ.ሮ ህንፃ ግንባታ	በቁጥር	01	ብር 51,700,809.55	ብር 60,380,803.83	ብር 68,589,837.55

D. Client, Contractor and Consultant Average Index Formulation

No	Construction contract delivery system	1	2	3	4	5	Average index	Rank
1	Force Account	9	0	7	2	0	2.44	5
2	Design Bid Build	0	1	3	12	2	3.84	1
3	Design Build/Turnkey	2	1	6	8	1	3.44	2
4	Finance/Build Operate Transfer	3	1	9	5	0	3.12	4
5	Construction Management	1	2	9	6	0	3.4	3
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

1. Client Average Index Formulation

No	Types of Construction contract	1	2	3	4	5	Average index	Rank
1	Lump sum (Fixed price contract)	2	2	1	10	3	3.62	2
2	Lump sum fixed price and escalation	2	4	10	2	0	2.9	5
3	Lump sum fixed price and schedule rate contract	2	3	10	3	0	2.9	5
4	Lump sum fixed price with escalation and schedule rate	4	2	6	1	5	3.16	4
5	Unit rate/BOQ/ Admeasurement	0	2	2	5	9	4.4	1
6	Unit rate and escalation contract	1	1	6	9	1	3.18	3
7	Schedule rate/Item rate contract	1	3	11	2	1	2.8	6
8	Schedule rate and escalation contract	1	1	13	2	1	2.72	7
9	Cost plus percentage of cost with GMC	3	1	12	2	0	2.4	9
10	Target cost incentive contract	5	1	10	2	0	2.34	10
11	Cost Plus Contract	2	2	11	2	1	2.5	8

12	Incentive contract	2	1	12	2	1	2.3	11
13	Guaranteed Maximum Cost/Price	2	2	9	5	0	2.5	8
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major reason for low-performance projects**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Severe competition among contractors	2	0	3	12	1	3.58	5
2	Low pricing	0	1	2	10	5	4.12	2
3	Inaccuracy of estimates	1	1	4	11	1	3.52	6
4	Shortage of time in preparing bids	2	2	4	8	2	3.4	9
5	The performance history of your company on previous projects	0	3	3	11	1	3.48	8
6	Other factors beyond your control	3	0	2	12	1	3.5	7
7	Least cost	0	0	2	7	9	4.04	1
8	Corrupted system	1	0	3	6	8	3.96	3
9	Contractors capacity	1	1	2	7	7	3.88	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Factors during the least cost tendering**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Size of the project	1	0	0	12	5	3.8	3
2	Volume of work at hand (monetary value of projects)	0	1	3	7	7	3.68	6
3	Stage of projects at hand (active projects and projects near completion)	0	2	1	4	11	3.74	4
4	Location of the project under consideration	1	1	2	9	5	3.92	2
5	Available company's expertise and equipment's	1	0	1	12	4	3.7	5

6	The similarity of the project with previously undertaken projects	1	0	2	12	3	3.38	8
7	Not to be idle / not to make resources idle	0	1	2	8	7	3.6	7
8	Least cost contract awarding system	1	0	2	8	7	3.98	1
9	Management sy4stem of cost, time and quality at construction stage	0	1	2	9	6	3.92	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major factors for non-performance under Least cost contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Contract Types	3	0	0	7	8	3.86	6
2	Delivery System	0	1	3	6	9	4	5
3	Project scope / type of work	0	1	1	12	4	3.86	6
4	Level of the accuracy of the estimates prepared during the tendering	0	1	3	8	6	3.82	8
5	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)	0	1	1	4	12	4.06	4
6	Lack of effective and efficient project cost management system	0	0	0	14	4	4.14	2
7	Technical difficulties (construction methods)	3	0	2	8	5	3.68	10
8	Escalation of materials, labor and subcontractor prices	1	2	0	5	10	4.08	3
9	Work change orders / variation orders	3	0	0	8	7	3.72	
10	Problems related with contract document /Drawings,	1	2	2	9	4	3.84	7

	specifications, conditions of contracts/							
11	Delays due to design changes or other reasons related to the client and / or consultant	1	0	3	8	6	4.18	1
12	Significant deviation in labor productivity between standard (assumed) and actual	1	1	1	14	1	3.76	9
13	Weather conditions	2	1	1	12	2	3.4	11
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Elements of good contract management framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Market management	1	1	0	12	4	3.96	5
2	Planning governance	0	1	3	4	10	3.94	6
3	People/Stakeholder	1	0	3	5	9	3.94	6
4	Administration/Management	0	0	1	9	8	4.12	2
5	Relationship	0	2	0	12	4	3.7	8
6	Performance	0	1	2	4	11	4.16	1
7	Payment	0	1	2	7	8	4.08	3
8	Risk	0	1	2	4	11	3.96	5
9	Contract development	0	0	2	9	7	3.86	7
10	Contractor development	0	0	2	8	8	4.16	1
11	Contractor relationship	0	0	1	9	8	4.02	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Changes to the contract required after contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Change in expected site conditions	1	0	1	6	10	3.88	3
2	Change in availability of specified materials	1	0	1	8	8	4.16	1
3	Value engineering	1	1	2	9	5	3.66	5

4	Change in requirements of the client/investor	0	0	2	9	7	4.08	2
5	External systemic events (not project risks) that impact on the project	0	0	2	8	8	3.82	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Activates in construction contract framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Managing risks	1	3	4	7	3	3.72	8
2	Managing resources	0	0	2	11	5	4.06	2
3	Behaving ethically	0	0	4	8	6	4.04	3
4	Keeping records	1	0	2	8	7	3.98	4
5	Specifying responsibilities	0	1	4	8	5	4.06	2
6	Establishing governance and contract management team	2	0	2	10	4	3.94	5
7	Planning, establishing and executing contract administration	0	2	2	8	6	4.18	1
8	Relationship management	1	1	2	4	10	3.92	6
9	Performance management	0	1	2	6	9	3.9	7
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Types of contract awarding system**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	The least cost system	3	4	7	4	0	2.67	5
2	Nearest to average of all bid received	0	1	5	7	5	3.6	3
3	Limited average bids and owners estimate	1	2	2	8	5	3.8	2
4	Competitive average bidding	3	1	4	6	4	3.4	4
5	Multi-parameter bidding	0	3	2	6	7	3.94	1

	method							
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

2. Contractors Average Index Formulation

No	**Construction contract delivery system**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Force Account	4	3	6	2	2	2.44	5
2	Design Bid Build	1	0	2	12	2	3.84	1
3	Design Build/Turnkey	1	3	5	6	2	3.44	2
4	Finance/Build Operate Transfer	1	1	10	4	1	3.12	4
5	Construction Management	1	2	4	6	4	3.4	3
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Construction contract types**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Lump sum (Fixed price contract)	3	3	4	2	5	3.51	2
2	Lump sum fixed price and escalation	1	5	4	6	1	2.9	5
3	Lump sum fixed price and schedule rate contract	3	4	5	3	2	2.9	5
4	Lump sum fixed price with escalation and schedule rate	2	5	3	4	3	3.16	4
5	Unit rate/BOQ/ Admeasurement	1	1	0	4	11	4.4	1
6	Unit rate and escalation contract	3	1	0	7	6	3.18	3
7	Schedule rate/Item rate contract	2	2	4	9	0	2.8	6
8	Schedule rate and escalation contract	3	3	3	6	2	2.72	7
9	Cost plus percentage of cost with GMC	4	4	5	3	1	2.4	9
10	Target cost incentive contract	4	5	5	3	0	2.34	10
11	Cost Plus Contract	5	4	4	3	1	2.5	8

12	Incentive contract	5	5	2	4	1	2.3	11
13	Guaranteed Maximum Cost/Price	5	3	5	3	1	2.5	8
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major reason for low-performance projects**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Severe competition among contractors	2	4	2	6	3	3.58	5
2	Low pricing	1	2	2	7	5	4.12	2
3	Inaccuracy of estimates	1	1	4	9	2	3.52	6
4	Shortage of time in preparing bids	2	4	6	3	2	3.4	9
5	The performance history of your company on previous projects	2	4	4	6	1	3.48	8
6	Other factors beyond your control	2	1	5	4	5	3.5	7
7	Least cost	1	2	3	3	8	4.04	1
8	Corrupted system	1	2	2	7	5	3.96	3
9	Contractors capacity	3	0	0	12	2	3.88	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Factors during the least cost tendering**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Size of the project	1	2	3	6	5	3.8	3
2	Volume of work at hand (monetary value of projects)	0	1	5	7	4	3.68	6
3	Stage of projects at hand (active projects and projects near completion)	0	2	4	7	4	3.74	4
4	Location of the project under consideration	1	1	2	7	6	3.92	2
5	Available company's expertise and equipment's	0	2	5	9	1	3.7	5
6	The similarity of the project with previously undertaken projects	2	5	4	6	0	3.38	8

7	Not to be idle / not to make resources idle	3	3	1	7	3	3.6	7
8	Least cost contract awarding system	1	2	4	5	5	3.98	1
9	Management sy4stem of cost, time and quality at construction stage	1	0	2	8	6	3.92	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major factors for non-performance under Least cost contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Contract Types	1	3	4	5	4	3.86	6
2	Delivery System	1	0	3	10	3	4	5
3	Project scope / type of work	1	3	3	7	3	3.86	6
4	Level of the accuracy of the estimates prepared during the tendering	1	4	4	6	2	3.82	8
5	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)	2	1	4	5	5	4.06	4
6	Lack of effective and efficient project cost management system	0	1	2	10	4	4.14	2
7	Technical difficulties (construction methods)	1	5	2	4	5	3.68	10
8	Escalation of materials, labor and subcontractor prices	0	0	2	12	3	4.08	3
9	Work change orders / variation orders	1	2	4	7	3	3.72	
10	Problems related with contract document /Drawings, specifications, conditions of contracts/	0	2	2	7	6	3.84	7

11	Delays due to design changes or other reasons related to the client and/or consultant	0	1	1	8	7	4.18	1
12	Significant deviation in labor productivity between standard (assumed) and actual	1	2	3	10	1	3.76	9
13	Weather conditions	4	4	4	4	1	3.4	11
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Elements of good contract management framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Market management	1	1	2	8	5	3.96	5
2	Planning governance	0	1	5	7	4	3.94	6
3	People/Stakeholder	1	1	4	7	4	3.94	6
4	Administration/Management	0	0	0	9	8	4.12	2
5	Relationship	1	2	4	8	2	3.7	8
6	Performance	1	0	0	12	4	4.16	1
7	Payment	0	1	1	11	4	4.08	3
8	Risk	0	1	5	9	2	3.96	5
9	Contract development	0	0	6	7	4	3.86	7
10	Contractor development	1	0	5	7	4	4.16	1
11	Contractor relationship	1	3	4	4	5	4.02	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Changes to the contract required after contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Change in expected site conditions	0	5	3	7	2	3.88	3
2	Change in availability of specified	1	0	2	10	4	4.16	1

	materials							
3	Value engineering	0	0	8	5	4	3.66	5
4	Change in requirements from the client/investor	0	0	2	11	4	4.08	2
5	External systemic events (not project risks) that impact on the project	1	2	4	9	1	3.82	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Activates in construction contract framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Managing risks	1	1	6	8	1	3.72	8
2	Managing resources	1	0	1	9	6	4.06	2
3	Behaving ethically	1	0	3	7	6	4.04	3
4	Keeping records	1	1	2	10	3	3.98	4
5	Specifying responsibilities	0	0	4	10	3	4.06	2
6	Establishing governance and contract management team	1	1	1	10	4	3.94	5
7	Planning, establishing and executing contract administration	1	1	0	10	5	4.18	1
8	Relationship management	0	1	4	10	2	3.92	6
9	Performance management	1	1	2	10	3	3.9	7
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Types of contract awarding system**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	The least cost system	2	2	6	4	3	3.2	4
2	Nearest to average of all bid received	4	1	0	4	8	3.65	2
3	Limited average bids and owners estimate	2	1	1	9	4	3.7	1
4	Competitive average bidding	3	2	3	3	6	3.4	3
5	Multi-parameter bidding method	1	4	0	6	6	3.7	1

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree

3. Consultant Average Index Formulation

No	**Construction contract delivery system**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Force Account	5	0	4	6	0	2.44	5
2	Design Bid Build	2	1	0	6	6	3.84	1
3	Design Build/Turnkey	0	2	3	6	4	3.44	2
4	Finance/Build Operate Transfer	1	2	5	5	2	3.12	4
5	Construction Management	2	0	2	10	1	3.4	3
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Construction contract types**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Lump sum (Fixed price contract)	2	2	0	8	3	3.52	2
2	Lump sum fixed price and escalation	4	0	4	6	1	2.9	5
3	Lump sum fixed price and schedule rate	2	1	5	6	1	2.9	5
4	Lump sum fixed price with escalation and schedule rate	3	4	2	6	0	3.16	4
5	Unit rate/BOQ/ Admeasurement contract	0	0	0	5	10	4.4	1
6	Unit rate and escalation contract	6	0	8	1	0	3.18	3
7	Schedule rate/Item rate contract	6	3	6	0	0	2.8	6
8	Schedule rate and escalation contract	6	2	7	0	0	2.72	7
9	Cost plus percentage of cost	8	2	5	0	0	2.4	10

	with GMC							
10	Target cost incentive contract	6	2	7	0	0	2.34	11
11	Cost Plus Contract	6	2	7	0	0	2.5	8
12	Incentive contract	10	5	0	0	0	2.3	12
13	Guaranteed Maximum Cost/Price Contract	8	0	7	0	0	2.5	8
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major reason for low-performance projects**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Severe competition among contractors	0	1	4	4	6	3.58	5
2	Low pricing	0	0	3	6	6	4.12	2
3	Inaccuracy of estimates	1	0	8	4	2	3.52	6
4	Shortage of time in preparing bids	0	1	2	8	4	3.4	9
5	Performance history of your company on pervious projects	1	2	0	6	6	3.48	8
6	Other factors beyond your control	1	2	2	8	2	3.5	7
7	Least cost	3	0	0	6	6	4.04	1
8	Corrupted system	1	0	2	8	4	3.96	3
9	Contractors capacity	1	0	2	6	6	3.88	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Factors during the least cost tendering**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Size of the project	2	2	0	8	3	3.8	3
2	Volume of work at hand (monetary value of projects)	4	0	4	6	1	3.68	6
3	Stage of projects at hand (active	4	0	6	2	3	3.74	4

	projects and projects near completion)							
4	Location of the project under consideration	2	0	2	4	7	3.92	2
5	Available company's expertise and equipment's	2	2	2	4	5	3.7	5
6	The similarity of the project with previously undertaken projects	2	2	2	6	3	3.38	8
7	Not to be idle / not to make resources idle	4	2	0	6	3	3.6	7
8	Least cost contract awarding system	0	2	2	4	7	3.98	1
9	Management sy4stem of cost, time and quality at construction stage	2	2	0	8	3	3.92	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Major factors for non-performance under Least cost contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Contract Types	1	2	0	2	10	3.86	6
2	Delivery System	0	3	0	6	6	4	5
3	Project scope / type of work	1	2	0	4	8	3.86	6
4	Level of the accuracy of the estimates prepared during the tendering	0	0	3	6	6	3.82	8
5	Inadequate financial planning (Budgeting, financial plan, cash flow forecast)	0	0	5	4	6	4.06	4
6	Lack of effective and efficient project cost management	0	0	3	2	10	4.14	2

	system							
7	Technical difficulties (construction methods)	0	1	2	8	4	3.68	10
8	Escalation of materials, labor and subcontractor prices	1	1	2	5	6	4.08	3
9	Work change orders / variation orders	1	3	0	6	4	3.72	
10	Problems related with contract document /Drawings, specifications, conditions of contracts/	1	0	2	10	2	3.84	7
11	Delays due to design changes or other reasons related with the client and / or consultant	0	1	2	6	6	4.18	1
12	Significant deviation in labor productivity between standard (assumed) and actual	0	1	4	4	6	3.76	9
13	Weather conditions	0	1	2	8	4	3.4	11
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Elements of good contract management framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Market management	1	0	4	2	8	3.96	5
2	Planning governance	1	2	4	2	6	3.94	6
3	People/Stakeholder	1	0	4	4	6	3.94	6
4	Administration/Management	5	0	0	4	6	4.12	2
5	Relationship	0	5	2	2	6	3.7	8
6	Performance	0	3	0	6	6	4.16	1
7	Payment	1	2	2	2	8	4.08	3
8	Risk	0	3	2	4	6	3.96	5
9	Contract development	0	7	2	0	6	3.86	7

10	Contractor development	0	1	0	6	8	4.16	1
11	Contractor relationship	0	1	2	6	6	4.02	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Changes to the contract required after contract award**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Change in expected site conditions	0	2	4	2	7	3.88	3
2	Change in availability of specified materials	0	4	2	4	5	4.16	1
3	Value engineering	0	2	8	4	1	3.66	5
4	Change in requirements from the client/investor	0	0	4	10	1	4.08	2
5	External systemic events (not project risks) that impact on the project	0	0	8	4	3	3.82	4
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Activates in construction contract framework**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	Managing risks	3	0	0	4	8	3.72	8
2	Managing resources	0	1	2	10	2	4.06	2
3	Behaving ethically	0	1	2	6	6	4.04	3
4	Keeping records	0	1	2	6	6	3.98	4
5	Specifying responsibilities	0	0	4	3	8	4.06	2
6	Establishing governance and contract management team	1	2	0	4	8	3.94	5

7	Planning, establishing and executing contract administration	0	0	1	4	10	4.18	1
8	Relationship management	0	0	5	6	4	3.92	6
9	Performance management	2	3	0	6	4	3.9	7
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								

No	**Types of contract awarding system**	**1**	**2**	**3**	**4**	**5**	**Average index**	**Rank**
1	The least cost system	4	2	4	5	0	2.67	5
2	Nearest to average of all bid received	3	0	2	6	4	3.5	3
3	Limited average bids and owners estimate	0	3	1	6	5	4.2	1
4	Competitive average bidding	2	1	5	3	4	3.47	4
5	Multi-parameter bidding method	2	0	3	7	3	3.6	2
1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree								