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IMPACTS OF PROCUREMENT PROCESS ON CONTRACTOR SELECTION IN ETHIOPIAN ROADS AUTHORITY

By

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Abbreviations

BoQ	=	Bill of Quantity
DBB	=	Design-Bid-Build
DB	=	Design Build
FDRE	=	Federal Democratic Republic of Ethiopia
ERA	=	Ethiopian Roads Authority
ETB	=	Ethiopian Birr
FIDIC	=	Fédération Internationale des Ingénieurs-Conseils
GTP	=	Growth and Transformation Plan
ICB	=	Internationals Competitive Bidding
ITB	=	Instruction to Bidders
NCB	=	Nationals Competitive Bidding
MoW&UD	=	Ministry of Works & Urban Development
PPA	=	Public Procurement Agency
PPD	=	Public Procurement Directive
RSDP	=	Road Sector Development Program
RFP	=	Request f or Proposal
RFQ	=	Request for Quotation
SBD	=	Standard Bidding Document
FDRE	=	Federal Democratic Republic of Ethiopia

Abstract

Ethiopian Roads Authority representing the Government of Ethiopia manages the substantial portion of the road construction projects in the country. However, most of the projects severely suffering from over extended delays, excessive cost overruns and quality problems. Hence, identifying prime factors in the procurement process that influences the selection of contractors plays essential role in devising appropriate measures on selection of the right contractor that will complete projects with the desired performance requirements.

A total of 30 factors that influence procurement process were identified based on the literature review and investigation made in Ethiopian Roads Authority and categorized into five groups depending on different stages of procurement process. Statistical analyses of their significances were carried out based on questionnaire survey of senior professionals. Accordingly, the top 10 factors are identified as significantly influencing whereby 30% are related to procurement planning and packaging, 40% are related to bid evaluation and qualification criteria and 30% are related to tender document preparation. Moreover, the study reveals that the procurement process is a multi step process and not properly managing the process would have a profound impact on the project's success or failure.

Discussion on mitigation measures of critical factors and conclusion was made based on the responses of hypothesized questions and document analysis. Recommendation towards improvement of the current procurement process for selecting a contractor in Ethiopian Roads Authority was portrayed which includes; to integrate procurement planning and strategy in projects cycles, to assess local contractors weakness and respective mitigation in the capacity building strategy, to include quality and overall management of projects as part of contractors' ongoing projects performance assessment, to evaluate financial and technical capacity of contractors' before award of a project and to include risk assessment and mitigation of projects as part of the major tasks of design consultants. The research also proposed a model to control workloads of contractors as part of qualification criteria. Future research is also recommended which includes studying the impacts of the current strategy to increase local content in the road projects in Ethiopian.

1. INTRODUCTION

1.1. Background

Road transport is the dominant mode of transport in Ethiopia and it plays a pivoted role in supporting economic and social development. Hence, improving the road network is regarded as one of the fundamental objectives towards the pursuit of campaign against poverty reduction. The Government of Ethiopia through its five years Growth and Transformation Plan (GTP) devices to increase the national road network from the existing 49,000km to 136,000km with the Road Sector Development Programme (RSDP) entering its 4th phase with an allocation of Birr 84 billion over a 5-year programme (FDRE GTP, 2010). Inevitably, ensuring the quality and density of road network is the vital component of Government strategy considering its effects on every sector of the economy.

Therefore, the road construction industry is an important part of the economic backbone in Ethiopia and shares a substantial volume of the overall construction work. According to the prevalent traditional, Design-Bid-Build mode of contract, the main players of the road construction sector of Ethiopia comprises of the client, consultants, contractors and financers. Generally there are three major clients in the construction sector i.e. the public sector, developers and private owners. Accordingly, the Ethiopian Roads Authority (ERA) on behalf of the Federal Government acts as a client with the mandate of regulating the road sector. Consultants give service like designing, supervising or technical assistances. Contractors do works associated with the construction, reconstruction, upgrading, demolition, repair or renovation of a building, road, or structure, as well as services incidental to works. The main contractors participating in road construction works are public contractors like Ethiopian Road Construction Corporation, local private contractors and international contractors. The major financer in construction of road projects are the Government of Ethiopia i.e. Government Treasury and Road Fund, The World Bank, African Development Bank, the Arab Fund, Kuwait Fund and other Multilateral and Bilateral Donors. The Government of Ethiopia takes the lion share in contribution for most of the road projects under construction.

In many countries the construction industry has, however, attracted criticism for inefficiencies in outcomes such as time and cost overruns, low productivity, poor quality and inadequate customer satisfaction (Ericsson, 2007). Traditionally, researchers and organizations have focused on the three project performance criteria of cost, time and quality. Cost overruns and delays can be a source of problems for an otherwise successful project as contractors are frequently criticized for the common occurrence of cost overruns and delays in construction projects (Chan and Chan, 2004). Cost overrun refers to the extra amount of money required to complete the project and delay refers to the time overrun beyond the completion date agreed between the parties specified in the contract. Quality is related to how the final product and its function meets the specification (Chan and Chan, 2004) and the service quality during the construction process, which reflects the client's perception of the process during which project participants interact to create the end product.

There are many causes of delays, quality problems and cost overruns in road construction projects and several studies have pointed out various factors based on the underlying conditions; that is, for a particular project type, specific location or to a particular project size, etc.

Procurement procedures potentially causing many problems in all stages of the buying process and hence procurement procedures are one key improvement area and can contribute substantially to project success (Eriksson, 2007). Procurement mean obtaining goods, works, consultancy or other services through purchasing, hiring or obtaining by any other contractual means (proclamation no 649/2009 article (5)).

Earlier research efforts in this area attempted to the investigation of how a single or a few specific procurement alternatives affect one or two project objectives. However, in order to achieve successful governance of construction projects a holistic and systemic approach to procurement procedures is crucial (Cox and Thompson, 1997, Eriksson and Pesämaa, 2007, Eriksson, 2008b). Hence, investigations of procurement process in selection of contractors and their effects on different aspects of project performance are called for.

Therefore, this thesis identifies problems of different procurement procedures in selection of contractors in ERA focusing on projects financed by Government of Ethiopia and recommends on how to improve the efforts made to make the procurement process well suited with regard to the identified problems.

1.2. Statement of the Problem

Most projects administered by ERA face delay on completion period, cost overrun and quality problem. The major factors influencing factors in road construction projects in Ethiopia are cost overruns and delay which occurs frequently and severe (Amare, 2006). Without a proper and accurate method for selecting the most appropriate contractor, the performance of the project will be affected (Cheng and Heng, 2004), thereby denying the client value for money.

In order to ensure successfully completion of road projects and to avert project implementation failure due to the contractor's inability to undertake or complete the work, the client must select the most appropriate contractor. This involves a procurement system that comprises five common process elements; project packaging, invitation, pre-qualification, short -listing and bid evaluation (Hatush, 1996; Hatush and Skitmore, 1997).

Although procurement procedures need to be tailored to enhance the fulfillment of different project objectives (Laedre et al., 2006), clients like ERA tends to choose those procurement procedures they have a habit of using, regardless of any differences between projects.

In order to enhance change, an increased understanding of how different procurement procedures in selection of contractors affect different aspects of project performance and devise improvement on the process is vital.

1.3. Objectives of the Study

The aim of this research is to identify the prime factors that influence each procurement process in selection of contractors on road projects administered by Ethiopian Roads Authority and look into how each procurement process can be improved.

The following objectives are outlined in order to achieve the above cited aim.

- To investigate the procurement process of different literatures and international procedures as exhaustively as possible;
- To investigate the procurement process of ERA and identify problem and constraints in the major milestones of the procurement process that will result poor performance of projects;
- To categorize the identified far-reaching factors that influence the procurement process in selection of contractor of road projects in ERA and prioritize them in order of their significance;
- To give recommendations on how to improve the procurement process in selection of contractor of road projects and substantially minimize the impacts of those identified factors.

1.4. Research Method

Considering the research approach as the criterion of classification there are two types of research namely, quantitative research and qualitative research (Addis Ababa University, 2009). Deciding which method to use depends on the purpose of the study and the type and availability of the required information. The objective of quantitative research is to develop and employ mathematical models, theories and hypotheses pertaining to natural phenomena (Addis Ababa University, 2009). Accordingly, to screen and rank the most important factors and responses of hypothesized questions a quantitative research method is being used.

Qualitative research is characterized by adherence to diverse array of orientations and strategies for maximizing the validity of trustworthiness of study procedures and results (Addis Ababa University, 2009). Qualitative research emphasizes meanings, experiences and descriptions to subjectively evaluate the opinion or perception of respondents towards a particular issue. Hence, in the discussion of mitigation measures of the identified critical factors a qualitative research method is being used.

The data collection mechanism depends on the nature of investigation and type of required information. There are two approaches for data collection, namely, primary data collection (field work) and secondary data collection (desk study of data collected by others (Addis Ababa University, 2009). The primary data collection further involves three practical approaches namely:

Survey method: This is used to scan a wide field of issues, populations, programs and to measure or describe any generalized features.

Correlation studies: This is used to trace relationships among two or more variables in order to gain greater situational insight.

Observation Studies: This is used in instances to study a behavior that occurs in its natural environment.

Case studies: This is used to emphasize detailed contextual analysis of a limited number of events or conditions and their relationships.

The Author intends to survey perspectives from wide cross section of experts in the field within a limited time frame; hence, survey method is selected using written questionnaire that encourages respondents to express their views they might otherwise not covey in interviews. The survey result has been analyzed using statistical methods to come up with the required information.

Considering the above selected research and data collection method, first to understand previous efforts a review of text books, periodicals and academic journals, seminars, conference and research paper have been made. After that a procurement process problems which affect the performance of a road project in ERA have been identified. Then a questionnaire survey has been conducted to rank the problems in their order of significance and to seek any additional variables beyond those found out from the literature review. The questionnaires have been sent to professionals who have been involved in the road construction sector in Ethiopia working on behalf of a client, consultant or contractor. Finally, the results are presented and interpretation and discussion was made on the research findings. Consequently conclusions are drawn and recommendations are forwarded.

1.5. Structure of the Thesis

This thesis has six chapters that discuss various aspects of procurement process focusing on the main provisions that are of relevance with this thesis.

Chapter One: Introduction

This chapter explains the background of the research and introduces the research problem and the aim of the study followed by the objectives of the research in achieving the depicted aim. The research methodology concisely addresses why the qualitative research methodology and questionnaire survey are selected among the alternative approaches.

Chapter Two: Literature Review

This chapter investigates the procurement process of different international procedures and literatures as exhaustively as possible. This investigation is important as it provides the baseline by assessing different procurement process and principles around the world.

Chapter Three: Procurement Process in Ethiopian Roads Authority

This chapter discusses about the procurement process of Ethiopian Roads Authority and identify, as exhaustively as possible, problem and constraints in the major milestones of the procurement process that will result poor performance of projects like delays, cost overrun and quality

problems. This investigation is important as it provides substantial part of the inputs for the lists of factors and variables to be considered for the research.

Chapter Four: Data Collection and Analysis

This chapter discusses how to screen the factors identified from Chapter-2 and Chapter-3 and any other relevant variables observed from personal experience. This chapter also explains the issues related to distribution of the questionnaire, collection of responses and subsequent analysis of the data acquired through the responses from professionals who are working for the client, consultants and contractors and involved in road construction sector in Ethiopia.

Chapter Five Discussions on the Critical Identified Factors

The critical factors have already been identified in Chapter 4 and it is deemed that mitigating these factors in procurement process would substantially minimize the problems of delays, cost overruns and quality problems in road construction projects in Ethiopia. Hence, this chapter focuses on answering the underlying research question how to mitigate and improve procurement process.

Chapter Six: Conclusions and Recommendations

This chapter draws conclusions of the research and forwarded recommendations to mitigate the identified problems. The chapter also highlights some recommendations for improvement and further research.

1.6. Limitation of Study

The primary limitation was the use of questionnaire survey as source of primary data. In addition, further counteractive recommendations and models was proposed based on response to the outcome of the survey, literature review and experience the Author for the most critical factors. Before proposing the identified factors and proposed mitigation measures the Author could not get the opportunity to brainstorm and discuss with a professional and respondents based on structured questionnaire. Besides, study was done in only in Ethiopian Roads Authority focusing on projects financed by Government of Ethiopia. Time was the basic limitation that precludes the Author from further in-depth researching on the topic.

Moreover, the research focused on only the three project performance criteria i.e. cost, time and quality as these criteria becomes a major problem in construction contracts at this time. However, recently, many studies have, however, included also other performance aspects, such as health and safety, environmental performance, customer satisfaction, and innovation. The researcher proposes to see other performance criteria with other researches.

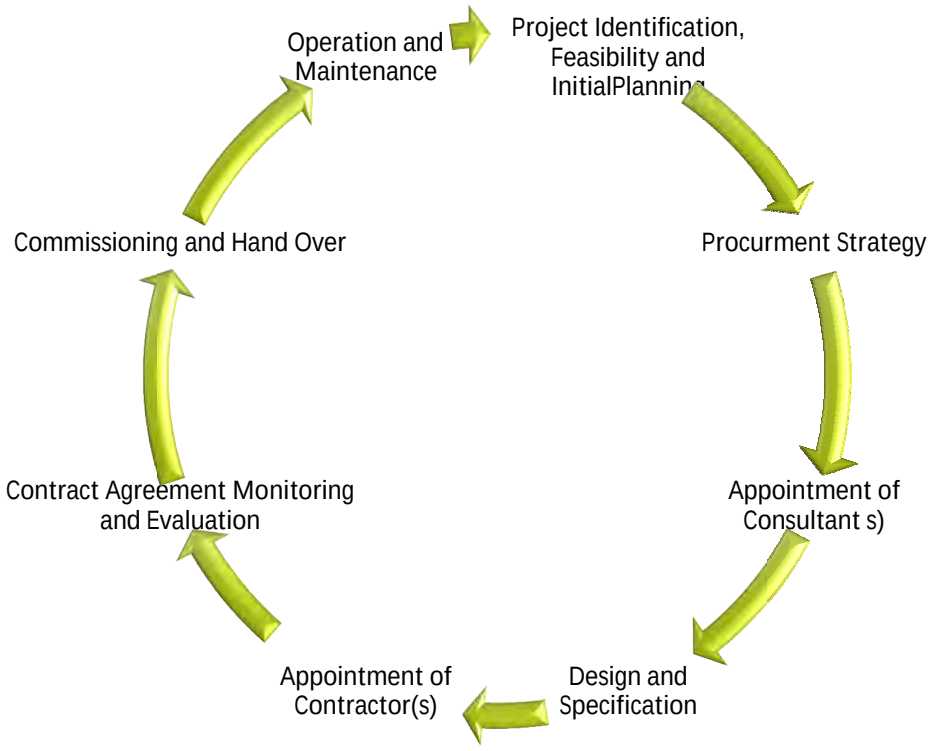
2. LITERATURE REVIEW

2.1. General Overview

Project cycles are understood as the processes at which projects are formulated, implemented and completed. Projects go through a life cycle of phases between their beginnings and end i.e. initiation, planning, design, construction, commissioning, and closeout (Alan C. Twort, 2004). As part of project cycle, clients undergo a procurement process to select a contractor to carry out the construction using predetermined selection variables.

The overall objective of major infrastructure project procurement is to execute a contract with a proponent contractor which satisfies the project requirements and is most likely to deliver best value, while utilizing processes which comply with relevant policy. Contractor selection refers to the process of aggregating the results of evaluation to identify optimum choice (Faridah, 2007). The basic principles of procurement are to achieve maximum value for money in procurement i.e. insures economy, efficiency and effectiveness, ensure accountability and transparency (PPD, 2010). Procurement is broadly defined to encompass all stages from the identification of need to the delivery and subsequent maintenance of the asset as indicated in Fig 2.1 below:

Fig 2.1: Procurement in different parts of project cycle (C.Perna,, 2009)



The above Fig 2.1 shows a project cycle based on traditional method of procurement. The procurement process is started with project identification, feasibility and initial planning which is the beginning of the project cycle by putting a procurement strategy or procurement plan. The

subject of procurement is also addressed in selection of a consultant(s) who is going to prepare the design and specification of the project. Here, the design consultant is expected to integrate aspects of procurement strategies set during procurement planning in the project design. After getting the design and specification of the project the selection of contractor(s) to deliver the required project will follow. The output of selection of a contractor will result a contract agreement between the client and the contractor and follows monitoring and evaluation.

From the above it is found that procurement is carried out based on the provisions made during the procurement planning phase of the procurement process. The procurement process for construction is a multi-step process which starts from procurement planning and then follows preparation of tender document, advertising the tender, submission of bids by the tenderers, evaluation of the submitting tender and award of the contract (Alan C. Twort, 2004).

Generally, it is found that the procurement process in selection of contractors basically contains setting strategies of the procurement through procurement plan and packaging, selecting the best project delivery method, means of bidding, forms of contract, bid evaluation and contract awarding procedures and setting qualification requirements for selection a contractor based on the specific project scope. All the above basic decisive procurement factors will be incorporated in the bidding documents which furnish the information necessary for a prospective bidder to prepare a bid for works to be provided.

Hence, the purpose of this chapter is to investigate the above decisive procurement factors in literatures and different international procedures as exhaustively as possible. This investigation is important as it provides the baseline by assessing different procurement process and principles around the world.

2.2. Procurement Planning and Packaging

2.2.1. Procurement Planning

The project procurement plan describes how the project will be executed, what delivery system(s) will be utilized, who and what organizations (including the owner) will perform what tasks and what forms of procurement and contracting will be used (PMBOK, 2000). Procurement planning also involves consideration of whether to procure, how to procure, what to procure, how much to procure, and when to procure. Hence, from the above definition the procurement plan will set strategy and helps guide project execution through the project life cycle. The strategy evolves over time and should continuously reflect the current status and desired end point of the program. The strategy must be flexible enough to accommodate oversight decisions.

As part of scope definition the client shall include aspects of procurement plan of each project. The scope of the projects includes definition of the project in terms of technical requirements, quality, delivery times, services and implications deriving from total life cycle considerations (World Bank Guideline, 2011). When there is poor scope definition, final project costs can be expected to be higher because of the inevitable changes which disrupt project rhythm, cause rework, increase project time, and lower the productivity and morale of the workforce.

If the procurement planning is not incorporating as part of the scope definition, it will have an impact in selecting the best delivery strategy, bidding method, managing risks and section of the suitable contractor for the project. For instance as part of the procurement process setting the qualification criteria is one of the basic process for selecting a competent contractor to perform the work and setting such criteria is dependent on the project scope definition like cost of project, duration and type of the project. Hence, if the procurement plan is not addressed in the scope definition it will also have an impact in selection of the right contractor for the specific project required.

The preparation of a realistic procurement plan for a project is critical for its successful monitoring and implementation of projects (World Bank Guideline, 2011). The procurement plan shall be prepared after the necessary preparation to forestall problems that might be encountered in the execution of procurement (Art. 8.2 of PPD). Hence, historical information, assumptions to be made and limitation can be the major inputs (PMBOK® Guide – 2000) to prevent problems that might be encountered in the execution of procurement. Considering historical information and assumptions will help to prepare a realistic procurement plan from lesson learnt in previous projects.

Procurement planning shall also include assessment of the market condition and their respective risks of the market on the overall delivery including mitigation strategies (C.Perna, 2009). Here, characteristics of the suitable contractors, available number of contractors, locations, regional limitations or advantages, quality management will be considered. The market survey evaluation needs principally at the planning level to determine requirements (characteristics, performance, target costs, etc.) and the selection of suitable markets able in principle to satisfy those needs.

Hence, procurement marketing is the process devoted in developing a systematic knowledge of markets and market opportunities. It allows the understanding of how markets work and do business, how strategies are devised to select suppliers and acquire products, suggests suitable relationship models with suppliers, and risks mitigation strategies.

2.2.2. Procurement Packaging

Procurement packaging defines the outcome (deliverables or products), the boundaries and interfaces with other projects, set up for resource requirements and specifies the criteria by which to measure completion or satisfaction of scope of work (Alan C. Twort, 2004). There are two principal forms of procurement packaging: (i) the grouping (or bulking) of procurement requirements within a procurement category for the purpose of acquiring them under a single contract, and (ii) the division of one requirement into multiple lots, where bidders can submit bids for one, several or all lots (as would be stipulated in the tender documents), and where a contract could be awarded for each lot (World Bank Manual, 2010). Hence, procurement packaging groups the procurement requirements in such a way as to ensure economy and efficiency in processing and the delivery of the right goods and services at the right time for the project.

Procurement packaging is one of the core steps to entertain local content objectives in the projects. One of the principles of procurement is to encourage local producers, companies and

small and micro-enterprises which support the national economy (article 4 (f)). To this effect the local contractors engaged in construction service are allowed to provide bid security in the form of conditional insurance bond (article 16.16.5) and granted preference 71/2 margin of preference and applied when comparing prices during evaluation of bids (article 16.20.2). However, local contractors may fail to benefit from price preference due to competition from international contractors as the directive requires means of procurement to be international competitive bidding if the value of the contract exceeds the threshold for works above birr 50 million (article 17.2). Considering this, the Directive states one of the consideration to be made in packages of contracts to be the packaging opens up opportunity for as many local producers as possible to participate in the procurement (article 9.3 (e)).

As an alternative to offering preferences on price, the whole or a proportion of the contract value may be dedicated for implementation by local contractors. This can produce the quickest, most visible gains to the entry of local firms into public procurement markets. The entry of new firms into the market at the lowest end can also boost competition and result in lower prices. In fact the three requirements of economy, fairness and transparency may all be met, provided that there are a sufficient number of local firms competing for work, which is generally the case with small contracts (Dr Jill Wells and John Hawkins, 2008)

Letting contracts in smaller packages can increase competition and give lower prices as it allows a greater number of local contractors to bid. Breaking contracts into smaller packages is relatively easy on road construction. However, this approach can increase the number of administrative tasks, financial transactions and supervisory roles for the client organization. Therefore a policy of breaking contracts must clearly strike a balance contracts which are too small will impose a high administrative burden, while contracts which are too large will exclude local firms. Moreover, allocating risk according to the capabilities of the participants to manage the risk is very crucial.

Generally, the procurement planning and packaging is the fundamental baseline for execution of the project. Time invested in preparation before developing the significant procurement plan will increase the chances of it being completed within the required timeframe and budget.

2.3. Project Delivery Methods

The other major part in selection decision of a contractor is the project delivery strategy. The contract strategy determines the level of integration of design, construction and ongoing maintenance for a given project, and should support the main project objectives in terms of risk allocation, delivery incentives and so on (Keith Potts, 2008). The chosen strategy influences the allocation of risk, the project management requirements, the design strategy and the employment of consultants and contractors. The difference delivery methods are explained below:

a) **Design-Bid-Build Delivery Method (DBB):** In this delivery method the designer prepares a complete construction document for the client. The client then receives bids from contractors based on the design documents and awards a construction contract to the bidder. Some of the main criticisms of the traditional DBB method of project delivery are lack of innovation, delayed completion periods, and cost overruns (Ibbs W.,

Y.H Kwak, and et al. 2003). Since, in the DBB method, the client bears most of the risks of the design and the construction aspects, there need to be better practices to assure the client's requirements are met, including quicker project completion times, and cost effective solutions.

b) **Design-Build Delivery Method (DB):** In this delivery method the owner\client selects an organization that will complete both the design and the construction of a project under one agreement. The design-build delivery system was identified as offering, on average, the best project performance (Marwa, A. El. W. May 2004). In DB method the main advantage is the project period becomes shorter and errors and most of the risk is not passed to the owner. The disadvantage includes the owner's loss control during design and lack of designers' representation of the owner's interest and puts tremendous pressure on the owner to know and clearly define criteria and quality at the very start.

c) **Construction Management Delivery Method (CM):** In this delivery method a construction manager becomes an integral part of the team, at early stages in the project, to oversee such elements as schedule, cost, and construction methodologies and procurement strategies. CM method of project delivery is based on an owner's agreement with a qualified firm to provide leadership and perform management for a defined scope of services.

d) **Design-Build-Operate-Transfer (BOT) Delivery Method:** In this innovative delivery methods a private company is responsible for the designs, construction, operation, maintenance, and financing of the project for a specified concession period. The contractor assumes the risks of financing until the end of the concession period. During this concession period, the company collects revenues from operating the project to recover its investment and to earn a profit. At the end of the concession period, ownership of the project is transferred to the client/owner.

Generally, there are different procurement delivery system chosen which mainly depends on work done by the agency and the work that is contracted out to consultant and/or construction contractors, degree of control the agency maintains over how the work is done and the control transferred to contractors through contracting out and assignment of risks associated with the project work undertaken by the agency and contractors. Different procurement delivery system will have different effect on the cost, time and quality of the project monitoring and control. Hence, selecting the suitable project delivery based on the project strategy is crucial for successful completion of a project.

2.4. Bidding Methods

2.4.1. Types Bidding Methods

It is very important at the very outset of the project to carefully consider all factors when selecting the most appropriate procurement approach for a construction project. This is because each system has its own feature and peculiarity that will have effect on the cost, time and quality of the project i.e. the project performance.

The Ethiopian Federal Government Procurement Proclamation, Proclamation No. 649/2009 (Federal Negarit Gazeta , 2009) states six types of methods of procurement: open bidding, request for proposals, two stage tendering, restricted tendering, request for quotation and direct procurement (article 33 (1)). It also declares that public bodies should use open bidding as the preferred procedure of procurement except only where conditions for use of such other method stipulated under the proclamation are satisfied (article 33 (2&3)).

Direct procurement is allowed when there is no competitions for technical reasons and if the required service can be supplied or provided only by one candidate or when there is a need of similar service or repetition of works from one supplier and when the total contract value is not exceeding 25% of the volume of such goods, works or consultancy assignment under the initial contract (article 51).

Restricted tendering is allowed only when the required object of procurement is available only with limited suppliers and the cost of the procurement does not exceed the limit in the directive issued by the Ministry; or where a repeated advertisement of the invitation to bid fails to attract bidders in respect of a procurement subject to the directive to be issued by the Ministry (article 49). The total contract value of procurement made by restricted bidding is limited by the federal public procurement directive to ETB 2 million for works (article 23.3) which is found to be very small.

Alternative procurement procedures other than the open bidding cannot be applicable for most public bodies' construction contracts as most public bodies' like ERA road construction contracts are more than the limits specified in the maximum limit provided in the directive. In addition, the conditions set forth for the use of other alternatives are not usually fulfilled for construction work contracts except in rare cases.

However, restricted tendering ensures selection of high quality contractors reduces the administrative burden of evaluating tenders and cost of tendering and reduces the risks of selecting non-responsive contractors. Invitation of a limited number of bidders also increases the chance for lasting relationships and a continuous workload over time for the selected contractors, which facilitate improved innovation and the development of knowledge about the clients and their demands, which is important for client satisfaction (Eriksson, 2007).

There are two main means of procurement irrespective of the method i.e. International Competitive Bidding (ICB) and National (Local) Competitive Bidding (NCB). International Competitive Bidding approach often includes open tendering where eligible pre-qualified bidders can come from any member country or from the home country. Alternatively there could be selective tendering where potential bidders are pre-qualified before some are placed on a short-list.

National (or Local) Competitive Bidding usually used for the projects with less value, thus not attractive to large international firms and all bidders are likely to be nationals of the project country or be companies established locally and generally run by local staff. This procurement procedure does not exclude international firms however, although local registration provisions may apply whereby involvement of international firms can be restricted. As per the Directive

before using a national competitive bidding, public bodies have to ascertain that the required objects of procurement can only be procured from local suppliers and the value of the procurement is below the threshold established for international competitive bidding i.e. ETB 50 million (for Works), or the required object of procurement is available only locally not withstanding that the cost of the procurement exceeds the threshold (article 16.1.1).

The threshold i.e. ETB 50 million to use ICB procedure is very small as a road project with an amount more than ETB 200 million is being constructed by local contractors. Using international competitive for most of projects will have an impact on the possibility of local contractors to get projects due to the competition from foreign contractor and as some portion of the payment to be made in foreign currency will affect the economy of the county. Hence, the Directive needs amendment in this regard.

2.4.2. Pre-qualification Vs Post Qualification

The assessment by the employer of suitable companies to undertake a specific contract prior to being invited to tender is a process known as pre-qualification. Nearly all funding agencies require pre-qualification of bidders for the construction of large or very complex works contracts. The pre-qualification process cannot be used to effectively short-list a predetermined number of bidders (as is done with service contracts) and all qualifying bidders that meet the required standard of pre-qualification must be allowed to bid.

Pre-qualification has both benefits and disadvantages. Pre-qualification allows inadequately qualified potential bidders to avoid the expense of preparing a bid, the employer is able to assess the interest from qualified bidders and thereby if necessary modify the contract to address issues perceived to be difficult by likely bidders, pre-qualified bidders are able to bid with the knowledge that they are competing against able and qualified bidders, reduce the amount of work by the employer, provide advanced warning of any potential conflict of interest between potential contractors and consultant involved with the project and avoids possible difficulties of having to reject low bids from unqualified and potential acquisitions of unfairness (Marta De Castro Meireles, 2006).

However, pre-qualification has a disadvantages as it increase the lead time for the procurement process if not programmed correctly, all of the submitted pre-qualification applications have to be assessed by the employer, easier for collusion between bidders with a smaller number of identified bidders and possible that subjectivity by the employer's in making judgments during the pre-qualification exercise might be a problem and deviate from the necessary impartiality expected (Marta De Castro Meireles, 2006).

An alternative to undertaking the pre-qualification exercise prior to the actual bidding, the pre-qualification documents are sent out at the same time as the tender documents, in which case the process is known as Post-qualification. The use of the prefix "post" instead of "pre" refers to the timing of the issue of the Pre-qualification Document relative to the preparation of the tender list. However although such post-qualification is not encouraged by the major funding agencies it may be used under certain circumstances, such as for lower value local competitive bidding contracts.

Post-qualification involves determination by the Employer that the bidder, supplier or contractor submitting the lowest evaluated bid and found responsive to the qualification criteria, has the capability and the capacity to perform the contract. If this bidder fails to demonstrate the necessary experience and capability to carry out the contract, the bid is rejected and the next lowest evaluated bidder is subject to post-qualification.

In the procurement directive pre-qualification is allowed in view of the particular nature of the procurement, where the procurement pertains to a work of design, manufacturing or installation of a very high value or complex nature, or where the procurement pertains to a turnkey contract of works, or the acquisition of machinery or Information technology or where the procurement pertains to supply of goods or equipments of considerable importance and includes installation, or where the cost of drawing up bidding documents is so high that only pre-qualified bidders should participate in the bid (Art 20.2)..

Post-qualification as means of procurement is not indicated in any of the Directive except the directive indicated public bodies to use open bidding as the preferred procedure of procurement in a similar sense as of post qualification. However, it does not clearly indicate whether it can be used as a single or two envelop system except indicating to use the standard bidding documents prepared by the Agency(Art 16) which is prepared based on the one envelop post qualification procedure. Moreover, there is no a clear rule when and for which types of projects to use a post qualification two envelop system. However, there is a specific procedure to open bid documents in two envelopes (Art 16.18.3). Moreover, under the procedure for evaluating bids and selecting the successful bidder it is stated that bids submitted in two envelopes, the selected bidder shall be the one who scores the highest point in the total sum of results of the technical and financial evaluation conducted on the basis of criteria applied to determine the functional value of the procurement (Art 16.19.2.1 (b)). This implies the two envelop is suitable for a service contract where the lowest evaluated bid offering the best economic advantage.

2.5. Forms of Contract and Risk Allocation in Tendering

There are numerous forms of contract that are used for carrying works, among others mostly used contracts are the bill of quantities (BoQ) or ad measurement (sometimes called re-measurement); lump sum, schedule of rates, cost reimbursement, cost plus percentage, cost plus fixed fee and cost plus fluctuating fee.

a) **A Bill of Quantities (BoQ) contracts** is a very common type of contract, and generally the most appropriate for all types of construction. The project is broken down into individual items of work and the amount, or quantity, of each item is computed at design stage. During the ‘tender stage’ competing contractors will insert their unit rates for items of work that are then extended and totaled to give the total bid price for the Works. This is the ‘Tender Total’ or ‘Contract Sum’ which a contractor may expect to be paid. However in civil engineering, quantities are usually approximate and subject to re-measurement.

b) **Lump sum contract** is based upon a fixed amount of money. This form of contract is usually considered where the scope of the work is limited and there is little risk of major changes in the quantities.

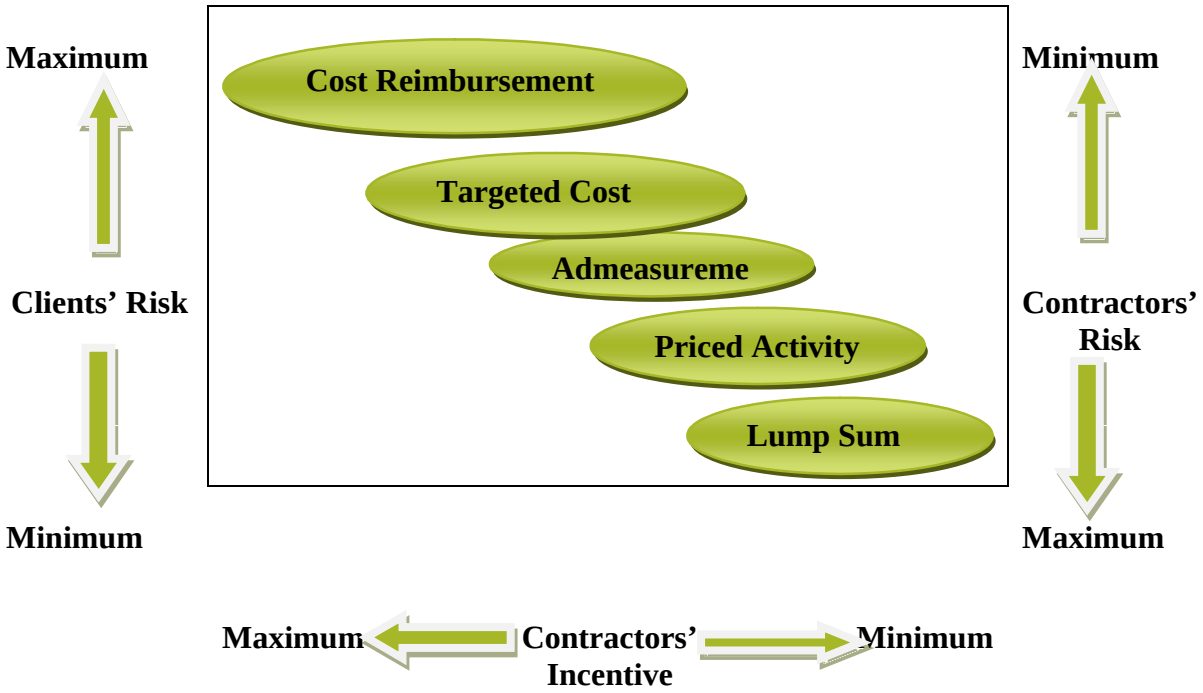
c) **Schedule of Rates** is used mainly where the amount of work is difficult to define and where the location and timing of the work is not known in detail, but the geographic boundaries are defined. Normally a schedule of work items without quantities is prepared and contractors then insert rates against each item. Sometimes a contract is prepared with rates prepared by the Engineer or Employer and contractors then enter a plus or minus percentage against the rates.

d) **Cost Reimbursement** sometimes known as cost plus contracts, these are based on the contractor being reimbursed actual costs together with an amount for overheads and profit. This form is useful when the scope of the work is difficult to determine, or for emergency work. Cost reimbursement contracts can have the major disadvantage of offering little incentive to the contractor to contain costs. Various types of cost reimbursement contracts can be used. In some cases such contracts are bid competitively but could also be arranged by negotiation.

e) **Cost plus percentage** is actual costs reimbursed plus an agreed percentage to cover overheads and profit. There is little incentive to contractor to contain costs or complete quickly. Cost plus fixed fee is actual costs reimbursed but the fee is a lump sum with the intention of trying to get the contractor to complete more quickly. Cost plus fluctuating fee is actual costs reimbursed but fee is on a sliding scale whereby the contractor receives a larger percentage if the costs are kept down. The percentage paid may be reduced in bands as the costs increase.

A key consideration in the choice of payment system is the allocation of the risk to the parties. Fig.2.2 shows the different payment systems identifying the risks attached thereto.

Fig 2.2: Relationship between types of payment systems (Keith Potts, 2008).



Form of contract is the best place to allocate risks in order to promote project implementation on time and on budget with specified quality in the contract that is to obtain the greatest value of money. All construction contracts allocate risks and there are some basic philosophical choices to be made. The most basic of all is to choose who takes the default position where different views could be seen for this. The American institute of architects takes the view that all risks belong to the employer when no other party can either control the risks or prevent the losses. Economic risks occur frequently during construction period, particularly the fluctuation of prices of materials, labour, and equipment.

Under sub-clause 13.8 of FIDIC 1999 form of contract, an adjustment formula for price fluctuation is given to deal with this issue. Such a provision indicates that the risk of inflation is shared between the employer and the contractor. However, MoWUD 1994 form of contract does not embrace price adjustment provision for fluctuation of prices and cost changes by the market unless such costs such as rates of wages, other emoluments and expenses are increased or decreased by any Act, Statute, Decree, Regulation and the like after the date of bid pricing. This means that the risk of inflation is not shared by the parties where the contractor is to carry the risk and the contractor should forecast and add a contingency for this work.

Risk of inflation is also entertained with the currently adopted PPA conditions of contract in a similar manner as FIDIC 1999 form of contract if only provided in the special conditions of contract. However, the PPA user's guide recommends price adjustment for contracts which provide for time of completion exceeding 18 months.

2.6. Tender Document Preparation

It must be remembered that a substantial proportion of the tender documentation will subsequently be incorporated into the contract documentation and, as such, it is of vital importance that it is properly prepared. Poor preparation of documents, at this stage, is one of the main sources of disputes and claims under a contract.

As civil engineering works are often complex, involving the contractor in many hundreds of different operations using many different materials and manufactured items, including employment of a wide variety of specialists, the documents defining the contract are complex and comprehensive. The task of preparing them for tendering therefore warrants close attention to detail and uniformity of approach, so as to achieve a coherent set of documents which forms an unambiguous and manageable contract.

The bidding documents shall furnish all information necessary for a prospective bidder to prepare a bid for works to be provided. While the detail and complexity of these documents may vary with the size and nature of the proposed bid package and contract, they generally include: invitation to bid; instructions to bidders; form of bid; form of contract; conditions of contract, both general and special; specifications and drawings; list of goods or bill of quantities; delivery time or schedule of completion; and necessary appendices, such as formats for various securities. The details of contents and their function of form of contract and evaluation and qualification criteria are discussed as a separate section in this chapter. The contents of the remaining parts of tender document for typical DBB delivery methods presented below:-

The Invitation for Bids/Tenders: is usually a fairly short document, around one to two pages, and would typically include brief information on the funding agency for the contract for which bids are sought, the fee for purchase of the tender documents (if any), eligibility requirement to participate in the bid, general information on the project, the required qualification criteria, the date and time by which tenders are to be submitted, the address for submission, and the amount of bid bond that is to be provided with the tender.

Invitation to bids prepared by ERA includes most of the above information. However, the required qualification criteria are not indicated in all of the invitation to bid except for projects financed by the World Bank. Not indicating the required qualification criteria in the invitation to bid will have an impact on the decision making of bidders to participate in the bid as bidders do not have the information whether they are capable or not for the project.

Instructions to Bidders/Tenderers: set out particular requirements that bidders must satisfy when preparing and submitting their tenders, and as such they cease to have any relevance once a contract has been awarded. However this is a very important document in that it may include all the relevant procurement requirements. These could cover, for example, the issue of tender documents, receipt of bidders' queries and issue of notices and addenda, receipt of tenders, assessment, etc.

Specifications: defines the standards for materials and workmanship to be incorporated in, or used in the execution of, the Works. It is common practice, and recommended as good practice, to prepare specifications in two parts, a General Specification and a Special or Particular Specification. The General Specification would typically be a standard document that may have been prepared by the relevant authority and would be included in the tender and contract documents for all contracts.

Drawings: set out in graphical form details of the permanent works to be constructed and any temporary works designed by the Engineer. They generally contain many references to, and should be read in conjunction with, the specification. Preparation of the Drawings is the responsibility of the designer but, as with the Specification and Bills of Quantities, a contractual overview is required. A particular feature of this overview would be checking cross-references to the Specification and nomenclatures, such as materials descriptions, included on the Drawings to remove any anomalies or inconsistencies.

Contract Forms: when a contract is awarded there are several formalities to be completed such as the signing of a contract agreement, provision by the contractor of performance bonds, etc. Employers usually have standard forms for these and samples are often included in the tender documents to familiarize bidders with the commitments they would be required to enter into.

The other parts of bidding document includes bid data sheet which states the provisions that are specific to each contract and supplement the information requirements included in Instructions to Bidders (ITB), bidding forms which contains the forms which are to be completed by the bidder and submitted as part of the Tender, eligible countries which gives information on eligible countries to participate in the bid and Schedules of Supplementary Information which indicates the information from bidders on their proposals for carrying out the works.

2.7. Qualification Requirements

The failure and success of any project is influenced by numerous decisions made by, or on behalf of, the client. Selecting a construction contractor is one of major decisions which may influence the progress and success of any construction project. Contractor prequalification is a commonly used process for identifying a qualified, sound and reliable construction contractor.

The qualification processes requires the development of necessary and sufficient criteria. Qualification is a process used to investigate and assess the capabilities of the contractors to carry out a job if it is awarded to them. This is the approach most currently used by many countries and in which many and different types of criteria are considered to evaluate the overall suitability of contractors. Contractor qualification involves a screening procedure based on a set of criteria set forth by each individual owner. As pointed out by Palaneeaswaran contractor prequalification is generally preferred by clients to minimize risks and failures and to enhance the performance levels of selected contractors by means of established minimal capacities below which contractors will not be considered.

The contractor's qualification (i.e. financial strength, past experience, business plan, work capacity, quality and experience of the technical personnel, etc), and project characteristics i.e. work schedule, type, value, duration, complexity, location of a project and contract type are the fundamental factors that affect contractor failure. Time-delays and cost-increases of construction projects are closely related to specifications on the qualifications of contractors (financial, technical, experience, etc) (Palaneeaswaran).

Russell et al (1990) stated that contractor prequalification decision-making involves a wide range of criteria that often consists of both qualitative and subjective information. The process remains largely an art where subjective judgment, based on the individual's experience, becomes an essential part of the process. He highlighted these parameters to include reputation, past performance, financial stability, references, experience record, firm capacity, current workload, and technical expertise. The major criteria requested for qualification of contractor includes:

Financial Stability: Basically this criterion involves evaluating the financial condition of each candidate contractor. Russell (1990) indicated the importance of contractor's credit rating, banking arrangements and financial statement to measure the solvency (or liquidity), efficiency and profitability of a contractor, in assessing his financial capability.

Experience: This criteria has been used in regular use for prequalification but has been called by different names like past project performed, past performance, experience etc. This involves evaluating the candidate contractor's project records to determine whether or not he has handled jobs of similar scope and complexity in the past or currently. Birrell (1985) indicated that possessing experience in projects similar to the proposed in terms of type, size and complexity should be an important evaluation criterion. This can be determined from satisfaction expressed by past clients/customers. This can also include investigating the performance history of the contractor in terms of completion on schedule and within budget, effectiveness of quality and cost control, and the quality of finished products.

Current Work Load (Capacity): This criterion also sometimes called as current projects on hand involves the evaluation of the candidate contractor's manpower, equipment and financial resources vis-à-vis his ongoing work projects to determine if his current commitment can impact his performance on the project for which he is being currently prequalified.

Management and Manpower Qualification: Also known as experience of key personnel, it is concerned with the qualification and skill of the management (administrative staff and engineering professionals) and labor crew. This is important as Clough and Sears (1994) remarked that the financial success of a construction enterprise depends almost entirely on the quality of its management. Russell (1991) contended that 8 out of 14 projects studied failed because of lack experience of the management and technical staff.

Contractor Organization: This seeks to evaluate the effectiveness of flow of information and decision making process among the different levels of the company. The importance of company organization was stressed by Birrell (1985).

Knowledge of Geographic Location of Project: The lack of knowledge about the geographic location, environment and local conditions of a project can be a reason for contractor's failure (Russell 1990). Lack of knowledge about the location increases the contractor's risk exposure and the probability of disputes arising.

Equipment Resources: Availability of equipment and their maintenance program are major factors affecting contractor performance. In this criterion the available resources in terms of personnel, plant and equipment are evaluated. Equipment cost control (maintenance, repair and replacement) is an important element of contractor's failure (Russell 1990).

Procurement and Material Management: With material cost ranging between 30 to 60% of total building project cost, procurement and material management are evidently essential to project success. Contractor's Procurement expertise and material management skills will result in on-time delivery avoiding delay as well as the additional cost for storage and double handling of early material delivery.

Safety Record: Accidents at construction sites may not only result in a loss of life but also result in increased insurance premium rates on the subsequent projects by the same contractor. It also results in a loss of goodwill. The selection of a contractor with a good safety record can minimize construction accidents and thereby save construction costs (Al-Gobali 1994) ranked this criterion as number 8 out of 14 factors affecting project performance.

Claim Attitudes: This is a measure of trust and cordiality in the relationship between the owner and contractor. Cooperation and coordination between the parties will lead to reduced interface problems, delays and consequently cost. Past experience of contractors can indicate their tendency towards litigation. Owners should avoid contractors who are inclined to litigation as a way of making profit. Hence, as part of the criteria the owner shall include the litigation history of the contractor where the award decisions become against the contractor.

Quality Program: A quality program in place always increases the chances of a better finished project. Hence Russell (1990) has included the existence of a quality program as a criterion in the prequalification process.

Past Owner Contractor Experience: Earlier interaction between the owner and the contractor plays a vital role in selecting a contractor as the owner prefers to work again with a contractor that has produced the earlier project at the required cost, time and quality benchmarks.

Studying different contractor selection approaches practiced by various clients around the globe and identifying their relative strengths and weaknesses will be useful for this research. Hence, the following practice is discussed below:

A. United Kingdom (UK) Practice

Mangitung and Emsley (2002) pointed that the contractor prequalification in the UK construction industry can be classified into two categories, that is, periodic prequalification for developing a standing list of contractors and project prequalification for developing a project. The main difference between both kinds is the timing of evaluation and the detailed level of contractors' data obtained. Periodic prequalification, which can be used by a client for short listing or invitation to bid, is carried out for certain periodic time frame. It has been found that standing lists of contractors in the UK were reevaluated annually, or every 2, 3 o r 5 years. UK procurement regulations apply the qualification principle to test the ability of tenderers to perform the work required. The contracting authority is required to list the qualification factors in the tender notice. The qualification process acts as a green light or signal for tenderers to be allowed to enter the procurement process, and is required in the early stage of the tendering process. The tenderer who possesses full technical and financial capabilities may be selected as the contractor.

B. Hong Kong Practice

Palaneeswaran and Kumaraswamy (2001) examined prequalification practices Hong Kong that requires only contractors on the approved lists can tender for contracts. They are categorized into five categories (buildings, port works, roads and drainage, site formation, and waterworks) according to their relevant expertise and managed by the relevant Works Departments. The lists of approved contractors are in three groups (A, B and C) based on their capacity. There are also two status levels termed `probationary' and `confirmed' in each group. The confirmation after probation relies on the satisfactory completion of works with good performance records. The promotion of contractors to a higher group depends on meeting requirements of financial criteria, appropriate technical and management capabilities, and continuous satisfactory completion of contracts under the present group. The lists of approved contractors are published annually, and the amendments are published from time to time. Every department keeps separate approved lists of contractors. The relevant Works Department manages the respective category of contractors.

C. Australian Practice

The Queensland Government of Australia has a system for prequalification of contractors known as Prequalification Criteria (PQC). All concerned contractors will have to be prequalified and registered on the PQC system, which is managed by the Department of Public Works and Housing, Queensland, Australia, to be eligible to tender for Government projects with a contract value of more than Australian $100,000.

Contractors are evaluated against prescribed criteria including technical capacity, management approach, business relations, and people involvement with commitment to continuous improvement. The PQC is designed with the aim of streamlining the process of contractor selection by ensuring a good match between the size and complexity of projects and the abilities of contractors (Palaneeswaran and Kumaraswamy, 2001).

D. USA Practice

There is evidence of wide efforts and research in the USA, aimed at structuring and improving contractor prequalification. Many public clients in USA use several prequalification ratings and these ratings are applied to identify parameters such as the maximum dollar amount of work that can be allocated to a prequalified bidder during the prequalification period and the maximum value of work that a contractor can bid for a particular project.

E. Ethiopian Practice

In Ethiopia one of the eligibility requirements for contractors to participate in a tender is registration by Ministry of Construction and Urban Development. The Minister register annually contractors by grouping into three (Building, Road and General Contractors) according to their relevant expertise. Each group then categorized into eight (1,2,…8) based on their capacity where the 1st category is with a higher capacity. This license is issued based upon the capacity of contractor mainly; owning equipment, permanent personnel, capital and availability of offices and office facilities.

Then each client set criteria based on the specific requirements of each projects. The Federal Government of Ethiopia has statutes requiring submission of competitive bids for construction projects. This statute requires public organizations to award such contracts to the lowest evaluated bidder and found responsive where responsiveness measures whether the bidder adequately meet the minimum qualifying criteria set forth in the bid document. Such minimum qualifying criteria includes

- Average annual volume of construction work (annual construction turnover)
- Experience as a prime contractor in the construction of similar contracts,
- Proposal of the timely acquisition of equipment (own, lease, hire, etc.)
- Personnel with specific qualification and experience
- Liquid assets and/or credit facilities net of other contractual commitments and exclusive of any advance payments which may be made under the Contract

These are the major qualification criteria stipulated in the tender document. In addition, a consistent history of litigation or arbitration awards against the applicant or any partner of a Joint Venture and non-performance of the contractor may result in disqualification. The detail however is determined by the nature of the construction project.

According to the proclamation article 43(3), the public body regards a bid as responsive only if it conforms to salient requirements set forth in the bidding document. The Federal Public Procurement Directive states that the criteria selected for conducting evaluation shall be objective and that can, as far as possible, be expressed in monetary terms in respect of achieving maximum value for money, ambiguous requirements are not acceptable and thus should not be used by the employer and the criteria should not be unfairly discriminatory.

F. Comparison of the above contractor selection approaches

The UK, Hong Kong, Australian and USA in their qualification of contractors utilize a long list of contractors based on the performance and capacity of contractors for prequalification and bidding purposes. Moreover, the clients further prepare the contractors' resources and capabilities in relation to the stated specific project requirement. In this practice if the contractor is not deemed competent and sufficiently responsible to take on the project, there is not a chance of this contractor receiving the contract, or any other contract of this nature and ensures that any contractor selected to work on projects is capable of completing the project. Another advantage is that prequalification reduces the number of contractors bidding on a project from a large number of parties from all disciplines to a smaller number of parties that are all specialized in the same area and it removes the bias to accept the lowest bid. A procedure will also ensure that the lowest bidder is qualified to perform the work required for the project.

In the World Bank and Ethiopian practice the clients review the contractors' resources and capabilities in relation to the stated specific project requirement indicated in the bidding/pre-qualification document. In this approaches, there is no discrimination or ranking of contractors within a particular qualified contractors. A qualified contractor who is near the upper boundary of the qualification criteria is not distinguished from another contractor who is near the lower limit of the qualification criteria. Furthermore, the varying levels of contractor performance under different workloads do not consider. The approaches are generally based on prime importance for experience/financial qualifications and on the assumption that contractors have similar capacities in all circumstances. All contractors are considered to be the same in a particular qualification category, which is unrealistic. Each contractor may have different capacities even within that particular qualification category itself. It also ignores the contractor workloads at any particular time.

However, in the UK, Hong Kong Practice, Australian and USA practices, it is difficult to make a decision without having a biased opinion or introducing a subjective point of view since the contractor would have to be qualified by a team of individuals. This procedure will also limit the contractor's ability to expand into new areas of construction. Since this process ensures that selected contractors would be well experienced in a particular area of construction, it will be difficult to award a contract to newcomers to that area of construction. This would result in a small number of contractors that always get the contract for that particular type of work. There

are also high costs associated with developing and implementing a qualification procedure that is based on past performance. With this development process comes the burden of creating a questionnaire that covers all of the required topics but at the same time minimizes the subjectivity.

Hence, considering the above the Ethiopian practice needs to take some of the advantages from others experience which would be suitable to the current level of the country. For example ranking of contractors within particular qualified contractors may benefit to distinguish highly qualified contractors to contractors near the lower limit of the qualification criteria. Furthermore, the varying levels of contractor performance under different workloads shall be considered as part of the qualification requirement. Currently, it might be difficult to practice to rate contractors based on performance and capacity rating as the country does not have qualified team of individuals who can give a professional unbiased opinion and it is not an easy task to get the detail data about the capacity of contractors past performance and work load of contractors and their capacity. Moreover, there are a limited number of experienced contractors who have the capacity to pass that requirement. However, it is recommended to learn from the developed countries experience and attempt to change the existing procedure in line with the development of the country.

2.8. Bid Evaluation and Contract Awarding Procedures

The term "evaluation" describes the procedure for the assessment of bids submitted by contractors. Bidding procedures are basically of two types: competitive and negotiated. Most of the other procedures are either variation of, or somewhere between these two extreme types. In pure competitive method, the contract is awarded to the lowest- bidder, if the bidder is found to be responsive. Responsive means bidders are required to meet the minimum qualifying criteria set forth in the qualification criteria in the bid document like annual construction turnover, experience, financial stability and proposal of the timely acquisition of equipment and personnel.

In 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 like Competitive Low Bidding (Price-based), Competitive Average Bidding (Price-based), Multi Parameter Bidding Method (Based on price and “other” factors), Competitive Negotiated Bidding, Non - Competitive Negotiated Bidding.

Although Competitive low bidding (Price - Based) is generally accepted that competitive low bid method saves taxpayers money and thus protects public interest, this traditional method has recently been criticized lately for promoting inferior quality, causing too many change orders, furthering adversarial relationships, time overrun, and increasing overall cost of the project (Photois, 1993).

The major drawbacks of the low- bid method is the possibility of awarding a construction contract to a contractor that submits, either accidentally or deliberately, an unrealistically low bid price. Often, such an occurrence works to the owner’s and contractor’s detriment by promoting disputes, increased costs, and delays. To address this problem, other countries

have adopted the average- bid method and award the contract to the contractor whose price is closest to the average - bid method and explores its merits relative to the low- bid method (Photois, 1993).

If a contractor submits a bid that is significantly lower than the engineer's estimate and the other bidders, it is difficult to understand how that contractor could complete the job profitably. The European Union defines those bids as Abnormally Low Tenders (Thomas, 2009). An abnormally low tender is a tender whose price is considered significantly lower than the average bid price of all bidders in the same procurement procedure. Different average-bid method use different procedures for calculating the average, or use different criteria for determining the winning bid. For example, some use an arithmetic average or a weighted average, while others use the average of the remaining bids after all bids that differ more than a certain percentage from the average of all other bids are eliminated. Similarly, the winner might be the contractor whose price is closest to the average, or the contractor whose bid is closest to, but less than the average. The former, for example, is used in Taiwan while the latter is used in Italy (Photios, 1993).

A formula to decide a reasonable offer from several competitive bids was developed by Ministry of Works and Urban Development (MoW&UD) which was the authorized public body in the procurement of all works under the Federal Government of Ethiopia until 2006. However, after the establishment of Public Procurement Agency (PPA) in 2006, the procurement of all Federal Government works and services have been guided by the rules and regulations prepared by this agency. The modified evaluation methodology proposed by the Ministry was:

i. Project estimate means 50% engineer's estimate and 50% estimate of the Ministry.
ii. Bidder 's who are submitted the required bid security and whose offer is within plus or minus 20% of the project estimate will be subjected to detail evaluation and bidders whose offer are outside the limit will be rejected.
iii. The winning bidder will be the least bidder whose offer is within minuses (-) 15% of the adjusted project estimate. The adjusted project estimate is 25% of the project estimate and 75% from the average of the offer from the bidders who are subjected to detail evaluation.

The main advantage is that it safeguards an owner against signing a construction contract for an unrealistically low bid price that almost certainly will lead to adversarial relationships during construction (Ioannou et al,1993). It was also pointed out that, under this method, contractors are protected from having to honor a bid containing a gross mistake or oversight.

The basic drawback of the average - bid method is that it does not necessarily promote price competition that leads to lower costs for the owner. A technological or managerial breakthrough that results in major cost savings will not necessarily be passed on to the owner in the form of lower prices, unless this breakthrough is known to be available to all bidders. Although it has been argued that average bidding method results in significantly higher profits for the contractors in projects won (Irtishad, 1993), when such high profits are available throughout the industry, bid prices should be expected to gradually fall and the savings will eventually be passed to the owner. It has been claimed that the average bid method

would increase contractor profitability and it has the potential to improve relationships between the owner and the contractor.

The competitive bidding process for awarding construction contracts in Ethiopia and ERA is typically based on the low bid method . According to this method, the construction firm who is responsive and submitting the lowest bid receives the right to the construction contract. Its main advantage is that it forces contractors to continuously try to lower costs by adopting cost - saving technological and managerial innovations (Photois, 1993). These savings are then passed to the owner through the competitive process.

2.9. Ethical Issues

Donaldson (2008) stated that ethical practices that promote economic efficiency include respect for intellectual property, engaging in fairer competition, avoiding monopolies, avoiding nepotism and crony capitalism, not abusing government relationships, providing accurate information to the market, avoiding bribery, respect for the environment and honoring contracts, promises and other commitments.

Ethical issues in project procurement are not only about bribery or corruption but also conflict of interests and collusive tendering. Due to the huge amount of money and a large number of companies involved with the procurement process for big contracts, potential exists for unethical business practices in each of the steps in the procurement process. Procurement process is one of the major areas in project management that can contribute to ethical issues during the implementation of projects.

Construction industry practitioners are involved in various stages of procurement of construction projects. Successful implementation of such projects depends on how well they have been conceived, designed, tendered, supervised and constructed. This has a bearing on the technical and ethical skills of those involved in the whole process. The problems of poor quality, late completion and cost overruns of construction projects are attributed not only to the technical skills of the experts but rather their ethical skills.

In Ethiopia, we have, although not adequate, a sizeable number of construction industry practitioners including Engineers, Economists and Architects that have been for some time involved in the realization of some completed and ongoing construction projects. Unfortunately some of these projects have not been successfully implemented as expected.

According to Guth (2009), linking to the project procurement processes, there a few of ethical issues that can occur here:

- Issues of influence:-behaviors or actions that may negatively influence or appear to influence, procurement decisions (such as seller gifts, entertainment or outright bribes);
- Perceived impropriety:-the intent and appearance of unethical or compromising conduct in relationships, actions and communications;
- Conflict of interest:-personal, business or other activities that conflict with the lawful interests of the employee;

- Confidential and propriety information:-violations of confidentiality, non-disclosure and proprietary rights
- Reciprocity:-improper reciprocal agreements
- Applicable laws, regulations and trade agreements:-violations of Law

There are many factors that cause people to be involved in ethical issues in project procurement. Bribes, gifts, personal payments have different meaning in different countries. It is important to understand and investigate the factors that contribute to these unethical conducts. When the reasons are known only then can the right methods be developed to curb these problems. The factors that contribute to unethical behavior in project procurement are economic downturn, national objectives, leadership, non-transparent selection process and ineffective evaluation of the process and ineffectiveness of professional ethics (Abu Hassim, Aliza and Kajewski, Stephen L. and Trigunarsyah, Bambang, 2010).

2.10. Summary of Literature Review

As part of procurement process, selection of contractors for construction start from procurement planning and then follows preparation of tender document, advertising the tender, submission of bids by the tenderers, evaluation of the submitting tender and award of the contract. Procurement plan is one of the basic and major steps for successful completion of a project. As part of the procurement plan work packaging also serves as the starting point for statement of work definition which groups the procurement requirements in such a way as to ensure economy and efficiency.

As part of the procurement process selection of the right type of project delivery methods which is based on cost certainty, time certainty, insuring quality and reduction of administrative burden to the public is essential for successful completion of the project. In literature review it is found that, the different procurement method and the selection of the right type of the form of contract will have different effect on the cost, time and quality of the project. The choice of form of contract is partly an exercise in risk allocation because; the accompanying payment schemes operate to place the cost of risk materialization on one party or on the other in the absence of a specific provision to the contrary.

In selection of contractors the client shall prepare the tender document considering specific nature of projects and avoid ambiguities, mistakes and inconsistent in the document. Contractor selection is a critical and crucial task for any client that may help to control some of these risks and manage the complexities. Various procedures such as open tendering, selective tendering, restricted tendering, registration/ pre-qualification, post-qualification are followed for selecting contractors. In addition to the above, to select a contractor for a project it is required to develop necessary and sufficient criteria to investigate and assess the capabilities of the contractors to carry out a job if it is awarded to them.

Most professionals agree the importance of the method of bid evaluation and contract award procedure chosen for the successful accomplishment of construction contracts. Least bidder bid awarding procedure has been widely accepted in many countries for decades. The customary practice of awarding contracts to a lowest bidder encourages unqualified

bidders in the competition and in contrary it discourages qualified contractors to participate. In the procurement process ethical issues will also cause difficulty in meeting the requirements and objectives of project procurement which could consequently cause high risk to the project completion.

Generally, from the above literature review it is concluded that selection of contractors for construction is a multi-step process and not properly managing the process would have a profound impact on the project success or failure.

3. PROCUREMENT PROCESS IN ETHIOPIAN ROADS AUTHORITY

3.1. General

Road construction project is a vital component of Government of Ethiopia (GoE) strategy considering its effect on every sector of the economy. ERA on behalf of the GoE plays a major role on identification and prioritization of road projects, procurement of service and works contracts, contract administration and the maintenance of completed projects. This research is mainly focused on assessment of impacts of the major milestones of the procurement process i.e procurement planning and packaging, project delivery strategy, bidding methods, forms of contract and risk allocation in tendering, qualification criteria and bid evaluation and ethics in ERA.

This chapter investigates the procurement process of ERA and identify, as exhaustively as possible, problem and constraints in the major milestones of the procurement process that will result poor performance of projects like delays, cost overrun and quality problems. This investigation is important as it provides substantial part of the inputs for the lists of factors and variables to be considered for the research.

3.2. Procurement Planning and Packaging

3.2.1. Procurement Planning

ERA identifies the road project needs by its Planning and Programming Directorate as per the priority of the roads and the available budget for the projects in which their designs are completed. In ERA, the projects design and tender documents are prepared by a design consultant.

The selection process is short listing of 3 up to 7 consultants from the submitted expressions of interest in response to the advertisement. Then the short-listed consultants invited to submit proposals based on the request for proposal. ERA, for all of design consultant selection uses a Quality and Cost Based Selection (QCBS) methodology which is based on both the quality (80%) and the cost (20%) of a consultant's proposal. The contract type used by ERA for all design projects is a Lump Sum where the payment is made based on delivery of design documents.

The selected design consultant will prepare, as per the required scope of the project, the complete design of the project including defining the project scope and preparation of the required tender document. The consultant will also responsible to select the appropriate project delivery method in consultation with ERA considering the specific nature of projects. From the projects where their design is completed and the required tender document is being prepared, based on the priority of projects and availability of budget the Planning and Programming Directorate forward the lists of projects to the Engineering Procurement Directorate to start their procurement process.

Then, the Engineering Procurement Directorate then prepares a procurement plan which indicates a schedule of main activities to be carried out in the procurement process. Since the project is handed over to procurement directorate after identification and completion the project design, the procurement plan will have nothing more than the schedule of main activities to be carried out in the procurement process. Consequently, the procurement plan does not consider historical information, assumptions to be made on a specific project and limitation of projects. However, considering historical information and assumptions will help to prepare a realistic procurement plan from lesson learnt in previous projects.

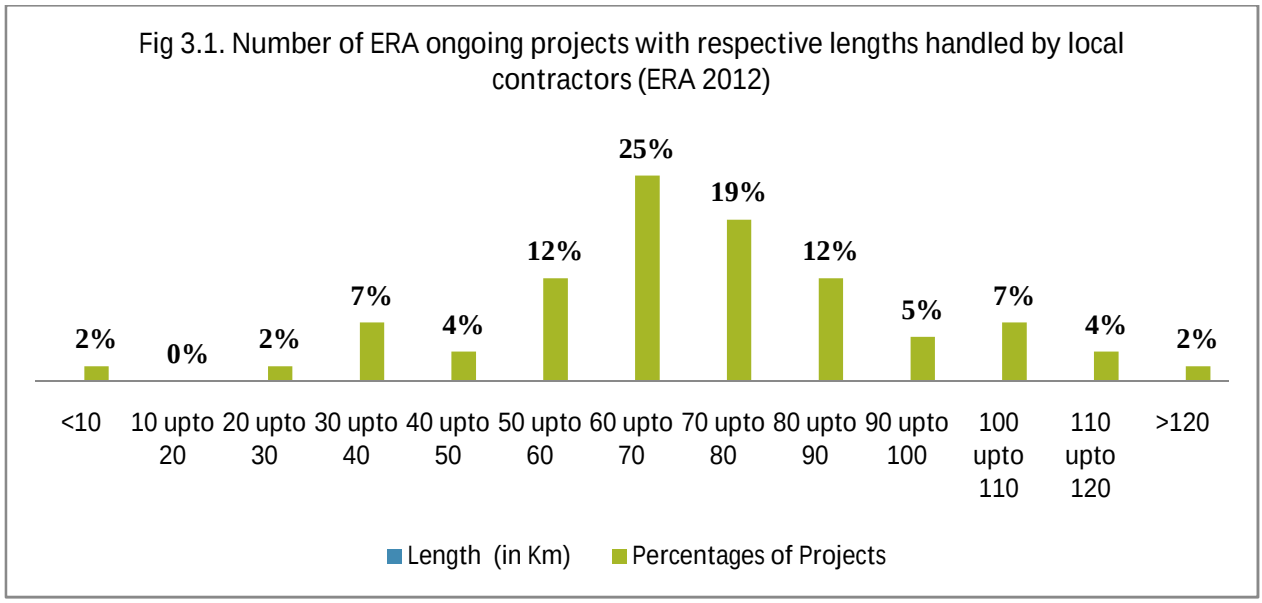
The procurement plan is not incorporating as part of the scope definition. This will have an impact in selecting the best delivery strategy, bidding method, managing risks and selection of the suitable contractor for the project. For instance fixing the duration of the project is part of the scope definition. As the required capacity to complete the project will depend on the duration of the project, this will have an impact in selection of contractor. However, most of the project durations administered by ERA have a common duration like 30 months or 36 months or 42 months irrespective of the peculiar nature of the project. Such consideration has an impact on the project success as it will increase the cost of the project, impact in quality of the project and delay.

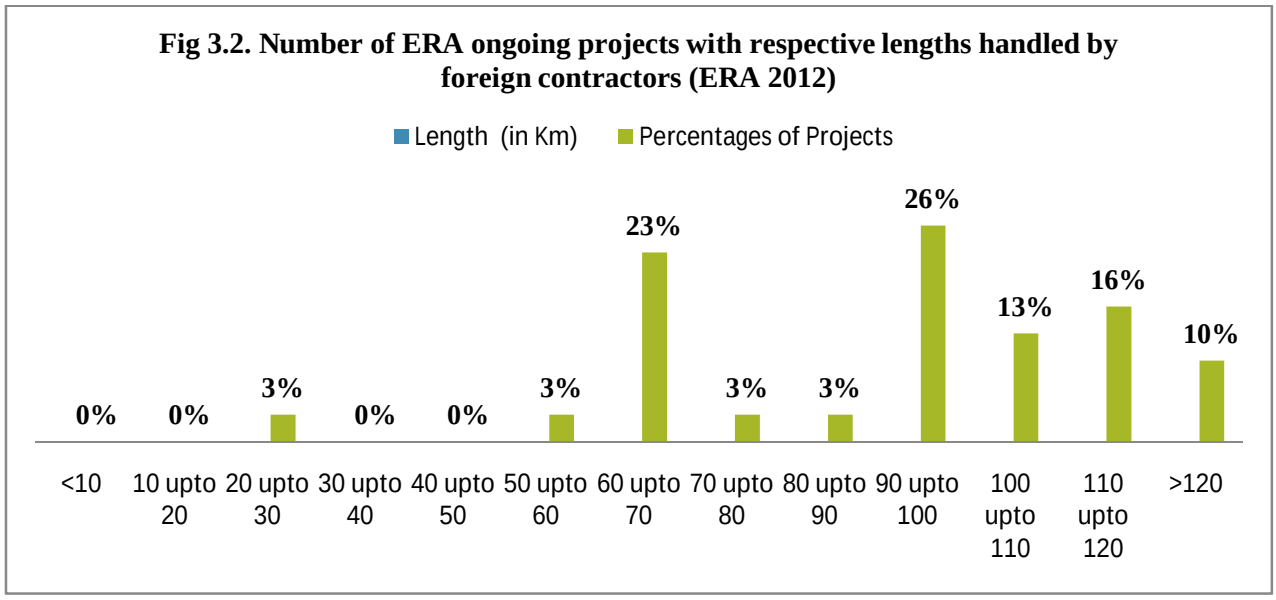
ERA's procurement plan also does not include assessment of the market condition and their respective risks of the market on the overall delivery including mitigation strategies like characteristics of the suitable contractors, available number of contractors, locations, regional limitations or advantages, quality management. The market survey evaluation needs principally at the planning level to determine requirements (characteristics, performance, target costs, etc.) and the selection of suitable markets able in principle to satisfy those needs.

Hence, in ERA's procurement plan preparation there is a basic problem in addressing the project scope and commercial arrangements, the procurement process, procurement risks and opportunities, stakeholder interfaces and alignment with market capability and capacity.

3.2.2. Procurement Packaging

In ERA procurement the project packaging is prepared by design consultants where the projects are divided based on the volume of the work for the specific contracts. ERA is currently administering 97 ongoing road construction projects out of which 31 projects are handled by foreign contractors and the rest 66 projects are handled by local contractors. Fig 3.1 and 3.2 below indicates the number of ongoing projects administered by ERA with respective range of lengths constructed by local and foreign bidders (ERA 2012).





As indicated in Fig 3.1 and 3.2 above most of ongoing projects length ranges from 60km upto 90 km for local contractors and 60km to 70km or 90km up to 100km for foreign bidders and it shows that ERA likely to divide projects within 60 up to 100km length. As per the World Bank Procurement Manual the first major concern regarding contract packaging relates to the ability of the local contractors to provide the procured product and the likely interest of foreign bidders to participate in the procedure. The same is reflected in the Federal Public Procurement Directive which states consideration regarding contract packaging relates to organizing the procurement in such a way as to open up opportunity for as many local producers as possible to participate in the procurement and to ensure that there are adequate suppliers in the market or classifying the procurement into lots based on category of supplies.

However, in the above two figures the lengths of majority of ongoing projects handled by both foreign and local contractors is in the same range and hence, this indicates that ERA in packaging projects do not consider the local firms capability of providing the works. Moreover, in ERA projects there is no a specific criteria in packaging the road projects. Due to this, discrepancies might occur in the application of the requirements and choices will be made in which interests the contract would rather serve. Hence this will result, small firms might press for breaking contracts into their manageable sizes, while large and middle size firms might try to bulk pack as much as possible so that they would have a better chance of being granted a contract.

Procurement packaging is one of the key steps to entertain local inputs. To build the capacity of local contractors, ERA has dedicated some road projects for local contractors to attract new contractors who don't have experience in ERA projects by relaxing the qualification of peak construction turnover and specific experience requirement to ETB 15 million irrespective of the size of the project. So far 13 contractors are awarded a road projects as a capacity building.

ERA to build the capacity of local contractors has applied breaking the contracts into smaller size without the necessary assessments the administrative burden of contracts. In fact dedicating some of projects by breaking in different size for local bidders may help in increasing the number of local competition. Such procedure was implemented in South Africa under the umbrella of 'Targeted Procurement' under which clearly defined objectives (e.g. for local content) are set out in the project specification, together with how they are to be measured and how they are to be achieved (C.Perna, FP7/PrepSKA, 2009).

However, ERA has not taken consideration regarding procedures related to the measurement and quantification of the participation of target groups, definition and identification of target groups, provision of incentives for the attainment of key performance indicators in the performance of contract, creation of contractual obligations to engage target groups in the performance of the contract, provision of third party management support; and evaluation of procurement outcomes. This will put a question the sustainability of the capacity building in the performance of the contract.

Generally, based on the projects packaging of ERA, there are two major challenges which negatively affect the project performance and competitiveness. The first one is associated with the business environment, whereas the second one is related to capacity and competence of individual firms. However, in ERA project detection of market risk potentially able to endanger business goals and supplier performance is not considered during work packaging. In the procurement packaging phase it is necessary to specifically investigate elements of weakness in the target industrial or national systems. Assessing the local capacity allows detecting the competitiveness nature of local market. The number of large and small contractors, their experience in related to road projects, their development level, and development stimulated by making contracts more likely to attract them.

3.3. Project Delivery Strategy

It has been observed that road projects in ERA are typically designed first; competitive bids are obtained, and then constructed by a contractor and supervised by a consultant construction supervision team. ERA is currently administering 97 ongoing road construction projects out of which 13 projects are design build and the rest 85 projects are traditional design bid build projects.

Fig 3.3 Percentage Comparison of DBB and DB ongoing ERA project (ERA 2013)

As indicated in Fig 3.3 above 87% of the projects are DBB and the rest 13% uses DB delivery methods. ERA has never used other innovative delivery method like Construction Management and Design-Build-Operate-Transfer (BOT) innovative delivery method. However, there is no a clear and scientific criteria for selection of project delivery like cost certainty, time certainty, insuring quality and reduction of administrative burden to the public owner.

As per the discussion held with different professionals working in/with ERA, it is found that ERA uses the traditional DBB delivery method for the reason that ERA has no experience in administrating such projects and limited capacity of local contractors on other innovative delivery methods.

However, in most projects ERA is suffering in cost overrun, delay and quality problem as identified by Amare (2006) the extent of severity of delays and cost overrun problems in some road projects administered by ERA was even more than the original contract period and the cost overruns also extend to the extent of more than 50% of the contract amount. Although, the cause of the problem need for investigating sticking on one type of delivery method might be one of the main factors for poor performance of the contracts.

3.4. Bidding Methods

The Proclamation of public procurement of Ethiopia restrict public sector clients' to use open invitations in which all contractors are welcome to submit bids unless a stated special reasons. The Federal Public Procurement Directive states the total contract value of a procurement of works made by restricted bidding shall not exceed ETB 2 million. However, ERA is unable to

use this method of procurement as most of the projects handled by ERA are larger than ETB 100 million.

Hence, alternative procurement procedures other than the open bidding cannot be applicable for most public bodies' construction contracts. As a public body, ERA for most projects uses open tendering as most of contracts are more than the maximum limit provided in the directive and not usually fulfill the conditions set forth for the use of other alternatives except in rare cases.

The selection mechanism for all Government financed projects in ERA is a two envelopes system where the envelope containing the qualification of the bidder first opened and the envelopes containing the financial bid of all bidders put unopened. The financial bid will remain sealed and kept carefully under the custody of the Deputy Director General until the second bid opening preceding. However, for other international financed projects, either pre-qualification or one envelop post qualification is being used.

In the procurement Directive there is no clear rule when and for which types of projects to use a two envelop system. However, there is a specific procedure to open bid documents in two envelopes (Art 16.18.3). Moreover, under the procedure for evaluating bids and selecting the successful bidder it is stated that bids submitted in two envelopes, the selected bidder shall be the one who scores the highest point in the total sum of results of the technical and financial evaluation conducted on the basis of criteria applied to determine the functional value of the procurement (Art 16.19.2.1 (b)). This implies the two envelop is suitable for a service/works contract where the lowest evaluated bid and found responsive to the qualification criteria offering the best economic advantage.

The two envelop bid actual have an advantage in decreasing the procurement lead time and collusion between bidders as compared to pre qualification and also avoids possible difficulties rejecting low bids from unqualified bidders as compared to post qualification. However, using two envelop system will result expense of preparing a bid for unqualified bidders and bidders will not able to bid with the knowledge that they are competing against able and qualified bidders. Moreover, there will be a question on the security of the financial bid which is kept carefully under the custody of the Deputy Director General.

3.5. Forms of Contract and Risk Allocation in Tendering

The delivery method of most of the road projects in ERA is a typically DBB strategy and for all DBB projects a bill of quantities with re-measurement is being used. The conditions of contract that have been used are either a FIDIC Conditions of Contract for Works of Civil Engineering Construction (Fourth Edition) or FIDIC Conditions of Contract for Construction 1999 or the Conditions of Contract for Construction MDB Harmonized Edition March 2006. The method of measurement of the bill of quantities contracts is defined in the ERA Standard Technical Specifications, 2002 and if necessary for a particular contract, may be revised or added to address specific issues.

Form of contract is the best place to allocate risks in order to promote project implementation on time and on budget with specified quality in the contract that is to obtain the greatest value of money. One of the basic risks in construction contracts is managing the economic risks and in conditions of contracts like price escalation clause are used to manage such economic risks. There are problems that have to be assessed regarding managing of risks related to price escalation in ERA. As per the assessment made in ERA practice of allocating economic risks in the contract, the first and basic problem related to price escalation is poor understanding of the contracting parties (employer, contractor and consultant) about price adjustment. This poor understanding especially; of design firms leads them to fail in giving appropriate weighting for input materials based on Engineers Cost Estimate. What design firms usually do is copying the weightings from any other projects and applies it regardless of the area and magnitude and nature of the work.

The second problem related to price escalation is the Country does not have a local indices and the authorized institution i.e the Ethiopian Statistics Authority do not prepare indices; for instant for labor, cement and fuel etc. In developed like USA and some developing countries like Uganda, India and China there are institutions for the preparation of indices. Hence, for local inputs ERA is obliged to use price quotation from suppliers as a base price in adjustment.

The third problem is during tender evaluation there is no mechanism for checking the authenticity of the supporting documents that indicate the base prices/indices. The only thing what staffs in ERA do is checking the papers (the source of price/indices and the price). Moreover, there is no mechanism to check the reliability of the supplier. In such circumstances, contractors may give small base price by communicating with suppliers; and sometimes they may come up with base prices from the suppliers which they think would benefit them according to its trend of increasing.

3.6. Qualification Criteria and Performance Evaluation

3.6.1. Qualification Criteria

Qualification of contractors in ERA is generally measure the technical ability and capacity of the bidder to perform the intended projects by means of established minimal capacities below which contractors will not be considered. The major criteria include financial capacity (turnover, cash flow and historical financial performance like current soundness and long term profitability), experience (general and specific to the project), and performance of the contractor in ongoing projects and technical capacity of contractor (availability of equipment and key personnel required for the execution of the works). In addition the work schedule and construction methodology presented for the execution of the works is also assessed.

ERA sets qualification criteria for project financed by the Government Ethiopia based on the framework set by its board. The framework states the factor for each required criteria by dividing it into local and foreign bidders and international and national competitive bidding. The essential criteria i.e. turnover, cash flow, general and specific experience as detailed in Table 3.1 below.

Table 3.1 Projects Qualification Criteria Setting Mechanism of ERA as per Relaxed Criteria Approved By ERA Board (Data from ERA)

I/N	Qualification Criteria	Minimum Requirement for Government Financed Projects	
		For local Bidders	For foreign Bidders
1	Annual construction Turn over	70% for ICB and 60% for NCB of the Engineer's Estimate divided by Contract Period in years (Peak value in the last five years)	200% of the Engineer's Estimate divided by Contract Period in years (Average value of the last five years)
2	Liquid asset /cash flow requirement	3 times for both ICB and NCB of the Engineer's Estimate divided by Contract Period in months	4 times of the Engineer's Estimate divided by Contract Period in months
3	General construction Experience	For ICB 3 yrs and for NCB 2 yrs firm experience in construction	5 yrs firm experience in construction
4	Specific construction projects experience	The number of projects required is one with a value of 50% for ICB and 25% for NCB of the project estimate or 75% for ICB and 50% for NCB of the length of the project. The type of the project is one standard below the subject of procurement for example for double surface treatment project the type of the project required for the criteria will be a new road gravel road construction/upgrading project.	The number of projects required is two with a value of 80% of the project estimate or 100% of the length of the project and the type of the project is the same as the standard of the subject of procurement. For example for double surface treatment project the type of the project required for the criteria will be double surface treatment project.

Clients shall increase the chance of local contractors winning contracts while minimizing the risk to the delivery of the project. As indicated in Table 3.1 above ERA puts its own strategy to increase the chance of local contractors winning contracts. However, ERA to increasing local content by relaxing the criteria to 25% and 50% of the required experience for NCB and ICB respectively and also 60% and 70% of the required turnover for ICB and NCB contracts respectively has taken too much risk as the capacity of the contractor with 25% or 50% of the requirement to deliver the project is in question.

There are such practices in a procurement strategy to increase the participation of local contractors in South Africa by simplifying tender procedures where appropriate, breaking the contracts into sizable to enable local contractor participation, issuing tender documents in local languages, alerting enterprises to tender opportunities by SMS and offering training through tender workshops. Another way by creating opportunities for small contractors on a sizeable project by employing a consultant (or contractor) as management contractor, as it is done in Zambia (C. Perna, 2009).

Unlike others experience, ERA's strategy is limited to relaxing the qualification criteria and the options of the criteria is limited regardless of the size of the project and no consideration was given like classifying the project type and value. Moreover, in ERA qualification criteria there is no mechanism to limit on the number of projects to be handled by a single contractor based on

contractors' capacities and hence the current system is allowing some contractors to take up more projects beyond their capacities. As the number of projects handled by a single bidder increases the infrastructure to support the growth of their projects shall also be increased otherwise the contractor may suffer significant losses. If the contractor does not manage to increase its capacity in line with the growth of its projects, the company will spread and its project management will become thin, promote inexperienced employees, or be forced to hastily hire additional inexperienced project managers. If the controls are not adequate the company may experience problems on its financial management, poor project management and cash flow problems.

As part of assessing the financial situation of contractors, ERA checks bidder's current soundness and long term profitability from the financial audited reports submitted by the bidders. However, this will not be a basis for rejection as the evaluators are civil engineers who cannot justify the soundness and profitability of the bidder by checking the historical financial performance. Moreover, the assessment made for major construction equipment, key personnel, work schedule and construction methodologies is not considered as a rejection criteria except noting the defects to be requested for clarification and confirmation by the contractor. Hence, from the above the ERA criteria do not actually measure the financial stability and resource capacity of the contractors.

3.6.2. Performance Evaluation

The other criterion is performance of bidders. The performance evaluation of contractors is set to award for good performing and to penalize them for poor performance. ERA sets history of non-performing contracts and poor performance as one of the criteria to qualify for the project. In addition to that contractor's performance will be evaluated based on the ERA's contractor's performance assessment framework and rating which is set by ERA Board.

The means of evaluation of the performance of the contractors in ERA is based on the progress of the work in monitory terms of the previous month on the date of opening of his qualification document by comparing with the expected aggregate performance of projects upto the end duration the previous month. The formula is used based on the category of contract period to get the expected performance of each projects as per the Table 3.2 below.

Table 3.2 Calculation of the Expected Performance in ongoing ERA projects (Data from ERA)

Contract Period	Formula for local bidders	Formula for foreign bidders	Remarks
First (1/3)rd	9(t1)	11(t1)	t1=(Time Elapsed -Mobilization Period) / (Total contract period /3-Mobilization Period)
Second(1/3)rd	9+29(t2)	11+31(t2)	t2=(Time Elapsed - Total contract period /3) / (Total contract period /3)
last (1/3)rd	38+32(t3)	42+38(t3)	t3=(Time Elapsed – 2*Total contract period /3) / (Total contract period /3)
Beyond Contract period	70+30(t4)	80+20(t4)	t4=(Time Elapsed – Total contract period) / (Total contract period /4)

As indicated in Table 3.2, the expected contractor's performance is 9% at the end of the first 1/3rd of the project period, 38% at the end of the first 2/3rd of the project period and 70% at the end of the project period. However, for projects delayed beyond the contract period, the bidder shall complete 100% of the project within 1.25 times the intended contract completion period otherwise it will be considered as non-performing and rejected from the bid.

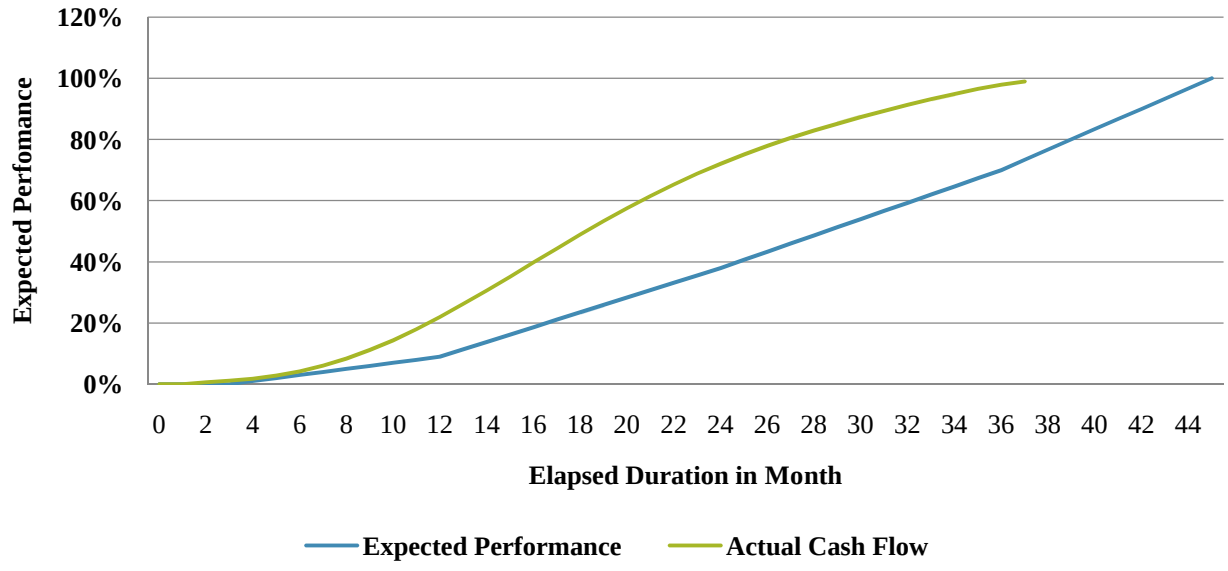
In order to check the calculation of the expected performance of contractor's in ERA, Takagi-Sugeno's S-curve cash flow diagram is used. As per Takagi-Sugeno's fuzzy theory, a cash flow of a construction project can be represented by a regression model. The amount of the project cash flow can be calculated with the s-curve formula:

$$C = -12.93\ T^6 + 42.07T^5 - 49.49T^4 + 23.07T^3 - 1.98\ T^2 + 0.25\ T,$$

Where C denotes the complete percentage (%); and T is the duration time (%).

Hence, a project with duration of 36 months was taken and the expected performance of a contractor is plotted both as per ERA and Takagi-Sugeno S-curve formula as indicated in Fig 3.4 below.

Fig 3.4 ERA Expected Performance Against S-Curve Progress



As clearly indicated in Fig 3.4 above the expected performance in ERA assessment is not in line with the expected completion as per S-curve cash flow diagram. For example at 12th month the ERA performance expected 9% and S-curve cash flow expects 33% of the project to be completed. At 24th month the ERA performance expected 38% and S-curve cash flow expects 75% and at end of the project ERA performance expected 70% and S-curve cash flow expects 100% of the project to be completed. When we compare the two values in ERA evaluation at 24th additional 29% which is 4.2 time the performance at 12th month while as per the S-curve 49% % is required which is 2.27% times the performance at 12th month. From this the formula for assessment of contractor's performance evaluation is not in line with the actual expected cash

flow progress of the contractor. This will result expecting a contractor to perform unlike the hypothetical cash flow diagram like Takagi-Sugeno's S-curve.

As explained above the performance evaluation process only considers the financial progress of the bidder. In this regard the assessment have a limitation in considering the physical progress of the work, quality of the work achieved by contractors and project management skills, personnel, equipment, and organization of the project. The formula is used based on the category of contract period to get the expected performance of each projects as per the Table 3.2 of above.

The other limitation of the performance evaluation is being monthly. The bidder who is participating for a tender which is opened in this month needs to fulfill the performance assessment of the previous month, for example for a bidder whose bid opened for any date of month May shall fulfill the cumulative performance assessment up to end of April.

For example for the year 2012 the performance of contractor who have ongoing project with ERA shows the following variation as indicated in Fig 3.5 and 3.6 below.

Fig 3.5 Monthly Pecentage of Local Contractors Passing the Performance Criteria in a Year 2012 (ERA Data)

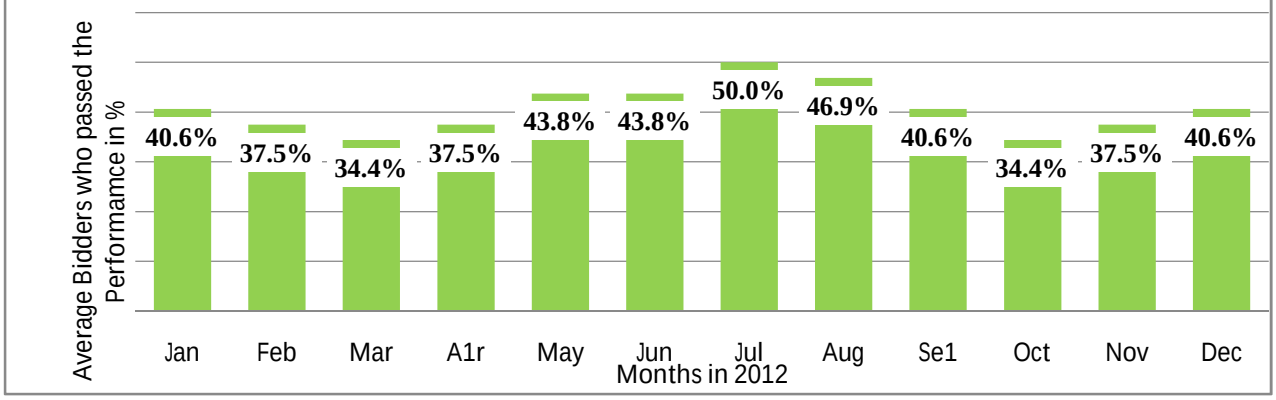
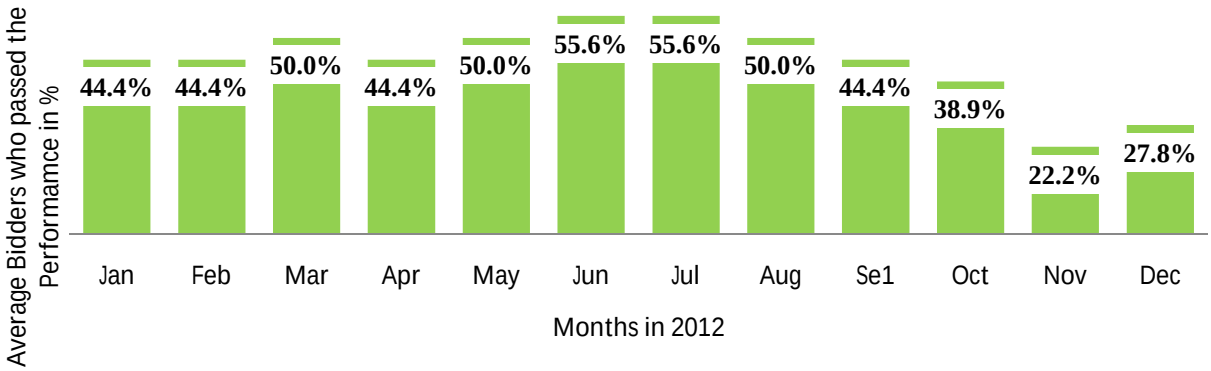


Fig 3.6 Monthly Pecentage of Foreign Contractors Passing the Performance Criteria in a Year 2012 (ERA Data)



As indicated in the above Fig 3.5 and 3.6, the performance of 38% of the local bidders and 47% of the foreign bidders varies for different month within the year. Awarding a contract based on

previous month will result a difficulty in planning of the bidders to participate in a bid as they will not have prior information on their qualification to fulfill the performance requirement. Consequently, the bidders will incur a cost of preparation of bid for a project they might be rejected. Moreover, as the time of disqualification becomes less uniform there will be an incident where the contractor to be awarded a project in a month its performance become unacceptable. In addition this will result for a contractor to plan for full filing a performance requirement of a specific month for which he is intended to participate in a bid while whose performance is being poor within a year. Hence, due to this the basic purpose of performance evaluation as part of qualification can be manipulated.

3.6.3. Bid Evaluation

Awarding construction contracts in ERA is typically based on the low bid method. According to this method, the construction firm who is responsive and submitting the lowest bid receives the right to the construction contract. The major drawbacks of the low- bid method is the possibility of awarding a construction contract to a contractor that submits, either accidentally or deliberately, an unrealistically low bid price. Often, such an occurrence works to the owner's and contractor's detriment by promoting disputes, increased costs, and schedule delays.

3.7. Conclusion

Procurement plan is one of the basic and major steps for successful completion of a project. However, it is found that ERA starts its procurement process when procurement requisition is made (that is reactive and not proactive). This will result failure to procure at the right time and effective and efficient procurement process. In ERA projects it is also noted that detection of market risk potentially able to endanger business goals and supplier performance is not considered during work packaging. In view of the above it is found that procurement planning and packaging is one factor to be considered for success of projects

The next major step of procurement process is selection of delivery and bidding methods. ERA on most projects follows DBB type of delivery method and the bidding method for all GoE financed projects is two envelops post qualification. However, sticking on one type of delivery and bidding method will have an impact on the delay, cost overrun and quality projects. Hence delivery and bidding method are found to be parts of the main factors to be considered.

ERA measures the technical ability and capacity of the bidder to perform the intended projects by means of established minimal capacities below which contractors will not be considered. However, to increase the local content ERA uses relaxing the qualification criteria and the options of the criteria is limited regardless of the size of the project and no consideration was given like classifying the project type and value. Moreover, in ERA qualification criteria there is no limit on the number of projects to be handled by a single contractor. The other criterion is performance evaluation process of bidders where ERA only considers the financial progress of the bidder without considering physical progress of the work, quality of the work achieved by contractors and project management skills, personnel, equipment, and organization of the project. Hence, setting qualification criteria is one of the major steps in the procurement process.

The other major thing to consider in procurement process is method of bid evaluation and contract award procedure where all ERA projects are based on the lowest evaluated bid and found responsive to the qualification criteria. However, allowing projects to be awarded based on the least price has become one of the major sources of construction projects failures. Hence, assessing the impact choosing the lowest bidder and overall evaluation procedure is important.

General, from the above detail assessment of procurement process in ERA, different variables are identified which have an impact on procurement process and will have effects on time, cost and quality of road projects in ERA. The detail of identified variable is indicated in Chapter 4 below.

4. DATA COLLECTION AND ANALYSIS

4.1. Introduction

The previous chapters provide general image of the environment in procurement process of selection of contractor. Furthermore, theoretical background of procurement process has been assessed addressing the potential factors that influence performance of projects. Having the insight, a questionnaire is developed to collect data from professionals who have ample experiences on road projects in Ethiopia.

The purpose of this section is therefore to screen the factors identified from Chapter 2 (Literature Review) and Chapter-3 (Assessment of procurement process in ERA) above and any other relevant variables observed from personal experience. This chapter also provides explanations to the issues related to distribution of the questionnaire, collection of responses and subsequent analysis of the data acquired through the responses from professionals who are working for the client, consultants and contractors and involved in road construction sector in Ethiopia.

The principal purpose is to rank the identified variables of delay, cost overruns and quality problems and then to find out the critical factors that are required to be given due attention in the procurement process in order to substantially minimize delay, cost overrun and quality problems in road construction projects in Ethiopia.

4.2. Variables and Questionnaire Design

The following thirty variables are identified from Chapter 2 (Literature Review), Chapter-3 (Assessment of procurement process in ERA) and Author‘s 6 years working experience in the same organization and found to be relevant to the underlying requirements of this research. Accordingly, the thirty variables are grouped in to five depending on different stages of procurement process. List of variables are indicated in Table 4.1 below.

Table 4.1: List of Identified Procurement Related Causes of Delay, Cost Overruns and Quality in Road Construction Projects

I/No	Identified procurement related causes of delay, cost overruns and quality
A	**Procurement planning and packaging related causes**
1	Ineffective Contract packaging
2	Improper scope definition and scheduling of the project by the client
3	Poor estimation of the project time and cost
4	Insufficient funding or not securing the funding
5	Failure to identify potential bidders and timing of their participation
B	**Procurement delivery and choice of the form of contract related causes**
6	Selection of form of contract is not based on the specific project nature
7	Selection of Delivery system is not based on the specific project type
8	Using traditional DBB delivery system on most of projects

I/No	Identified procurement related causes of delay, cost overruns and quality
9	Limiting on DB Innovative project delivery methods only
10	Limited capacity of local contractors on innovative delivery methods
C	**Tender Document Preparation and tender process related causes**
11	Providing inadequate information for tenderers
12	Failure to adequately address enquiries from tenderers
13	Poor preparation of tender document documents
14	Terms and conditions in the bidding document unacceptable to tenderers
15	Using Post Qualification (Two Envelop) system for most of projects
16	Using open bidding for most of large projects
17	Ambiguities, mistakes and inconsistent in Tender Document including Specification, Bill of Quantity and Drawings
18	Similar tender document on most projects especially the special conditions of contracts and specifications
D	**Bid evaluation and qualification criteria related causes**
19	Offers fail to meet needs
20	contractor 's performance evaluation method is not proper
21	Selecting an unqualified bidder
22	contractor 's financial standing and cash flow requirement is not properly evaluated
23	Selection method is limited to lowest evaluated bid and found responsive to the qualification criteria
24	Not Evaluating in detail financial offered submitted by contractor
25	Not giving enough attention in evaluating contractor's Equipment, methodology and qualifications of contractor's technical staff
E	**Ethical issues in project procurement related causes**
26	Actual or perceived favoritism in providing information and issues of influence
27	Bribery or corruption in projects procurement process
28	conflict of interests on tendering
29	Collusive practice in tendering.
30	Actual or perceived breach of confidentiality

A questionnaire survey have been conducted to gather the required information from professionals who have been involved in the road construction sector in Ethiopia working on behalf of a client, consultant or contractor; towards answering the basic research question and the questionnaire is divided into the following three major sections.

Section 1:

This section consists of inquiries on general background information of the respondent and the organization in which the respondent is representing for.

Section 2:

It incorporates list of identified possible variables of procurement process towards the project success criteria i.e. time, cost and quality in road construction projects. For each variable two questions have been asked; these are the degree of impact and the frequency of occurrence. The degree of impact was categorized on a five point scale: Very high, High, Moderate, Neutral and None. Whereas the frequency of occurrence was categorized on four point scale: Great, Medium, Low and Never.

Section 3:

This section incorporates eleven questions, which are aimed to acquire information that will indicate the direction on how to control the procurement process toward fulfilling the project success indicated above in road construction projects in ERA. The respondents have been asked to answer each question by selecting one of the five levels of agreement/ disagreement choices; i.e., strongly agree, slightly agree, neutral, slightly disagree and strongly disagree. If their choice is from the last three levels they are again asked to rank from the list of proposed solutions and/or to indicate their proposed solution for the problem in question.

The questionnaire is attached as annex-A.

The sampling data sources are representative specimen or part of a population as it is difficult to carry out a survey to the whole population of a study. However, due consideration is given while selecting the data sources since the collected data determines the validity of research outcome. As mentioned in the forgoing chapters, the traditional procurement system is the predominantly used approach in delivering road projects in ERA. Accordingly, representatives of the client, engineering consultants and contractors are selected as source of data; given that, they are the main provider and recipients of the procurement process. Since ERA is the major client of road projects and the research is mainly based on the procurement process in ERA, representatives from ERA are selected as source of data from the Client side. It is however, less likely to have reasonable feedback from financers on factors influencing procurement process, and hence the survey excluded financing Agents.

4.3. Distribution and Response Rate

It was aimed to distribute the questionnaire to 60 individuals; i.e., 20 professionals each working for the client, for consultants and for contractors, and it was possible to distribute same for the client, consultants and contractors using a free online surveying tool website SurveyGizmo https://students.sgizmo.com/ the questionnaire. As much as possible attempts have been made so that the samples drawn from the population are representatives. Table 4.2 presents the samples and their distributions, including the response rate.

Table 4.2: Questionnaire Distribution and Response

Description	Number Questionnaire Distributed	Number of Respondents to Questionnaire	% of Number of Questionnaire Distributed	% of number of Responses to Questionnaire
Client	20	16	100%	80%
Consultant	20	12	100%	60%
contractor	20	12	100%	60%
Total	60	40	100%	67%

From the 60 questionnaires distributed a total of 40 responses were received, consisting of 16 (80%) from the client, 12 (60%) from consultants and 12 (60%) from contractors. The overall response rate was 67% as shown in Table 4.1. As compared to that of the client, the response rate from the contractors (60%) and consultants (60%) seems to be to the lower side. Assessment of experiences of individual respondents shows that over 80% of the total respondents have more than five years of experience in road related projects; out of these 31% have experience of more than 10 years in road projects.

4.4. Data Analysis Approach

For each of variables of delay, cost overruns and quality problems respondents were requested to indicate the degree of impact (or severity) and frequency of occurrence. The degree of impact has been categorized into five scales and the frequency of occurrence into four scales. Before the start of the analysis, weightings have been assigned to each of the categories. For degree of impact the weightings assigned are 5 for very high, 4 for high, 3 for moderate, 2 for neutral, and 1 for none. Similarly, the weightings for frequency of occurrence are 4 for great, 3 for medium, 2 for low, and 1 for never. Then the responses given by each of the respondents have been summarized and counted. Summaries of responses have been attached as Appendix B.

The following indices as given by Assaf and Hejji (2006) and other statistical methods have been used to analyze the data.

a) The Severity Index for each of the variables has been computed with the following formula.

$$\textbf{Severity Index (S.I) (\%)} = \frac{\sum A \cdot N}{\sum N} \times 100\% \quad \text{.....[4.1]}$$

Where

- **A** is the constant expressing the weighting given to each response, it ranges from 1 for none to 5 for very high;
- **N** is the frequency of the responses.

b) Similarly, the Frequency Index for each of the variables has been computed with the following formula.

$$\textbf{Frequency Index (F.I) (\%)} = \frac{}{} \times 100\% \quad \ldots\ldots\ldots\ldots..[4.2]$$

Where :

- **B** is the constant expressing the weighting given to each response, it ranges from 1 for never to 4 for high;
- **N** is the frequency of the responses.

c) Importance Index for each of the variables has been computed as a product of both severity and frequency indices.

$$\textbf{Importance Index (I.I) (\%)} = \frac{[S.I\ (\%)\ *(F.I\ (\%)\ ]}{100} \quad \ldots\ldots\ldots\ldots\ldots..[4.3]$$

d) Ranking of variables has been made using the Importance Index (II) by assigning the first rank for the highest value, the second rank to the next highest value and so on.

4.5. Research Findings and Results

Analysis of the data has been made using the aforementioned statistical methods considering the three identified variables of delay, cost overruns and quality problems. The analysis illustrates the findings and results of the survey for the severity, frequency and importance indices of all the variables of delay, cost overruns and quality problems causes. Besides, results of each of the hypothesized questions raised under section 3 of the questionnaire have been dealt with.

4.5.1. Severity of delay, cost overrun and quality problem causes (equation (4.1))

Severity indices for delay variables have been computed using equation (4.1) and ranked accordingly. The analysis of severity of variables indicates that the most severe causes of delay are:

- Offers of the contractor is unnecessarily very low and fail to meet needs
- Ambiguities, mistakes and inconsistent in Tender Document including Specification, Bill of Quantity and Drawings

- Selecting an unqualified bidder
- Poor estimation of the project time and cost
- Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts

Severity indices for cost overrun variables have been computed using equation (4.1) and ranked accordingly. The analysis of severity of variables indicates that the most severe causes of cost overrun are:

- Ambiguities, mistakes and inconsistent in Tender Document including Specification, Bill of Quantity and Drawings
- Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts
- Poor preparation of tender document documents
- Poor estimation of the project time and cost
- Improper scope definition and scheduling of the project by the client

Severity indices for quality problems variables have been computed using equation (4.1) and ranked accordingly. The analysis of severity of variables indicates that the most severe causes of quality problems are:

- Selecting an unqualified bidder
- Ambiguities, mistakes and inconsistent in Tender Document including Specification, Bill of Quantity and Drawings
- Offers of the contractor is unnecessarily very low and fail to meet needs
- Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts
- contractor ’s performance evaluation method is not proper

This shows that ambiguities, mistakes and inconsistent in tender document is the major problem which causes for all variables of delay, cost overruns and quality problems. Offers of the contractor is unnecessarily very low and selecting an unqualified bidder are also the major causes for occurrence of both delay and quality problem whereas poor estimation of the project time and cost are the major causes for occurrence of both delay and cost overrun problem.

Calculation of the severity indices separately for each variable of delay, cost overruns and quality problems causes with the respective ranks are indicated in Appendix C.

4.5.2. Frequency of delay, cost overrun and quality problem causes (equation (4.2))

Similarly, frequency indices are calculated using the aforementioned equation (4.2). The most frequent delay causes are:

- contractor ’s performance evaluation method is not proper
- Poor estimation of the project time and cost
- Ineffective contract packaging

- Ambiguities, mistakes and inconsistent in tender document including specification, bill of quantity and drawings
- Not giving enough attention in evaluating contractor's equipment, methodology and qualifications of contractor's technical staff

The most frequent cost overrun causes are:

- contractor 's performance evaluation method is not proper
- Poor estimation of the project time and cost
- Ineffective contract packaging
- Ambiguities, mistakes and inconsistent in tender document including specification, bill of quantity and drawings
- Poor preparation of tender document documents

The most frequent quality problem causes are:

- contractor 's performance evaluation method is not proper
- Ineffective Contract packaging
- Ambiguities, mistakes and inconsistent in tender document including specification, bill of quantity and drawings
- Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts
- Selection method is limited to lowest evaluated bid and found responsive to the qualification criteria

This shows that in ERA projects ineffective contract packaging, improper contractor's performance evaluation method and ambiguities, mistakes and inconsistent in tender document are the most frequent problem which causes for all variables of delay, cost overruns and quality problems.

Determination of the frequency indices separately for each variable of delay, cost overruns and quality problems causes with the respective ranks are indicated in Appendix C.

4.5.3. Importance of delay, cost overrun and quality problem causes (equation (4.3))

As illustrated in equation (4.3) above the importance index is a product of severity and frequency indices, and same is used to rank the variables for all delay cost overrun and quality problems. The variables were ranked independently based on the responses given for each delay, cost overrun and quality problems causes.

Ten most important delay cost overrun and quality problems variables from each set of rankings were selected, and these are listed in Table 4.3.

Table 4.3: Importance Index of delay, cost overruns and quality problems causes

Rank	Delay	Cost Overrun	Quality
1	Poor estimation of the project time and cost	Poor estimation of the project time and cost	Ambiguities, mistakes and inconsistent in Tender Document
2	Ambiguities, mistakes and inconsistent in Tender Document	Ambiguities, mistakes and inconsistent in Tender Document	Tender document is not prepared considering specific nature of projects
3	Poor preparation of tender document documents	Poor preparation of tender document documents	Offers of the contractor is unnecessarily very low and fail to meet needs
4	contractor 's performance evaluation method is not proper	Tender document is not prepared considering specific nature of projects	Poor preparation of tender document documents
5	Tender document is not prepared considering specific nature of projects	contractor 's performance evaluation method is not proper	contractor 's performance evaluation method is not proper
6	Offers of the contractor is unnecessarily very low and fail to meet needs	Ineffective Contract packaging	Ineffective Contract packaging
7	Ineffective Contract packaging	Improper scope definition and scheduling of the project by the client	Not giving enough attention in evaluating contractor's Equipment, methodology and qualifications of contractor's technical staff
8	contractor 's financial standing and cash flow requirement is not properly evaluated	Offers of the contractor is unnecessarily very low and fail to meet needs	Selecting an unqualified bidder
9	Not giving enough attention in evaluating contractor's Equipment, methodology and qualifications of contractor's technical staff	Not giving enough attention in evaluating contractor's Equipment, methodology and qualifications of contractor's technical staff	contractor 's financial standing and cash flow requirement is not properly evaluated
10	Improper scope definition and scheduling of the project by the client	contractor 's financial standing and cash flow requirement is not properly evaluated	Poor estimation of the project time and cost

As indicated in the above Table 4.3 nine of the following variables were common for all the three delay, cost overruns and quality problems causes.

1. Poor estimation of the project time and cost,
2. Ambiguities, mistakes and inconsistent in tender document including specification, bill of quantity and drawings,
3. Poor preparation of tender document documents,
4. Contractor's performance evaluation method is not proper,
5. Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts,
6. Offers of the contractor are unnecessarily very low and fail to meet needs,
7. Ineffective contract packaging,
8. Contractor's financial standing and cash flow requirement is not properly evaluated,
9. Not giving enough attention in evaluating contractor's equipment, methodology and qualifications of contractor's technical staff,

This is an indication that similar problems in the procurement process attribute to the creation of delay, cost overruns and quality problems on road projects. However, their rank in importance index is different and their respective effect is different.

It must be remembered that the tender document is the means to inform to the bidder about the procurement procedure, qualification criteria, the requirement of the specific work, measurement and payment of the work and the contract to be made. Moreover, a substantial proportion of the tender documentation will subsequently be incorporated into the contract documentation and, as such, it is of vital importance that it is properly prepared. Hence, it is proper as agreed by most respondents that ambiguities, mistakes and inconsistent and poor preparation of the tender documents by ERA is one of the most important factor for delay, cost overrun and quality problem in performance of a project.

The other problem is scope definition which is part of project identification and design and includes details of the project requirement, estimation of the project time and cost. Hence, poor scope definition will result poor performance on the project. As pointed out above the project will be constructed by a contractor, hence selecting a qualified, sound and reliable contractor is important in order to get the project delivered properly. Moreover, contractors are a profit making organization and hence in order to deliver the project with the required performance they expect a reasonable payment for the work they deliver. Hence, if the offer of a contractor is not reasonable, the contractor will search for a means to get his profit back like through claims or decreasing the required quality of the project etc. Therefore, it is proper to put these factors as a most important.

The performance history of the contractor is measured to award good contractors and penalize a contractor who is not delivering what required in terms of completion on schedule and budget, effectiveness of quality and cost control, and the quality of finished products. It noted that ERA performance assessment have a limitation in considering the physical progress of the work, quality of the work achieved by contractors and project management skills, personnel, equipment, and organization on the ongoing project. In addition the assessment is made monthly which do not consider the overall performance of the contractor for a specific period of time before awarding a contract. Hence, not considering these criteria as a measure will have an impact on assessing and awarding a good performing contractor. Consequently, this may result

selecting inappropriate contractor who is unable deliver the project with the required performance. Hence, as majority of respondents agree, it is found that contractor's performance evaluation method is being the most important factor in ERA procurement process.

It also noted that in ERA projects work packaging detection of market risk potentially able to endanger business goals and supplier performance is not considered. However, work packaging serves work definition which groups the procurement requirements in such a way as to ensure economy and efficiency. As a result of this majority of respondents agree that ERA packing is the most frequent cause for problems in performance of projects as poor packaging is the main source of problems in delivering the required project output. Moreover, as explain above the tender document is a major document in process of selection of contracts and hence in ERA projects the problem becomes the most important factor for poor performance of projects.

4.5.4. Analysis of Major Categories of Delay, Cost overrun and Quality Problems

It is recalled that the causes of delay, cost overrun and quality problems have been categorized into five major groups depending on the source. Ranking of these major groups has also been exercised based on the importance indices of the variables under each of them. The importance index of each group was determined by taking the average of the importance indices of the variables under the group in question.

These groups have been ranked and found that for both delay and cost overrun causes the following groups in order are found to be the most important causes:

- Procurement planning and packaging related causes
- Bid evaluation and qualification criteria related causes ,
- Tender Document Preparation and tender process related causes ,
- Procurement delivery and choice of the form of contract related causes and
- Ethical issues in project procurement related causes.

For quality problem causes the following groups in order are found to be the most important causes:

- Bid evaluation and qualification criteria related causes,
- Procurement planning and packaging related causes,
- Tender Document Preparation and tender process related causes ,
- Procurement delivery and choice of the form of contract related causes and
- Ethical issues in project procurement related causes.

From the above major groups ranking is similar for both delay and cost overrun. Their ranking is different with regard to quality problems where bid evaluation and qualification criteria related causes is ranked 1st and procurement planning and packaging related causes is ranked 2nd. However, in case of delay and cost overrun bid evaluation qualification criteria related causes is ranked 2^{nd} and procurement planning and packaging related causes is ranked 1^{st}. This is an indication that similar problems in the procurement process attribute to the creation of delay, cost overruns and quality problems on road projects.

4.5.5. Analysis of Hypothesized Questions

Through the questionnaire respondents were asked to express their agreement/disagreement on eleven hypothesized questions. They have also been asked to give their opinion as to how the problems are mitigated if they are disagreeing with the hypothesized questions. This approach is used in order to get a wider perspective in recommending solutions for the prevailing problems, which are discussed in the next chapter.

These questions address the direction how to manage the procurement process in order to increase the performance of the projects by the parties involved in road projects in ERA. Though the respondents are asked to respond their agreement/disagreement in five scales, to simplify the analysis the comparison was made on three scales; that is Agree, Neutral and Disagree. Summaries of responses have been included in Appendix B.

The responses for each of the eleven hypothesized questions are compared as presented herein below.

Question # 1: ERA prepares projects procurement plan considering scope of the project, how the project will be executed, and what delivery system will be utilized, capacity of contractors and the possibility of letting local firms participate effectively.

Among the respondents 53.85% of them disagreed to the above hypothesis showing that preparation of projects procurement planning by ERA is inefficient. This question is aimed to look at the views of the respondents with respect to whether ERA prepares procurement plan considering the project scope and commercial arrangements, the procurement process, procurement resources, procurement risks and opportunities, stakeholder interfaces and alignment with market capability and capacity.

However, the procurement planning is the fundamental baseline for execution of the project which sets acquisition strategy and helps guide program execution across the entire project life-cycle which investigates the projects requirements, market conditions, project risks, product breakdown and contract awarding processes. Hence, problem on the planning of procurement will affect the overall performance of the project.

Question # 2: ERA prepares procurement packages based on main objective of achieving economy and efficiency and consider the ability of bidders to provide the procured product.

Among the respondents, 52.5% of them disagreed to the above hypothesis showing that procurement packaging by ERA is inefficiency. This question is aimed to look at the views of the respondents with respect to whether ERA prepares work package considering business environment and capacity and competence of individual firms.

Generally, based on the projects packaging of ERA, there are two major challenges which negatively affect the project performance and competitiveness. The first one is associated with the business environment, whereas the second one is related to capacity and competence of

individual firms. However, in ERA project detection of market risk potentially able to endanger business goals and supplier performance is not considered during work packaging. In the procurement packaging phase it is necessary to specifically investigate elements of weakness in the target industrial or national systems. Assessing the local capacity allows detecting the competitiveness nature of local market. The number of large and small contractors, their experience in related to road projects, their development level, and development stimulated by making contracts more likely to attract them is not considered. Hence, such problems will affect the overall performance of the project.

Question # 3: The current capacity building procedure employed by ERA is the better option to bring medium contractors and increase the number of experienced contractors in the road sector.

Among the respondents, 69% of them agreed to the above hypothesis showing that the current capacity building procedure employed by ERA is the better option to bring medium contractors and increase the number of experienced contractors in the road sector.

However, it is noted that ERA in the capacity building procedure has only applied breaking contracts and relaxes the qualification criteria. ERA has not taken consideration regarding procedures related to the measurement and quantification of the participation of target groups, definition and identification of target groups, provision of incentives for the attainment of key performance indicators in the performance of contract, creation of contractual obligations to engage target groups in the performance of the contract, provision of third party management support; and evaluation of procurement outcomes. This will put a question on the sustainability of the capacity building in the performance of the contract.

Question # 4: ERA on most of projects employed the traditional (DBB) method as it is effective delivery method

Among the respondents, 62% of them agree that ERA on most of projects employed the traditional (DBB) method as it is effective delivery method.

Question # 5: ERA employ the traditional (DBB) method as the local bidders' inability to take the risks of other Innovative project delivery methods.

Among the respondents, 46% of them agree that ERA employ the traditional (DBB) method as the local bidders' inability to take the risks of other Innovative project delivery methods.

Question # 6: Currently the local construction industry does not seem ready to take part in the Innovative project delivery method like DB.

Among the respondents, 69% of them agree that currently the local construction industry does not seem ready to take part in the innovative project delivery method like DB

Majority of the respondents agreed to the above 4, 5 and 6 hypotheses showing that traditional (DBB) method which ERA employed on most of projects is effective delivery method and ERA

employs the traditional (DBB) method as the local bidders' inability to take the risks of other innovative project delivery methods. This question is aimed to look at the views of the respondents with respect to the effectiveness of the traditional Design-Bid-Build (DBB) which ERA uses for most projects, whether ERA considers scientific criteria like allocation of risk in the selection of the procurement strategy for the project and capacity of local contractors to take the risks of other Innovative project delivery methods.

Question # 7: ERA on most of projects employed the BOQ and lump sum contracts for traditional (DBB) and DB delivery method respectively as they are effective contract types for respective delivery method.

Among the respondents, 79% of them agree to the above hypothesis showing that the BoQ and lumpsum contracts for traditional (DBB) and DB delivery method respectively as they are effective contract types for respective delivery method.

However, there are problems that have to be assessed regarding managing of risks related to price escalation in ERA. The basic problem related to price escalation is poor understanding of the contracting parties (employer, contractor and consultant) about price adjustment, the Country does not have a local indices and the authorized institution and during tender evaluation there is no mechanism for checking the authenticity of the supporting documents that indicate the base prices/indices.

Question # 8: The existing open bidding procedure and post qualification (two envelop) system in ERA for projects financed by Government of Ethiopia is efficient for good performance of the project implementation.

Among the respondents, 46% of them agree to the above hypothesis showing that the open bidding procedure and post qualification (two envelop) system in ERA for projects financed by Government of Ethiopia is efficient for good performance of the project implementation.

Question # 9: ERA qualification criteria consider objective and measurable factors, including relevant general and specific experience, and satisfactory past performance and successful completion of similar contracts over a given period, financial position; and capability of construction and/or manufacturing facilities.

Among the respondents, 51% of them agree to the above hypothesis showing that ERA qualification criteria consider objective and measurable factors, including relevant general and specific experience, and satisfactory past performance and successful completion of similar contracts over a given period, financial position; and capability of construction and/or manufacturing facilities.

Question # 10: ERA selection methodology of contractor based on lowest evaluated bid and found responsive to the qualification criteria is most efficient which result competitive price and appropriate bidder who can deliver the required works.

Among the respondents, 51.28% of them agree to the above hypothesis showing that ERA selection methodology of contractor based on lowest evaluated bid and found responsive to the qualification criteria is most efficient which result competitive price and appropriate bidder who can deliver the required works

Question # 11: In ERA project procurement the ethical issue like favoritism, confidentiality, corruption, conflict of interests and collusive practice are not major on their effects on performance of the project.

Among the respondents, 28% of them agree, 39% of them disagree and 33% of them are neutral. The respondents are not agreed to the above hypothesis. This indicates that in ERA project procurement the ethical issue like favoritism, confidentiality, corruption, conflict of interests and collusive practice are not major on their effects on performance of the project.

4.6. Summary of the Result

One of the objectives of this research is to identify factors in procurement process which affect the performance of the road construction projects in line with the context of the road constructions administered by ERA. Then, the objective is to analyze and rank the identified problems in their order of significance.

Hence, to identify the critical factors causing delay, cost overruns and quality problems on road construction projects in Ethiopian Roads Authority, the already identified factors have been ranked in their order of importance. The following steps have been followed to rank the factors and sort out the critical ones.

- Severity, frequency and importance indices have been determined using statistical methods.
- Variables have been ranked in the order of their importance for each group.
- Out of the ten most important delay variables, nine are found to be common for each set of the rankings.
- Importance indices have also been determined for each of the eleven major causes of delays, cost overrun and quality problems by taking the average of the importance indices of the factors under each group.
- The major groups of delays, cost overrun and quality problems causes have also been ranked and the degree of agreement and significance level of the sets of rankings were determined.

Ranking of the factors that impact procurement process in selection of contractor therefore summarized by selecting the first 10 factors among the identified 30 factors whereby 30% are found to be from procurement planning and packaging, 40% from bid evaluation and

qualification criteria and 30% from bidding process. Hence, the top ten factors for each of the three groups shown below and analysis and comparisons for eleven hypothesized questions are discussed in Chapter 5.

- Procurement planning and packaging is found to be the most critical category among these, the respondents agrees that ineffective contract packaging, poor estimation of time and cost of projects and improper scope definition as the major causes of delays, cost overruns and quality problems.

- Bid evaluation and qualification criteria is found to be second most critical category among these, the respondents agrees that inappropriate contractor's performance evaluation method, unnecessarily very low offer of contractor, inefficient evaluation of contractor's financial standing and cash flow, inefficient evaluation of contractor's equipment, methodology, technical staff as the major causes of delays, cost overruns and quality problems.

- Tender Document Preparation and tender process related causes are found to be third most critical category among these, the respondents agrees that ambiguities, mistakes and inconsistent in tender documents, poor preparation of tender documents and not addressing specific nature of projects in preparation of tender document as major causes of delays, cost overruns and quality problem.

5. DISCUSSION ON THE CRITICAL IDENTIFIED FACTORS

5.1. Introduction

After analysis and ranking of the identified problems in their order of significance, the objective was to give recommendations on how to improve procurement process to substantially minimize the impacts of those identified factors. The previous section illustrated practices that could minimize the impacts of procurement process on projects success based on a questionnaire survey. To similar effect, this section addresses mitigation measures following the outcome of the study, with a view of avoiding or minimizing the top ranked influencing factors and their effects.

Hence, from the above data collection and analysis critical factors causing delay, cost overruns and quality problems on road construction projects in Ethiopian Roads Authority, it is found that the most critical factors in the procurement process which result on poor performance of project implementation are:

1. Procurement planning and packaging,
2. Qualification criteria requirement,
3. Assessment of Financial and Technical capacity of Contractors
4. Preparation of tender documents

Hence, based on responses of hypothesized questions and document analysis the following discussion and mitigation measures are indicated for the above critical factors.

5.2. Procurement Planning and Packaging

5.2.1. Procurement Planning

The respondents agrees that ineffective contract packaging and poor estimation of the project time and cost as one of the major causes of delays, cost overruns and quality problems. Besides, improper scope definition and scheduling of the project by the client is also pointed out to be a main cause of delays and cost overruns. As per the assessment made in ERA procurement process it is found that the preparation of procurement plan does not integrate with scope definition as a result procurement risks and opportunities is not considered. This is the key stage to consider how to meet the identified need, identification of the context of the programme, define the processes and procedures and identify procurement risks. Hence, ERA shall start procurement planning starting from the identification of project.

Most of the respondents agree on giving more consideration for the delivery system(s) to be utilized and capacity of contractors and the possibility of letting local firms participate effectively in preparing projects procurement plan and packaging. Large projects, especially if carried out by multinational or collaborating organizations, require a sound knowledge of markets to select the right suppliers for the various phases. A lack of that knowledge may turn a positive engineering outcome into a waste of money and effort (C. Perna, FP7/ PrepSKA, 2009).

Procurement marketing is the process devoted to developing a systematic knowledge of markets and market opportunities. It allows the understanding of how markets work and do business, how strategies are devised to select suppliers and acquire products, suggests suitable relationship models with suppliers, and risks mitigation strategies.

Hence, ERA during planning stage categorize projects per industrial segments like for local, capacity building or foreign contractors and analyze the respective contractors' capabilities and performances characteristics. Capabilities evaluation includes understanding of the core competences of contractors, and measure, in some way, their ability to meet requirements in terms of quantity, quality, cost and performance. The capabilities evaluation shall include:

- Determining core business and business dimension of the selected contractors,
- Evaluating the production structure, skills, tools, equipment, quality, management, customer base, financial capacity, etc;
- Measuring suppliers' characteristics against needs and requirements;
- Evaluating the ability of selected suppliers to satisfy needs (dimension of accessible output against dimension of needs).
- Investigating elements of weakness of the local contractors in relation their potential use; on the goals of the acquiring Government needs and evaluating cost/results of possible mitigation strategies and actions.

Then after strategies can be developed to mitigate risks and utilize market opportunities based on the knowledge of market. Some of the respondents suggest that ERA to take the full responsibility of planning of procurement as ERA has the network planning for the entire road needs of the country. As suggested by respondents, ERA can set the procurement strategy of overall projects however; the detail of assessment specific to the project nature shall be the responsibility of the design consultant. .

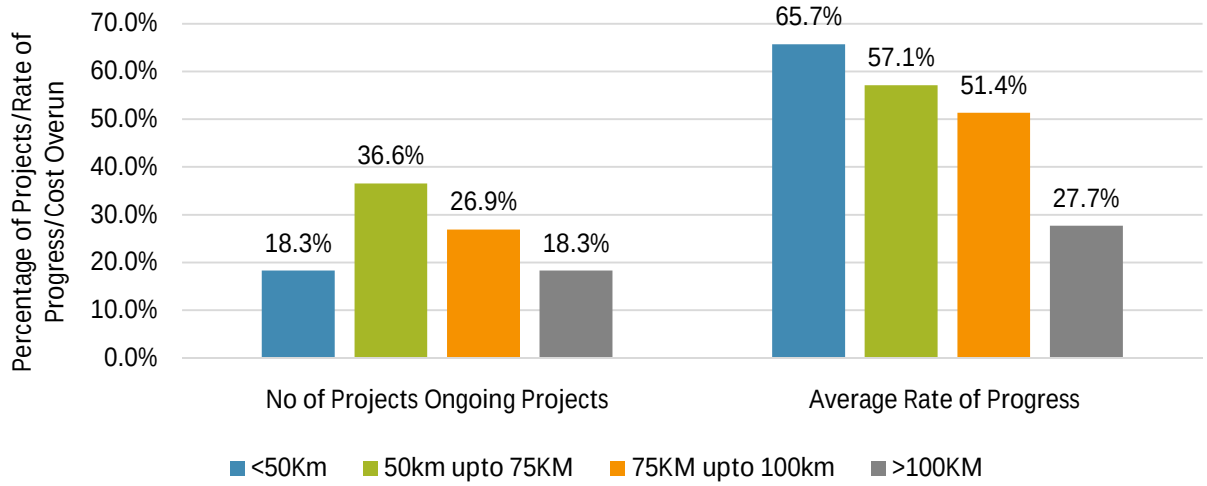
For example the project dedicated for developing local capacity shall be identified during the project identification and need further assessment in other stages of the project cycle. Following this identification of the capacity of target local contractors can be made and subsequently contract breaking will be made based on their capacity and respective risks on the projects. Moreover, provision of incentives for the attainment of key performance indicators and contractual obligations can be included in course of preparation of design and tender documents. If required provision of third party management support can be recommended.

5.2.2. Procurement Packaging

In procurement packaging most respondent agreed that ERA does not prepare procurement packages based on main objective of achieving economy and efficiency and consider the ability of bidders to provide the procured product. Most of the respondents also agree that ERA to use "slicing and packaging" mechanism, a procedure whereby a large homogeneous project is sliced into smaller similar contracts, which are bid simultaneously to attract the interest of both small and large firms. In this mechanism, small firms can then apply to one or more contracts while large firms can apply for the whole lot.

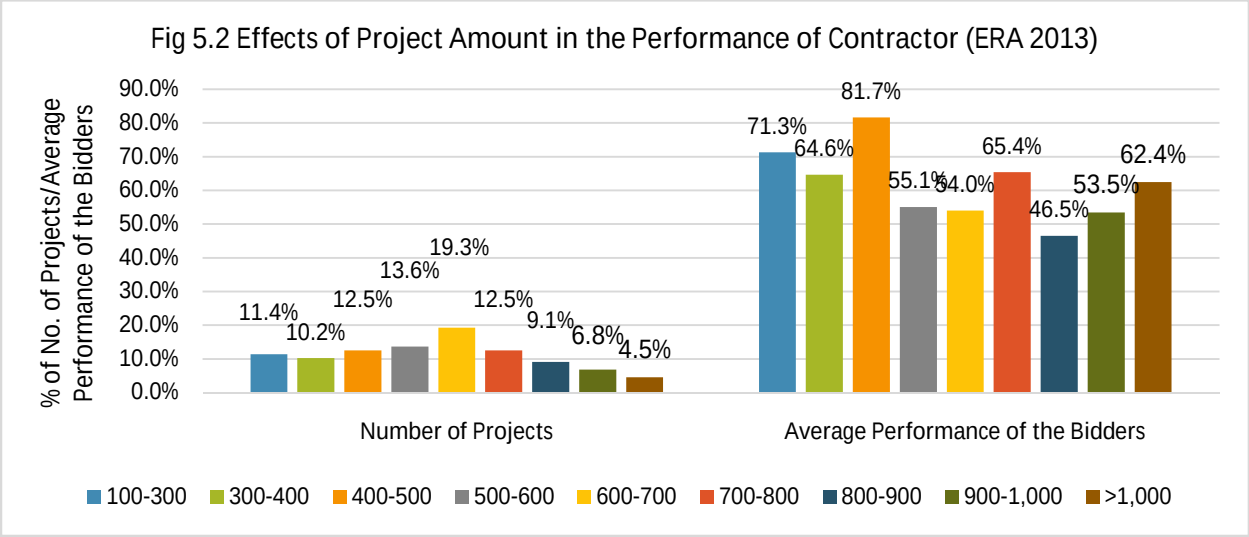
To see the effect of project length on performance of a project, an assessment was made on ongoing projects length and their corresponding performance. The following Fig 5.1 indicates the projects performance by comparing the elapsed time with accomplishment to-date. The performance evaluation is made by grouping the projects based on a range of project length awarded to contractors.

Fig 5.1. Effects of Project Length in the Performance of Contractor (ERA 2013)



The length of projects less than 50km have a better performance but dividing projects with a smaller length will have an impact due to the overall project cost might be higher, increase the number of administrative tasks, financial transactions and supervisory roles for the client organization.. The length of projects within 50km up to 75km have also a better average rate of progress and dividing the projects lengths within this range will be a good practice considering the capacity of bidders. The progress of projects with a length of within 75km and 100km has lesser rate of progress as compared to projects within 50km up to 75km. However, dividing projects within such a length will have an impact on the client as large projects needs contractors with big capacity and this will lead to a limitation in participation of middle sized contractors and will result a limited completion. However, progress of projects above 100km is found to be not good and hence it is proposed to restrict not to divide projects above 100km. As indicated in Fig. 5.1 above as the length of project increases the performance of contractors' declines. Hence, the length of the project is one of the determinant factors to be considered in contract packaging.

Moreover, to see the effect of project cost on performance of a project, an assessment was made on ongoing projects value and their corresponding performance. The following Fig 5.2 indicates the performance projects by comparing the elapsed time with accomplishment to-date. The performance evaluation is made by grouping the projects based on a range of project value awarded to contractors.



As indicated in Fig. 5.2 above the best performance is indicated for the project values between 400-500 Million and 600-700 million and performance varies in different contract amount. Hence, the cost of the project is one of the determinant factors to be considered in contract packaging.

Breaking contracts into smaller packages is relatively easy on road construction and can increase competition and give lower prices as it allows a greater number of local contractors to bid. However, this approach can increase the number of administrative tasks, financial transactions and supervisory roles for the client organization. Therefore ERA shall set a strategy to divide contracts based on balance of administrative burden and local participation. Moreover, before packaging an assessment of market survey about potential contractors in relation with internal demand and their suitability shall be made. In addition the scope of the project shall be assessed in terms contractor's ability.

5.3. Qualification Criteria Requirement

This major category consists of seven factors. Among these, the respondents agrees that contractor's performance evaluation method is not proper, offers of the contractor is unnecessarily very low and fail to meet needs, contractor's financial standing and cash flow requirement is not properly evaluated and not giving enough attention in evaluating contractor's equipment, methodology and qualifications of contractor's technical staff as the major causes of delays, cost overruns and quality problems. From the analysis outlined in the previous chapter, this section discusses some proposed change. The proposed changes to the existing system are modifications rather than major administrative restructuring.

5.3.1. Qualification Criteria to Measure Capacity of Contractor

Qualification of contractors is generally preferred by clients to measure the technical ability of the bidder to perform the intended projects, to minimize risks and failures and to enhance the performance levels of selected contractors by means of established minimal capacities below

which contractors will not be considered. In ERA practice of contractor selection the contractors' resources and capabilities is assessed in relation to the stated specific project requirement indicated in the bidding/pre-qualification document.

The existing qualification criteria and evaluation of tenders in ERA, as most of respondents agree is not a perfect one and it is functioning with a result of delays, cost overruns and quality problems on projects. As indicated in previous chapters ERA to increasing local content by relaxing the criteria to 25% and 50% of the required experience for NCB and ICB respectively and also 60% and 70% of the required turnover for ICB and NCB contracts respectively has taken too much risk as the capacity of the contractor with 25% or 50% of the requirement to deliver the project is in question.

ERA in setting the criteria for experience of the firm use one option regardless of the size of the project and no consideration was given like classifying the project type and value. Consideration of different factors based on the project type, size and value will have an advantage of getting a competitive market by giving opportunity for different levels of contractors. For example setting a criteria by dividing the project type as very complex, large and small will give an opportunity to attract the pool of contractors being relatively small, big and very big.

Furthermore, ERA in setting the criteria has not considered other alternatives like by decreasing the factor in setting the requirement for the contractors who have an average annual turnover for last three years rather than using very high turnover figures for one year. Likewise requesting two or three projects as experience with a lower percentage of the required value rather than using high experience requirement of one project.

Moreover, in setting specific construction projects experience considering the project length as an alternative criteria have an influence in comparing the complexity of the project performed by the bidder and the capacity required for the project. Hence, equivalent length of the project shall be reinforced by a minimum amount of quantity of major activities in that project to be considered as a specific experience.

Generally, when setting minimum standards, care should be taken to ensure that they are related and proportionate to the subject matter of the contract and should not be set at a level that discriminates against certain groups. Hence, ERA as recommended in above section during procurement planning stage categorize projects per industrial segments like for local, capacity building or foreign contractors. Then analyze the respective category industrial capabilities, performances and development and at the same time find out strategies necessary to increase local content. ERA shall investigate elements of weakness of the local contractors in relation their potential participation and possible mitigation strategies and actions. The possible risk of the recommended mitigation including the existing relaxed criteria shall also be assessed in relation to the project performance.

5.3.2. Performance Evaluation

As stated in above the means of assessment of the performance of the contractors for their work with ERA is based on the progress of the work in monitory terms of the previous month on the

date of opening of his qualification document by comparing with the client expected performance of each projects on the project duration.

Like ERA, some of USA Department of Transports uses performance ratings during pre-qualification. However, their methodology of evaluation of performance is different. Public Works Canada (PWC) performed has a system which addresses directly the contractor's performance on a job by job basis. The process is involves the consideration of only three factors which includes quality of workmanship, time, and management [PWC 92].

- Quality of work involves all materials and equipment that are incorporated into the final product. This work must meet the requirements of the plans and specifications.
- Time is an indication of the timeliness of the contractor in completing the work. There is also consideration given to factors beyond the contractor's control.
- Management is a rating of how well the contractor manages the overall construction.

Hence, ERA by adopting such performance appraisal form shall include aspects of quality and overall management of project in performance evaluation.

5.3.3. Considering Maximum Work Load as a Qualification Criteria

Selection of contractor is a critical and crucial task for any client that may help to control some of these risks and manage the complexities. ERA has been controlling the risks of workload by the qualification criteria and performance evaluation of contractors. In the qualification criteria, if a bidder was awarded any works/maintenance contract/s by ERA before six month, the qualification criteria for the construction turnover and key activities will be the aggregate of the criteria of the project in which the bidder is intended to participate and criteria of the awarded contract/s.

For instance a bidder is awarded a contract within the last six months where the requirement of turnover of the awarded project was ETB 100 million and one of the key activities like earthwork requirement was 600,000m3/yr. If the same bidder intends to participate on another project with a requirement of turnover ETB 150 million and earthwork is 750,000m3/yr, the requirement of turnover and key activity of the current project will be taken the aggregate of the previous awarded project and the current project. As per our example the requirement of current project turnover will be (ETB 250 million) = ETB 100 million+ ETB 150 million and the requirement of earthwork current project will be (1,350,000m3/yr) = 750,000m3/yr + 600,000m3/yr.

In this criteria, ERA attempts to control the workload of a contractor by comparing his capacity measured by construction turnover and key activity experience requirements. However, the criteria have the following limitations:

- It only consider construction turnover and key activity experience requirements to measure the capacity of the contractor by ignoring capacity of a contractor i.e. the specific project experience,
- It only takes into account only projects awarded on the last six months. However, it does not state how to apply the criteria in case of concurrently floated projects.

- It does not consider the ongoing projects handled by a contractor or value of current commitment

ERA has also been controlling the risks of workload by the performance evaluation of contractors considering additional progress of 2*(1.5^(n-3)) for bidders have more than 3 projects where n is the number of projects. Using this formula the additional progress expected from a contractor is indicated in a Table 5.1 below:

Table 5.1 Calculation of additional expected performance in ongoing ERA projects

Number of Projects	1	2	3	4	5	6	7	8	9	10	11
Additional progress expected	0	0	2.0	3.0	4.5	6.8	10.1	15.2	22.8	34.2	51.3

From the above Table 5.1 as a contract gets 3 projects additional 2% progresses is expected in its performance, 4 projects 3% progress, 5 projects 4.5% progress is expected and etc. However, the criteria have the following limitation:

- It does not take into account the capacity of a contractor as it only applied considering the number of projects.
- The formula is not linked with the cost and duration of the projects and hence it will have an impact to appropriately take account relative expected performance of each projects. In this case a project with an amount of ETB 100 million or ETB 1 billion is considered as the same projects.
- The formula is not linked with the actual aggregate performance of a contractor. Considering the above formula a contractor who has 11 projects the additional 51.26 progress will be expected on the aggregate expected performance of a contractor irrespective of the actual aggregate performance of a contractor. For instance if the aggregate expected performance of a contractor is 25% of ten projects, the total expected performance of a contractor will be 76.26% (25%+51.26%). Hence, in order to fulfill the performance requirement a contractor is expected to have an actual aggregate performance more than 76.26% and hence to fulfill this actual performance of a contractor shall be 3 times the expected performance of each projects. This will result to expect impracticable performance from a contractor.

However, others experience like the FDOT uses a performance-based contractor prequalification program with a direct mathematical link between contractor capacity evaluations and a contractor's ability to bid. FDOT's emphasis on rating how well the contractor with the agency in its coordination, cooperation, and mitigation areas. FDOT has an explicit definition for each area and prescribes the number of points to be awarded based on achievement of the definition. The accumulated record of a given contractor's rated performance is termed the "contractor's past performance record" and is used to determine an "ability factor" for each contractor in the database. This ability factor is used to determine the "maximum capacity rating" of a contractor that seeks to be deemed qualified to bid on FDOT contracts.

Once the ability factor based on past performance ratings is determined, it is used in the following formula to determine a contractor's "maximum capacity rating," which is the "aggregate dollar volume of uncompleted work a firm is allowed by the Department to have under contract at one time" (FDOT 2004). This, in turn, determines the amount of work that it can be awarded.

MCR = AF * CRF * ANW (FDOT 2004)

Where: MCR = maximum capacity rating,

AF = ability factor,

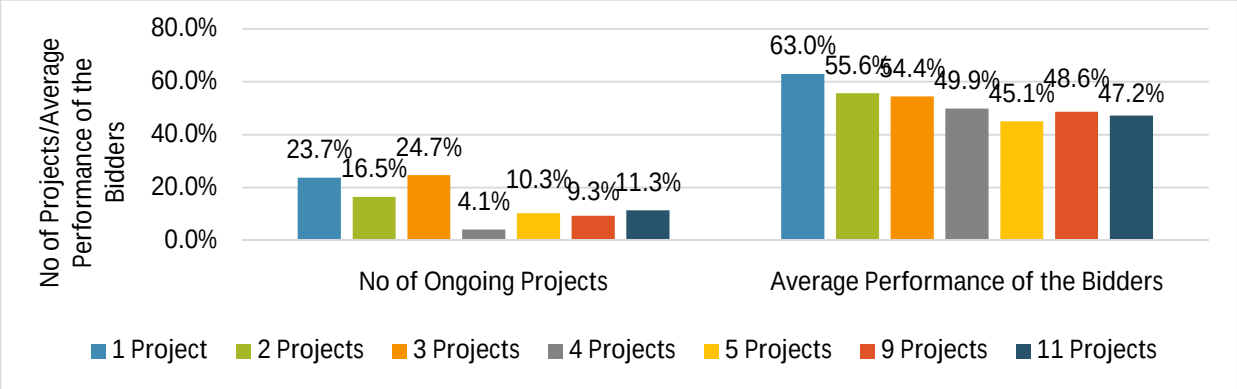
CRF = current ratio factor (current assets/current liabilities), and

ANW = adjusted net worth.

For this research by modifying the maximum capacity of contractors used by FDOT the following model is proposed. The proposed model is to limit the number of projects handled by single contractors by applying a coefficient in their available capacity like turnover and experience considering their current work load factor.

The main cause of problems seems to be the existing workload of the contractor at the time he is awarded a new contract and this has to be checked carefully as it can lead to other problems. In order to determine the maximum number of project, performance comparisons with respect to number projects in ERA ongoing project handled by single contractor are made. The following Fig 5.3 indicates the performance of ongoing projects in ERA by comparing the elapsed time with accomplishment to-date. The performance evaluation is made by grouping the projects based on a number of projects handled by a single contractor.

Fig 5.3 Performance Comparison with Respect to Number Projects Handled by Single contractor (ERA 2012)



As indicated in Fig. 5.3 above as the number of projects handled by a single contractor increases the performance of contractors' declines. For example for 1 project the performance of the bidder 62.96% and decrease to 47.21% when a single firm handles 11 projects. In addition to the above fixing the maximum number of project to be handled by a contractor is essential. In order

to get the specific the number of projects a single contractor can handle the corresponding number projects for the weighted average cumulative performance from the above ongoing projects in Fig 5.16. Hence, the weighted average cumulative performance of the above ongoing projects is found to be 54.1% and from the above graph a bidder at most can handle 3 projects to attain 54.4% performance which is closer to the required average performance of 54.1%.

In order to determine the maximum amount of current commitment first the average amount of a single project of ERA ongoing projects is calculated which is found to be ETB 600.00 million. However, as the remaining current commitment will be considered for calculating the maximum amount of current commitment, only 50% of the above amount i.e. ETB 300 million is considered. Then by multiplying 3 projects where good performance of a contractor found, with the calculated ETB 300.00 Million the maximum amount the remaining current commitment is found to be ETB 900 million.

Hence, taking the above into consideration, in Table 5.2 below a model is developed to calculate the coefficient work load of a contractor. This coefficient shall be used as a multiplier on the available turnover and experience of the contractor.

Table 5.2: Model for calculation of Coefficient for Workload of a contractor

Description	Rating	Points	Factor
Total Work load	Total Number of Projects	3 (Maximum Number) N (Number of Ongoing projects handled by contractor) N>3	60%
	Total Amount of remaining current commitment	ETB 900 million (Maximum Amount) RC (Total Amount of Remaining Current Commitment) RC>ETB 900 Million	40%
	Overall Point Rating		100

Hence, in application of the above model if a contractor has less than 3 ongoing projects and a total amount of remaining current commitment less than ETB 900 million, his capacity for like turnover and experience will be considered as 100%. However, either the number of projects handled by a contractor is greater than 3 or total amount of remaining current commitment greater than ETB 900 million the sum of the proportional for each rating will be consider as a multiplication coefficient of his capacity for like turnover and experience.

The project type is considered to be new construction/upgrading/rehabilitation of road projects to be considered in the above calculation. The value of projects to be considered for this evaluation shall be a project with a total contract amount above ETB 450 million considering 75% of the average value of ongoing projects calculated above. The project will be considered as substantially completed if it is completed above 70%.

For example the following Table 5.3 shows how to calculate peak turnover of different contractors considering the coefficient of work load.

Table 5.3 Example on how calculate peak turnover of different contractors considering the coefficient of work load.

Bidder	Amount Current Commitment	Factor Current Commitment	No. of projects	Factor Number of Projects	Coefficient for Workload	Peak Construction Turnover	Adjusted Construction Turnover
A	4,523,119,084	0.20	10	0.30	0.26	490,100,000	127,225,596
B	2,641,565,934	0.34	5	0.60	0.50	206,930,980	102,696,286
C	1,549,445,946	0.53	2	1.50	0.81	808,073,000	655,510,791
D	1,677,255,518	0.54	5	0.60	0.57	1,293,085,078	743,053,687

As indicated above Table 5.3 for peak construction turnover, the same can be applied for specific project and key activity experience by multiplying the coefficient with existing experience of the bidder (both project amount and length) and key activity performed by the bidder. As a result contractor work load can be controlled using a coefficient on their capacity to participate in the bid based on their current workload.

5.3.4. Assessment of Financial Capacity of Contractors

Financial stability is a factor that makes its appearance in almost every prequalifying team's list. Basically this criterion involves evaluating the financial condition of each candidate contractor. This indicates the capacity of the candidate contractor to fully meet financial commitments. Russell (1990) indicated the importance of contractor's credit rating, banking arrangements and financial statement to measure the solvency (or liquidity), efficiency and profitability of a contractor, in assessing his financial capability.

Poor initial funding of the project by the contractor and lack of timely resources of materials, machineries and workforces are the major factors identified as causes of delays during the construction phase in Ethiopian construction industry (Abdo, 2006). Hence, investigation and assessment of the capabilities of the contractors in terms of its financial capacity and availability of basic resources is crucial to prevent delays in project performance.

As per the World Bank Guideline, the financial information provided by an Applicant should be reviewed in its entirety to allow a truly informed judgment, and the pass–fail decision on the financial position of the Applicant should be given on this basis. The indicators used are most frequently are working capital and net worth. Working capital is the difference between current assets and current liabilities, and measures the firm's ability to generate cash in the short term. To help in the interpretation of the adequacy of working capital, the current ratio, which compares the current assets with the current liabilities, is more helpful than a figure for working capital. Net worth is the difference between total assets and total liabilities. The net worth measures a firm's ability to produce profits over the long run as well as its ability to sustain losses. Russell (1990) indicated the importance of contractor's credit rating, banking arrangements and financial statement to measure the solvency (or liquidity), efficiency and profitability of a contractor, in assessing his financial capability.

Hence, it is recommended that ERA shall strictly evaluate bidder's financial longevity and his/her capacity to meet financial obligations, both short-term and long -term, as well as the financial reporting practices represented by quality of financial statements, adequacy of banking arrangements.

5.3.5. Assessment of Technical Capacity of Contractors

Experience of key personnel, it is concerned with the qualification and skill of the management is important as Clough and Sears (1994) remarked that the financial success of a construction enterprise depends almost entirely on the quality of its management. Russell (1991) contended that 8 out of 14 projects studied failed because of lack experience of the management and technical staff. Also known as experience of key personnel, it is concerned with the qualification and skill of the management (administrative staff and engineering professionals) and labor crew (craftsmen and trades).

Construction equipment is one of the most important physical assets in a construction firm (Skibniewski, 2006). It plays an important role in construction operations and constitutes a major portion of construction project. The contractor should be seen to be employing the relevant equipment in the operations at site as against equipment listed during tendering. Again, the contractor should hold the minimum equipment required to carry out operations at site.

Hence, ERA shall strictly evaluate the technical capacity to determine whether the management team is experienced enough to effectively manage a construction project of a given magnitude in the requested work classification. In addition, the capacity of the contractor with regard to the available plant and equipment for project considering owned, lease or rental shall be assessed strictly. Generally, the capacity of the contractor with regard to skills, tools, professional qualifications, manpower and scientific research shall be assessed in line with the requirement of the project.

5.4. Preparation of Tender Documents

This major category consists of eight factors. Among these, the respondents agrees that ambiguities, mistakes and inconsistent in tender document, poor preparation of tender documents and tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts as major causes of delays, cost overruns and quality problem. Most of the respondents agree that the quality of tender documents of ERA’s projects needs improvement in terms of consistency and with respect to addressing the specific nature of each project.

The quality of tender document basically depends on the quality of design documents in the Design-Bid –Build strategy. In DBB delivery method the procurement of road projects follows the conventional separation of design and construction phases. Among the three design deficiencies Lutz et al., (1990) have categorized contract documents conflict (e.g. discrepancy between drawings and specifications) as a major one. In ERA 87% of the projects are DBB and hence the occurrence of ambiguities, mistakes and inconsistent in tender document is prominent as agreed by most of the respondents.

In ERA projects the projects design and tender documents are prepared by a design consultant. ERA for hiring consultants uses a short listing mechanism where on the basis of consultants who submitted expressions of interest in response to the advertisement. ERA prepares a short-list of consultants and invites them to submit proposals based on the request for proposal. ERA, for all of design consultant selection uses a Quality and Cost Based Selection (QCBS) methodology which is based on both the quality (80%) and the cost (20%) of a consultant's proposal. The contract type used by ERA for all design projects is a Lump Sum where the payment is made based on delivery of design documents.

Hence, the cause of poor quality in ERA projects tender documents is related to both the client i.e. ERA and the design consultant which are discussed separately below.

5.4.1. Client Related Factors

In design process the consultant submits different design output documents including the final tender document for ERA review and comments. ERA in turn reviews the submitted documents and gives comments through its different regional Directorates. However, the ERA staffs who assigned to review the design documents are not experienced enough. In this regard, the monitoring mechanism of the submitted design documents is not efficient as the review made by inexperienced staff who cannot give sufficient technical comments to control the deficiencies and problems in the design document

ERA in controlling such design risks uses Professional Indemnity Insurance (PII). However, the PII has a limitation in setting the validity period which is equal to the period of design while the project construction is started after completion of the design. In that case it will not be valid for design risks identified after completion of design period which leave both the consultants and ERA unprotected. In addition the amount it covers is limited to the cost of design which is impractical; to cover the cost of defects due to design problems in construction stage such as failure of bridges due to design errors. Bezawit (2010) recommends to strict use of professional indemnity insurance. Such non-functional indemnity insurances is emanated from the lack of capacity of local consultants to provide a PII applicable for duration of projects including construction period and amount to cover the design risk and the insurance industry in Ethiopia has not yet developed to the required level. Hence, it is difficult to strict use PII currently.

Getachew (2009) in his study proposed to allocate risks of design errors and omissions to both the contractor and the design professional using Design-Build project delivery method that unites both the consultant and contractor. However, using such DB deliver method will have an impact as it allocates more risks to the contractor and currently as pointed above the local construction do not have a capacity to take such risks.

It is recommended that ERA shall monitor the quality of design documents through strict monitoring mechanism of the quality of design. ERA to strengthen the reviewing capacity of design documents starts to hire Panel of Experts to provide technical advisory panel to through independent expert and impartial design advice on selected design projects. Specifically, the Panel of Experts are expected to provide technical advisory input to ERA to meet its quality control functions by involving in the design review of deliverables from on-going design service

contracts, act as an independent peer reviewer, monitor the different phases of the design services and give an opinion to the current stage of the design before it progresses to the subsequent phase and identify in advance possible errors and deficiencies on the prepared design to address design quality issues.

This is a good starts to control the quality of design documents. However, ERA shall strictly control the conflict of interest that may arise on the staff in the panel of expert and the consultant in charge of design. Moreover, in addition to the above responsibility the panel of experts shall also involve in a follow up, guidance and training of staff assigned to review the design process. In addition, ERA shall set a quality management system to control documents submitted by the design consultants and strengthen the capacity of his employers who are assigned to review design documents submitted by consultants.

It is also recommended that ERA shall monitor the quality of design documents through strict monitoring mechanism of consultants most importantly, the negligence observed by most consultants and their staffs. Bezawit (2010) stringent follow up of consultants‘ adherence to the methodology they proposed upon tendering and enforcing exclusive use of ERA specification in place of random use of international specifications, AASHTO, ASTM etc and avoids prevalence of recurrent errors on specification details of projects.

Recently, ERA starts performance evaluation system to assess the performance of firms and responsible professionals on road design projects and hold accountable those who deliver poor quality design outputs. For this purpose ERA Management has been designing an accountability system that would enable to evaluate performance of designs undertaken over the years. This is a good starts to the negligence observed by most consultants and their staffs.

However, the criteria for assessing the performance of consultants or his staff were not part of the design contract and the degree of assessment of the basic performance measurement is not clearly indicated in advance. Moreover, the performance evaluation is reactive for occurrence of the events and there is a question on the transparency and fairness of the performance assessment. Therefore, it is recommended to continue the performance evaluation considering the criteria to be part of the design contract and the detail of performance assessment criteria and consequent measures to be stated clearly in advance.

5.4.2. Consultants Related Factors

The quality of tender document is basically depends on the quality of design documents and in turn quality of design is based on the capacity of consultants. In addition to the capacity of the consultant the experience of the design team and team spirit and resilience among the design team members is important. Getachew (2009) in his study pointed out that incomplete/inaccurate quantity estimate, incomplete/poor specifications and lack of experience of the design team are among the main sources of risks in road construction projects.

The local design consultants on most of the projects submit low price for the sake getting the projects. Contrary, the shortage of experienced professionals within the required skills and judgments in the majority of the disciplines increases the cost of fee for professionals. As a result

design service delivery of consultants' becomes substandard. Bezawit (2010) in her study pointed out high staff turnover, low profit margin from fierce competition, failure to undertake adequate site investigation before providing design solution, lack of practical quality assurance system at company level and delay in mobilizing professional staff are the top critical factors which affects quality of consultants delivery.

Most of the design consultants relay on freelancers rather than developing in-house capacity and this affects the team spirit among the design team members and lack of professionals' commitment and negligence. In addition the local consultants do not have a tendency in acquainting oneself with new technology and new way of designing and in adequate technology development adopted for the designing activities.

In order to increase the quality of design, consultants' capacity on delivery of services shall be assessed. In addition to their experience, company establishment like technical and managerial organization, availability of office and laboratory facilities and the number of permanent professional and their diversity related to the service shall be considered in selection of the consultants. Moreover, mechanisms shall be set to regulate the work load of consultants and professionals, to control low consultancy offer and pursue strong accountability proceedings so as to hold non performing firms and individuals accountable.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

Road construction projects in Ethiopia are severely suffering from over extended delays, excessive cost overruns and quality problems and affect the implementation of the country's road sector development program which intends in improving the existing poor road network. As part of road construction project cycle the procurement process mainly selection of contractor has a significant role in the successful completion of a project. Selecting the most appropriate contractor requires:

- Preparation of appropriate procurement plan
- Selection of suitable project delivery strategy, method of bidding and form of contract
- Preparation of quality tender documents and properly managing the tender process
- Setting suitable qualification requirements
- Appropriate bid evaluation and contract awarding procedures

Based on the assessment made in ERA procurement process in selection of contractors, it is found that the most critical factors in the procurement process which result on poor performance of project implementation are procurement planning and packaging, bid evaluation and setting qualification criteria and preparation of tender documents. Hence, the following conclusions and recommendations for the above most critical identified factors are forwarded.

6.2. Conclusions

i. Procurement Planning and Packaging

The finding implies that, in ERA projects, the preparation of procurement plan starts after completion of project identification, procurement strategy of each project is not prepared after project identification and preparation of procurement packaging does not consider the ability bidders to provide the procured product. Moreover, procurement plan and packaging disregard definition and identification of target contractors and detection of market risk potentially able to endanger project scopes As a result, the projects scope definitions do not take into account aspects of procurement risks and opportunities and the procurement packaging is not aligned with contractors' capability, capacity and performance.

ii. Evaluation and Qualification Criteria

The study elucidates that, in ERA projects, awarding construction contracts is typically based on the low bid method where the construction firm who fulfils the required qualification criterion and submitting the lowest bid. However, as part of the evaluation process it is found that the

performance assessment of contractors in their ongoing projects is not strong. The performance assessment is made solely based financial progress and duration of projects disregarding quality and overall management of projects and formula used for calculation of the expected performance of contractors is not in line with the actual expected cash flow progress. In addition, the performance assessment is made in monthly basis and may results contractors to focus in fulfilling a performance requirement of a specific month based on the intention to participate a specific tender and non uniform disqualification of contractors.

The study also identifies that qualification criterion of local contractors is exceptionally relaxed and no strong mechanism to control the workload contractors' in relation to their capacity. Moreover, the technical and financial capacity of contractors is not properly evaluated like the financial standing of the contractor, the capacity of the contractor in terms of equipment and technical staff.

Based on the study, it is found that the existing evaluation and qualification criteria will result in selection of unqualified contractor who do not have the capability, capacity and good performance. This affects the overall performance and results in delays, cost overruns and poor quality of projects. In addition, incapable contractors as compared to the project scope might not have the capacity to study the projects in detail before submitting their bids come up with unnecessarily very low offer which results projects delays and poor quality.

iii. Preparation of tender documents

The study elucidates that, in ERA projects there is no a strong mechanism to control the quality of tender documents prepared by design consultants. Most of the local design consultants submit low price for the sake getting the projects and most of the proposed professionals are freelancers. This will result substandard service delivery. The performance evaluation of design consultants and professionals is reactive for occurrence of the events and not strong. In addition professionals assigned to review design documents are junior Engineers and do not have a capacity to control the required quality of design documents. As a result, ERA's tender documents lacks quality, consistency and not prepared based on specific projects nature.

6.3. Recommendations

Based on the findings of the study, the following recommendations are put forward for improvement of the current practices of ERA project procurement process.

i. Procurement planning and packaging

ERA shall start procurement planning starting from the identification of project and as part of the projects scope definitions aspects of procurement risks and opportunities shall be consider. ERA during planning stage shall define and identify target contractors like local, capacity building or foreign contractors then analyze the respective category capacities, assess market risk and find out procurement strategies suitable for the respective capacity.

Moreover, in the capacity building procedure in addition to breaking contracts and relaxing the qualification criteria provisions of incentives in project scope like measurement and quantification, performance of contract and contractual obligations shall be considered without affecting the project requirement.

ii. Qualification Criteria

The qualification criterion for local bidders is exceptionally relaxed to increase the local content regardless of the size of the projects. It is recommended that before relaxing qualification criterion for local bidders, ERA shall investigate elements of weakness of the local contractors in relation to their potential participation and possible mitigation strategies and the possible risk of the recommended mitigation to the project performance. ERA shall also start to evaluate the performance of contractors on their ongoing project by considering the quality, time of completion and overall management in their ongoing projects and the performance evaluation is recommended to be made annually. It is also recommended that ERA by adopting from others practices shall start measuring the work load of contractor based on their capacity.

iii. Bid Evaluation

It is recommended that ERA shall strictly evaluate bidder's financial capacity and cash flow to meet financial obligations of the project. It is also recommended that ERA shall strictly evaluate contractor’s technical capacity to manage the project, the available plant and equipment for project considering owned, lease or rental in line with the requirement of the project and shall include the availability of research section in contractor’s organization as a requirement.

iv. Preparation of Tender Documents

ERA is expected to establish a monitoring mechanism to control the quality of tender documents prepared by the design consultants and strengthen the in-house professionals capacity assigned to review design documents. In selection process of design consultants their capacity on delivery of services shall be assessed strictly including their company establishment and their number of permanent professional. Moreover, as part of assessment of proposals, proposed professionals working relation as a design team and limit of number of freelancers shall be considered and

mechanism shall be set to control low price. In addition, strong performance evaluation of design consultants shall be set to pursue accountability proceedings so as to hold non performing consultants and responsible individuals and work load of consultants and professionals.

6.4. Recommendation for further studies

1. It is recommended that further studies to be conducted on as to how the recommended mitigation measures could be implemented by ERA and other public institutes in Ethiopia.

2. The current capacity building of contractors which brings medium level contractors who do not fulfill the required experience and have no experience in road construction projects needs additional research including identifying the merit and demerit of awarded contracts, selection of projects and targeting contractors.

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Appendix A: Questionnaire

Dear participant,

I am currently working on a research on Procurement Process Study in Selection of Contractors (case study in Ethiopian Roads Authority), as a partial fulfillment for my MSc study in Construction Technology and Management at the Addis Ababa University. This research is aimed to investigate the problems on works contract implementation arise from procurement process and to recommend improvement on the procurement process in Ethiopian Roads Authority.

It is therefore important to identify factors/variables of procurement process towards the project success criteria i.e. time, cost and quality in road construction projects in Ethiopia and rank them in their order of severity before conducting analysis and subsequent recommendation of the possible solutions towards minimizing the problem.

To successfully conduct this research, it is mandatory to look into the issues from different perspectives by involving professionals who have experience in the Ethiopian road construction sector. In this respect, you are the one who can give the correct information; hence I kindly request you to respond to the questions.

I would like to confirm you that your response will be kept strictly confidential and it will be used exclusively for the purpose of this research. Besides, your quick response is vitally important in order to finalize the research timely and I would appreciate if you complete and return it within one week of your receipt of same.

Thank you very much for your time and cooperation, and looking forward to receiving your response.

Yours faithfully,

George Fekadu

Addis Ababa University,

School of Graduate Studies

Institute of Technology

School of Civil and Environmental Engineering

My Address

Tel: 0913142368

E-mail: gfekadu123@gmail.com or georgefeed@yahoo.com

Section 1: General Background Information

The questions below are related to your organization and yourself. Please indicate your response by ticking (X or √) the appropriate box (es), and also filling the blank spaces provided as appropriate.

1.1. Name of organization: _____

1.2. Type of organization:

Employer ☐ contractor ☐ Consultant ☐

Other ☐ (Please specify) _____

1.3. Years within the organization since establishment:

< 5 years ☐ 5 – 10 years ☐ > 10 years ☐

1.4. Your work experience in relation to projects administered by ERA

< 5 years ☐ 5 – 10 years ☐ > 10 years ☐

1.5. Your Name, Title and Contact address:

Name (optional): _____

Job Title: _____

Contact address (optional):_____

E-mail: _____

Tel: _____

Section 2: Assessment of Degree of Impact and Frequency of Occurrence

The following factors in different stages of procurement process towards the project poor performance and success i.e. delay, cost overrun and poor quality in road construction projects were identified from review of literature and personal experience. Please think in terms of your organization's experience and/or your knowledge about the degree of impact and frequency of occurrence of the under listed factors on road projects and respond by ticking (X or √) in the column representing your selection.

Please note that delay in this research refers to time exceeding beyond the original contract period; hence, all extensions of time granted to the original time for completion were considered as delays. Similarly, Cost overrun refers to the additional money required beyond the original contract amount agreed between the owner and the contractor at contract signature. Quality refers how the final product and its function meet the specification and quality of end product with regard to users' satisfaction with the finished construction and critical success factor.

I/No	Factors in Procurement Process	Effects on Projects Performance	Degree of Impact					Frequency of Occurrence			
			Very High	High	Moderate	Neutral	None	High	Medium	Low	Never
A	**Procurement Planning and packaging related Causes**										
1	Ineffective Contract packaging	Delay									
		Cost Overrun									
		Quality									
2	Improper scope definition and scheduling of the project by the client	Delay									
		Cost Overrun									
		Quality									
3	Poor estimation of the project time and cost	Delay									
		Cost Overrun									
		Quality									
4	Insufficient funding or not securing the funding	Delay									
		Cost Overrun									
		Quality									
5	Failure to identify potential bidders and timing of their participation	Delay									
		Cost Overrun									
		Quality									
B	**Procurement Delivery and Choice of the form of contract related Causes**										
6	Selection of form of contract is not based on the specific project nature	Delay									
		Cost Overrun									
		Quality									
7	Selection of Delivery system is not based on the specific project type	Delay									
		Cost Overrun									
		Quality									
8	Using traditional DBB delivery system on most of projects	Delay									
		Cost Overrun									
		Quality									

I/No	Factors in Procurement Process	Effects on Projects Performance	Degree of Impact					Frequency of Occurrence			
			Very High	High	Moderate	Neutral	None	High	Medium	Low	Never
9	Not Introducing other innovative project delivery system	Delay									
		Cost Overrun									
		Quality									
10	Limited capacity of local contractors on innovative delivery methods	Delay									
		Cost Overrun									
		Quality									
C	**Tender Document Preparation and tender process related causes**										
11	Providing inadequate information for tenderers	Delay									
		Cost Overrun									
		Quality									
12	Failure to adequately address enquiries from tenderers	Delay									
		Cost Overrun									
		Quality									
13	Poor preparation of tender document documents	Delay									
		Cost Overrun									
		Quality									
14	Terms and conditions in the bidding document unacceptable to tenderers	Delay									
		Cost Overrun									
		Quality									
15	Using Post Qualification (Two Envelop) system for most of projects	Delay									
		Cost Overrun									
		Quality									
16	Using open bidding for most of large projects	Delay									
		Cost Overrun									
		Quality									
17	Ambiguities, mistakes and inconsistent in Tender Document including Specification, Bill of Quantity and Drawings	Delay									
		Cost Overrun									
		Quality									
18	Tender document is not prepared considering specific nature of projects especially the special provision of specifications and conditions of contracts	Delay									
		Cost Overrun									
		Quality									
D	**Bid Evaluation and Qualification Criteria related Causes**										
19	Offers of the contractor is unnecessarily very low and fail to	Delay									
		Cost Overrun									

I/No	Factors in Procurement Process	Effects on Projects Performance	Degree of Impact					Frequency of Occurrence			
			Very High	High	Moderate	Neutral	None	High	Medium	Low	Never
	meet needs	Quality									
20	contractor 's performance evaluation method is not proper	Delay									
		Cost Overrun									
		Quality									
21	Selecting an unqualified bidder	Delay									
		Cost Overrun									
		Quality									
22	contractor 's financial standing and cash flow requirement is not properly evaluated	Delay									
		Cost Overrun									
		Quality									
23	Selection method is limited to lowest evaluated bid and found responsive to the qualification criteria	Delay									
		Cost Overrun									
		Quality									
24	Not Evaluating in detail financial offered submitted by contractor	Delay									
		Cost Overrun									
		Quality									
25	Not giving enough attention in evaluating contractor's Equipment, methodology and qualifications of contractor's technical staff	Delay									
		Cost Overrun									
		Quality									
E	**Ethical Issues in Project Procurement related Causes**										
26	Actual or perceived favoritism in providing information and issues of influence	Delay									
		Cost Overrun									
		Quality									
27	Bribery or corruption in projects procurement process	Delay									
		Cost Overrun									
		Quality									
28	conflict of interests on tendering	Delay									
		Cost Overrun									
		Quality									
29	Collusive practice in tendering.	Delay									
		Cost Overrun									
		Quality									
30	Actual or perceived breach of confidentiality	Delay									
		Cost Overrun									
		Quality									

Section 3: Assessment of Controlling Mechanisms

The following questions indicate the direction how to manage the procurement process in order to increase the performance of the projects by the parties involved in road projects in Ethiopia. Please respond by clicking the box representing your selection. If your rating is Neutral, Slightly disagree or Strongly disagree, please indicate your proposed solutions in their order of importance from the list below each question by putting 1, 2, 3, …etc. in the box(es). You can also state any different proposed solutions in addition to the list in the space provided.

also state any different proposed solutions in addition to the list in the space provided.

1. ERA prepares projects procurement plan considering scope of the project, how the project will be executed, what delivery system(s) will be utilized, capacity of contractors and the possibility of letting local firms participate effectively

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall give more consideration for the scope of the project in preparing projects procurement plan ☐
- ERA shall give more consideration on how the project will be executed and what delivery system(s) will be utilized in preparing projects procurement plan ☐
- ERA shall give more consideration for capacity of contractors and the possibility of letting local firms participate effectively in preparing projects procurement plan and packaging ☐
- ERA shall organize a separate Project Management Plan team who will only follow and manage procurement planning and packaging for each fiscal year for all projects which their funds are secured and their design is completed ☐
- ERA shall prepare procurement plan and packaging for each project which their design is completed and fund secured ☐
- ERA shall give the full responsibility of procurement planning and packaging to the design consultant as part of the activity expected for each project by including as one of the duty in the design consultant contract. ☐

Other (please specify)_____

_____

2. ERA prepare procurement packages based on main objective of achieving economy and efficiency and consider the ability bidders to provide the procured product.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

3. The current capacity building procedure employed by ERA is the better option to bring medium contractors and increase the number of experienced contractors in the road sector.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall use "slicing and packaging" mechanism, a procedure whereby a large homogeneous project is sliced into smaller similar contracts, which are bid simultaneously to attract the interest of both small and large firms. In this mechanism, small firms can then apply to one or more contracts while large firms can apply for the whole lot. ☐
- ERA shall plan to tender projects separately based on the capacity of bidders to provide the procured work. ☐
- ERA shall not slice large projects into small to mere use of capacity building of local contractors as this will affect the economy and efficiency of projects and increase burden on ERA in administration of a number of projects. ☐
- ERA shall continue employing the existing projects procurement packaging. ☐

Other (please specify)_____

_____

4. ERA on most of projects employed the traditional (DBB) method as it is effective delivery method.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

5. ERA employ the traditional (DBB) method as the local bidders' inability to take the risks of other Innovative project delivery methods

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

6. Currently the local construction industry does not seem ready to take part in the Innovative project delivery method like DB.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall continue employing the traditional (DBB) method for NCB contracts as the local bidders do not have the capacity to take the risks of other Innovative project delivery methods ☐
- ERA shall restrict the use of DBB method to situations when the public owner wishes to be actively involved in the design and construction processes, and when it has sufficient time to permit design to be fully completed before construction bids are obtained. ☐
- ERA shall improve the existing delivery methods thereby improving the overall project performance after identifying merits and demerits of the method specific to the project with respect to capacity of the bidders. ☐

- ERA sometimes is required to out resource some of the projects to be administered by efficient management contractors. ☐
- ERA shall continue employing the existing method of selection of project delivery system. ☐

Other (please specify)_____

_____

_____

7. ERA on most of projects employed the BoQ and lump sum contracts for traditional (DBB) and DB delivery method respectively as they are effective contract types for respective delivery method.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall continue employing the BoQ and lump sum contracts for traditional (DBB) and DB delivery method respectively as they are effective contract types for respective delivery method. ☐
- Clients shall start to implement other contracts types like Schedule of Rates, Negotiated Contracts, Cost Reimbursement, Cost plus percentage, Cost plus fixed fee, Cost plus fluctuating fee and etc based on the specific project nature for improving the overall project performance after identifying merits and demerits of each contract types method specific to the project with respect to capacity of the bidders. ☐

Other (please specify)_____

_____

_____

8. The existing open bidding procedure and post qualification (two envelop) system in ERA for projects financed by Government of Ethiopia is efficient for good performance of the project implementation.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall continue employing existing open bidding procedure and post qualification (two envelop) system as it is efficient for good performance of the project implementation. ☐
- ERA shall start to use pre-qualification system for large value or very complex projects financed by Government of Ethiopian. ☐
- ERA shall start to use short-listing of contractors (using restricted bidding) as it ensures selection of high quality contractors reduces the administrative burden of evaluating tenders and cost of tendering and reduces the risks of selecting non-responsive contractors. ☐

Other (please specify)_____

_____

9. ERA qualification criteria consider objective and measurable factors, including relevant general and specific experience, and satisfactory past performance and successful completion of similar contracts over a given period, financial position; and capability of construction and/or manufacturing facilities.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- ERA shall strictly set criteria like experience, construction turnover and cash flow of the project based on the project value rather than relaxing the criteria on basis of bidding capacity of the bidders. ☐
- ERA shall assign weighting to each criterion of skills, tools, professional qualifications, history of working in a particular type of procurement, manpower, scientific research, and specialism including visiting the contractor's home office to collect the required information. ☐
- ERA shall start annually performance assessment of the bidders on its ongoing and completed projects by giving grade and respective suspension of the bidder for a specified time in participation of tenders rather than following monthly performance assessment criteria. ☐

Other (please specify)_____

_____

_____

10. ERA selection methodology of contractor based on lowest evaluated bid and found responsive to the qualification criteria is most efficient which result competitive price and appropriate bidder who can deliver the required service.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- In using the lowest price method, ERA shall not open the financial bid of the bidders if the number of bidders are less than three as the number of bidders decrease it will not guarantee whether the offer is lowest or not ☐
- Lowest bid price increase the risk for opportunism and conflicts and hampers cooperation and increase the risk for cost and schedule growth due to several change orders since contractors often bid low to get the job and then search for “extras” to achieve profitability. Hence, ERA shall start to give weighting for technical capacity of the bidders. ☐

Other (please specify)_____

_____

11. In ERA project procurement the ethical issue like favoritism, confidentiality, corruption, conflict of interests and collusive practice are not major on their effects on performance of the project.

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
☐	☐	☐	☐	☐

- The government shall investigate the officials who have access to very confidential and/or market sensitive information not to use inside information provided to the Procuring Entity as part of a tender process, either for the material benefit of the official or for another person. ☐
- Increasing transparency, accountability and increasing the bidders to request for their right in the procurement process will decreases the potential of occurrence of unethical issue like favoritism, confidentiality, corruption, conflict of interests and collusive practice are not major on their effects on performance of the project ☐

Other (please specify)_____

~~~End of Questionnaire~~~

Thank you very much for your time and cooperation

Appendix B: Summary of Responses

Appendix B-1: Summary of Responses for Degree of Impact and Frequency of Occurrence of Delay

	Degree of Impact						Frequency of Occurrence				
	Very High	**High**	**Moderate**	**Neutral**	**None**	**Total Response**	**Great**	**Medium**	**Low**	**None**	**Total Response**
	5	**4**	**3**	**2**	**1**		**4**	**3**	**2**	**1**	
A	**Procurement Planning and packaging related Cause**										
1	16	15	4	3	2	40	10	8	7	3	28
2	18	12	8	2	0	40	2	17	9	4	32
3	21	16	3	0	0	40	7	19	5	2	33
4	18	11	5	6	0	40	1	12	10	9	32
5	4	16	15	4	0	39	2	17	6	7	32
B	**Procurement Delivery and Choice of the form of contract related Causes**										
6	7	11	18	4	1	41	2	8	15	7	32
7	4	16	15	3	1	39	1	13	11	4	29
8	4	11	13	10	0	38	3	11	13	4	31
9	4	9	11	13	2	39	3	10	12	4	29
10	8	14	9	5	0	36	4	13	9	4	30
C	**Tender Document Preparation and tender process related causes**										
11	8	17	12	0	1	38	1	12	14	5	32
12	4	18	13	1	2	38	2	6	17	8	33
13	20	13	4	0	1	38	4	19	8	3	34
14	7	12	15	3	1	38	1	10	15	7	33
15	0	8	11	15	5	39	3	4	14	7	28
16	6	9	14	7	3	39	3	9	9	9	30
17	25	9	5	0	0	39	6	16	9	1	32
18	19	16	4	0	0	39	5	15	8	4	32
19	22	15	1	0	0	38	3	16	10	4	33
D	**Bid Evaluation and Qualification Criteria related Causes**										
20	14	13	7	3	3	40	12	8	6	2	28
21	26	7	3	1	1	38	1	9	12	5	27
22	12	18	7	1	0	38	4	16	7	4	31
23	9	9	14	5	2	39	4	15	8	4	31
24	2	21	13	3	0	39	1	13	11	5	30
25	6	22	10	1	0	39	4	19	6	3	32
E	**Ethical Issues in Project Procurement related Causes**										
26	4	17	8	7	0	36	0	10	12	10	32
27	14	15	6	3	0	38	0	10	12	7	29
28	10	15	7	5	0	37	0	6	12	10	28
29	7	21	6	4	0	38	0	5	18	8	31
30	4	12	10	5	0	31	0	4	19	8	31

Appendix B-2: Summary of Responses for Degree of Impact and Frequency of Occurrence of Cost Overrun

	Degree of Impact						Frequency of Occurrence				
	Very High	**High**	**Moderate**	**Neutral**	**None**	**Total Response**	**Great**	**Medium**	**Low**	**None**	**Total Response**
	5	**4**	**3**	**2**	**1**		**4**	**3**	**2**	**1**	
A	**Procurement Planning and packaging related Cause**										
1	11	20	3	4	2	40	11	7	7	4	29
2	18	11	10	1	0	40	2	16	10	4	32
3	19	16	4	0	0	39	7	20	4	2	33
4	11	0	9	9	0	29	1	13	10	7	31
5	2	14	18	4	0	38	3	15	6	7	31
B	**Procurement Delivery and Choice of the form of contract related Causes**										
6	5	13	17	4	2	41	2	7	16	7	32
7	5	12	16	5	1	39	1	14	11	5	31
8	5	10	11	10	0	36	3	13	13	2	31
9	4	11	10	12	2	39	4	10	11	4	29
10	4	16	11	5	0	36	4	11	10	5	30
C	**Tender Document Preparation and tender process related causes**										
11	7	17	11	2	1	38	1	11	16	4	32
12	5	14	17	0	2	38	2	8	17	7	34
13	23	10	4	0	1	38	3	21	8	2	34
14	7	13	13	4	1	38	1	8	16	7	32
15	0	7	14	13	5	39	2	5	14	7	28
16	4	6	17	9	3	39	2	9	10	9	30
17	25	10	4	0	0	39	6	15	10	1	32
18	21	15	3	0	0	39	5	15	8	4	32
19	12	19	7	0	0	38	3	13	13	4	33
D	**Bid Evaluation and Qualification Criteria related Causes**										
20	12	12	8	5	3	40	12	8	6	2	28
21	20	10	7	2	1	40	1	9	12	6	28
22	4	18	13	3	0	38	4	15	8	4	31
23	6	6	19	6	2	39	4	15	8	4	31
24	4	21	9	5	0	39	1	17	6	6	30
25	3	20	13	2	0	38	4	18	7	3	32
E	**Ethical Issues in Project Procurement related Causes**										
26	6	16	8	8	1	39	0	9	12	10	31
27	13	16	6	2	0	37	0	11	11	7	29
28	12	17	4	5	0	38	0	8	11	9	28
29	9	23	3	3	0	38	0	5	18	8	31
30	6	13	9	3	0	31	1	4	19	7	31

Appendix B-3: Summary of Responses for Degree of Impact and Frequency of Occurrence of Quality Problem

	Degree of Impact						Frequency of Occurrence				
	Very High	**High**	**Moderate**	**Neutral**	**None**	**Total Response**	**Great**	**Medium**	**Low**	**None**	**Total Response**
	5	**4**	**3**	**2**	**1**		**4**	**3**	**2**	**1**	
A	**Procurement Planning and packaging related Cause**										
1	12	6	14	4	2	38	11	9	6	5	31
2	12	9	15	2	0	38	3	14	12	6	35
3	10	10	15	4	0	39	4	15	6	6	31
4	7	5	15	9	1	37	1	11	12	11	35
5	2	13	17	5	0	37	1	17	6	7	31
B	**Procurement Delivery and Choice of the form of contract related Causes**										
6	2	13	18	5	2	40	2	10	14	7	33
7	2	13	16	6	1	38	1	12	12	7	32
8	1	9	15	9	0	34	1	13	14	4	32
9	3	7	13	13	2	38	2	11	13	4	30
10	4	10	16	5	0	35	3	11	12	5	31
C	**Tender Document Preparation and tender process related causes**										
11	4	17	13	2	1	37	1	10	18	4	33
12	4	14	15	2	2	37	1	6	21	7	35
13	18	11	7	0	1	37	2	21	8	4	35
14	6	11	14	5	1	37	1	7	18	10	36
15	0	4	14	15	6	39	1	3	16	8	28
16	2	5	18	10	3	38	2	8	13	8	31
17	23	7	8	0	0	38	5	16	10	2	33
18	16	15	6	0	0	37	3	19	7	4	33
19	18	16	2	1	0	37	1	19	11	3	34
D	**Bid Evaluation and Qualification Criteria related Causes**										
20	14	10	9	4	3	40	9	9	6	3	27
21	25	7	3	1	1	37	1	9	13	6	29
22	6	20	12	1	0	39	3	16	8	5	32
23	5	9	17	4	2	37	4	15	8	4	31
24	1	16	16	4	1	38	1	10	12	8	31
25	6	16	12	2	0	36	4	18	6	5	33
E	**Ethical Issues in Project Procurement related Causes**										
26	3	14	13	8	0	38	0	10	12	10	32
27	13	16	5	3	0	37	0	10	12	8	30
28	6	14	10	7	0	37	0	6	11	12	29
29	3	22	9	3	0	37	0	4	17	10	31
30	2	12	12	5	0	31	0	3	17	10	30

Appendix B-4 Summary of Responses for Hypothesized Questions

Summary of Responses for Hypothesized Questions						
Q. No.	Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree	Total Responses
1	9	9	0	6	15	39
2	8	9	2	5	16	40
3	15	12	6	2	4	39
4	5	19	4	5	6	39
5	11	14	9	1	4	39
6	13	14	6	4	2	39
7	14	16	3	2	3	38
8	16	16	7	1	0	40
9	10	10	7	8	4	39
10	6	14	8	6	5	39
11	4	7	13	6	9	39

Percentage of Response			
Q. No.	Agree	Neutral	Disagree
1	46.15%	0.00%	53.85%
2	42.50%	5.00%	52.50%
3	69.23%	15.38%	15.38%
4	61.54%	10.26%	28.21%
5	64.10%	23.08%	12.82%
6	69.23%	15.38%	15.38%
7	78.95%	7.89%	13.16%
8	80.00%	17.50%	2.50%
9	51.28%	17.95%	30.77%
10	51.28%	20.51%	28.21%
11	28.21%	33.33%	38.46%

Appendix C- Computation of Severity Index Frequency Index and Importance Index

Appendix C-1 Computation of Severity Index Frequency Index and Importance Index of Impact on of Procurement Process which cause Delay

	Degree of Impact							Frequency of Occurrence						Importance Index	Rank
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
A	**Procurement Planning and packaging related Causes**														
1	16	15	4	3	2	40	80.00%	10	8	7	3	28	72.32%	57.9%	7
2	18	12	8	2	0	40	83.00%	2	17	9	4	32	63.28%	52.5%	10
3	21	16	3	0	0	40	89.00%	7	19	5	2	33	73.48%	65.4%	1
4	18	11	5	6	0	40	80.50%	1	12	10	9	32	53.91%	43.4%	15
5	4	16	15	4	0	39	70.26%	2	17	6	7	32	60.94%	42.8%	16
B	**Procurement Delivery and Choice of the form of contract related Causes**														
6	7	11	18	4	1	41	69.27%	2	8	15	7	32	53.91%	37.3%	22
7	4	16	15	3	1	39	69.74%	1	13	11	4	29	59.48%	41.5%	19
8	4	11	13	10	0	38	64.74%	3	11	13	4	31	60.48%	39.2%	20
9	4	9	11	13	2	39	60.00%	3	10	12	4	29	60.34%	36.2%	25
10	8	14	9	5	0	36	73.89%	4	13	9	4	30	64.17%	47.4%	12
C	**Tender Document Preparation and tender process related causes**														
11	8	17	12	0	1	38	76.32%	1	12	14	5	32	57.03%	43.5%	14
12	4	18	13	1	2	38	71.05%	2	6	17	8	33	51.52%	36.6%	23
13	20	13	4	0	1	38	86.84%	4	19	8	3	34	67.65%	58.7%	3
14	7	12	15	3	1	38	71.05%	1	10	15	7	33	53.79%	38.2%	21
15	0	8	11	15	5	39	51.28%	3	4	14	7	28	52.68%	27.0%	30
16	6	9	14	7	3	39	64.10%	3	9	9	9	30	55.00%	35.3%	27
17	25	9	5	0	0	39	90.26%	6	16	9	1	32	71.09%	64.2%	2
18	19	16	4	0	0	39	87.69%	5	15	8	4	32	66.41%	58.2%	5
19	22	15	1	0	0	38	91.05%	3	16	10	4	33	63.64%	57.9%	6
D	**Bid Evaluation and Qualification Criteria related Causes**														
20	14	13	7	3	3	40	76.00%	12	8	6	2	28	76.79%	58.4%	4
21	26	7	3	1	1	38	89.47%	1	9	12	5	27	55.56%	49.7%	11
22	12	18	7	1	0	38	81.58%	4	16	7	4	31	66.13%	53.9%	8
23	9	9	14	5	2	39	69.23%	4	15	8	4	31	65.32%	45.2%	13
24	2	21	13	3	0	39	71.28%	1	13	11	5	30	58.33%	41.6%	18

	Degree of Impact							Frequency of Occurrence						Importance Index	Rank
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
25	6	22	10	1	0	39	76.92%	4	19	6	3	32	68.75%	52.9%	9
E	**Ethical Issues in Project Procurement related Causes**														
26	4	17	8	7	0	36	70.00%	0	10	12	10	32	50.00%	35.0%	28
27	14	15	6	3	0	38	81.05%	0	10	12	7	29	52.59%	42.6%	17
28	10	15	7	5	0	37	76.22%	0	6	12	10	28	46.43%	35.4%	26
29	7	21	6	4	0	38	76.32%	0	5	18	8	31	47.58%	36.3%	24
30	4	12	10	5	0	31	69.68%	0	4	19	8	31	46.77%	32.6%	29

Appendix C-2 Computation of Severity Index Frequency Index and Importance Index of Impact on of Procurement Process which cause Cost over Run

	Degree of Impact							Frequency of Occurrence						**Importance Index**	**Rank**
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
A	**Procurement Planning and packaging related Causes**														
1	11	20	3	4	2	40	77.00%	11	7	7	4	29	71.55%	55.1%	6
2	18	11	10	1	0	40	83.00%	2	16	10	4	32	62.50%	51.9%	7
3	19	16	4	0	0	39	87.69%	7	20	4	2	33	74.24%	65.1%	1
4	11	0	9	9	0	29	68.97%	1	13	10	7	31	56.45%	38.9%	20
5	2	14	18	4	0	38	67.37%	3	15	6	7	31	61.29%	41.3%	18
B	**Procurement Delivery and Choice of the form of contract related Causes**														
6	5	13	17	4	2	41	67.32%	2	7	16	7	32	53.13%	35.8%	27
7	5	12	16	5	1	39	67.69%	1	14	11	5	31	58.87%	39.9%	19
8	5	10	11	10	0	36	65.56%	3	13	13	2	31	63.71%	41.8%	17
9	4	11	10	12	2	39	61.54%	4	10	11	4	29	62.07%	38.2%	22
10	4	16	11	5	0	36	70.56%	4	11	10	5	30	61.67%	43.5%	14
C	**Tender Document Preparation and tender process related causes**														
11	7	17	11	2	1	38	74.21%	1	11	16	4	32	57.03%	42.3%	15
12	5	14	17	0	2	38	70.53%	2	8	17	7	34	53.68%	37.9%	24
13	23	10	4	0	1	38	88.42%	3	21	8	2	34	68.38%	60.5%	3
14	7	13	13	4	1	38	71.05%	1	8	16	7	32	52.34%	37.2%	25
15	0	7	14	13	5	39	51.79%	2	5	14	7	28	51.79%	26.8%	30
16	4	6	17	9	3	39	59.49%	2	9	10	9	30	53.33%	31.7%	29
17	25	10	4	0	0	39	90.77%	6	15	10	1	32	70.31%	63.8%	2
18	21	15	3	0	0	39	89.23%	5	15	8	4	32	66.41%	59.3%	4
19	12	19	7	0	0	38	82.63%	3	13	13	4	33	61.36%	50.7%	8
D	**Bid Evaluation and Qualification Criteria related Causes**														
20	12	12	8	5	3	40	72.50%	12	8	6	2	28	76.79%	55.7%	5
21	20	10	7	2	1	40	83.00%	1	9	12	6	28	54.46%	45.2%	11
22	4	18	13	3	0	38	72.11%	4	15	8	4	31	65.32%	47.1%	10
23	6	6	19	6	2	39	64.10%	4	15	8	4	31	65.32%	41.9%	16
24	4	21	9	5	0	39	72.31%	1	17	6	6	30	60.83%	44.0%	12
25	3	20	13	2	0	38	72.63%	4	18	7	3	32	67.97%	49.4%	9

	Degree of Impact							Frequency of Occurrence						**Importance Index**	**Rank**
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
E	**Ethical Issues in Project Procurement related Causes**														
26	6	16	8	8	1	39	69.23%	0	9	12	10	31	49.19%	34.1%	28
27	13	16	6	2	0	37	81.62%	0	11	11	7	29	53.45%	43.6%	13
28	12	17	4	5	0	38	78.95%	0	8	11	9	28	49.11%	38.8%	21
29	9	23	3	3	0	38	80.00%	0	5	18	8	31	47.58%	38.1%	23
30	6	13	9	3	0	31	74.19%	1	4	19	7	31	49.19%	36.5%	26

Appendix C-3 Computation of Severity Index Frequency Index and Importance Index of Impact on of Procurement Process which cause Quality Problem

	Degree of Impact							Frequency of Occurrence						Importance Index	Rank
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
A	**Procurement Planning and packaging related Causes**														
1	12	6	14	4	2	38	71.58%	11	9	6	5	31	70.97%	51%	6
2	12	9	15	2	0	38	76.32%	3	14	12	6	35	60.00%	46%	11
3	10	10	15	4	0	39	73.33%	4	15	6	6	31	63.71%	47%	10
4	7	5	15	9	1	37	64.32%	1	11	12	11	35	51.43%	33%	26
5	2	13	17	5	0	37	66.49%	1	17	6	7	31	59.68%	40%	16
B	**Procurement Delivery and Choice of the form of contract related Causes**														
6	2	13	18	5	2	40	64.00%	2	10	14	7	33	55.30%	35%	19
7	2	13	16	6	1	38	64.74%	1	12	12	7	32	55.47%	36%	17
8	1	9	15	9	0	34	61.18%	1	13	14	4	32	58.59%	36%	18
9	3	7	13	13	2	38	57.89%	2	11	13	4	30	59.17%	34%	22
10	4	10	16	5	0	35	67.43%	3	11	12	5	31	59.68%	40%	14
C	**Tender Document Preparation and tender process related causes**														
11	4	17	13	2	1	37	71.35%	1	10	18	4	33	56.06%	40%	15
12	4	14	15	2	2	37	68.65%	1	6	21	7	35	50.71%	35%	21
13	18	11	7	0	1	37	84.32%	2	21	8	4	35	65.00%	55%	4
14	6	11	14	5	1	37	68.65%	1	7	18	10	36	49.31%	34%	23
15	0	4	14	15	6	39	48.21%	1	3	16	8	28	47.32%	23%	30
16	2	5	18	10	3	38	56.32%	2	8	13	8	31	53.23%	30%	28
17	23	7	8	0	0	38	87.89%	5	16	10	2	33	68.18%	60%	1
18	16	15	6	0	0	37	85.41%	3	19	7	4	33	65.91%	56%	2
19	18	16	2	1	0	37	87.57%	1	19	11	3	34	63.24%	55%	3
D	**Bid Evaluation and Qualification Criteria related Causes**														
20	14	10	9	4	3	40	74.00%	9	9	6	3	27	72.22%	53%	5
21	25	7	3	1	1	37	89.19%	1	9	13	6	29	54.31%	48%	8
22	6	20	12	1	0	39	75.90%	3	16	8	5	32	63.28%	48%	9
23	5	9	17	4	2	37	65.95%	4	15	8	4	31	65.32%	43%	12
24	1	16	16	4	1	38	66.32%	1	10	12	8	31	53.23%	35%	20

	Degree of Impact							Frequency of Occurrence						**Importance Index**	**Rank**
	Very High	High	Moderate	Neutral	None	Total Response	Severity Index	Great	Medium	Low	None	Total Response	Frequency Index		
	5	**4**	**3**	**2**	**1**			**4**	**3**	**2**	**1**				
25	6	16	12	2	0	36	74.44%	4	18	6	5	33	65.91%	49%	7
E	**Ethical Issues in Project Procurement related Causes**														
26	3	14	13	8	0	38	66.32%	0	10	12	10	32	50.00%	33%	25
27	13	16	5	3	0	37	81.08%	0	10	12	8	30	51.67%	42%	13
28	6	14	10	7	0	37	70.27%	0	6	11	12	29	44.83%	32%	27
29	3	22	9	3	0	37	73.51%	0	4	17	10	31	45.16%	33%	24
30	2	12	12	5	0	31	67.10%	0	3	17	10	30	44.17%	30%	29

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other universities and all sources of materials used for this thesis have been duly acknowledged.

Name: George Fekadu

Signature: _____

Place:

Addis Ababa University, Faculty of Technology, School of Civil and Environmental Engineering

Date of Submission: _____