CHAPTER ONE

INTRODUCTION

1.1. Background of the study

The construction industry is dedicated to the establishment of physical infrastructures like roads, tunnels, bridges and building. It has often characterized by complex large-scale activities organized as projects. Construction projects have unique and complex characteristics compared to each other. Road construction projects are characterized by large-scale activities and consume an enormous amount of budget.

Construction of a high-quality road network are irreplaceably important for the economic development a given country by reducing trip time, cost and making a region more attractive for investment. The design, construction and maintenance of major national routes such as motorways or dual carriageways are generally the responsibility of a designated government department or an agency (Martin Rogers 2003). On the Ethiopian context, the Ethiopian Road Authority is responsible for the administration and construction of main road. Those feeder and collector roads into the national routes, together with local roads, tend to be the responsibility of local authorities. Ethiopian Road Authority usually takes responsibility for the development of national standards and construction, supervision and maintenance of trunk roads which have a significant impact on the national economy and connects the nation with other countries.

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 Program (RSDP) entering its 4th phase with an allocation of Birr 84 billion over a 5-year program (FDRE GTP, 2010). 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.

For the implementation of the Road Sector Development Program (RSDP), Ethiopian Road Authority has given the responsibility, accordingly this road projects delivered through different mode of procurement method for different stakeholders. In Design-Bid-Build mode of contract delivery method, the main players of the road construction sector of Ethiopia encompass the client,

consultants, contractors and financiers. Generally, there are three major clients in the construction sector i.e. the public sector, developers and private owners. (George Fekadu 2013).

The terms procurement method, delivery system and contract type often are used more or less interchangeably. (STA, 2011).

Several studies show that Ethiopian road construction projects are unable to meet the core project success factors such as quality, budget and schedule, regarding to this, procurement methods and procedures have potential to cause many problems in all stages of the project life cycle and procurement procedures are one of the key areas which need improvement and it can contribute a lot for the success of a project (Eriksson 2007).

Therefore, this thesis tries to see the procurement or contract delivery methods that ERA is using for the construction of road projects and the impact each procurement method on the success of a given road project and recommends methods for selecting and implementing the most efficient and effective procurement method for intended project type to enhance the success of road projects in Ethiopia.

1.2. Statement of the Problem

The Ethiopian main road network comprises a very large national asset that requires careful development planning, project implementation and maintenance to provide the high level of service that is demanded by the road users and communities (ERA, 2019). Project cost overrun, time overrun and quality problems are the main issues that Ethiopian Road Authority is facing on the road projects of the country. The selected procurement method influences the project success in many ways like: stakeholder integration, cost of the project, quality and time of project completion. Without a proper and accurate method for selecting the most appropriate contractor, the performance of the project will be affected (Cheng and Heng, 2004), therefore, the selection of the most appropriate procurement method is mandatory by the client to achieve project goal and objective. To ensure successful completion of road projects and to avoid project failure due to stakeholder inability to undertake or complete the project work successfully, therefore, the selection of appropriate procurement method is very essential. According to (Laeder et al. 2007) procurement methods need to be tailor-made to enhance the different project objectives, As a result, ERA has to choose the procurement method for different projects depending upon their requirement.

1.3. Study Questions

- ✓ What type of procurement method ERA has been using?
- ✓ What are the selection criteria's to select effective procurement method for the intended road project?
- ✓ What are the evaluation criteria for the project success of road projects?
- ✓ How the procurement methods affect the road project?

1.4. Objectives of the Research

1.4.1. General Objective

The objective of this study is to identify the types of procurement method which ERA has been using for a long time and revile their impacts on the success of road projects that Ethiopian Road Authority has been implementing.

1.4.2. Specific Objectives.

- ❖ To find out what type of procurement method ERA has been using for the road projects.
- ❖ To find out which type of procurement method frequently used by ERA road projects.
- ❖ To assess the factors to select a specific procurement method.
- ❖ To show the factors that affect the procurement method selection.
- ❖ To see how the selected procurement method affects the project success of ERA road project.

1.5. Significance of the Study

The success of the road project depends upon many factors from those factors the impact of procurement plays a major role. The selection and type of procurement method affect the success of road projects at large, therefore, this study tries to show the impact of procurement on the project success and suggest a direction for ERA to implement and use a variety of procurement methods for its road projects.

At the individual level, ERA employees and other construction industry stakeholders will learn new and latest skills that they can use to contribute for the success of road projects that they are involved daily by implementing the proper and suitable type of procurement method

1.6. Scope and Limitations of the Study

The study covered employees of ERA from upper management, middle management and project engineers from Engineering procurement Directorate and the Project Contract administration directorate those engaged in the selection of procurement methods and implementation of procurement method on different projects respectively. The researcher used different project documents to analyze & evaluate the project progress and/or completion of the project successfully. Questionnaires were used to collect the required data.

Limitations of the study

This study was conducted with some sort of limitations. One of the limitations of the study was unavailability of project status reports for the completed road project fully in Ethiopia Roads Authority.

The researcher was faced many problems which may affect the quality of the study. Even though, mixed approach is used in this study to reduce the weakness effects of the Quantitative approach, the following limitations were expected**:** unwillingness of the respondent to fill the questionnaire, delay in returning back the questionnaire, unavailability of well-organized secondary data that could be easily accessed for the purpose, shortage of time and budget to undertake the study. To minimize the effects of these problems, the researcher has used maximum effort through spending more time and giving more attention.

Due to time and budget constraints unable to include other stakeholders on the research study and the research data analysis is more dependent on the view of the respondents as a result of lack of sufficient data about the project status of the road projects with respective to the selected procurement method.

Unable to collect data about the status of ongoing projects from different regional project management directorate because of confidentiality.

1.7. Organization of the Study

The research is organized into five parts. Part one includes background, facts and objective of the study. Part two is devoted to the review of the literature. Part three describes the research methodology employed. Part four consist of results and discussions and part five tells us about the conclusion and recommendations for the results and discussions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. General Overview

Project is a unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources (Lester, n.d.). Project is series of activities and tasks that have Specific objectives, defined start and end dates, funding limits, and it also has characteristics of multifunctional i.e. cut across several functional lines (Kerzner, 2009). A temporary endeavour was undertaken to create a unique product, service, or result (PMI, 2013, & Kernzer, 2013).

The project cycle is the process in which projects are formulated, implemented and completed, and they go through a life cycle of phases between beginning and end, by Initiation, planning, design, construction, commissioning and closeout (Alan C Twort, 2004)

Procurement is one of the key knowledge areas of project management, which plays a major role in the success of a given project. As part of the project cycle, clients undergo a procurement process to select a contractor to carry out the construction using predetermined selection variables. The procurement system is the way project owners together with project regulators and financiers determine the assignment of responsibilities to project stakeholders along the construction process and it is often determined during the basic planning phase of a construction project. The construction industry involves procurement to ensure fair competition and distribution of obligation and rights among stakeholders. Different procurement delivery system will have a different effect on the cost, time and quality of the project monitoring and control. (Mohammed F. Dulaimi, Richard C. Dalziel, 1992) Therefore, selection of the procurement approach is very important to the successful completion of any construction project. Bryde and Brown (2004) concluded that the traditional distinction between good and poor project performance focused on the meeting of cost, time and product quality-related criteria.

2.2. Definition of Procurement

Many different terms used to describe an organizational structure chosen for a particular construction project, these are commonly known as procurement, contractual or delivery methods or options of project delivery (P.Davenport &T. EUher, 2009).

"Procurement" as defined by the Ethiopian Public Procurement and Property Administration Manual, is obtaining goods, works, consultancy or other services through purchasing, hiring or obtaining by any other contractual means.; Procurement method or project delivery method is a system for facilitating the organization financing, designing, construction, operations and maintenance of the physical infrastructures by assigning responsibilities and risks to whom that can manage best and enter into legal agreements with one or more entitles for a short or long term perspective (ERA, 2019).

The overall objective of major infrastructure project procurement is to execute a contract with a proponent contractor which satisfy the project requirements and is most likely to deliver the best value while utilizing a process which complies with relevant policy (Fekadu, 2013). Contractor Selection refers to the process of aggregating the results of the evaluation to identify optimum choice (Faridah, 2007)

Molenaar et al. (2009) defined procurement method as a comprehensive process by which designers, constructors, and various consultants provide services for design and construction to deliver a complete project to the client. According to this scholar procurement method involves a wide range of processes and stakeholders to execute a project with a demarcated scope, time and budget. Franks (1992) designates the construction procurement method as the creating organized activities of a project by a client to implement them. Procurement method states relationships, roles and responsibilities of stakeholders and the sequence of activities required to deliver the capital projects. It is an organizational structure that defines a framework of contractual and communication links between project stakeholders and expresses core functional and administrative units of a project and a hierarchy of key project stakeholders. It is a method that the responsibilities and contractual obligations of each party expected to execute activities for delivering a project to the owner.

Chan (2000) and Yakowenko (2004) indicated that no single procurement option is appropriate for all projects. There are several types of procurement method to deliver a project, each method

differs one another in terms of allocation of responsibilities, activities sequencing and process and organizational approach to deliver a project and the processes are often interconnected to one another and their effectiveness and efficiency impact significantly the success and failure of any projects.

2.3. Properties of Effective Procurement

Effective procurement requires the application of sound business practices that capitalize the value of the organization through the acquisition of works, goods and services. Sollish & Semanik, (2005). Effective and efficient procurement method ensures "five rights" these rights are the right quality, quantity, cost, counterpart and time. According to Thai (2005), every organization that purchases goods or services must have effective standard procurement procedures, the methods they use to acquire those things required for an organization to provide goods/services to its clients.

Right quality: quality is one of the core constraints of a given project, it is not necessary to spend time, money and all the efforts for procuring unqualified services or goods or works. According to Alhazini and McCaffer (2000), each project has its characteristics and requirements, and for a project to be successful, the procurement method must address the technical features of the project together with the clients' and contractors' needs. Therefore, it is essential to ensure whether such procurements are the right quality. It is always based on two major factors these are the technical expectation and the economic consideration, while the technical quality can be insured by the provisions of specifications and checking their conformance reliability of the intended job, while the economic consideration can be taken into account by the competition initiated using procurement processes. This implies that a tender document should as much as possible specify the quality requirements and allow participation of qualified and experienced firms for tendering.

The Right Cost: - in strict terms the right cost usually relates itself very much to the quality expected to accomplish the task. It is clear to say that it is difficult to get the right cost, however, there is a possibility to approach it. It is one of the main ground for procurement to be processed. To have the right cost and to accomplish the project market intelligence and negotiation play a key role. Competition is the bases for determining the right cost for a project.

The Right Time: for a client to select the right procurement method time is a major priority factor. This usually relieves the extra cost incurred on the parties which will make them suffer, besides if the project is not completed at the right time, its effects are devastating. To ensure the prevention

of such happenings scheduling concerning right timing is essential. Reducing the duration of a project has a significant positive influence on project performance or success (Gehrig, 2009; Tooky et al. 2001).

The Right Quantity: - quantity of a project needs a carefully computation and included in BOQ. This is because it has an effect on the project cost and site organization, which is the base for offering the right price. If the quantity is taken mistakenly, it will have consequential effects such as: understocking or more storing places and risk of spoilage due to high stocking, Overenthusiastic contract administration, improper Contractor cash flow, corrupt practices due to over budget provisions... etc.

Therefore, provisions of the right quantity resolve the occurrences of the above-stated problems. This can be mitigated through Take-Off-Sheet Measurements and Resources Allocation.

The Right Counterparts: - This is to guarantee that the parties involved in project implementation shall be fit for the job. The project owner should know what his needs are as accurate as possible, be competent to act as an employer and should possess the finance. The consultant must have the expected skill, knowledge and persistence performance of his obligations. If authorized to certify, decide or exercise discretion, the engineer does so fairly between the client and the third party not as an arbitrator but as an independent professional act by his skill and judgement. The contractor shall be able to execute and maintain the task successfully with due care, diligence and provide all labors including supervision, materials, equipment, etc. Therefore, with the help of tendering, it is possible to select the right counterparts. Kotler (2000) maintains that satisfaction can be understood as a person's satisfaction or disappointment resulting from the performance of a product as compared to the person's expectations.

2.4. Project Procurement Methods or Project Delivery Methods

The other major part in the selection of a contractor is the project delivery strategy (George Fekadu 2013). Procurement method determines the level of integration of design, construction and ongoing maintenance for a given project, and it supports the main project objectives in terms of risk allocation, delivery incentives and so on (Keith Potts, 2008). The chosen procurement method influences the allocation of risk, the project management requirements, the design strategy and the employment of consultants and contractors. Different project delivery methods are explained below. Project delivery or procurement methods are specifically designed organizational strategies or structures for delivering construction projects within cost and time budgets, the methods vary

and their nature is determined by the roles played by the project team members, the relationship between them, timing of events and formal general condition of contract used (Thomas E. Uher, Philip Davenport, 2009)

There are six types of Procurement or Contract Delivery systems. These are:

- Force Account,
- Design Bid Build (DBB),
- Design-Build (DB) or Turnkey,
- Public-Private Partnership (PPP),
- Management Procurement method

a) Force Account

Force account is a procurement method the construction of a project is done by public or semi-public agencies, where the public or semi-public agency has its personnel and equipment.

In force account procurement method the Project Owners engage themselves to undertake the project. Often such a system is promoted if the Project Owners believe that there is a comparative advantage in Cost, Time and Quality issues. Besides, when there is a lack of interest from the private sector to undertake the project, public companies do undertake such projects using Force account delivery systems.

These days this type of procurement method is often used when projects are small and places are remote such that reaching them is difficult and in general they are not attractive enough to call the attention of Bidders. Besides when projects are spatially scattered and maintenance are to be done for road, schools, colleges, health centers etc., such cases can be applied.

b) Design-Bid-Build (Traditional) Procurement Method (DBB):

Traditional procurement is the oldest form of construction procurement, it is considered as a popular form of separated-and-cooperative procurement method (Ghadamsi, 2012). The increased size and complexity of the construction projects, financial challenges, political and social consideration, and information technology are just some of the changes that have been taking place for the development of alternative procurement systems other than the famous traditional one (El Agha & El Sawalhi, 2013). According to Larmour (2011), this method is used to describe procurement which involves the client's design team producing a full construction design then the contractor will then tender for the construction of this package. The other scholar Davis et al., (2008) stated that in DBB the design work accepted by the employer is generally separate from

construction and consultants are hired for design and cost control while the contractor is responsible for carrying out the works according to the design. In this method a project owners did prepare the Basic Planning that identifies construction project programs, they call upon the participation of Design and/or Supervision Consultants either by tender or by negotiation contracts and this consultant will carry out the design together with the necessary tender documents which will be the bases for tendering and selecting contractors. 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 (George Fekadu 2013).

In this type of delivery system, the project is divided into different work packages. The design and supervision consultant will be the prime professional on behalf of the owner and largely the administrator of the construction contract. The employer takes the responsibility of coordinating the various project packages and their respecting interfaces. Both the consultant and employer are held accountable based on their superior knowledge and sufficient competence and ability to design with a reasonable degree of technical skills. Contractors are also responsible to construct works with due care and diligence and complete them as per the contract, but they are not held responsible for design deficiencies.

According to (Ibbs W., Y.H Kwak, and et al., 2003) the traditional or DBB method of project delivery is lack of innovation, delayed completion periods, and cost overruns. Since, in the DBB method, the client bears most of the risks of the design and the construction aspects, there need to be better practiced to assure the client's requirements are met, including quicker project completion times, and cost-effective solutions (George Fekadu, 2013). The following standard forms of DBB Conditions of Contract are known for use for such delivery system, FIDIC White Book for Consultancy Services (Design and Supervision) and Red Book for Construction Works, Standard Conditions of Contract for Construction of Civil Works, 1994; MWUD

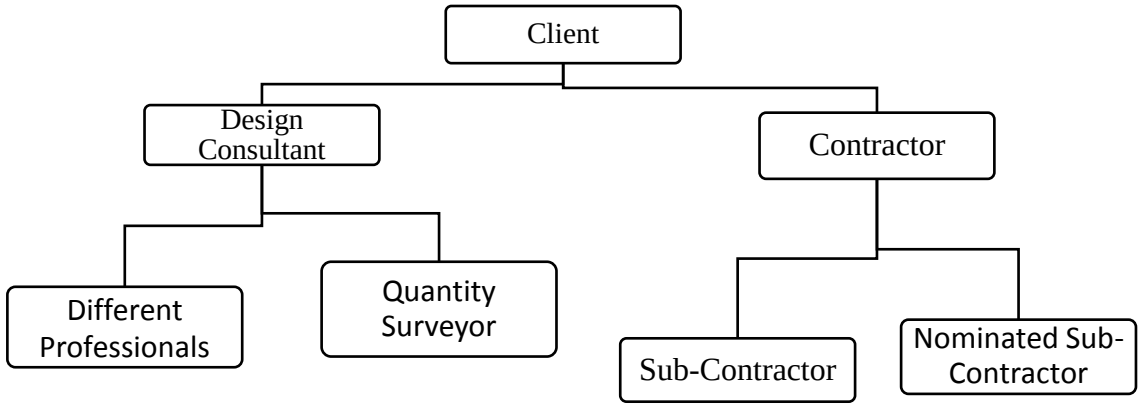

Figure 2.1: Source: Davis et al., (2008), Traditional procurement method,

c) Non-Traditional procurement

Masterman in 2002 defines a non-traditional procurement system as a diversified contemporary procurement system that not only considers design and construction but also considers financing, operating and facility management.

i. Design-Build Delivery Method (DB):

Design and Build Delivery system is a response to problems associated with the previous two types of delivery systems. Design and construct procurement method is an arrangement where one contracting organization usually but not exclusively the contractor takes sole responsibility for the design and construction of the project, normally on a lump sum fixed price basis, for the custom-made design and construction of a client's project (Masterman 2002, Mathonsi and Thwala, 2012). The client deals only with one organization. In this delivery method, the client selects an organization that will complete both the design and the construction of a project under one agreement (George Fekadu 2013). It was identified as offering the project for the best project performance (Marwa, A. El. W. May 2004).

Design-Build by principle reduces numbers of procurement processes and employ only one procurement process and a single contractor to provide the entire construction implementation process (design and construction). It is universally common for Private projects. It directed lead contracting firms to form a team or syndicate of designers and speciality contractors who work together to meet the entire demand of the employer. In this type of procurement, method projects are initiated after the client built the project concept during the planning phase and brought to the DB Contracting Syndicates. This makes an additional responsibility to the contractor which is ¨fitness to purpose¨ according to the Orange Book of FIDIC.

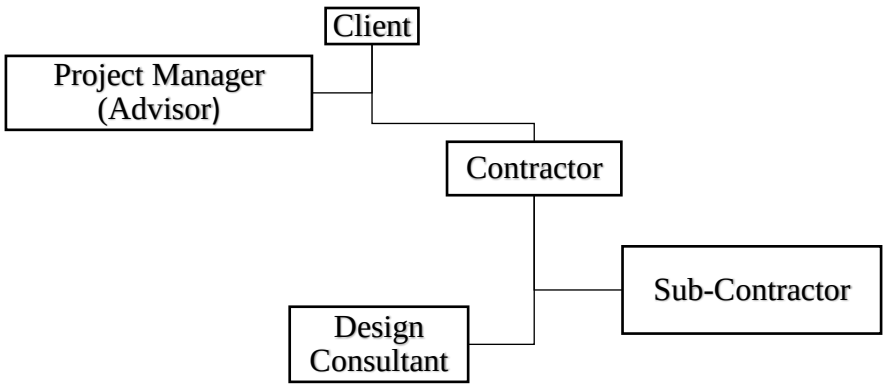

Figure 2.2: Source: Davis et al., (2008), Design and Build Procurement Method,

Public-Private Partnership (PPP) Project Delivery Method:

It is a Long-Term Project Delivery Method enabling partnership agreement to be established between a government entity and a private organization for developing and operating a public asset and/or providing a public service in which the private organization bears significant risk and management responsibility for performance-based compensation from service fees by the beneficiaries and / or the Government (ERA, 2019). It was brought about by the lack of public funds to maintain such activities within the government domain as well as the need to make such services more efficient (P.Davenport &T. EUher, 2009). In which a private company is responsible to finance, design, construct, and operate a project for a certain period and transfer the project for the public. According to (P.Davenport &T. EUher, 2009) the most common forms of PPP are outsourcing or contracting out, and concessional delivery methods such as BOT and BOOT. 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 (George Fekadu 2013).

Herein project delivers method government grants a project development company to develop and operate what would normally be a public sector project, for a given period known as the concession period. The arrangement is that the contractor or a consortium of the contractor and another party (the operator), commonly known as ‘promoter', will contract to build the project, for example a toll road, a bridge, a prison or a water treatment plant, operate the project either under a lease (BOT) or as an owner (BOOT), and at the end of a concession period, say 20 to 40 years, transfer the project to the principal (P. Davenport & T. EUher,2009). PPP project involves a potentially complex contractual structure. Such procurement method needs the appropriate packaging of

projects and their demarcation. It is advisable to start with small projects and tries to develop experience and expertise to make such a delivery system successful. Projects may be unsuccessful for very large projects because it is an extremely risky business for contractors. The increasing popularity of the PPP project is largely due to a shortage of public funding and the opinion that the facility will be more efficiently managed by a private entity. The following standard forms of PPP Conditions of Contract are known for use for such delivery systems: FIDIC Yellow Book

ii. Management Procurement method

According to Larmour (2011) this method is involves a contractor when it provides management service. In management procurement the client contracts separately, but somewhat simultaneously, with a design consultant and with a firm whose primary expertise is construction (Collins, 2011). The two main variants of this are Management Contracting and Construction Management, which are both very different approaches(El Agha & El Sawalhi, 2013). Mathonsi and Thwala, (2012) stated that under a management-oriented procurement system, the management of the project is carried out by an organization working with the designer and other consultants to produce the designs and manage the physical operations which are carried out by contractors. There are several variants of management procurement, but the two most common among the management methods of procurement are; (a). Management contracts (b). Construction Management. Both of these systems operate almost on the same concept, except that in Management Contracting, the package contractors enter into contract with the management contractor and in Construction Management System, the Package Contractors enter into contract with the client (Rashid et al., 2006)

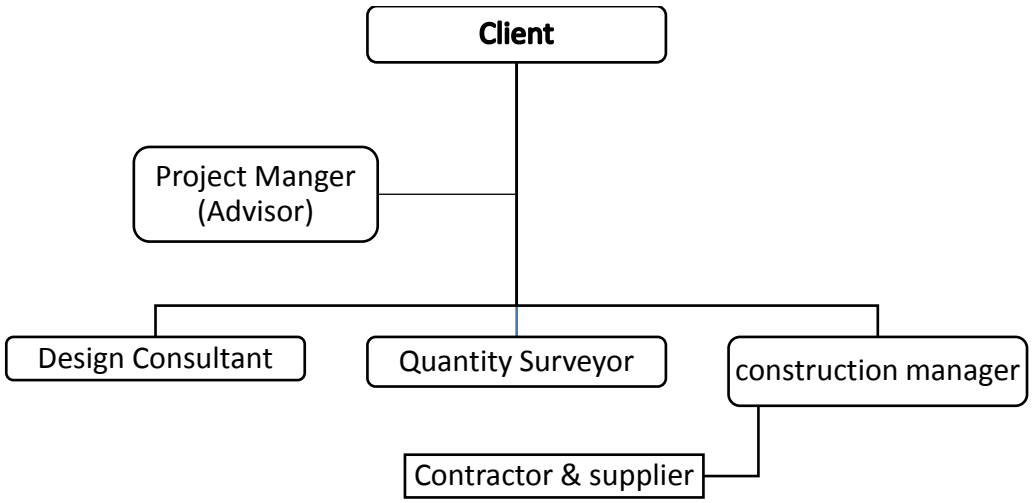

Figure 2.3: Source: Davis et al., (2008), Management procurement method

- **Management contracting procurement method**

The management delivery method is a unique organization structure with the project manager as a leader of the team.(P. Davenport & T. EUher, 2009). Their involvement at pre-construction stages will be as adviser to the team, and during construction they will be responsible for executing the works using direct works contracts and during construction they will be responsible for executing the works using direct works contracts (El Agha & El Sawalhi, 2013). Using this type of contract it is conceivable to make an early start on-site and attain early completion, because of its flexibility, it allows the client to change the design during construction because drawings and matters of detail can be adjusted and finalized as the work proceeds (Davis, Love, & Baccarini, 2008)

- **Construction Management Delivery Method (CM):**

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.

The construction industry is dedicated to the establishment of physical infrastructure like roads, tunnels, bridges and building. It has often characterized by complex large-scale activities organized as projects. Construction projects have unique and complex characteristics compared to each other. Road construction projects are characterized by a large-scale activities and consume enormous amount of budget.

Construction Management delivery system include the management activities related to a construction program carried out during the Basic Planning, Design & Construction Implementation and its completion process that contributes for the successful completion of projects.

Construction Management Consultancy service are particularly attractive to organizations that involve in construction physical infrastructures such as MoE, MoH, Real Estate Organizations, MoWRs, MoT&C, etc.

2.5. Procurement method selection criteria

A road construction project is one way of delivering a solution to the particular business needs of clients, whether for new construction road, upgrading or improved efficiency.

The efficient procurement of a road project through the choice of the most appropriate procurement strategy has long been recognized as a major determinant of project success and a failure to select an appropriate procurement approach as the primary cause of project dissatisfaction (Miller, Furneaux, Davi, Love, & O'Donnell, 2009).

New road projects are invariably unique one-off designs and built on sites that are also unique in nature (Turner, 1990). Thus, when considering a procurement method of a project, a client should be made aware of the complex array of activities and processes that are involved with the procurement process to manage the project activities appropriately (Gordon, 1994). Newcombe (1992) suggests that the selection of a procurement method is more than simply establishing a contractual relationship as it involves creating a unique set of social relationships whereby forms of power within a unification of challenging or compliant interest groups are established. Differing goals and objectives and varying degrees of power within a project team are often the primary conditions for prompting adversarial relations (Love et al., 2004). The New South Wales Government (2005) designated that the selection of a procurement methodology essentially involves establishing:

- The most appropriate overall arrangements for the procurement;
- A contract system for each of the contract or work packages involved as components of the chosen delivery system; and
- The way procurement will be managed by the agency or management system to suit the delivery system and contract system selected.

According to ERA alternative procurement manual selecting the suitable PM is expected to provide the following benefits:

a) Achieving Best Price or Value
b) Achieving Critical Schedule Requirement including Milestones
c) Achieving Best Quality
d) Achieving Maximum Scope
e) Alignment with the Employer, Employer's Representatives, Contractors, Suppliers, etc. Capabilities
f) Alignment with the Project Specific Attributes
g) Utilizing PM benefits to predict Project Risks

ERA in its Modernization process indicated the following five issues to be considered in preparing a guideline on the suitability of evaluating and selecting the appropriate PDM:

i. Flexibility
ii. Speed
iii. Value for Money (Cost)
iv. Safeguarding of Public Values (Road Life Time)
v. Level of the Construction Industry

A primary issue that often is raised within the construction industry relates to what clients want in order to be satisfied with their construction and the means by which those construction have been procured. Consequently, it is important to evaluate the clients 'criteria, their importance and then seek performance to match the criteria. All clients require their construction to be finalized on time, within budget and to the highest quality. However, some clients give high priority for selection criteria more than others.

Conventional procurement selection criteria are based around the concepts of time, cost and quality (Rowlinson, 1999b). While the use of such criteria can be used as a guide to assist decision-makers with an initial understanding of the basic attributes of a particular procurement system, they should not be used as a basis for selecting the procurement method (Miller et al., 2009). This is because of the underlying complexity associated with matching client needs and priorities with a particular method (Kumaraswamy and Dissanayaka, 1998).

NEDO (1985) identified nine criteria that clients could use to select their priorities for projects. These are:

1) Time: is early completion required?
2) Certainty of time: is project completion of time important?
3) Certainty of cost: is a firm price needed before any commitment to construction given?
4) Price competition: is the selection of the construction team by price competition important?
5) Flexibility: are variations necessary after work has begun on-site?
6) Complexity: does the building need to be highly specialized, technologically advanced or highly serviced?
7) Quality: is high quality of the product, in terms of material and workmanship and design concept important?
8) Responsibility: is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?
9) Risk: is the transfer of the risk of cost and time slippage from the client important?

According to Rowlinson (1999a) the concept of cost certainty is a fallacy in the context of traditional approaches that are based upon full drawings and bills of quantities. This approach should provide a client with a firm, fixed price for construction but in practice very few projects are actually completed within the tendered price (Rowlinson, 1999a; Love, 2002). Complete drawings and BoQs are generally not available when a projects goes to tender. Rowlinson (1999) therefore asks why do clients 'continue to use this method when it can be argued that it leads to:

- a lack of flexibility;
- a price to pay in terms of claims-conscious behavior due to the fallacy of cost certainty; and
- A release of control by the client organization.

Luu et al. (2003) state that the use of a limited number of factors such as those identified by NEDO may give augmentation to the selection of a sub-optimal procurement method. Since the selection of procurement method is influenced by project characteristics (Ambrose and Tucker, 2000), client characteristics (Moshini and Botros, 1990) and the external environment (Alhamzi and McCaffer, 2000), procurement selection criteria representing the constraints imposed on the project should be considered before a decision is made. Constructing on their review of selection criteria, Luu et al. (2003) empirically identified a set of interrelated factors that need to be taken into account during the procurement selection process. The bases of these criteria have been used to develop decision support systems that will be described (Luu et al. 2005). The project characteristics

identified by Luu et al. (2003) as being key factors influencing procurement selection were project type, project size, and road construction type. The New South Wales Department of Commerce (2006) provide a more comprehensive list of project characteristics and constraints that must be considered when selecting a procurement method for a specific to the project. The selection of an appropriate procurement method can be effective in mitigating the risks inherent in a project (Davis et al., 2008). However, it should be noted that the contract itself will assign and allocate the risk and responsibilities of parties involved in a project (Miller et al., 2009).

The different procurement methods which are available now has made clients' decisions comparative to adopt any of the method for any project. Various factors have to be taken into consideration before any informed decision can be made on the right procurement choice.

2.6. Factors influencing procurement method

Love et al., 1998; Luu, and Chen, 2005, Ratnasabapathy et al. 2006, Rowlinson, 1999, Morledge et al. 2006 classify factors that influence the selection of procurement method into two:

- External surroundings like social, political, finance, legal, nature disasters, technological factors and;

These factors should be considered because they have a potential impact on the client and his business, and the project team during project's lifecycle economically, commercially, technologically, politically, socially and legally. For example, potential changes in interest rates, changes in legislation and so on (Davis et al., 2008)

Changes in technology may result in changes being introduced to a project procurement method.

- Internal surroundings which may be divided under three main factors; project characteristics, client's characteristics and client's demand.

Project characteristics like the size, complexity, location and uniqueness of the project should be considered because it will influence time, cost and risk.

Client resources – a client's knowledge, the experience of the organization with procuring road projects and the environment within which it operates will influence the procurement method adopted.

Client objectives are influenced by the nature and culture of the organization. The degree of client involvement in the project is a major consideration in the procurement method.

Ability to make changes ideally the needs of the client early stage project identification, this is not always possible. Changes in scope usually result in increased costs and time, especially if it occurs

during construction period. It is important at the beginning of the project to consider the extent to which design can be completed and the possibility of changes occurring.

Cost issues – An assessment for the need for price certainty by the client should be undertaken considering that there is a time delay from the initial estimate to when tenders are received. The extent to which design is complete will influence the cost at the time of tender. If price certainty is required, then design must be complete before construction commences and design changes avoided.

Timing – Most projects are required within a specific time frame. It is important that an adequate design time is allowed, particularly if design is required to be complete before construction. Assurances from the design team about the resources that are available for the project should be sought. Planning approvals can influence the progress of the project. If early completion is a critical factor then design and construction activities can be overlapped so that construction can commence earlier on-site. Time and cost tradeoffs should be evaluated.

2.7. Project Success

The definition of project success is ambiguous, Salleh (2009). Traditionally, researchers and organizations have focused on three project success performance criteria of cost, time and quality (Dainty el al., 2003, Chan 2004, Swan and Khalfan 2007), however, many studies include other performance aspects, such as health and safety, environmental and customer satisfaction and innovation were criteria's to evaluate construction projects performance and considered as success criteria (Chan 2004, Collins and Baccarini 2004, Harty 2008). PMBOK 4th edition (2008) stated that a project is successful if it achieves the triple objective outcome of within time, scope, and quality. This is the traditional view of project management as used by Munns and Bjeirmi (1996). Project success is measured against the project's overall objectives and project management success that is measured against the iron triangle (time, cost and quality) and customer satisfaction. Success factors are the set of circumstances, facts, or influences which contribute to the project outcomes (Serrador & Turner, 2015). Project success is the efficiency of the project with regarding to cost, time and quality performance of the project or the iron triangle of the project. Stakeholders' satisfaction has become prominent in the modern approach to performance measurement, and clients remain the most important stakeholder when considering project performance. In (1999) Baccarini indicate that, project success results include 2 different elements, particularly project success results and also project success product results.

According to Freeman and Beale 1992, there are seven criteria for measuring project success.

- Technical performance, which includes scope and quality,
- Efficiency of project execution, which integrates time and cost,
- Managerial and organizational implications encompasses the satisfaction of the parties involved and the degree to which the project was carried out without disrupting the organization,
- Personal growth of the project team
- Project cessation in terms of handover to operations
- Technical innovativeness

Kerzner, concluded that, whilst in the past, success criteria associated with the quality of the product, such as technical performance, cost and duration, were the important measures, the quality of the project management process, as perceived by the parties involved in the project, were now equally as important.

Freeman and Beale identify technical performance, cost and duration as the main criteria used by one particular stakeholder group, project sponsors, in measuring success. Larson & Gobeli used the criteria of "cost", "schedule", "technical performance" and "overall" to measure project success, with the "overall" criterion incorporating measures of business benefit, such as market share and technological breakthrough. Larson & Gobeli concluded that the "overall" measure of success often overrides the other criteria Barnes & Wearne highlight the importance of a risk policy, anticipation of problems, early decisions and a committed project team. Cash & Fox identify control and reporting, and staffing as important influences on success. Neumann et a! Highlight the influence of proper rewards, in terms of team empowerment, on project success.

Belassi & Tukel grouped factors into four areas:

- Factors relating to the project, such as uniqueness and urgency
- Factors relating to the project manager/project team, such as competence and commitment
- Factors relating to the organization, such as top management support
- Factors, such as client and competition, relating to the external environment

Critical success factors are important influences that contribute to project success (Baccarini, 2003). The most familiar success criteria are completion on time, keeping the project costs within budget, and meeting the performance and quality requirements set out in the specification. However, there are additional criteria that in some industries are equally or even more important.

These can be safety, sustainability, reliability, legacy (long-term performance), and meeting the desired business benefit(Lester, n.d.)

By summarizing the literatures of different scholar's cost, time, quality and customer satisfaction are main project success evaluation criteria's.

2.8. Empirical literature review

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 were DB procurement method and the rests 85 projects were DBB procurement method (George Fekadu 2013).

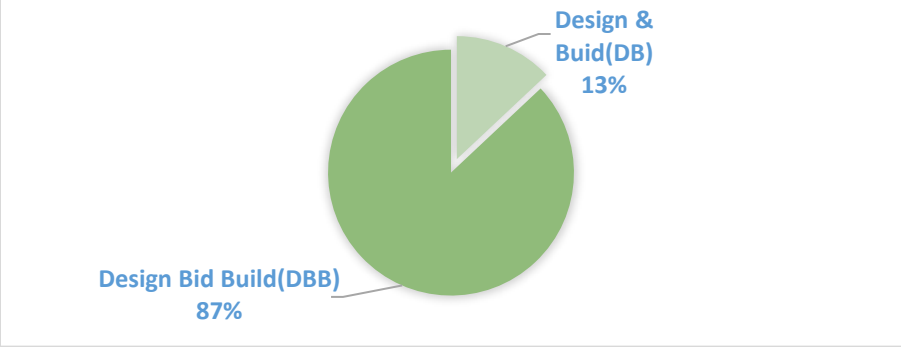

Figure 2.4: procurement method used in ERA: source (Fekadu, 2013)

Most projects of ERA were suffered in cost overrunning, time delay and quality problems due to ERA road contract administration and the procurement method, on many projects the cost overrun exceeds 50% of the project contract amount (Amare 2006). 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). Different types of procurement methods employed in road construction projects has a vital role on the success of project.

Procurement method and tender method are factors affecting project success according to Chan, 2004, Kumaraswamy and Chan, (1999); Walker (1997); Walker and Vines, (2000).

The efficiency of a given project is measured by its delivery of the project in regard to time, cost and quality performance. Procurement methods have become an important issue in the construction industry because every project is procured by a method. The importance of a given

procurement method in the construction industry is due to two basic reasons according to many scholars, the first reason, the procurement of construction projects involves a series of interrelated and sequential processes that affect the effectiveness and the efficiency of a given project significantly. Naoum (1991), Mohsini and Davidson (1992), Bennett, Pothecary and Robinson (1996), Sanvido and Konchar (1998), Molenaar and Songer (1998), Ojo, Adeyemi and Ikpo (2000), Chan, Ho and Tam (2001), Ibbs et al. (2003), Ling et al. (2004) and Idoro (2006; 2007). Second, there are many procurement methods available for a developer to implement in procuring a project. Accordingly, the project developer faces a serious challenge in choosing one technique out of those procurement methods. (Naoum, Fong and Walker) procurement is designed to act as an integrating function, to pull together combinations of resources into temporary organizations to achieve a required purpose.

Procurement has a major impact on Development as, resources are mostly used to procure goods, works or services critical to the achievement of a project development objective (PDO), Public procurement represents 10 to 20% of the GDP of a country and Opportunities for fraud & corruption affect the achievement of the PDOs World Bank (2011). According to EPPPA Report (2011) 64% of many public originations' budget goes to procuring public goods and services in Ethiopia.

Rowlinson and Newcombe (1986) evaluate the performance of the DB and the DBB options and discover that while the cost-overruns in projects procured using the two options are the same, the time-overrun in projects procured by DBB is considerably higher than that of projects procured by DB, they discovered that the cost-overrun in DBB and DB projects was 4%, while their time-overruns were 70% and 40%, respectively. In another study, Konchar and Snavido (1998) discover that DB options solve many problems inherent in the DBB method and that DB projects experience 5.2% fewer changes than DBB projects, which experience 11.4% more changes in their schedule. In another study, Pocock et al. (1996) wrote that projects procured by the design-build method were better than the traditional contract method in cost and schedule growth, the number of contract modifications per millions of dollars and the percentage of changes due to design inefficiency.

Ojo, Adeyemi and Ikpo (2000) and Idoro (2007) find that procurement method is a prominent option in the Nigerian construction industry for project performance. Project performance remains

a prominent issue in project delivery because projects involve defined objectives that must be achieved and numerous resources that must be efficiently utilized. Ling (2004) identifies 70 potential factors for measuring project performance. These and other parameters that have been used in research studies can be classified into two broad categories: subjective and objective parameters. Ling (2004) states that the performance of a project is multi-dimensional and it may include unit cost, construction and delivery speeds and the level of the clients' satisfaction. Pinto and Slevin (1998) classify project success parameters into

- Internal factors, which are the project variables: schedule, cost and quality
- External factors, which are concerned with stakeholders' satisfaction with the performance of a project and the perceived impact on the organization’s effectiveness.

Conceptual Framework of the Research

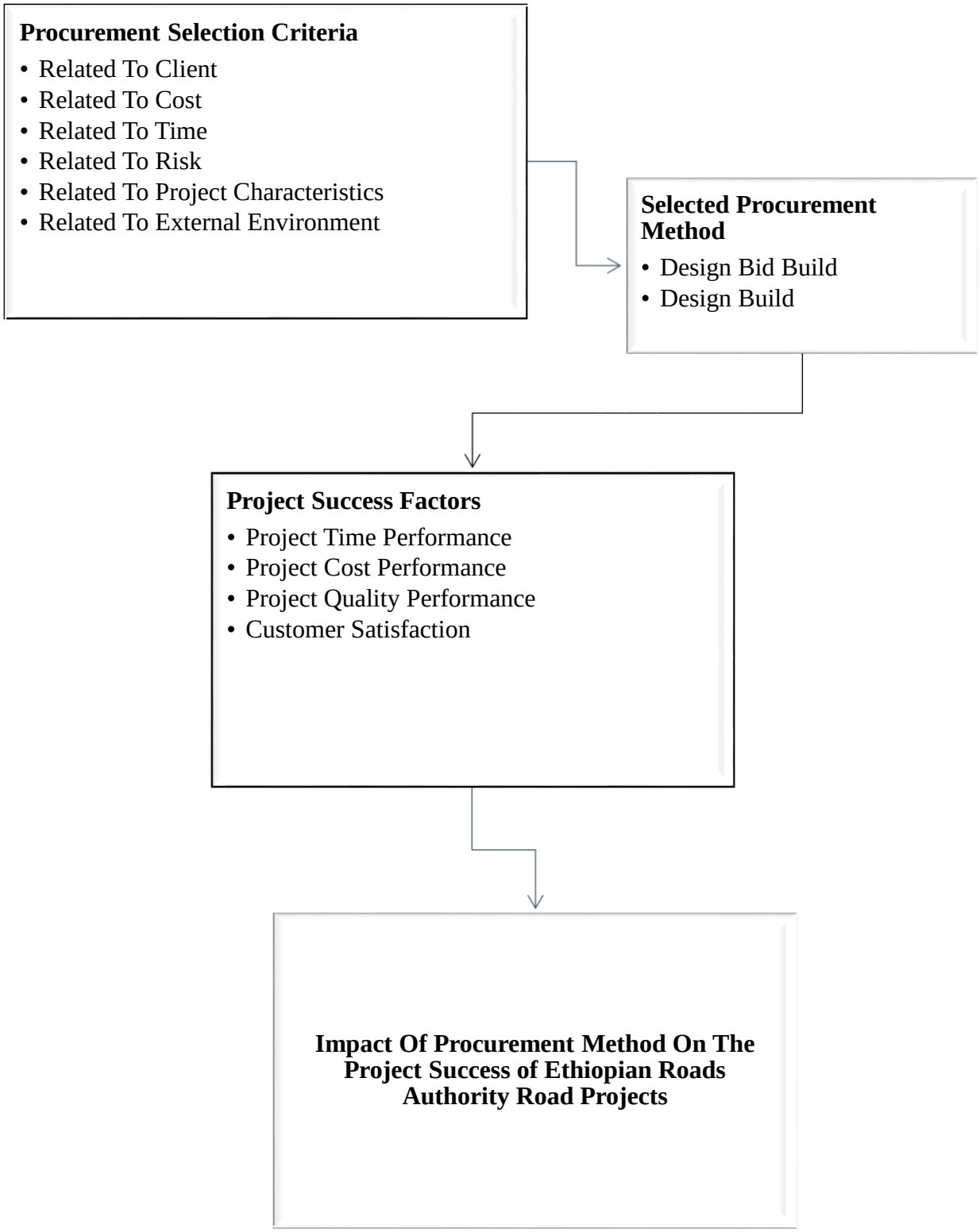

Figure 2.5: Conceptual *Framework of project success with the appropriate procurement method selection criteria.*

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

The main aim of this study was to identify the types of procurement method which ERA has been using for long period of time and to revile the impact on the success of road projects that Ethiopian Road Authority has been accomplishing. So different types of research methodologies were employed to get the necessary data for the research. From those methods, review of contract documents and different research articles to find out the types of procurement method ERA has been using to execute projects were broadly used systems and Extensive review of different publishes on procurement methods and project success to relate procurement methods with project success and selection criteria's of procurement method. On the other hand Distribution of questionnaire to get information about the trend of ERA on selecting procurement method and the impact of the methods on the projects that they are implementing.

3.2. Research Design

To achieve the objective of the research a structured questionnaires were deployed for the ERA staffs and collect data that showed the project detail information that ERA procured for the Contractors and Consultants. The structured questionnaire was widely used data collection method for conducting survey and widely used for descriptive and analytical assessment in order to find out facts, opinions and views.

3.3. Population and Sample Design

Since this study is limited to the types of procurement methods and their impact on the project success of Ethiopian Road Authority, the population of the study was focused on staffs those directly involve on the procurement method selection and implementation the selected methods on different road projects all over the country. There are two core directorates in ERA involve in the selection and implementation of procurement method, these are Engineering Procurement and Regional Construction Project Management Directorate respectively. The regional construction project management directorate has five sub directorates like: south region, north region, central region, east and west region project management directorate. So the study designated these directorates as sample representatives of the total population due to very close experience on the procurement methods and execution of road projects. Because of the specificity nature of the study

that needs knowledgeable persons in the procurement methods and related area of practices, Purposive sampling, sometimes referred as judgmental sampling, which is a non-probability sampling method, is deployed to select the respondents for this research purpose. Therefore it was believed that the data collected from the above stated staff members of the Engineering Procurement directorates all the staffs are selected as sample to have full information about the selection and the types of procurement method. On the other hand for Regional construction project management directorate staff members the sampling method was random sampling because of the task they are performing have similarity and to decreases redundancy of the questioner distribution. By random sampling method respondents were selected from the five region and four regions were selected randomly and questionnaires were distributed.

Table 3.1: Population of Regional Construction Project Management Directorate

	Team	Team members	Total including team leader	Total including director
Engineering Procurement Directorates	4	10	40	41
Regional Directorates				
South Region Construction Project Management Directorate	3	12	36	37
West Region Construction Project Management Directorate	3	12	36	37
North Region Construction Project Management Directorate	4	10	40	41
East Region Construction Project Management Directorate	3	12	36	37
Central Region Construction Project Management Directorate	4	10	40	41
Total population				234

Source: own survey 2019.

3.3.1. Sample Size Estimation

- Sampling Equation

For randomly selected regional staffs the equation of (Kish, 1995 cited in Arian and Pheng 2005) can be used to determine the sample size. The sample size can be calculated as shown below for 95% confidence level (Assaf et al., 2001); Moore et al., 2003 the required sample size for the research for each parties involved in the survey was determined statistically using the following expression.

- Confidence level 95%

$$n_0 = (p*q)/ V^2$$

$$n = n_0 / [1+ (n_0 / N)$$

Where: n_0: First estimate of sample size

p: The proportion of the characteristic being measured in the target population

q: Complement of p or 1-p

V: The maximum standard error allowed

N: The population size

n: The sample size

To maximize n, p was set at 0.5. The target populations.

$$q=1-p$$

$$=0.5$$

$$no = \frac{.5 * .5}{(0.05\text{^}2)}$$

$$= 100$$

$$n = \frac{no}{(1 + \frac{no}{N})}$$

$$= \frac{100}{1 + \frac{100}{193}}$$

$$= 34.129$$

$$\text{Sample Size} = 35$$

From the regional construction project management directorate 35 candidates are selected for the questioner distribution and to get information about project success criteria evaluation.

For this research purpose all Engineering Procurement department 41 individuals and from RCPD 35 individuals were involved on questionnaire response. As much as possible to get the full response of the sample population and to increase the precision of the data 91 questionnaires were distributed in these two directorates. From those questionnaires 72 questioners where recovered. From total 76 survey sample 72 respondents return the questioner. this shows 95% of the sample population respond for the questioner and the table shows the postion of these respondents.

Table 3.2: Sample Size of the Research Study

Directorate	Sample size	Frequency of respondents	Percent
Engineering Procurement	41	36	47.5
Regional Construction Project Management	35	36	47.5
Total	76	72	95

Source: own survey 2019.

From the above data the sample population response of the RCPM directorate is greater than the sample population becaues the questionniar distrbuted for that directorate is 50 becaues to get repersentive the sample population properly and to reduce the error that comes due to unreturned questionniar.

The above table demonstrate respondentes on their position.most of respondents were project engineers. This support the research through providing relevant response.

3.4. Statistical analysis tool

The researcher used both quantitative and qualitative data analysis methods. The data analysis was made with IBM (SPSS 20) and analyzed the data through the following methods.

- Frequency and descriptive analysis
- Cronbach's Alpha for reliability statistics
- Spearman Rank correlation for validity
- Relative Importance Index (RII)
- Regression analysis

The relative importance index methods (RII) are used to determine the ranks of all factors and sub-factors. The relative importance index is computed as (Sambasivan and Soon, 2007)

The RII value had a range from 0 to 1 (0 not inclusive), higher the value of RII, more agree for the paragraph.

Sign test is used to determine if the mean of a paragraph is significantly different from a Middle value of Likert scale. If the value of Sig is smaller than or equal to the level of significance, α= 0.05, then the mean of a paragraph is significantly different from a hypothesized value, The sign of the test value indicates whether the mean is significantly greater or smaller than hypothesized value, On the other hand, if the value of Sig is greater than the level of significance, α= 0.05, then the mean a paragraph is insignificantly different from a hypothesized value(El Agha & El Sawalhi, 2013).

3.5. Methods of Data Collection

The basic methods applied to achieve the objectives of this research were the followings:

Concerning objective one and two: (To investigate types of procurement methods in Ethiopian Roads Authority projects)

Data collected from ERA, Engineering procurement directorate three year complied data about procurement methods and through a structured questionnaire survey approach from both directorates was used to find out the project delivery method performed in ERA

Concerning objectives three & four: (To identify the factors and factors affecting the selection of procurement method)

Review of related Literatures about the factors that affect the selection of procurement method from different alternatives was reviewed by (Maizonet al., 2006; Shiyamini et al., 2007; Babatunde et al., 2010; Odhigu et al., 2011; Rosli et al., 2006; Husam and Sedki, 2009; Franco et al., 2002; Thomas, 2001; Shafik and Martin, 2006; Mahon, 2011; Abu Bakar et al., 2009; Mortledge et al., 2006; love et al., 2008; Tran et al., 2012; Eyitope et al., 2012, El Agha & El Sawalhi, 2013) to identify the main and sub-factors affecting the selection of procurement method in ERA road projects. In addition, there are other factors from ERA alternative project delivery method manual 2019 was taken to and analysis from questionnaire from the ERA staffs. From a conducted literature review six main factors and 46 sub-factors affecting the selection of procurement method recognized by researchers. These sub-factors are grouped into six main groups based on literature review as shown in Table 3.3.

Table 3.3: Factors for Selection of Procurement Method

Main Factors	Sub-Factors
Factors related to client	Client reputation
	Client's experience in procurement methods
	Client's trust in other parties
	Flexibility for changes and variations
	Client's financial capability
	The degree of desired client involvement
	Availability of qualified personnel (procurement staff)
Factors related to cost	Price competition
	Design cost
	Consultant fees
	Price certainly prior to commencement
	Cost control
Factors related to time	Speed of project activity
	Minimize design time
	Time constrains of project
	Time control
	Delays in obtaining environmental approval
	Delay in the project completion time
	Delivery time schedule
Factors related to risk	Risk avoidance/allocation
	Responsibility allocation
	Disputes & arbitration
	Geotechnical investigation
Factors related to project characteristics	Degree of project complexity
	Funding method
	Project site location
	Project payments modality
	Quality level of project
	Expected performance of project
	Available resources of project
	Constructability of design
	Project completion at estimated time
	Project completion at estimated cost
Factors related to external environment	Procurement policy
	Market competitiveness and structure
	Political considerations
	Social factors

	Environment impact
	funding organization involvement/role/participation
	Legal issues/factors
	Number of competitors
	Technology
	Stakeholder integration
	Worker conditions
	Material availability

Source: own survey 2019.

Concerning objective five

The analysis from the questionnaire and data collected from ERA will address these objectives depending on survey results, literature review.

3.5.1.Developing Questionnaire

Questionnaire survey is designed to attain further information in order to support the research study objectives and to identify the impact of project procurement method on the road projects of ERA. The questions of the research questioner were developed based on

- Review of related Literature.
- Data obtained from ERA Engineering Procurement Directorate three year complied data about procurement methods.

3.6. Validity test and reliability test

3.6.1. Validity test

This section presents test of validity of questionnaire. Pilot and Hungler, (1985), stated validity as the degree to which an instrument measures what it is supposed to measure. Validity has a number of different aspects and assessment approaches, from those aspects, Statistical validity is used to evaluate instrument validity, which include criterion-related validity and construct validity (El Agha & El Sawalhi, 2013).

To insure the validity of the questionnaire, two statistical tests should be applied. The first test is Criterion-related validity test (Spearman test) which measures the correlation coefficient between each paragraph in one field and the whole field and the second test is structure validity test (Spearman test) that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire (El Agha & El Sawalhi, 2013). It measures

the correlation coefficient between one filed and all the fields of the questionnaire that have the same level of similar scale (Akali, 2018).

Table 3.4: Spearman Correlation Coefficient for Validity of Questionnaire

Spearman's rho Correlations							
		A	B	C	D	E	F
Factors related to client (A)	Correlation Coefficient	1					
	Sig.						
Factors related to cost (B)	Correlation Coefficient	.543**	1				
	Sig.	.000					
Factors related to time (C)	Correlation Coefficient	.426**	.701**	1			
	Sig.	.000	.000				
Factors related to risk (D)	Correlation Coefficient	.630**	.558**	.529**	1		
	Sig.	.000	.000	.000			
Factors related to project characteristics (E)	Correlation Coefficient	.610**	.480**	.657**	.502**	1	
	Sig.	.000	.000	.000	.000		
Factors related to external environment (F)	Correlation Coefficient	.608**	.596**	.641**	.559**	.731**	1
	Sig.	.000	.000	.000	.000	.000	

**. Correlation is significant at the 0.01 level. *. Correlation is significant at the 0.05 level.

Source: own survey 2019

3.6.2. Instrument (Questionnaire) reliability

The reliability of an instrument is the degree of consistency which measures the characteristic; it is supposed to be measured (Polit and Hunger, 1985). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (Polit and Hunger, 1985).

The value of the reliability coefficient theoretically can range between -1.00 and +1.00. For most purposes, reliability coefficients above 0.7 are considered satisfactory (Polit and Hungler, 1999). The reliability coefficient was calculated which indicated a high level of reliability. For more accuracy, reliability coefficient was calculated for important parts.

This section presents test of reliability of questionnaire according to the pilot study. Reliability of internal consistency was used to test the reliability of the research questionnaire. The reliability coefficient of the scale was established by Cronbach's alfa using SPSS package. Cronbach's alpha

method is used to measure the reliability of the questionnaire between each factor and the mean of the whole factors of the questionnaire. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. The Cronbach's coefficient alpha was calculated for each factor of the questionnaire. The formula that determines alpha is fairly simple and makes use of the variables,

- k, the scale of variables and
- r, the average of the inter-item correlations

$$a = \frac{kr}{1 + (k-1)r}$$

As the number of items (variables) in the scale (k) increases the value α becomes large. Also, if the inter-correlation between items is large, the corresponding α will also be large. Since the alpha value is inflated by a large number of variables then there is no set interpretation as to what is an acceptable alpha value. A rule of thumb that applies to must situations is:

$0.9 \leq A \leq 1.0$ Excellent

$0.8 \leq A \leq 0.9$ Good

$0.7 \leq A \leq 0.8$, Acceptable

$0.6 \leq A \leq 0.7$ Questionable

$0.5 \leq A \leq 0.6$ Poor

$0.0 \leq A \leq 0.5$ Unacceptable

The Cronbach's coefficient alpha was calculated for each field of the questionnaire

Table 3.5: Cronbach's Coefficient Alpha Value to Measure Reliability Main Factors

Field	Cronbach's Alpha
Factors Related To Client	0.956
Factors Related To Cost	0.927
Factors Related To Time	0.963
Factors Related To Risk	0.929
Factors Related To Project Characteristics	0.681
Factors Related To External Environment	0.96
Project Success Criteria of DBB	0.96
project Success Criteria of DB	0.918

Source: own survey 2019

The most identical values of alpha indicate that the mean and variances in the original scales do not differ much, and thus standardization does not make a great difference in alpha.

Thus values of Cronbach's Alpha for each factor of the questionnaire and the entire questionnaire for the fields range from .681 and .963. This range is considered as good and the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals .899 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire.

3.7. Method of data analysis

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there must be an appropriate methods applied. In this research, ordinal scales were used. Ordinal scales are show a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned were (1, 2, 3, 4, 5) to indicate that the interval between scales and they were equal in weight and they indicate absolute quantities. They are merely numerical labels. To rate the importance of the factors in Likert scale was used on the questionnaires.

The data was analyzed using Excel and SPSS packages and will be discussed in Chapter 4, descriptive statistics such as frequency and percentage were computed for each item in the questionnaire. Factor Analysis was performed to allow finding a small number of underlying dimensions from among a large number of variables.

3.8. Ethical Considerations

Comply with ethical rules is essential in conducting research. The researcher received a letter of introduction form the St. Mary's University. Letter of permission enabled the researcher to carry out the research and approach the informants. Participant of the study was informed about the objectives of the study emphasizing that the data were used only for the intended academic purpose only. Careful attention was given, regarding respecting the rights, requirements and values of the study subjects, and maintaining confidentiality of the data and acknowledging sources of information.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1. Introduction

This chapter discusses the results that have been deduced from a field survey of 72 questionnaires, 36 engineers from Engineering Procurement and 36 Engineers from RCPM respondent. Part one will present the profiles and all necessary information about the respondents, part two identify the types of procurement ERA is using to implement the road projects all over the country. Part three was designed to identify and rank the most common main factors and sub-factors affecting the selection of procurement method in road construction projects in ERA, and part four will how these procurement methods impact the project success of the road projects. The results obtained are compared with the relevant literatures and the researcher comments are added.

4.2. Demography of Respondents

This section mainly designed to provide general information about the respondents in terms of gender, profession, education level, directorate, position and years of experience.

Table 4.1 Demography of Respondents

		Frequency	Percent
Sex	Male	48	66.7%
	Female	24	33.3%
Profession	Engineer	70	97.2%
	Construction Management	2	2.8%
Education Level	First Degree	44	61.1%
	Master's Degree	28	38.9%
Directorate	Engineering Procurement	36	50.0%
	Regional Construction Project Management	36	50.0%
Position	Director	3	4.2%
	Team Leader	9	12.5%
	Project Engineer	58	80.6%
	Other	2	2.8%
Experience On Project Management	<3 Years	18	25.0%
	4-10years	44	61.1%
	11-20years	8	11.1%
	>30years	2	2.8%

Source: own survey 2019

From both directorates 33.3% respondents were females and 66.7% were males and 97.2% respondents were engineers and 2.8% were construction management professional, this indicates almost all professionals were engineers. From those respondents 61.1% were first degree holders and 38.9% of respondents were master's degree holders. This result support the quality of the retrieved information from respondents who are almost qualified and experienced.

According to the respondents reply most of the respondents were project engineers, and they account 80.6% the respondents, 11.1% were team leaders, 5.6% directors and 2.8% other staffs of ERA. It can be seen that more than 97.2% of the respondents have a good procurement experience which support the quality of gained information due to direct involvement on the procurement method implementation.

Experience as a general concept encompasses skill and knowledge on observation of something or some event gained through involvement and exposure to that thing or event. The figure shows that 61.1%% have 4-10 years' experience on project management, 25% had less than three year experience, 11.1% respondents have 11-20 years of experience and from those respondents both 21-30 and greater than 30 years of experience accounts 1.4%. it can be seen that respondents with an experience more than 4 years have the highest percentage (75 %), which is cross checked with the obtained results in the position of the respondent (more than 61.1% of the respondents have a good experience on procurement method. This can be taken as a good indicator that respondents had a good experience on the procurement method. Moreover, the variety of experiences between each group will enrich the research with different knowledge and information.

4.3. Perspective about Procurement Method

4.3.1. Most common and frequently used procurement method in your organization

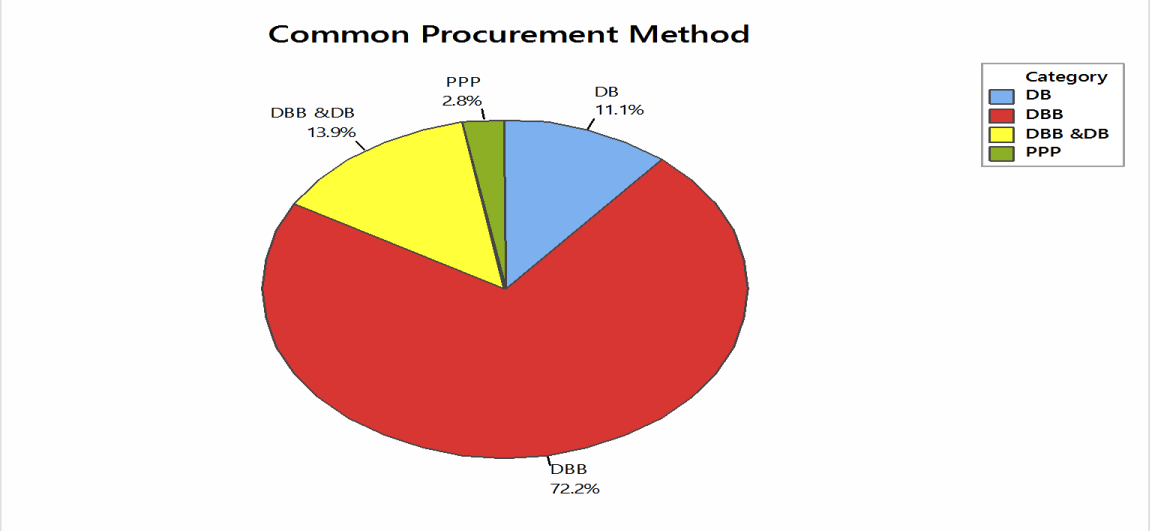

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Figure 4.1: Common Procurement Respondent Experienced

The figure 4.2 shows that, the most common procurement method that selected by the respondents in Ethiopian road authority is a traditional (DBB) procurement method which represent around three fourth (72.2%) from the total sample and the high percentage of this result reflects a bad indicator to ensure that there is no a variety of procurement methods selected and used in ERA road projects. The second most common procurement method is Design and Build (DB) method which represent 11.1% from the total sample and 13.9% of the respondents replay DBB and DB procurement method used commonly used by ERA.

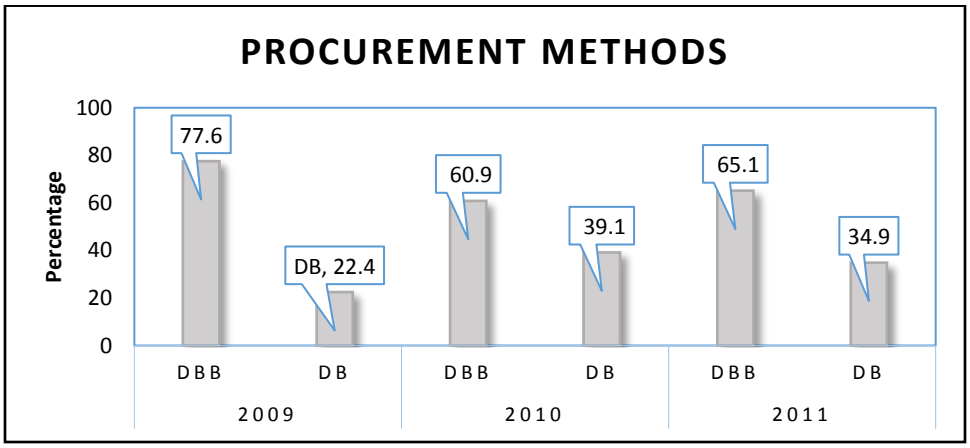

Figure 4.2: Procurement Methods Used In ERA

With reference to the data gathered from engineering procurement ERA used DBB procurement method more than DB procurement method. When we compare respondents reply with above graph, DBB procurement method used to deliver more projects than the DB project delivery method.

It is important to point that other common procurement methods are very rarely selected in Ethiopian Road Authority. According to George Fekadu (2013) ERA has been using the traditional DBB procurement method because ERA has no experience in administrating such projects and limited capacity of local contractors on other innovative procurement methods. The result of this study are in the agreement with Babatunde et al., (2010) study. Abu Bakar et al., (2009) mentioned that the traditional method was preferred by the organizations to procure the projects because it is well known and gives a great control of the project to the client.

4.3.2. Did you involve on the selection of procurement method

According to the respondent's reply most of them (69.4%) did not involve on the procurement method selection, the 30.6% respondents involve on the section of procurement method. This shows that the section process involve different stakeholders from both directorates. The involvement of different stakeholders increase the effectiveness of the selected procurement method.

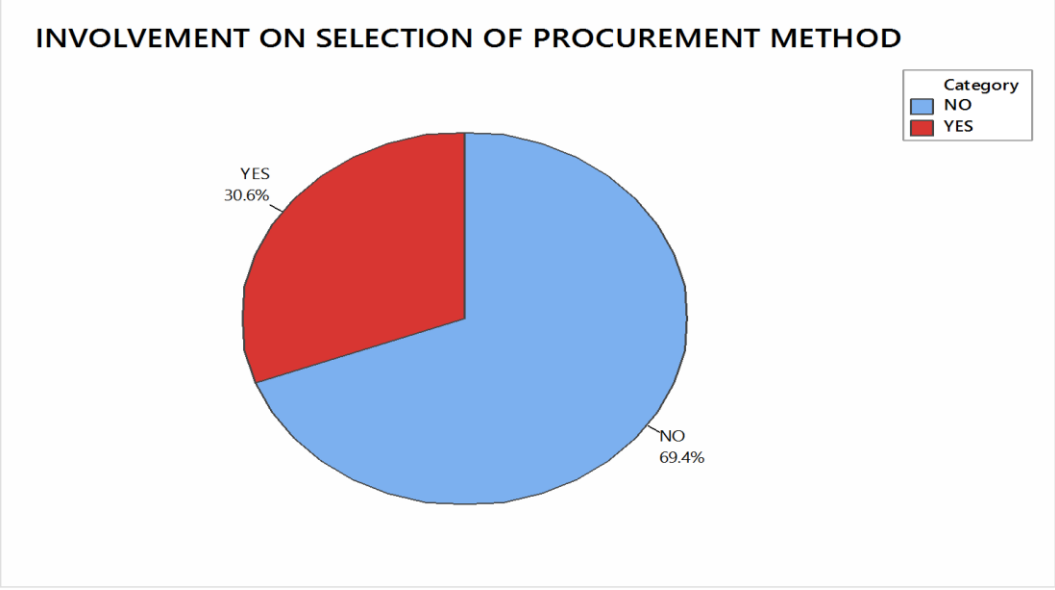

Figure 4.3: Respondents Involvement on the Selection of Procurement Method

4.3.3. Use of Orange FIDIC Book for DB Projects

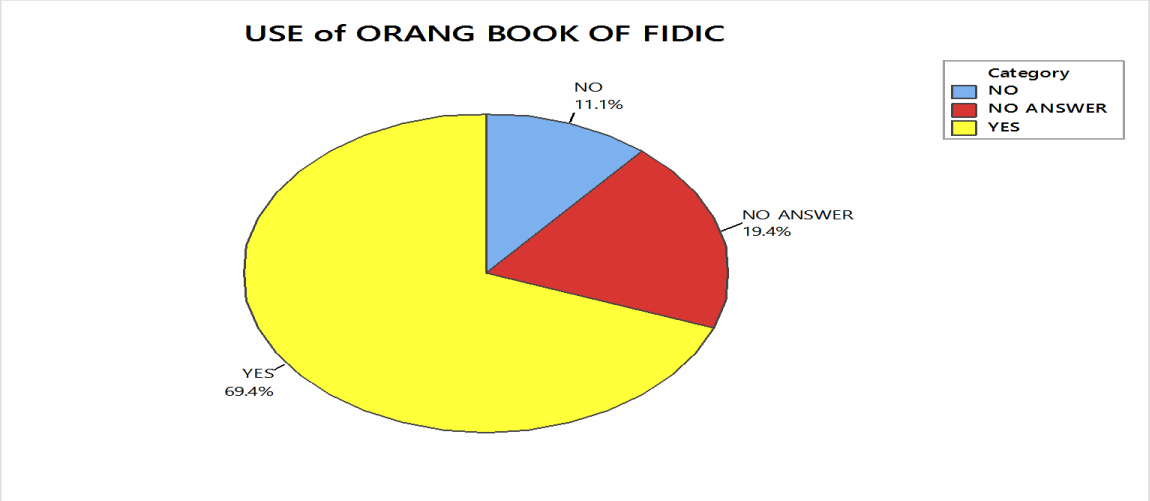

Figure 4.4: Respondents Reply on the Use of Orange FIDIC Book

The figure shows that 69.4% of the respondents retort that they use the orange FIDIC book for the DB projects 19.4% of the respondents were unable to answer this question, this shows respondents use the FIDIC book for contract without any differentiation for each procurement method. The rest 11.1% did not use the orange FIDIC book for contract administration of DB projects. One of the issues for the failure of projects is improper contract administration, this can happen due to the usage of wrong contact administration manuals for a given procurement method on a project.

4.3.4. Complete drawings and BOQ available during procurement of projects

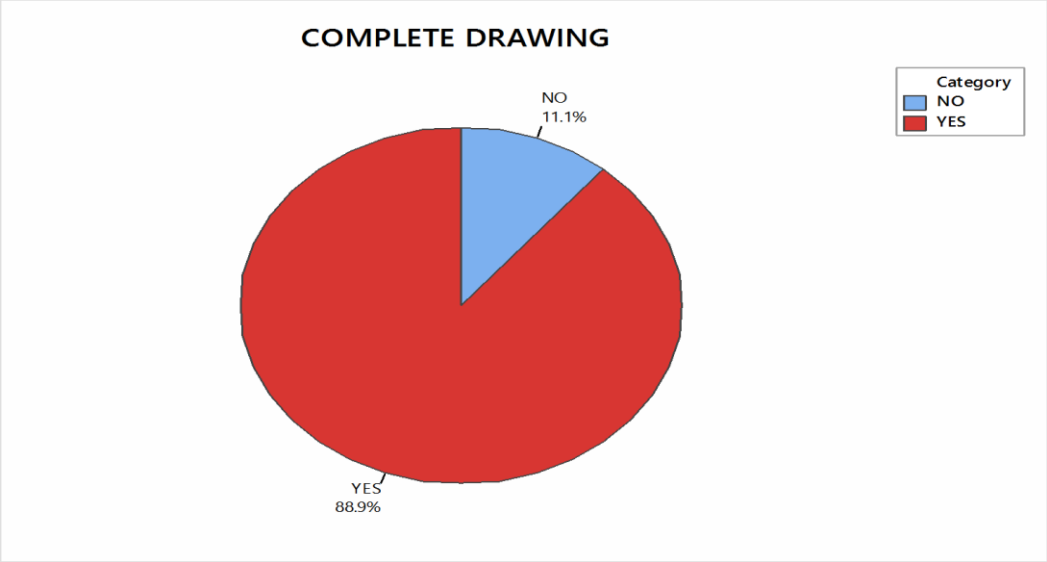

Figure 4.5: Respondents Replay for Complete Drawings and BOQ Availability

Rendering to respondent's response ERA provide a complete drawing and BOQ for the procurement of the project. 88.9% the respondent's agree that a complete drawing and BOQ prepared before procurement process begin but the rest 11.1% of the respondent's reply that there is a delay of drawing and BOQ on the procurement process. To select the appropriate procurement method having a complete drawing and BOQ plays a major role. If the a complete drawing and BOQ is prepared for a given project the procurement method most probably DBB procurement method.

4.3.5. The selected procurement method affect the project success of a project

Each any every related factors to the project affect the project positively or negatively. From the reply of respondent's a majority of them agree the selected procurement method affect the project success and these number accounts 72.2% of the sample population. The rest 27.8% considerd the selected procurement method could not affect the project success.

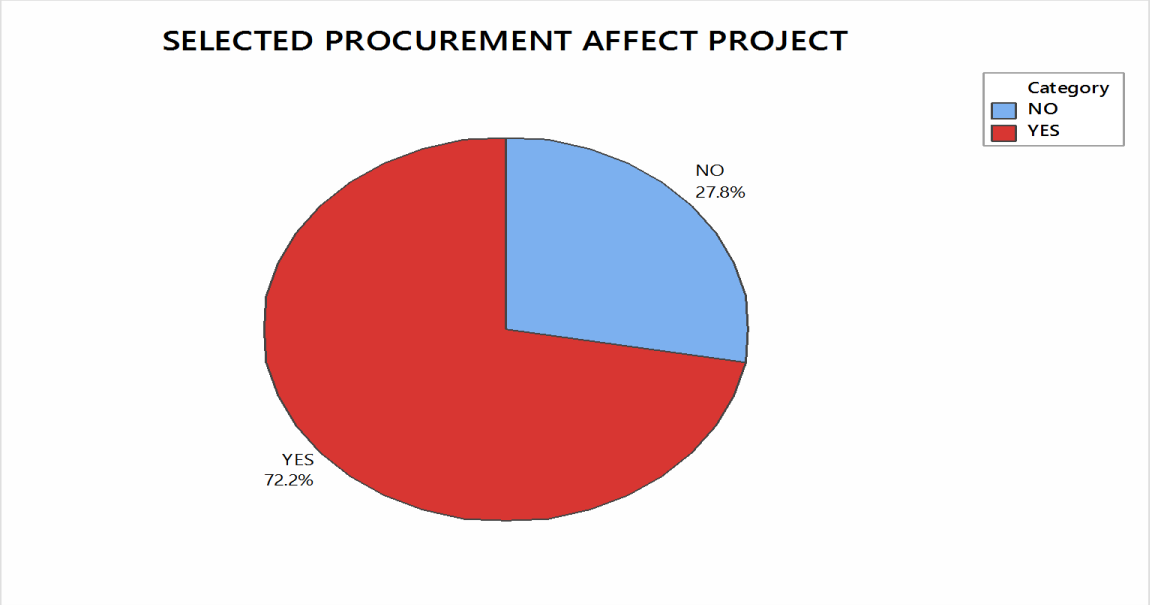

Figure 4.6: Respondents perception towards the impact of procurement method on success of project

4.4. Factors affecting the selection of procurement method

4.4.1. Main factor groups affecting the selection of procurement method

This part consists of results and discussion of main factors that affecting the selection of procurement method in ERA. These factors were grouped into six groups. The first group is related to client factors. The second group is related to cost factors. The third group is related to time factors. The fourth group is related to risk factors. The fifth group is related to project characteristics factors. The last group is related to the external environment factors.

The results of this part of study provide the mean to compare factors that affect the section of procurement method and used to rank the major groups affecting the selection of procurement method ERA. Table 4.7 shows summary of major groups ranking according the mean found from all respondents reply.

Table 4.2: Main Factors for the Selection of Procurement Method

No	Factor Group	Mean	RII	Rank
1	Factors Related To Client	3.5694	71.38889	3
2	Factors Related To Cost	3.3278	66.55556	6
3	Factors Related To Time	3.5026	70.05291	4
4	Factors Related To Risk	3.6806	73.61111	2
5	Factors Related To Project Characteristics	3.7111	74.22222	1
6	Factors Related To External Environment	3.3356	66.71296	5
	Mean Value	**3.521197**	**70.42394**	

Source: own survey 2019

From the above mentioned groups factors related to project characteristics has been ranked by all respondents first position with RII value 74.2. This group is the most important according to the respondents more concerned with project properties such as project funding method, degree of project complexity, project site location, quality level of project, available resource of project and project payments modality. In 2007 Shiyamini et al., ranked project characteristics group in the second position and he stated that this group was also an important parameter in terms of project type and complexity. Eyitope et al. (2012) stated that the project characteristics factor project complexity affects the selection of procurement method. Again in 2006 Mortledge et al., stated sub-factors related to project characteristics such as the project size, complexity, project site location and uniqueness should be considered as factors those influence time, cost and risk factors.

Love et al. (2008) finds that the project characteristics factor is the first important selection criteria and this result has a great similarity with this study and project characteristics groups like complexity, project site location and constructability of the project determines the procurement method in relation to finding a competitive contractor on the market.

Factors related to risk ranked on the second position with RII value of 73.6 depending upon the response of respondents. One of the main aim of selecting procurement method is to allocate risk and responsibility. In construction industry risk and responsibility allocation is clearly shown on different procurement methods.

Figure 4.7: Risk apportionment between client and contractor, source: Davis et al., (2008)

Therefore, selecting the appropriate project procurement method minimize the risk and claim raised due to unclear responsibility engagement.

The client related factors are ranked on third position with RII value 71.39. This is mainly due to experience on procurement methods, financial capability and client involvement on the project, which are considered as important factors by respondents and this is related to client satisfaction. According to (El Agha & El Sawalhi, 2013) client related factors ranked first due to financing issue and client interference, Shiyamini and Rameezdeen (2007) are in agreement with the result of (El Agha & El Sawalhi, 2013) by ranking in the first position. The researcher illustrated that this group can be one of the most important group at macro level in the procurement selection process. Mahon (2011) are strongly agree with this result as he ranked client factors group in the third position and he stated that this group was an important parameter in terms of client experience on procurement method, flexibility to change and client requirement for value for money.

On fourth position factors related to time is ranked with a value 70.05. Minimizing the design time and delivery time of the project are the sub factors in the selection of procurement method and these factors the reasons why DB procurement method is chosen to deliver a project on time by doing the design and construction simultaneously. It is ranked fourth according to El Agha & El Sawalhi, 2013 and this shows the similarity of the rank on both researches.

Factors related to external environment group is has been ranked by the all respondents in the fifth position with RII value 66.71. Shiyamini and Rameezdeen (2007) are disagree with this result as they ranked external environment group in the third position and they stated that this group was also an important parameter and it is one of set of procurement selection indicators.

On sixth or last position cost related factors are ranked with RII value 66.56. In 2011 Mahon considered factors related to cost affects the selection of procurement method strongly and the researcher confirmed that the procurement selection parameter of cost requirements was universally rated as the single most powerful parameter and was considered as most important criteria for the decision of procurement method selection and closely followed by time factors. These two parameters were clearly rated as being the most influential in terms of procurement method selection (El Agha & El Sawalhi, 2013) and they stated this factor on the second position because of its relevance.

4.4.2. The relationship among the selection criteria's of procurement method

This section discuss the relation among main factors that affect the selection of procurement method of ERA by Pearson correlation coefficient. The correlation coefficient below is statistically significant at $\alpha = 0.05$ among these groups: "factors related to client", "factors related to cost", "factors related to time", "factors related to risk", "factors related to project characteristics", and "factors related to external environment" groups because the Sig. value is less than 0.05. In summary, the result indicates that there is a statistically significant correlation at $\alpha = 0.05$ among all the main groups. Correlation coefficient to determine the strength of the linear relationship between two variables(Bluman, 2009).

Table 4.3 Pearson Correlation Coefficient for procurement method selection factors

Correlations							
		Client	Cost	Time	Risk	Project characteristics	External Environment
Client	Pearson Correlation	1					
	sig						
Cost	Pearson Correlation	.775**	1				
	sig	.000					
Time	Pearson Correlation	.683**	.862**	1			
	sig	.000	.000				
Risk	Pearson Correlation	.796**	.814**	.822**	1		
	sig	.000	.000	.000			
Project characteristics	Pearson Correlation	.730**	.695**	.721**	.702**	1	
	sig	.000	.000	.000	.000		
External Environment	Pearson Correlation	.781**	.808**	.861**	.817**	.787**	1
	sig	.000	.000	.000	.000	.000	

Source: own survey 2019

From the above table, the correlation coefficient computed from the sample data measures the strength and direction of a linear relationship between two variables(Bluman, 2009). Pearson correlation coefficient of the above table is almost proximate to one, therefore, factors have strong positive linear relationship among them. These means one factor affect the other factor on positive way.

4.5. Sub-Factors Affecting the Selection of Procurement Method

4.5.1. Factors related to client

As per the reply of respondent's client experience in the selection of procurement method ranked on the first place with RII value of 79.44 and we conclude that the respondents agreed that this sub-factor is the most important one in factors related to client group. Flexibility for changes and variations takes placed on the second position with RII value 75.56 and we conclude that the respondents agreed that this sub-factor is very important factor in client group. With RII value 70 client financial capability ranked on the third position. The responses from respondent's shows the

procurement method depend upon on the client experience on procurement method. These can be one of the reason that frequently DBB procurement method selected for ERA road projects.

Table 4.4: Client Related Sub-Factors

	Mean	RII (%)	Rank
Client reputation	3.50	70.00	3
Client's experience in procurement methods	3.97	79.44	1
Client's trust in other parties	3.47	69.44	4
Flexibility for changes and variations	3.78	75.56	2
Client's financial capability	3.50	70.00	3
The degree of desired client involvement	3.38	67.65	5
Availability of qualified personnel (procurement staff)	3.29	65.71	6

4.5.2. Factors related to cost

Related to cost respondents ranked price competition and cost control first and second with RII value 76.11 and 72.57 respectively. Price competition is most important sub-factor from factors related to cost group according to respondent's response.

Table 4.5: Cost Related Sub-Factors

	Mean	RII (%)	Rank
Price competition	3.81	76.11	1
Design cost	3.25	65.00	3
Consultant fees	2.89	57.78	5
Price certainly prior to commencement	2.97	59.43	4
Cost control	3.63	72.57	2

Source: own survey 2019

4.5.3. Factors related to time

From time related factors time constrains of project and time control sub-factor have been ranked on the first position by the all respondents with RII equals 73.33, and speed of project activity place on second position next to time control and time constraint of project.

Table 4.6: Time Related Sub-Factors

	Mean	RII (%)	Rank
Speed of project activity	3.61	72.22	2
Minimize design time	3.58	71.67	3
Time constrains of project	3.67	73.33	1
Time control	3.67	73.33	1
Delays in obtaining environmental approval	3.06	61.11	6
Delay in the project completion time	3.53	70.56	4
Delivery time schedule	3.40	68.00	5

Source: own survey 2019

4.5.4. Factors related to risk

Risk avoidance or allocation is ranked on the first position with RII value 79.44 and responsibility allocation ranked on the second position with RII value 78.33. Risk allocation or avoidance and responsibility allocation are the main features procurement method differ one other.

Table 4.7: Risk Related Sub-Factors

	Mean	RII (%)	Rank
Risk avoidance/allocation	3.97	79.44	1
Responsibility allocation	3.92	78.33	2
Disputes & arbitration	3.33	66.67	4
Geotechnical investigation	3.60	72.00	3

Source: own survey 2019

4.5.5. Factor related project characteristic

From factors related to project characteristics quality level of project ranked on the first position with RII value 93.89%. This shows as the respondents gave more attention towards quality to select the procurement method. On DBB procurement method the design of the road project is prepared by Consultants hired by the client and the involvement of the client on the design, monitoring and evaluation more than DB procurement method therefore respondents had more concern on the quality of the project.

On the second position degree of project complexity ranked with RII value of 82.78% on the third position project completion at estimated cost ranked with 80.00%.

Table 4.8: Project Characteristic Related Sub-Factors

	Mean	RII (%)	Rank
Degree of project complexity	4.14	82.78	2
Funding method	3.61	72.22	4
Project site location	3.39	67.78	9
Project payments modality	3.39	67.78	9
Quality level of project	4.69	93.89	1
Expected performance of project	3.57	71.43	5
Available resources of project	3.44	68.89	8
Constructability of design	3.50	70.00	6
Project completion at estimated time	3.47	69.44	7
Project completion at estimated cost	4.00	80.00	3

Source: own survey 2019

4.5.6. Factors related to external environment

From external factor procurement policy and political consideration ranked on the first position with RII value of 73.33% and funding organization involvement ranked on second position with the value of 71.67%. These shows us political decision and funding organization interest influence the choice of the right procurement method.

Table 4.9: External Environment Related Sub-Factors

	Mean	RII (%)	Rank
Procurement policy	3.67	73.33	1
Market competitiveness and structure	3.44	68.89	4
Political considerations	3.67	73.33	1
Social factors	3.50	70.00	3
Environment impact	2.92	58.33	9
funding organization involvement/role/participation	3.58	71.67	2
Legal issues/factors	3.17	63.33	7
Number of competitors	3.19	63.89	6
Technology	3.36	67.22	5
Stakeholder integration	3.25	65.00	6
Worker conditions	3.03	60.56	8
Material availability	3.25	65.00	6

Source: own survey 2019

4.6. Impact of Procurement Method on the Project Success

To determine the impact of procurement on the success of road projects, Regression analysis was used and by using this analysis four models were generated. The independent variables in order to predict the dependent variable by best approach. From this analysis different models were generated to explain the impact of procurement methods on the success of project in terms of cost, time, quality and customer satisfaction. This was important in measuring the extent to which changes in one or more variables jointly affected changes in another variable. On this research two procurement methods were analyzed, these were Design, bid, and build (DBB) and Design and build (DB) procurement methods and they considered as the independent variables tose determine the dependent variables time, budget, quality and customer satisfaction.

Table: 4.10: descriptive statistics of procurement methods

Descriptive Statistics		
	Mean	Std. Deviation
Completing Project Within Time	3.3	1.1
Completing Project Within Budget	3.4	1.2
Completing Project within quality	3.5	1.1
Customer Satisfaction of the Project	3.5	1.1
DBB	3.3	1.3
DB	3.6	1.0

Source: own survey 2019

From the above table the cost of Design and Build procurement method project completed according to the plan with the mean value of 3.6, while the cost of the DBB projects not completed according to the plan relative to DB projects. Denoting the above respondents reply completing the project with in time, cost, quality and customer satisfaction had very close value, this indicates that the traditional and Design and Build procurement methods had comparable project performance. According to (Rashid, Taib, & Ahmad, 2006) The traditional procurement system has been identified as the slowest project delivery approach. However, this approach is more preferable because it provides clear accountability and better design and construction control by the client.

4.6.1. Assumption of regression analysis

According to (Bluman, 2009) there are six assumptions the used regression analysis values valid. The following revealed below are assumption of regression analysis.

- Assumption #1: There is a linear relationship between the dependent variable and the independent variables. (This is called the *linearity* assumption.) graphs on the appendix show the linear relation between the dependent and independent variables.
- Assumption #2: There is no multicollinearity in your data.

Analysis of collinearity statistics show this assumption has been met, as VIF scores were well below 10, and tolerance scores above 0.2. According to the table 4.12 there is no multicollinearity on the data with VIF value 1.92 and tolerance value 0.52. this satisfy the assumption to make regression analysis.

- Assumption #3: The values of the residuals are independent.

The Durbin-Watson statistic showed that this assumption had been met, as the obtained value was close to 2.

- Assumption #4: The variance of the residuals is constant.

Our plot of standardized residuals vs standardized predicted values showed no obvious signs of funneling, suggesting the assumption of homoscedasticity has been met.

- Assumption #5: The values of the residuals are normally distributed.

The P-P plot for the model suggested that the assumption of normality of the residuals may have been violated. However, as only extreme deviations from normality are likely to have a significant impact on your findings, the results are probably still valid.

- Assumption #6: There are no influential cases biasing your model.

Cook's Distance values were all under 1, suggesting individual cases were not unduly influencing the model. According to the analysis the value for Cook's were below one and the value found on the appendix.

Table: 4.11: model summary of procurement method

Model Summary [b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.945a	0.89	0.89	0.36	0.89	285.94	2.00	69.00	0.00	2.03
2	.940a	0.88	0.88	0.41	0.88	261.76	2.00	69.00	0.00	2.76
3	.953a	0.91	0.91	0.34	0.91	339.82	2.00	69.00	0.00	2.12
4	.947a	0.90	0.89	0.35	0.90	298.47	2.00	69.00	0.00	1.95

1. *Dependent Variable: Completing Project within Time*
2. *Dependent Variable: Completing Project within budget*
3. *Dependent Variable: Completing Project within quality*
4. *Dependent Variable: Customer Satisfaction of the Project*

a. Predictors: DB, DBB

Source: own survey 2019

From the above table four models were generated for each dependent variable. The generated model explain the project success in terms of cost, time, quality and customer satisfaction. The generated model explain the project success on average with the adjusted R square value of 89.25%, this indicates 10.75% of the independent variable explain the dependent variable and needs the studying of other variables.

4.6.2. Equations of the Model

Coefficient of determination explains the extent to which changes in the dependent variable (project success) can be explained in terms of different factors (cost, time, quality and customer satisfaction) by change in the independent variables (procurement methods). Variation in the dependent variable is explained by independent variables (DB and DBB procurement methods).

Table 4.13: Coefficients *of Dependent Variable: Project Success*

Coefficients [a]													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	Constant	0.01	0.16		0.05	0.96	-0.32	0.34					
	DBB	0.53	0.05	0.64	11.67	0.00	0.44	0.62	0.90	0.81	0.46	0.52	1.92
	DB	0.43	0.06	0.38	6.97	0.00	0.30	0.55	0.82	0.64	0.28	0.52	1.92
2	Constant	0.02	0.19		0.11	0.91	-0.35	0.39					
	DBB	0.66	0.05	0.72	12.68	0.00	0.55	0.76	0.92	0.84	0.52	0.52	1.92
	DB	0.34	0.07	0.28	4.94	0.00	0.20	0.48	0.78	0.51	0.20	0.52	1.92
3	Constant	-0.14	0.15		-0.93	0.35	-0.45	0.16					
	DBB	0.36	0.04	0.43	8.39	0.00	0.27	0.45	0.85	0.71	0.31	0.52	1.92
	DB	0.69	0.06	0.61	11.98	0.00	0.57	0.80	0.90	0.82	0.44	0.52	1.92
4	Constant	0.12	0.16		0.72	0.47	-0.20	0.43					
	DBB	0.45	0.04	0.54	10.11	0.00	0.36	0.54	0.88	0.77	0.39	0.52	1.92
	DB	0.54	0.06	0.49	9.03	0.00	0.42	0.66	0.86	0.74	0.35	0.52	1.92

1. *Dependent Variable: Completing Project within Time*
2. *Dependent Variable: Completing Project within budget*
3. *Dependent Variable: Completing Project within quality*
4. *Dependent Variable: Customer Satisfaction of the Project*

a. Predictors: (Constant), DB, DBB

Source: own survey 2019

As per the SPSS generated model the equation of multi-regression (Y=β0+ β1X1+ β2X2 +β3X3 +β4X4) become

$$Y = 0.01 + 0.53x_1 + 0.43x_2$$

Where: Y= *Completing Project within Time*

X1= *DBB procurement method*

X2= *DB procurement method*

According to the above regression equation, taking all the independent into constant zero value the impact of procurement method on the project success of ERA, completing projects on time was 1%. The data findings show that a unit increase on DBB procurement method would lead to 53% increase on the project success of a project in terms of time. A unit increase in DB procurement method would lead to 43% increase on project success of project on time. From this without

selecting any procurement method the project success of the project in terms time is insignificant and from the selected procurement method the traditional (DBB) procurement method affects the success of the project more than the DB procurement method. During the selection of the DBB procurement method more concern should be taken in account.

$$Y = 0.02 + 0.66x_1 + 0.34x_2$$

Where: Y= *Completing Project within budget*

X1= *DBB procurement method*

X2= *DB procurement method*

In referring to the above regression equation, *Completing Project within budget* was explained with different coefficients. Taking all the independent into constant zero value the impact of procurement method on the project success of ERA, completing projects within the budget was 2%. The data findings show that a unit increase on DBB procurement method would lead to 66% increase on the project success of a project in terms of budget. A unit increase in DB procurement method would lead to 34% increase on project success of project on budget.

$$Y = -0.14 + 0.36x_1 + 0.69x_2$$

Where: Y= *Completing Project within quality*

X1= *DBB procurement method*

X2= *DB procurement method*

In referring to the above regression equation, Completing Project within quality was explained with different coefficients. Taking all the independent into constant zero value the impact of procurement method on the project success of ERA, Completing Project within quality was -14%. The data findings show that a unit increase on DBB procurement method would lead to 36% increase on the project success of a project in terms of quality. A unit increase in DB procurement method would lead to 69% increase on project success of project on quality

$$Y = 0.12 + 0.45x_1 + 0.54x_2$$

Where: Y= *Customer Satisfaction of the Project*

X1= *DBB procurement method*

X2= *DB procurement method*

In referring to the above regression equation, Customer Satisfaction of the Project was explained with different coefficients. Taking all the independent into constant zero value the impact of procurement method on the project success of ERA, Customer Satisfaction on the Project was

12%. The data findings show that a unit increase on DBB procurement method would lead to 45% increase on the project success of a project in terms of time. A unit increase in DB procurement method would lead to 54% increase on project success of project on time.

Selecting both procurement methods had an equal impact on the project success of Ethiopian Roads Authority road projects by considering the four project success criteria's, but, each procurement method had more impact than the other comparing according by a single factor.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

In this chapter, a conclusion of the research findings that has been discussed and analyzed in detail in chapter four is drawn shortly and recommendation will be forwarded based on the findings have been provided and also future research gaps are indicated.

An exploratory study of factors affecting the selection of procurement method was conducted in this research to determine the level of importance and influence for each factor and the impact of the selected procurement method on the success of a project designated in terms of cost, time, quality and customer satisfaction. The researcher relied on literature review and survey to achieve the goals of this research

5.1. Summary of Major Findings

Different procurement systems differ from each other in term of allocation of responsibilities, activities sequencing, process and procedure and organizational approach in project delivery (Rashid et al., 2006). In order to increase the efficiency of the project development the improvement of procurement method and an increased understanding of how different procurement procedures affect different aspects of project performance in different types of projects is vital (Vennström, 2006). The selection of the most applicable procurement method is critical for both the client and other project participants as it is an important factor that contributes to the overall client's satisfaction and project success(Ramanathan & Narayanan, 2016). Procurement related factors related to selection criteria influence project success(Eriksson & Westerberg, 2011), therefore, from the analysis we conclude that each procurement selection criteria influence the project success because wrong procurement method for a project due to wrong selection criteria influence the project success negatively and on the reverse with the right procurement selection criteria and right procurement method the success of a project enhance towards achieving its goal. In ERA the most frequently used procurement method is the traditional procurement method (DBB) and there is a practice of innovative procurement methods like Design and Build (DB) procurement method. Procurement selection criteria's influence each other positively according to the data analysis, therefore, the increase on one factor increase the in influence of other factor. Due to this reason the increase of one factor by 1% affect the project success in a positive way, if it is weighted properly to select the procurement method.

From the regression analysis different models were retrieved to indicate the way procurement methods affect the success of a project. For DB procurement method the quality of the project impacted more than other success criteria's and on DBB procurement method all four project success criteria's were equally impacted.

- From the finding 10 most influential criteria's/ factors that affect the selection of procurement method were shown as subsequently.

1. Quality level of project (RII=93.89%),
2. Degree of project complexity (RII = 82.75%),
3. Project completion at estimated cost (RII=80.0 %),
4. Client's experience in procurement methods (RII = 79.44%),
5. Risk avoidance/allocation (RII = 79.44%),
6. Responsibility allocation (RII = 78.33%),
7. Price competition (RII=76.11%)
8. Flexibility for change and variation (RII=75.56%)
9. Time constrains of project (RII = 73.33%),
10. Procurement policy (RII = 73.33%),
11. Political consideration (RII=73.33%)

ERA can truly benefit from realizing the importance of above several factors into the selection of procurement method.

Selecting both procurement methods had an equal impact on the project success of Ethiopian Roads Authority road projects by considering the four project success criteria's, but, each procurement method had more impact than the other comparing according by a single factor.

5.2. CONCLUSION

Based on the results obtained from this research, the following research conclusion are drawn.

There were 45 factors selected by the researcher for the selection procurement depending on the literatures. These factors grouped into six main factors, which were shown to be reliable and valid. The data was collected from Ethiopian Roads Authority through questionnaire and data from Engineering Procurement.

- The results give a general indication that both the traditional (DBB) and non-conventional (DB) procurement methods were used on ERA projects. This study reveals approximately two-thirds (67.87%) of construction projects are executed by means of traditional (DBB) procurement method and 32.13% projects are executed through Design and Build (DB) procurement method. The procurement methods in use are still traditional (DBB) method, This may be presumably due to client experience and well familiarity with traditional methods and this familiarity was found regarding to a long age existence of the traditional procurement systems in ERA.
- Among the different types of procurement methods, the traditional procurement method measurement method based on BOQ (Measure and pay method) had the highest selection share. The popularity of this method is mainly due to the government procurement police influence procurement methods selected by ERA for its road projects. ERA as a major client in the road sector use and develop alternative procurement methods.
- The success of a project very much deepened upon the selected procurement method, because, affect the integration of the project and communication between the parties. From data analysis the selected procurement method have impact on the success of the project and the impact of each procurement method can be explained in terms of quality, cost, time and customer satisfaction. That none of the selected procurement systems could be called 'the best' but one can be better than the other the other in term of specific performance.

5.3. RECOMMENDATIONS

The following recommendations are the most important ones that can be deduced by this research

- During the selection of the procurement method a proper weighting of factors should be implemented to make the selected procurement method tailor made for the given project.
- The evaluation of every project should be done relating to the implementation of the procurement methods to make adjustment on the selection criteria's/factors for the ERA Alternative project delivery methods 2019.
- Ethiopian Roads Authority should familiarize themselves with various procurement methods as this will assist them in making well-informed procurement method.
- It is also recommended that training courses, seminars, and workshops in procurement method should be conducted. These activities would improve the ERA staffs in the selection process and increase the capabilities of procurement staff in using mathematical models for the selection of an appropriate procurement system and the actual needs and requirements, objectives and project goals must be identified and accurately conveyed to the project team in order to enable the project team to develop a sound procurement method.
- A clear type of procurement method should be established at a very early stage of the project which will define what has to be done, how it must be done, by whom it must be done, where it must be done and when it must be done.
- Procurement specialists involved in procurement decision-making should formulate a systematic selection approach, as this will assist in eliminating unnecessary project demands.

5.3.1. Recommendations for Future Research

The research results have identified several areas that call for further research efforts. The following points discuss recommendations for strengthening the current this research.

- A follow-up advance study on the non-traditional procurement methods such as design and built procurement methods deployed in ERA.
- The factors affecting the selection of procurement method studied from ERA perspective only. So it is important to repeat this study and take and add contractors, procurement specialists, engineer consultants and donor respective.
- A follow-up study on the impact of the type of procurement methods on the project success would be favorable for the success of road projects in Ethiopia. The future researches could be examine in-depth the success of project together with the procurement methods selected and implemented including consultants contractors, procurement specialists and donor respective.
- It is necessary to repeat this research for each and every project to observe the new trends of procurement method on the project success.

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APPENDIX

Descriptive Statistics		
	Mean	Std. Deviation
Completing Project Within Time	3.3	1.1
Completing Project Within Budget	3.4	1.2
Completing Project within quality	3.5	1.1
Customer Satisfaction of the Project	3.5	1.1
DBB	3.3	1.3
DB	3.6	1.0

Correlations				
		Completing Project within Time	DBB	DB
Pearson Correlation	Completing Project within Time	1.0	0.9	0.8
	DBB	0.9	1.0	0.7
	DB	0.8	0.7	1.0
Sig. (1-tailed)	Completing Project within Time		0.0	0.0
	DBB	0.0		0.0
	DB	0.0	0.0	

Model Summary [b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	945a	0.9	0.9	0.4	0.9	285.9	2.0	69.0	0.0	2.0

a. Dependent Variable: Completing Project within Time

b. Predictors: (Constant), DB, DBB

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73.1	2.0	36.6	285.9	.000b
	Residual	8.8	69.0	0.1		
	Total	82.0	71.0			

a. Dependent Variable: Completing Project within Time

b. Predictors: (Constant), DB, DBB

Coefficients [a]													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	0.01	0.16		0.05	0.96	(0.32)	0.34					
	DBB	0.53	0.05	0.64	11.67	0.00	0.44	0.62	0.90	0.81	0.46	0.52	1.92
	DB	0.43	0.06	0.38	6.97	0.00	0.30	0.55	0.82	0.64	0.28	0.52	1.92

a. Dependent Variable: Completing Project within Time

b. Predictors: (Constant), DB, DBB

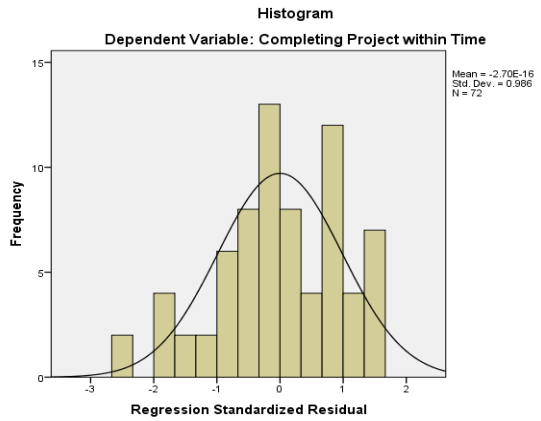
Coefficient Correlations [a]				
Model			DB	DBB
1	Correlations	DB	1.00	-0.69
		DBB	-0.69	1.00
	Covariance	DB	0.00	-0.00
		DBB	-0.00	0.00

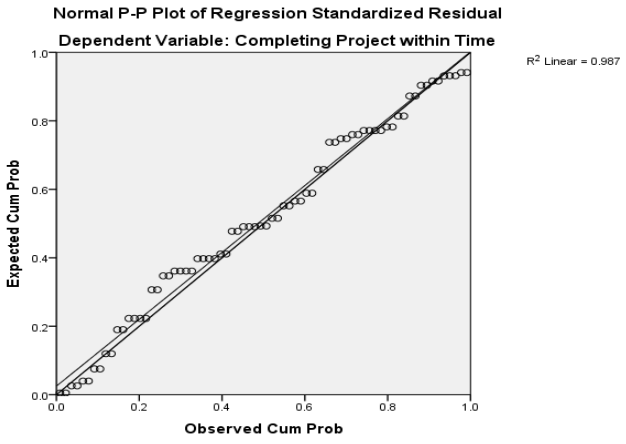
a. Dependent Variable: Completing Project within Time

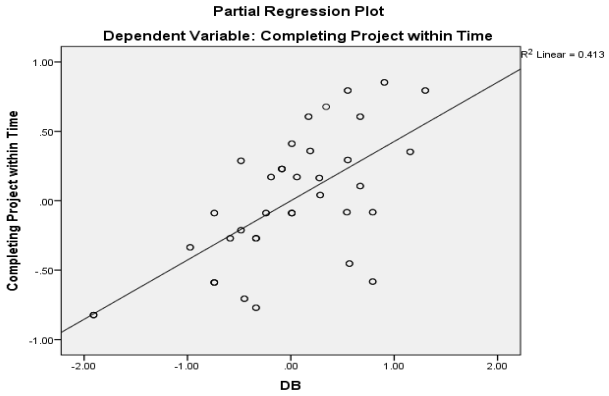
Collinearity Diagnostics [a]						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	DBB	DB
1	1	2.91	1.00	0.01	0.01	0.00
	2	0.07	6.46	0.46	0.52	0.00
	3	0.02	11.30	0.53	0.48	1.00

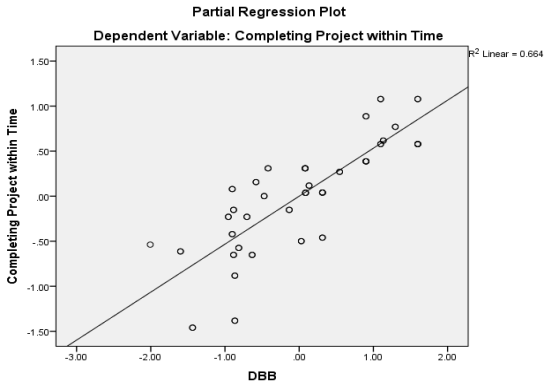
a. Dependent Variable: Completing Project within Time

Residuals Statistics [a]				
	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	0.01	4.59	3.27	1.01
Std. Predicted Value	(3.21)	1.30	(0.00)	1.00
Standard Error of Predicted Value	0.04	0.16	0.07	0.02
Adjusted Predicted Value	0.01	4.60	3.27	1.02
Residual	(0.92)	0.56	(0.00)	0.35
Std. Residual	(2.57)	1.56	(0.00)	0.99
Stud. Residual	(2.62)	1.59	0.00	1.00
Deleted Residual	(0.95)	0.59	0.00	0.37
Stud. Deleted Residual	(2.74)	1.60	(0.00)	1.02
Mahal. Distance	0.02	13.95	1.97	2.76
Cook's Distance	0.00	0.10	0.01	0.02
Centered Leverage Value	0.00	0.20	0.03	0.04









Descriptive Statistics		
	Mean	Std. Deviation
Completing Project within budget	3.39	1.17
DBB	3.25	1.29
DB	3.59	0.96

Correlations				
		Completing Project within budget	DBB	DB
Pearson Correlation	Completing Project within budget	1.00	0.92	0.78
	DBB	0.92	1.00	0.69
	DB	0.78	0.69	1.00
Sig. (1-tailed)	Completing Project within budget		0.00	0.00
	DBB	0.00		0.00
	DB	0.00	0.00	

Model Summary [b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.940a	0.88	0.88	0.41	0.88	261.76	2.00	69.00	0.00	2.76

a. Predictors: (Constant), DB, DBB

b. Dependent Variable: Completing Project within budget

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	86.24	2.00	43.12	261.76	.000b
	Residual	11.37	69.00	0.16		
	Total	97.61	71.00			

a. Predictors: (Constant), DB, DBB

b. Dependent Variable: Completing Project within budget

Coefficients [a]													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	0.02	0.19		0.11	0.91	(0.35)	0.39					
	DBB	0.66	0.05	0.72	12.68	0.00	0.55	0.76	0.92	0.84	0.52	0.52	1.92
	DB	0.34	0.07	0.28	4.94	0.00	0.20	0.48	0.78	0.51	0.20	0.52	1.92

a. Dependent Variable: Completing Project within budget

Coefficient Correlations [a]				
Model			DB	DBB
1	Correlations	DB	1.00	(0.69)
		DBB	(0.69)	1.00
	Covariance	DB	0.00	(0.00)
		DBB	(0.00)	0.00

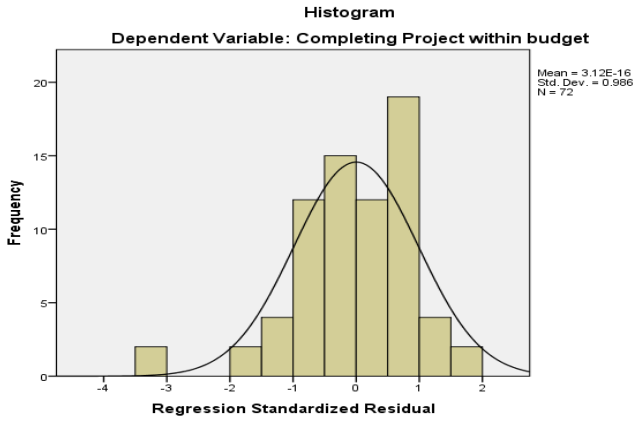
a. Dependent Variable: Completing Project within budget

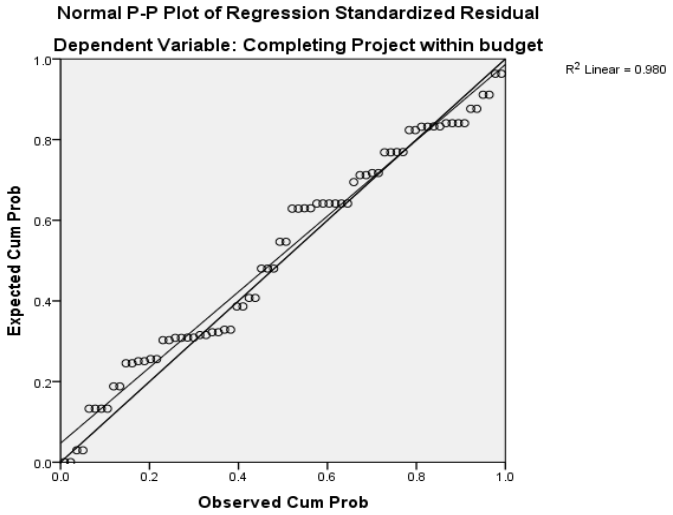
Collinearity Diagnostics[a]						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	DBB	DB
1	1	2.91	1.00	0.01	0.01	0.00
	2	0.07	6.46	0.46	0.52	0.00
	3	0.02	11.30	0.53	0.48	1.00

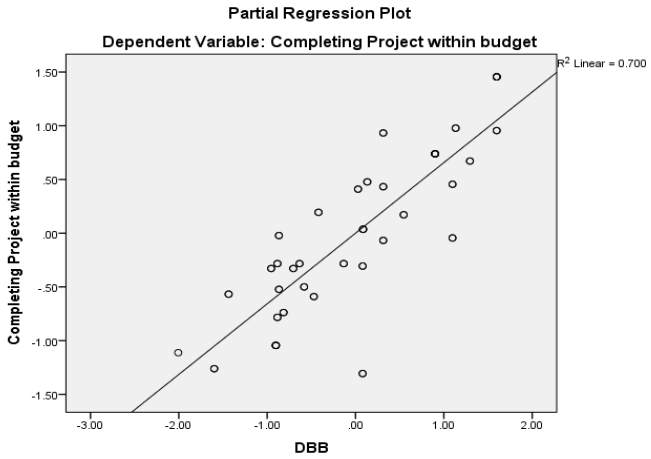
a. Dependent Variable: Completing Project within budget

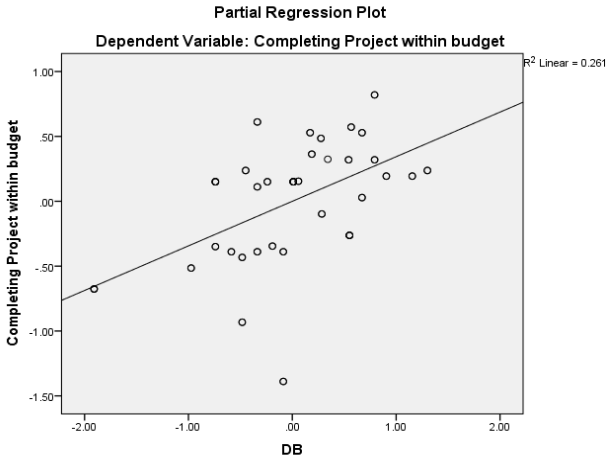
Residuals Statistics[a]				
	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	0.02	4.85	3.39	1.10
Std. Predicted Value	(3.06)	1.33	(0.00)	1.00
Standard Error of Predicted Value	0.05	0.19	0.08	0.03
Adjusted Predicted Value	0.03	4.85	3.39	1.10
Residual	(1.36)	0.73	0.00	0.40
Std. Residual	(3.35)	1.79	0.00	0.99
Stud. Residual	(3.37)	1.81	0.00	1.00
Deleted Residual	(1.38)	0.74	0.00	0.41
Stud. Deleted Residual	(3.66)	1.84	(0.01)	1.03
Mahal. Distance	0.02	13.95	1.97	2.76
Cook's Distance	0.00	0.05	0.01	0.01
Centered Leverage Value	0.00	0.20	0.03	0.04

a. Dependent Variable: Completing Project within budget









Descriptive Statistics		
	Mean	Std. Deviation
Completing Project within quality	3.50	1.09
DBB	3.25	1.29
DB	3.59	0.96

Correlations				
		Completing Project within quality	DBB	DB
Pearson Correlation	Completing Project within quality	1.00	0.85	0.90
	DBB	0.85	1.00	0.69
	DB	0.90	0.69	1.00
Sig. (1-tailed)	Completing Project within quality		0.00	0.00
	DBB	0.00		0.00
	DB	0.00	0.00	

Model Summaryb										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.953a	0.91	0.91	0.34	0.91	339.82	2.00	69.00	0.00	2.12

a. Predictors: (Constant), DB, DBB

b. Dependent Variable: Completing Project within quality

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.71	2.00	38.36	339.82	.000b
	Residual	7.79	69.00	0.11		
	Total	84.50	71.00			

a. Predictors: (Constant), DB, DBB

b. Dependent Variable: Completing Project within quality

Coefficients[a]													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	Constant	-0.14	0.15		-0.93	0.35	-0.45	0.16					
	DBB	0.36	0.04	0.43	8.39	0.00	0.27	0.45	0.85	0.71	0.31	0.52	1.92
	DB	0.69	0.06	0.61	11.98	0.00	0.57	0.80	0.90	0.82	0.44	0.52	1.92

a. Dependent Variable: Completing Project within quality

Coefficient Correlations[a]				
Model			DB	DBB
1	Correlations	DB	1.00	(0.69)
		DBB	(0.69)	1.00
	Covariances	DB	0.00	(0.00)
		DBB	(0.00)	0.00

a. Dependent Variable: Completing Project within quality

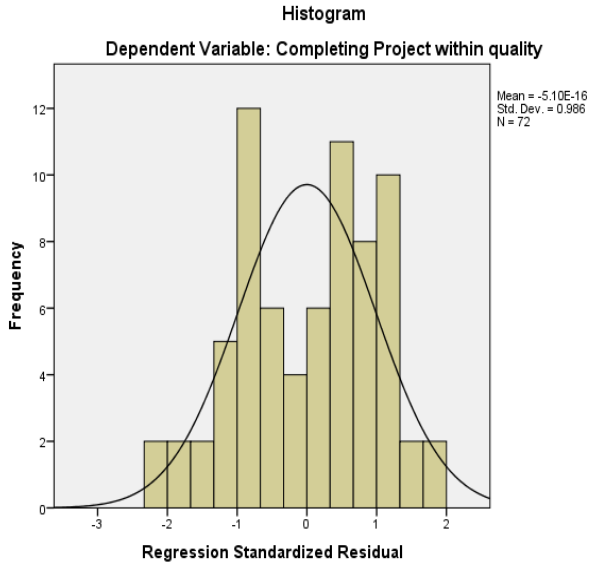
Collinearity Diagnosticsa						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	DBB	DB
1	1	2.91	1.00	0.01	0.01	0.00
	2	0.07	6.46	0.46	0.52	0.00
	3	0.02	11.30	0.53	0.48	1.00

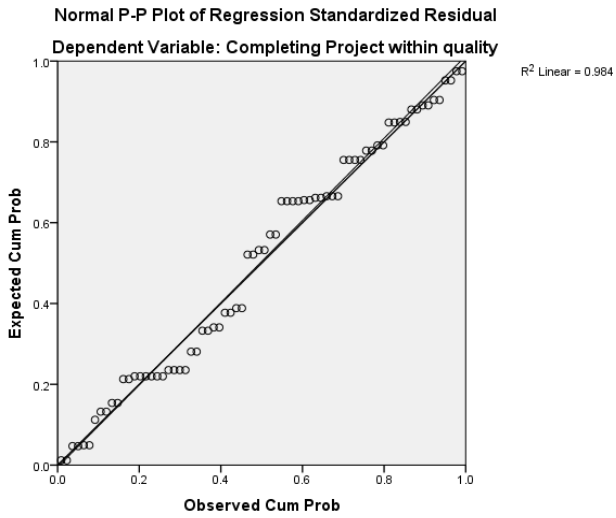
a. Dependent Variable: Completing Project within quality

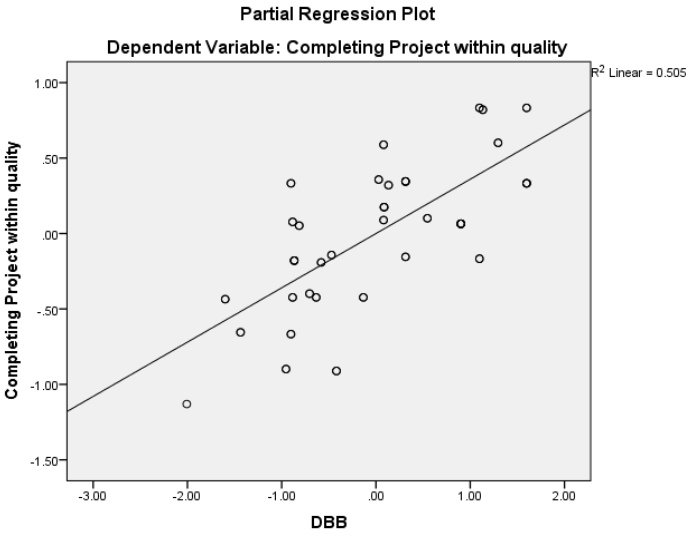
b.

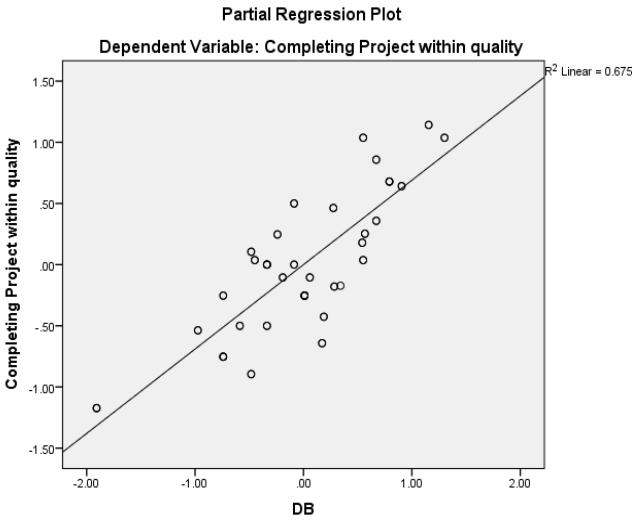
Residuals Statisticsa				
	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	(0.14)	4.76	3.50	1.04
Std. Predicted Value	(3.51)	1.21	0.00	1.00
Standard Error of Predicted Value	0.04	0.15	0.06	0.02
Adjusted Predicted Value	(0.18)	4.77	3.50	1.04
Residual	(0.76)	0.66	(0.00)	0.33
Std. Residual	(2.26)	1.96	(0.00)	0.99
Stud. Residual	(2.28)	1.98	0.00	1.00
Deleted Residual	(0.77)	0.68	0.00	0.34
Stud. Deleted Residual	(2.36)	2.03	0.00	1.01
Mahal. Distance	0.02	13.95	1.97	2.76
Cook's Distance	0.00	0.07	0.01	0.01
Centered Leverage Value	0.00	0.20	0.03	0.04

a. Dependent Variable: Completing Project within quality









Descriptive Statistics		
	Mean	Std. Deviation
Customer Satisfaction of the Project	3.51	1.07
DBB	3.25	1.29
DB	3.59	0.96

Correlations				
		Customer Satisfaction of the Project	DBB	DB
Pearson Correlation	Customer Satisfaction of the Project	1.00	0.88	0.86
	DBB	0.88	1.00	0.69
	DB	0.86	0.69	1.00
Sig. (1-tailed)	Customer Satisfaction of the Project		0.00	0.00
	DBB	0.00		0.00
	DB	0.00	0.00	

Model Summaryb										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.947a	0.90	0.89	0.35	0.90	298.47	2.00	69.00	0.00	1.95

a. Predictors: (Constant), DB, DBB

b. Dependent Variable: Customer Satisfaction of the Project

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	72.60	2.00	36.30	298.47	.000b
	Residual	8.39	69.00	0.12		
	Total	80.99	71.00			

a. Dependent Variable: Customer Satisfaction of the Project

b. Predictors: (Constant), DB, DBB

Coefficientsa													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	Constant	0.12	0.16		0.72	0.47	-0.20	0.43					
	DBB	0.45	0.04	0.54	10.11	0.00	0.36	0.54	0.88	0.77	0.39	0.52	1.92
	DB	0.54	0.06	0.49	9.03	0.00	0.42	0.66	0.86	0.74	0.35	0.52	1.92

a. Dependent Variable: Customer Satisfaction of the Project

Coefficient Correlationsa				
Model			DB	DBB
1	Correlations	DB	1.00	-0.69
		DBB	-0.69	1.00
	Covariances	DB	0.00	-0.00
		DBB	-0.00	0.00

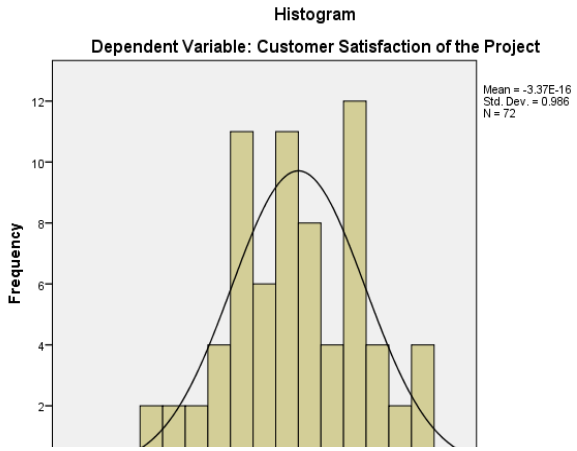
a. Dependent Variable: Customer Satisfaction of the Project

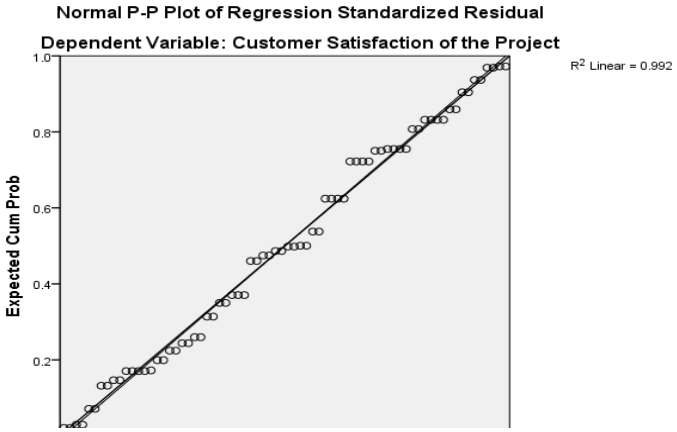
Collinearity Diagnosticsa						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	DBB	DB
1	1	2.91	1.00	0.01	0.01	0.00
	2	0.07	6.46	0.46	0.52	0.00
	3	0.02	11.30	0.53	0.48	1.00

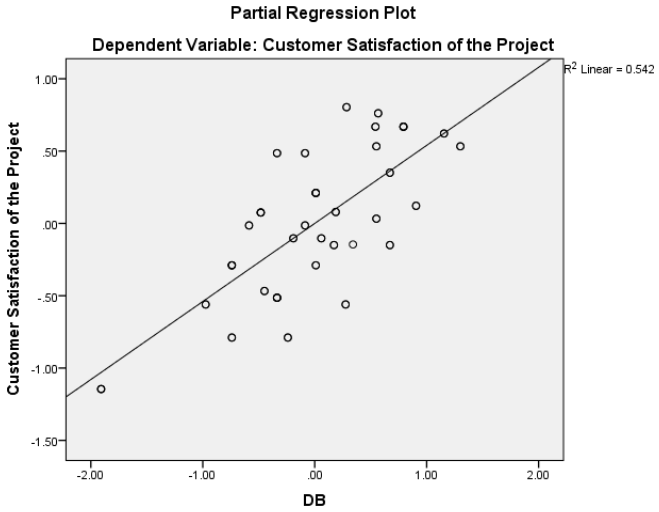
a. Dependent Variable: Customer Satisfaction of the Project

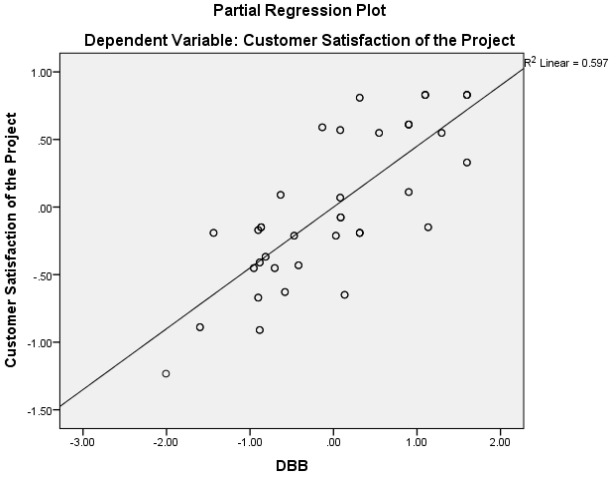
Residuals Statisticsa				
	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	0.12	4.79	3.51	1.01
Std. Predicted Value	(3.36)	1.27	0.00	1.00
Standard Error of Predicted Value	0.04	0.16	0.07	0.02
Adjusted Predicted Value	0.15	4.81	3.52	1.01
Residual	(0.71)	0.67	(0.00)	0.34
Std. Residual	(2.03)	1.92	(0.00)	0.99
Stud. Residual	(2.06)	1.93	(0.00)	1.00
Deleted Residual	(0.72)	0.68	(0.00)	0.35
Stud. Deleted Residual	(2.11)	1.97	(0.00)	1.01
Mahal. Distance	0.02	13.95	1.97	2.76
Cook's Distance	0.00	0.05	0.01	0.01
Centered Leverage Value	0.00	0.20	0.03	0.04

a. Dependent Variable: Customer Satisfaction of the Project


Histogram
Dependent Variable: Customer Satisfaction of the Project
Mean = -3.37E-16
Std. Dev. = 0.986
N = 72
Frequency


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Customer Satisfaction of the Project
R² Linear = 0.992
Expected Cum Prob


Partial Regression Plot
Dependent Variable: Customer Satisfaction of the Project
R² Linear = 0.542
Customer Satisfaction of the Project
DB


Partial Regression Plot
Dependent Variable: Customer Satisfaction of the Project
R² Linear = 0.597
Customer Satisfaction of the Project
DBB

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

(Questionnaire)

For Fulfilment of thesis Requirement on Project Management (MBA)

ASSESSING THE TYPES OF PROCUREMENT METHODS AND THEIR IMPACT ON THE PROJECT SUCCESS OF ETHIOPIAN ROAD AUTHORITY

With sincerity I would like to extend my deep appreciation to your organization and the staff for the willingness and cooperation in undertaking this valuable research. I ask your kindly cooperation in answering the question as truthful as possible and your response will be highly confidential.

The aim of this questionnaire is to study types of procurement methods and their impact on the project success of Ethiopian Road Authority. This questionnaire is required to be filled with relevant facts as much as possible. All data included in this questionnaire will be used only for academic research and will be strictly confidential. After all questionnaires are collected and analyzed, interested participants of this study will be given feedback on the overall research results.

Yours Sincerely

Thank you very much for your kind cooperation

Researcher Ersido Abayneh

Contact address: mobile 0916337160 email: ersidoabay@gmail.com

November 2019

Part One: General information:

Please specify the choices that belong to you bellow: Please add (√) as appropriate

1. Please specify your gender:

□Male □ Female

2.Please specify your educational Profession

□Engineering □Project Management □Construction Management

3.Please specify the level of your education:

□First Degree □Master's Degree □PhD

4. Directorate you are working _____

□Engineering Procurement □Regional Construction Project Management □Other------

5. Position

□Director/Vice director □Team Leader □Projects Engineer □Other

6. Experience in the project management work

□Under3 year □4-10 year's □11-20year's □21- 30 year's □ above 30years

Part Two: General Questions

1. What is the most common and frequently used procurement method in your organization?

□Traditional Procurement Method (DBB) □Design and Construct Procurement Method (DB) □ Management Procurement method □Public Private Partnership Procurement

2. Did you involve during procurement method selection period?

□Yes □ No

3. During design and build project procurement method do you use Orange Book of FIDIC?

□Yes □ No

4. A Complete drawings and BoQs are generally available when a projects goes to procurement?

□Yes □ No

5. Do you think currently the local construction industry does seem ready to take part in the Innovative project delivery method? □Yes □ No

6. Do you think that the selected procurement method affect the project success of ERA?

□Yes □ No

Part three: Factors affecting the selection of procurement method in your organization

From your experience, please express your opinion on the importance of the following sub-factors affecting the selection of procurement method of ERA projects. Please tick (√) the appropriate box.

No	Factors	Degree of importance				
		Very high 5	High 4	Medium 3	Low 2	Very low 1
A	Factors related to client					
1	Client reputation					
2	Client's experience in procurement methods					
3	Client's trust in other parties					
4	Flexibility for changes and variations					
5	Client's financial capability					
6	The degree of desired client involvement					
7	Availability of qualified personnel (procurement staff)					
B	Factors related to cost					
1	Price competition					
2	Design cost					
3	Consultant fees					
4	Price certainly prior to commencement					
5	Cost control					
C	Factors related to time					
1	Speed of project activity					
2	Minimize design time					
3	Time constrains of project					
4	Time control					
5	Delays in obtaining environmental approval					
6	Delay in the project completion time					
7	Delivery time schedule					
D	Factors related to risk					

1	Risk avoidance/allocation					
2	Responsibility allocation					
3	Disputes & arbitration					
4	Geotechnical investigation					
E	Factors related to project characteristics					
1	Degree of project complexity					
2	Funding method					
3	Project site location					
4	Project payments modality					
5	Quality level of project					
6	Expected performance of project					
7	Available resources of project					
8	Constructability of design					
9	Project completion at estimated time					
10	Project completion at estimated cost					
F	Factors related to external environment					
1	Procurement policy					
2	Market competitiveness and structure					
3	Political factors					
4	Social factors					
5	Environment impact					
6	Funding organization involvement/role/participation					
7	Legal issues					
8	Number of competitors					
9	Technology					
10	Stakeholder integration					
11	Worker conditions					
12	Material availability					

Part four: Please rate the project success criteria below per their level (degree) of performance to the overall success of the Ethiopian Road Authority road construction project you are involved. Where, Please tick (√) the appropriate box.

Code	Lists of Suggested Success Criteria	Rate				
		strongly agree = 5	agree = 4	neutral = 3	disagree = 2	strongly disagree = 1
1	Completing the project within time					
a	DBB					
b	DB					
2	Completing the project within budget					
a	DBB					
b	DB					
3	Completing the project with specification (specified quality)					
a	DBB					
b	DB					
4	Customer satisfaction					
a	DBB					
b	DB					