

# **FACTORS CAUSING DELAYS IN THE PRE-CONTRACT PROCUREMENT PROCESS OF ELECTRICAL INFRASTRUCTURE PROJECTS**

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**Declaration**

I declare that this Research Report is my own unaided work. It is submitted in partial fulfilment of the degree of Masters of Science (MSc) in the field of Project Management at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

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## **Abstract**

Public infrastructure investments are critical in addressing the high rates of unemployment, poverty and inequality in South Africa. Infrastructure investments facilitates economic activities, thus enabling economic growth, job creation and poverty alleviation. In addition economists and policy makers are recognizing the importance of governance for economic growth and development. Good governance or lack thereof, contributes to the differences in economic growth. This study focused primarily on electrical infrastructure. The availability of electric power forms the backbone of any nation's economy, and electrical infrastructure plays a central role in electrical distribution. In South Africa, there are existing factors that cause significant delays in the pre-contract procurement process of construction projects, electrical infrastructure projects in particular. These existing factors should typically be resolved within ninety days of initiating the procurement process. However, from frequent occurrences in most of these electrical infrastructure projects, the procurement process can take up to six months due to various delays, such as awarding of contracts. This quantitative study aimed to identify what are the factors causing significant delays in the pre-contract procurement process of electrical infrastructure projects. There is a paucity of studies undertaken to investigate the causes of delays in the pre-contract stage, particularly delays affecting electrical infrastructure projects. A survey was conducted and consisted of a self-administered questionnaire. The questionnaires were initially emailed to more than forty professionals including project managers (PMs) employed by Eskom Holdings SOC Ltd with no response. The questionnaires were then disseminated to fifteen project managers possessing more than five years of work experience. They were all working for South Africa's electricity parastatal, Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution department in Gauteng province at the time of data collection. The questionnaire responses were captured on Microsoft Excel, and data obtained were analysed descriptively in order to identify themes that emerged from the participants' responses. The Relative Importance Index (RII) was used to identify the most significant factors that contributed to delays in the procurement process. The findings of the study indicate that factors that cause delays in the delivery of electrical infrastructure in South Africa include: the workload from staff, lack of quantity surveyor resources, unavailability of all stakeholders for negotiation, at the same time, an unexpected number of received tenders, rescheduling of negotiations, understaffed technical departments, lack of communication and coordination amongst various stakeholders and departments.

The findings suggest that there is lack of technical capacity to execute the amount of work within Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department and as a result the pre-contract procurement process takes longer, this results in projects not being executed within the planned time. It is therefore significant for the company to capacitate the department within the identified areas of expertise that are causing delays in order to mitigate most of the identified delays. The research approach for the study is deductive and is associated with a positivist philosophy. In the deductive approach, a theory is not developed, instead an existing theory developed from a thorough literature survey and data collection is tested (Saunders & Thornhill, 2011).

**Key Words:** Electrical Infrastructure, Pre-Procurement, Delays, Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department, Project Managers

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## **Outline of Dissertation**

### **Chapter 1: Introduction**

This chapter gives the background of the study, gives the problem statement and substantiates it. It further discusses research questions, objectives, research aim as well as scope of the study and limitations.

### **Chapter 2: Literature Review**

This chapter presents the review of literature. Topics covered are types of delays, power sector overview, construction industry and few case studies.

### **Chapter 3: Research Methodology**

This chapter gives a brief description of the sampling design, questionnaire/instrument design, data collection procedure, data analysis procedure as well as ethical consideration.

### **Chapter 4: Data Analysis and Results**

This chapter presents data collection, presentation, analysis and the results obtained from the self-administered questionnaire survey.

### **Chapter 5: Discussions of findings**

This chapter presents the findings and discussion of the study. It also focuses on addressing the research objectives, which in turn addresses the main research question.

### **Chapter 6: Conclusion and Recommendations**

This chapter presents conclusion and recommendations of the study.

# Chapter 1: Introduction

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## 1.1 Background of Study

According to Perry *et al.* (2006), the failure to maintain existing infrastructure coupled with inadequate investments into new infrastructure contributes to unprogressive development and insufficient job creation. Mbanda and Chitiga-Mabugu (2017) cite public infrastructure investments as one of the critical factors in addressing the high rates of unemployment, poverty and inequality in South Africa. South Africa's post-apartheid government continue to pursue an infrastructure-centric vision that prioritises the physical extension of networks of infrastructure such as housing, water, sanitation and electricity (Lemanski, 2019). The drive for adequate provision of public infrastructure is motivated by the need to ensure South African citizens, including the previously disadvantaged, have access to basic needs (Lemanski, 2019). The existence of public infrastructure is a necessity because the state and state-owned businesses require it to deliver services to citizens. Services include the provision of policing, social services, housing and water delivery, sanitation, transportation and many more. Infrastructure provides improvements or efficiencies in services, production or export capabilities, and must be delivered and maintained in a manner that minimises waste of materials, time and effort to generate the maximum possible amount of value, is most likely to contribute to economic growth. According to Karunakaran *et al.*, (2018), electrical infrastructure (construction) projects are conventionally designed by appointed consultants according to a client's desire and are executed by the appointed contractor(s) to build the desired design works. Electrical infrastructure projects undertaken in South Africa's public sector are required to follow a certain model, standard or governance framework to regulate the delivery of those projects. There are specific models that any business develops, adopts and refers to in order to ensure the application of best practices during electrical infrastructure project delivery. As much as these processes, standards and framework are in place to be followed, over time, it became evident that a significant amount of time is lost in the process of implementation from the time the project is handed over to the project manager until the project contract awarded.

Trauner *et al.* (2009) defined delay as causing something to happen later than expected; to cause something to be performed later than planned, or not to act timely. The activity undergoing the delay determines if a project milestone will be completed late.

Many factors are contributing to delays in the procurement process of electrical infrastructure projects. The degree of the delays varies considerably from project to another. It is essential to define the fundamental factors causing delays to minimise, mitigate, and avoid them (Asnaashari *et al.*, 2009). More precisely, the risk of delays can be minimised only when the causes are recognized and required actions to prevent delays are implemented (Pourroostam & Ismail 2012; Yang *et al.*, 2013). Organisations must have specific knowledge regarding factors that cause delays for projects to be completed effectively and satisfactorily (Wong & Vimonsatit 2012).

One of the models used is the Project Life cycle Model (PLCM), which is a collection of generally sequential project phases having names and numbers determined by the governance and control needs of the business entities involved in the planning and implementation of the project. Execution phase is one of the phases found in the PLCM. It is in this phase where procurement process is dealt with and pre-contract is a collective of all activities completed towards the actual award of the contract. All the work done in the pre-contract stage is time based because it is embedded in the entire time factor of the project. Delays in the pre-contract stage will undoubtedly impact the project time negatively. The Eskom Deliver Projects Policy (240-112292436) prescribes that all projects requiring funding approvals, either individually or collectively as bulk projects, shall follow an Eskom approved Project Life Cycle Model, be subjected to gate reviews during the life cycle of the project, and be linked to a portfolio. In a concerted effort to optimise the delivery approach of projects, strengthen levels of defence and assure overall business sustainability, both the Chief Operating Officer and Chief Financial Officer recently authorised the Reference PLCM Framework (240-95232993) and Standard (240-95401790) for implementation by business.

In this study, the factors causing delays in the procurement process of electrical infrastructure projects will be examined. The research problem that this study aims to cover including the aim, objectives and listing of research question as well as research methodology to be followed in conducting this research to get to the conclusion will be briefly defined and covered. The aim of the research is to identify factors causing significant delay in the pre-contract procurement process of electrical infrastructure projects with a view to prevent project time and cost overrun.

## **1.2 Substantiation of the Problem**

Infrastructure delivery is the combination of all planning, technical, administrative and managerial actions associated with the construction, supply, refurbishment, rehabilitation, alteration, maintenance, operation or disposal of infrastructure. Infrastructure procurement is the procurement of goods or services including any combination thereof associated with the acquisition, refurbishment, rehabilitation, alteration, maintenance, operation or disposal of infrastructure. Accordingly, the procurement process for the delivery of infrastructure involves the initial and subsequent recurring updating of planning processes at a portfolio level flowing out of an assessment of public sector service delivery requirements or business needs. Although procurement practices vary widely, public sector procurement law regulates the purchasing by public sector bodies through contracts for goods, works or services. Unlike contracts awarded which are entirely within the private sector, the public sector is subject to several precise regulations (Lewis & Scheck 2015), and each organ of state has a legislated mandate. A study by Pall *et al.*, (2019), on the causes of delay in power transmission projects, found that the most sector specific factors causing delays are right of way problems of transmission lines, frequent changes in transmission line routes, and accessibility to the tower locations. It is evident that these delays are during contract stage, and, however, there is a gap in studies undertaken to identify the factors causing delays in pre-contract stage. This study seeks to bridge this gap by identifying factors causing delays in the procurement process of the infrastructure project within South Africa using Eskom as a case study for empirical evidence.

## **1.3 Problem Statement**

Typically, in South Africa's public sector once approval to undertake an infrastructure project is granted, one of the initial activities is to go through a procurement process to select a suitable contractor to execute the task (Lewis & Scheck 2015). Although there is a paucity of studies undertaken to identify factors causing significant delays infrastructure/power transmission projects during the pre-contract stage of the procurement process, in South Africa, there are existing factors that cause significant delays in the pre-contract procurement process of construction projects, electrical infrastructure projects in particular. These existing factors should typically be resolved within ninety days of initiating the procurement process. However, from frequent occurrences in

most of these electrical infrastructure projects, the procurement process can take up to six months due to various delays.

Existing studies fail to comprehensively determine the systemic causes of undue delays in the procurement process of electrical infrastructure projects. A better understanding of the factors causing delays in the procurement process of the infrastructure project is therefore needed to identify plausible solutions to minimise or curb undue delays significantly. The consequence of such a problem of delays in procurement process includes a delay in the awarding of contracts, subsequently compromising the infrastructure and safety of the people, and ultimately the company's reputation.

There are gaps identified and it is because the literature review above has provided insight on the key factors that influence pre-contract procurement delay in infrastructure projects. The literature focused on overall pre-contract procurement delays because they affect the time of procurement including that of electrical infrastructure (Antoun, et al 2019). Regardless of the type of infrastructure the procurement processes that are followed are usually the same with minimal differences (Tadelis, 2017). The case studies outlined did not focus on electrical infrastructure but are relevant because of the pre-contract procurement processes that are followed. The study will contribute towards electrical infrastructure pre-contract procurement delays research because the majority of available research focuses on building infrastructure. This study aims to contribute to this knowledge gap.

#### **1.4 Primary Research Question**

1. What are the factors causing significant delays in the pre-contract procurement process of the electrical infrastructure projects?

#### **1.5 Secondary Research Questions**

From the primary question, the secondary research questions are identified as follows:

2. What are the specific aspects of the electrical infrastructure projects ~~procurement process~~ that are prone to significant pre-contract procurement process delays?
3. What are the specific causes of the delays in the electrical infrastructure projects pre-contract procurement process?

## **1.6 Research Aim**

The aim of the research is to identify factors causing significant delay in the pre-contract procurement process of electrical infrastructure projects with a view to prevent project time and cost overrun.

## **1.7 Research objectives**

From the aim, the following research objectives are derived:

- 1.7.1 To identify factors causing significant delays in the electrical infrastructure projects pre-contract procurement process.
- 1.7.2 To identify specific aspects of the of the electrical infrastructure projects that are prone to significant pre-contract procurement delays.
- 1.7.3 To investigate the specific causes of the delays in the electrical infrastructure projects pre-contract procurement process.

## **1.8 Scope of the study**

The study will focus on the factors causing delays in the pre-contract stage of the procurement process of the electrical projects in Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department in Gauteng Province. Currently, there are over 32 projects executed in Gauteng Province with an approximate total budget of R70million. The pre-contract stage of the procurement process within Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department takes longer than planned and it is on this basis that the context of the study focuses on Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department particularly.

The rationale for this study scope has been outlined in section 1.3 (Problem Statement). The reason for the choice of the research location is because the Researcher is an employee of the Eskom Holdings SOC Ltd.

**MAP: Eskom Holdings SOC Ltd (Head Office, Megawatt Park)**

# Eskom Megawatt Park

[Gauteng, South Africa](#)



Place Types : [Local Business](#)

Address : Midrand, Gauteng

Coordinate : [-26.03619, 28.1272](#)

# Chapter 2: Literature Review

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## 2. Introduction to the literature review

This chapter presents the review of literature that relates to analysing and identifying factors that cause delays in the pre-contract procurement process of electrical infrastructure projects. Existing literature aided in identifying different delays and exploring case studies to evaluate delays on various projects. Delay mitigation was also examined to find ways of minimising delays.

### 2.1 Delay

Assaf and Al-Hejji (2006) defined delay as the extended time added to a specified contract completion date on which parties have agreed. Delay is also considered as a completion date that is slipping over a planned project schedule. According to Bassioni and El-Razek (2008), delays are a common construction problem that have a negative effect on implementation of projects. Identifying delays is essential for preventing them. According to Arditi and Pattanakitchamrorn (2006), delays can lead to lost productivity, increased costs, late completion, and contract termination. Different delays can occur at the same time and affect the same project in different ways at the same time. Delays that are caused by the client such as late specifications and drawing submissions, inadequate site information and numerous change orders can cause lengthy court cases. Delays that are caused by contractors are usually a result of poor managerial skills and poor financial discipline. Majid (2006) mentioned that delays could be minimized when its' causes are identified.

### 2.2 Power Sector Overview

The industrial revolution has deemed power to the development mainstay of civilization. The high electrical power demand by the world is rapidly increasing and is expected to double by 2040 in comparison to 2014's power consumption (International Energy Agency, 2017). Past studies have showcased that power distribution and power transmission system losses amount to fifteen per cent of the electricity that is generated (Hirst & Kirby, 2001). A functional and reliable power transmission system is an essential link between distribution and power generation that is required

to generate forecasted power to the consumer (Huang *et al.*, 2013). Countries around the world are keen to complete their power sector projects in time because it contributes to the betterment of civilization. The energy power sector has three subsectors, namely power transmission, power generation and power distribution. Power transmissions are essential for keeping up with the world’s development.

Below is a table that summarises factors that lead to significant delays on power projects.

Table 1. Major Delays on Power Projects (Goutom *et al.*, 2020)

Cause of delays	Ranking			
	Overall	Owner	Contractor	Consultant
Poor coordination and communication amongst project parties	4	8	5	6
Delay in payments	5	7	2	7
Political interventions	7	3	7	4
Design and drawing related problems	6	4	4	8
Approval process of project documentation	8	9	6	5

Table one summaries the major delays on Power Projects being poor coordination and communication amongst project parties. The owner of the project endures the most from this delay. Delay in payments is mostly endured by the owner and consultants. Political intervention delays are mostly endured by contractors. Design and drawing related problems are mostly endured by consultants. Approval process of project documentation is mostly endured by the owner.

**2.3 Construction Industry**

The construction industry contributes to the economy and development of a country. Many construction companies worldwide experience construction delays and exceed their initial deadline and budget (Hussin *et al.*, 2017). As the construction industry continues to grow, projects are becoming more complex and more extensive.

Clients have high demands and high standards for projects as a preference, as provided by world real-estate (Chatain & Eizenberg, 2015). Quality, time and cost have created the competitive nature within the construction industry. According to Hoonakker Carayon and Loushine (2010), competition and growth have increased the quality construction worldwide. Gunduz's (2020) construction project outcomes worldwide continue to disappoint project stakeholders despite the expertise from construction professionals. Construction delays are a worldwide reality because of cost overruns, litigation, time overruns and project abandonment (Fugar & Agyakwah-Baah, 2010). Construction delays can be defined as the time overrun either beyond completion date specified in a contract or beyond the project delivery date as agreed by parties (Assaf & Al-Hejji, 2006). Infrastructure development in developing countries has shown to be unstable over the last decade and infrastructure delivery has seen instability because of project delays (Fugar et al., 2010) (Asante, Kissi & Badu, 2014). These delays increases construction costs and push back the expected completion time of a project. Infrastructure projects delivery has seen instability because of project delays (Fugar *et al.*, 2010) which increases construction costs and push back the expected completion time of a project. Technology is the branch of knowledge that deals with the use and creation of technical means, the environment and society, interaction with life, pure science and applied engineering science (Schwalbe, 2008). Technology allows for improved construction quality and efficiency. Improving construction processes and management can help mitigate construction delay.

## **2.4 Different types of delays**

### **2.4.1 Client/owner delays**

The client or owner is the most crucial participant during the entire life cycle of a project (Kwakye, 1998). The responsibility and duty of clients are numerous. Clients require skilled professionals to organize and manage a project. Clients can either have their own in house professionals, but most of the time, hire professionals to handle a project (Odeh & Battaineh, 2002). A crucial decision that clients need to make is to determine the contract duration. Clients usually prefer a duration that is fast-paced, but an investigation is essential to ensure that the contract duration is realistic. A significant delay caused by clients is a delay in handing over the site to the contractor.

Quick decision making and personal involvement by the client during the initial phase of the project will accelerate the progress of projects.

The working relationship between a client and a contractor is one of the most crucial determinants of a project's success, and this relationship also develops trust between the two parties (Kimmons & Loweree, 1989). According to Aydin and Mihlayanlar (2017), slow decision making and delays in having projects design documents approved as a related delay is summarised in Table 2.

Table 2. Client Related Delay (Shebob *et al*, 2012)

	<b>Cause of delays</b>
1	Delay in delivering and furnishing site to the contractor
2	Unrealistic contract durations
3	Delayed settlement in contractors claims by the owner
4	Suspended work by the owners organization
5	Delayed issuing of change orders by clients
6	Slow decision making by the owners organization
7	Uncooperative client with the contractor which complicates contract administration
8	Delayed progress payment by the client
9	Poor communication with government authorities and construction parties by the owner
10	Client failing to coordinate with government authorities during the planning stage of a project.
11	Poor coordination by the client with project parties
12	Excessive bureaucracy towards the owner's administration

Table two summaries client related delays. These delays are a result of poor decision making and organising that can be prevented by proper planning and thinking ahead. These delays range from delay in delivering and furnishing site to the contractor, unrealistic contract durations and delayed settlement in contractors claims by the owner etc.

Mulenga (2014) identified the following as the main owner/client- related causes of construction delays:

1. Slowness in the decision-making process
2. Change in design during construction

3. Poor project coordination
4. Late revision and approval of design documentation
5. Poor communication
6. Delay in progress payments
7. Suspension of workers
8. Delay in site handover
9. Delay in approving shop drawings and
10. Delay in approving sample materials

Oshungade (2017) found that the main client- related causes of construction delays include among others;

1. Errors in contract documents
2. Poor communication between parties
3. Delay in the decision-making process by the client
4. Employee strikes
5. Unavailability of equipment
6. Ineffective planning and scheduling of project
7. Type of project bidding and award
8. Delays in issuing drawings
9. Suspension of work by the client
10. Rework due to errors during construction

#### 2.4.2 Consultant related delays

Consultant delays are delays that are caused by the consultant/s working on the project. Schedule delays by different studies have categorized them under consultant related. Late issuance of instructions and incomplete drawings are examples of consultant-related delays (Aibinu & Odeyinka, 2006). Consultants have the responsibility to supervise sites, and a failure to supervise accordingly can result in delays occurring in completion of projects (Al-Khalil & Al-Ghafly, 1999). Delayed changes in the scope of work, inexperienced consults and the late reviewing of design documentation are delays that are caused by consultants and are considered critical (Al-Kharashi & Skitmore, 2009).

According to Arditi *et al.* (1985), inadequate site inspection and delays in design work as main consulted related delays. Assaf and Hejji (2006) listed consulted related delays as:

1. Delayed testing inspection by consultants
2. Delays in major scope of works changes
3. Lack of flexibility by consultant
4. Poor coordination and communication between other parties and consultants
5. Conflict between design engineer and consultants
6. Inexperienced consultants

Mulenga (2014) identified the following as principal consultant-related causes of construction delays:

1. Delay in approving major changes in the scope of work,
2. Unclear and inadequate drawing details,
3. Poor communication and coordination
4. Delay in producing design documents,
5. Lack of experience and
6. Errors in designs,
7. Inadequate data collection and survey before design and
8. Lack of advanced engineering design software

Table 3 summarises different consultant-related delays. (Consultant related delays (Muhlezi *et al.*, 2014))

<b>Cause of delays</b>	
1.	Delay in evaluating/assessing major changes in the scope of works
2.	Errors in design overlooked by design
3.	Inadequate site investigation
4.	Inadequate and unclear drawings
5.	Interim payment certificate delay
6.	Delays in approving and reviewing design changes
7.	Delays in conducting testing and inspections

8.	Project complexity
9.	Inexperienced consultants
10.	Consultant conflict

Table two summaries client related delays. These delays are a result of poor decision making and organising that can be prevented by proper planning and thinking ahead. These delays range from delay in delivering and furnishing site to the contractor, unrealistic contract durations and delayed settlement in contractors claims by the owner etc.

#### 2.4.3 Contractor related delays

Mulenga (2014) identified the following as the main contractor- related causes of construction delays:

1. Rework due to errors in construction
2. Poor coordination
3. Poor communication
4. Ineffective planning and scheduling of projects
5. Difficulties in financing projects
6. Contractor's experience
7. Conflicts in sub-contractors schedule in project execution
8. Conflicts between contractor and other parties
9. Improper construction methods and
10. Delay in subcontractor's work

Oshungade (2017) found that the main contractor-related causes of construction delays include among others;

1. Poor communication between parties
2. Unforeseen ground conditions
3. Weather conditions
4. Original contract duration is too short

5. Low productivity level of labours
6. Shortage of labour and equipment
7. Shortage of materials in the market
8. Rework due to errors during construction

#### 2.4.4 Early design and planning

The design and planning stage of a project can either affect the project life cycle positively or negatively. Design and planning that is precise, accurate and adequate can ensure that construction activities are completed on time (Shebob, 2012). A great deal of extensive information and attention is required to ensure that activities run smoothly (Shebob, 2012). According to Carnell (2000), the purpose of design and planning is to ensure that parties involved respect and abide by their respective contractual obligations. Carnell (2000), states that unclear and incomplete specifications, documents and designs can create problems for construction participants and the owner, while also creating an unpleasant site environment in which to work. The vital role of drawings during the early design stage of a project must be recognised through coordinated planning and proper communication (Shebob, 2012). Odeh and Battaineh (2000), mention that the design stage should include materials, drawings, shape, location and infrastructure that relate to the project. Table 4 below provides information the various delays in initial design and planning.

Table 3. Early design and planning delays (Shebob, 2012)

Groups	Factors
Early planning and design	<ol style="list-style-type: none"> <li>1. Changes that affect the scope of the project</li> <li>2. Mistakes, ambiguities and drawing and specification inconsistency.</li> <li>3. Subsurface site conditions that are different from contract document.</li> <li>4. Initial contract duration is too short.</li> </ol>

Inadequate experience from the design office and unclear drawings are delays caused by the consultant (Aydin & Mihlayanlar, 2017).

#### 2.4.5 Material delay

Materials are an essential part of a construction project and form a significant part of projects expenditure. Planning material procurement is vital for a contractor to ensure during the initial planning stage of a construction project (Adbulrahman and Alidrisyi, 1994). Poor material procurement planning and handling of the material by the contractor can result in delays, material deterioration and material theft. Timely material purchases are essential to prevent delays caused by unavailable material (Odeh & Bataineh, 2002). Material price fluctuation goes a long way back, especially on large projects. It can hinder the client's decision to acquire more materials and waiting for prices to drop can lead to delaying the entire construction project (Koushki *et al.*, 2005). Changes and modifications in projects specifications occur due to errors during the design stage of infrastructure. Such design changes usually do not affect the type of materials used, but the acquisition of new material may take time because of client approval and price negotiation (Wiguna and Scott, 2005). Table 5 provides a list of factors that relate to material delays.

Table 4: Material related delay (Shebob, 2012)

	Factors
Material delays	<ol style="list-style-type: none"><li>1. Required material shortage</li><li>2. Material delivery delay</li><li>3. Material price change</li><li>4. Material specification changes</li></ol>

Material delays are caused by material shortage, late material delivery, fluctuating material price and changes in material specifications.

#### 2.4.6 Financial delays

Financial delays are delays that revolve around financial issues that will cause a delay. Kazaz, Ulubeyli and Tuncbilekli (2012) ranked delay in payments, inflation, material cost fluctuation and cash flow problems as common financial factor delays. O'Brien (2012) discussed and mentioned that inflation is an essential factor that the construction industry in Iran faces. Drawing on the fact that both Iran and South Africa are developing countries, South Africa is likely to face a similar issue. Financial delays may result from environmental factors such as site layout, site location and

geological problems as well as labour factors such as a shortage of skilled labour and low labour productivity (Sambasivan & Soon, 2007). Management factors such as contract disputes, material changes, design changes, poor quality control and estimation problems cause financial delays (Kazaz *et al.*, 2012).

Inaccurate cost estimates can cause high-cost escalations in construction projects. According to Doloi (2010), cost estimates are a vital part of project management and assist towards good decision making, resource management, time management and cost schedules. Doloi (2010) mentioned that cost estimation has three methods being parametric, analogy and detailed individual cost estimation. Analogy estimation involves making use of similar historical projects with a similar design and size to make estimation. Parametric estimation is when past information is converted into a parametric input and across sub-elements and elements to formulate a preliminary cost estimate. Detailed individual estimation involves individual cost estimates that are then summed up together to formulate an accurate estimate.

#### *2.4.6.1 Poor contract time estimation*

According to Irfan *et al* (2011), establishing accurate time durations for completing a project is very helpful during the bid process of a project. Contract negotiation delays can be mitigated the sooner accurate information is available. Good estimations during the early stages of a project are helpful towards tender evolution, contract administration and construction planning (Toussi, 2015). The complexity of a project can attribute towards finding out the duration of a project which is expected to be accurate (Toussi, 2015). Contract negotiation delays can be mitigated the sooner accurate information is available.

#### **2.4.7 Scope change delays**

Assaf and Al-Hejji (2006), conducted a survey in Saudi Arabia to interrogate civil project delays. Al-Hejji found that scope-change variations to the contract as a frequent delay factor. Kazaz (2012) mentioned different scope change delays, and these are listed in Table 6 below.

Table 5: Scope change delays (Shebob, 2012).

Rank	Factor Groups	Factors
1.	Managerial factors	Design and material changes
2.	Financial factors	Delay of payments
3.	Financial factors	Cash flow problems
4.	Financial factors	Contractor's financial problems
5.	Labour-based factors	Poor labour productivity
6.	Managerial factors	Estimation problems
7.	Project-based factors	Lack of feasibility studies
8.	Labour-based factors	Construction defects
9.	Labour-based factors	Unbalanced number of workers
10.	Financial factors	Fluctuation in material prices

**Table six breaks down the different factor groups that create scope change delays. The factor groups are either managerial, financial, project based or labour related factors that cause scope change delays.**

#### 2.4.8 Excusable Delay

An excusable delay is one that cannot be controlled by the subcontractor or contractor. Excusable delays are known as an unforeseeable event. The following delays are considered excusable depending on the agreed-upon contract:

1. Floods
2. Unusual weather conditions
3. Direct owner changes
4. Fires
5. Acts of God
6. General worker strikes
7. Outside agency intervention
8. Omissions and errors in specifications and plans
9. A lack of action from government bodies
10. Different site conditions

Excusable delays are unforeseeable and may be reasonable, but the contractor/sub-contractor has no control over them (Trauner, 2009). The analysis of an excusable delay is based on its preceding definition. All decisions that concern a delay must be in line with the specific contract, which can cause a delay in the initial contract being formulated. The contract should clearly outline the factors which will be valid delays concerning the project and justify for an awarded time extension (Trauner, 2009). Some contracts may not allow for a time extension because of unusual and severe weather conditions. Time extensions on a project can also be awarded for material and design changes, payment delays, cash flow problems, poor labour productivity, estimation problems and material price fluctuations (Kazaz *et al.* 2011).

#### **2.4.9 Non-excusable delay**

Excusable delays are events which are within the contractors' control and are foreseeable. Examples of non-excusable delays are listed below.

1. Late subcontractor performance
2. Untimely performance by suppliers
3. Faulty workmanship from the subcontractor or the contractor
4. Labour related strike

A project's contract dictates whether a delay is classified and considered to be non-excusable. An example is if a contractor makes a material purchase, but the supplier delivers late, which is beyond the contractor's control. Depending on the contractual agreement, this supplier delay can be considered non-excusable. The client and drafter of the contract must ensure that the contract document is unambiguous and clear. Contractors should ensure that they fully understand the contract of the project before signing (Trauner, 2009).

#### **2.5 Pre-contract causes and influences of delays**

Project delays can cause contract and conflict disputes toward delivering a civil or building project on time (Aibinu & Odeyinka, 2002). When construction delay claims are avoided, a project can be financially viable. A study conducted by Aibinu (2009) revealed that when a contractor has received an unfavourable outcome because of contract administration on delay claims. According to the study, the intensity of conflict was lower when there was pre-contract negotiation and pre-contract

agreement regarding the rules for quantifying and assessing the impact of anticipated delays than when there was none (Aibinu, 2009). The higher the level of pre-contract agreement and pre-contract negotiation on assessing and quantifying delay rules, the higher the contractor will perceive decision making quality towards delay during the construction phase. When contractors highly perceive delay decision making for delay claims, the intensity towards conflict is decreased. Project management and clients when entering into contracts, need to pay close attention towards pre-contract negotiation and agreements made with contractors to agree on rules for assessing and quantifying the impact of anticipated disruption and delay. Pre-contract negotiation aspects require clarification and agreement on the following:

1. A Construction program that details preparation and the update procedure of the program
2. Evidence for claims
3. Methodology which analyses delay claims
4. Structured method for quantifying disruption costs
5. Formula to quantify prolongation costs
6. Method for handling concurrent delays
7. Claimable profit and amount to be paid
8. Compensation

Most standard forms of contract do not mention the points listed above adequately. An agreement on the points listed above may be incorporated as a partnership or a supplement to the actual contract agreement. Pre-contract clarity, negotiation and agreement can produce non-instrumental or instrumental effects that can facilitate disruption claims and delay resolution and assessment. This can mitigate conflict towards an unfavoured delay claim outcome.

## **2.6 Case Studies**

### **2.6.1 Case Study 1: Iran**

Toussi (2015) conducted a study to evaluate influencing delays in construction projects. Construction expert practitioners who have been involved in civil projects in Iran were interviewed, they represented different companies ranging in size that operating in the public and private sector. The interviewed professionals were senior project managers, architects or a project engineer.

They all had no less than fifteen years of professional experience. Out of the projects they have been part of, eighty percent of them experienced project delays. Detailed individual estimating and parametric cost estimating was the dominant estimation method used by the professionals on projects. Initial estimation was averaged to be ten percent accurate. The cause of poor estimation was a result of poorly detailed plans, unpredictable inflation and poor estimation. The professionals revealed that on average; seventy percent of projects they have worked on had financial issues. Inflation negatively affected projects by ninety percent. The professionals revealed that different changes such as flawed feasibility studies, clients changing their minds and inadequate understanding of the client’s requirements had caused delays on projects.

The form of contract selected for a project can cause a fifty percent delay towards a project the professionals revealed. The tender process was revealed to affect a project by sixty percent negatively, and the negative effect is caused by low bidders being awarded contracts. This negative effect can be mitigated by changing the criteria of the winner in the tender process to be awarded to a performance capable bidder. Political instability was revealed to cause a twenty percent negative effect on projects and a shortage of labour, causing a ten percent negative impact. Drawing on the fact that there is a plethora of political instability in South Africa, the country is likely to face a similar situation. Table 7 gives delays that were listed by the professionals.

Table 6. Listed delays by professionals (Toussi, 2015).

	Factor	Financial issues	Poor feasibility studies	Contract related issues	Inter-party communication	Materials	Political issues
1	Inadequate funding	•					
2	Inadequate fund allocation	•					•
3	Inadequate time for fund allocation	•					
4	Inflation	•		•			•

5	Currency rate drop	•		•			•
6	Instability in economics	•		•			•
		•		•			•
7	Material price fluctuation			•		•	
8	Poor initial estimation		•	•			
9	Too many changes		•				
10	Poor understanding of client's needs		•				
11	Lack of detailed plan		•				
12	Political instability						•
13	Low bid winner			•			
14	Form of contract			•			
15	Tender process			•			
16	Poor communication between parties				•		
21	Approval timeline underestimate		•		•		

Table seven lists the different professional delays that were highlighted by a study conducted in Iran. The most occurring delays fell under financial issues, poor feasibility studies, contract related issues and political issues.

## 2.6.2 Case Study 2: Libya and the United Kingdom

Shebob (2012) conducted a study to examine construction project delays. The study was conducted in both Libya and the United Kingdom. Questionnaires were used to examine procurement methods, tendering arrangements, delays experienced and finding out the ratio between non-delayed projects and delayed projects.

### 2.6.2.1 Procurement methods

Different procurement methods are used across construction projects. Questionnaires in the Libya and United Kingdom were distributed to consultants and clients relating to a contractual arrangement. It was found that different procurement methods lead to different delays. Respondents gave feedback on procurement methods in which they had experience. Traditional procurement was the most used procurement method (29.11%), followed by Management contracting (22.76%), then Design and build (20.25%) and lastly Construction Management Procurement (27.85%) (Shebob, 2012). Delay factors were revealed to be influenced by the most used to the least used procurement method. Design and Build were shown to have less delay influence because design approval and errors are reducible (Shebob, 2012).

### 2.6.2.2 Tendering arrangements

The case study examined different tendering arrangements. The tendering process was determined as having influential delays in construction projects. The respondents have experience and have participated in different tendering arrangements. Selective tendering (34.17%) had been the most used tendering arrangement, followed by open tender (25.33%), then negotiation (20.25%) and continued tendering (20.25%) had the same response (Shebob, 2012)..

### 2.6.2.3 Delays experienced

Out of the 76 participants, 61.84 % had been involved in projects that were not completed on time and as planned. The remaining 38.16% had never experienced any type of delay (Shebob, 2012). South Africa is likely to experience such delays because the above-mentioned different tendering arrangements applies in our context.

### 2.6.3 Case study 3: Saudi Arabia

Al-Barak (1993) found from surveying 34 different causes of failure and 68 contractors in Saudi Arabia that poor estimation practice, lack of experience, bad decision making and economic inflation as major causes of delay. Zanelidin (2006), Frimpong and Oluwoye (2003) revealed that different countries and projects experience different delays.

### 2.6.4 Case study 4

Al-Najjar (2008) conducted a study and evaluated different construction projects procurement process. The bidding stage, the evaluation stage and awarding stage were examined. Clients, consultants and contractors were interviewed, and the characteristics of each project were reviewed.

#### 2.6.4.1 *Jnena clinic centre*

Complete bidding documents were provided that included private and general conditions, drawings and bill of quantity. The bidding stage went on for twenty one (21) days and underwent advertising, bid sell, site visits, per bid meetings and tender submitting open meetings (Al-Najjar, 2008). The evaluation stage consisted of the preliminary examination process, price corrections, price reviews and technical advisory follow-ups. The planned contract amount was 560 000 US dollars and the actual contract amount spent by the time the project was concluded was 572 500 US dollars. The planned project duration was initially twelve months. The project was completed in thirteen months and two days more. The project suffered a thirteen months and two days delay. The contract was awarded to the lowest bidder. Of the shortlisted contractors, only three out of seven pitched a bid amount that was higher than 580 000 US dollars (Al-Najjar, 2008).

#### 2.6.4.2 *Construction of financial ministry building in the State of Palestine (Gaza Strip)*

Complete bidding documents were provided that included private and general conditions, drawings and bill of quantity. The bidding stage went on for twenty-one days. Passing through advertising, bid sell, site visits, bid meetings, tender submitting and open meetings. The evaluation stage consisted of the preliminary examination process, price corrections, price reviews and technical advisory follow-ups. The planned contract amount was \$2 800 150. The actual contract amount spent at completion of the project was \$2 835 430.

The planned project duration was initially thirty-six months but it was completed in forty-four months and four days. The project suffered a two hundred and forty four days delay. The contract was awarded to the lowest bidder. Of the shortlisted contractors, eighty percent pitched a bid amount that was higher than \$2 840 000(AI-Najjar, 2008). Awarding contracts to the lowers bidder it is not always an ideal situation because it causes project delays, which is the similar situation in the South African context.

## **2.7 Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department Case Study**

Eskom Holdings SOC Ltd is a South African State Owned Company responsible for generation, transmission and distribution of electrical power to the country's industrial, agricultural, commercial and domestic consumers. Eskom Holdings SOC Ltd owns the electricity network comprising of more than 300 000 kilometres of power lines, 27 000 kilometres of the transmission grid and over 7.5 million electrification connections (Energy, 2015a). Eskom Holdings SOC Ltd strives to fulfil its mandate in terms of providing efficient, effective and sustainable operation of electricity supply infrastructure, promoting the use of renewable energy sources and energy efficiency as well as to facilitate universal access to electricity for South African consumers (Gazette, 2006). South African consumers are experiencing frequent loading shedding due to the imbalance between generation capacity and load demands. The increased load demands cause power shortages. They are a result of many years of economic growth and the provision of electricity to townships and rural areas that were not connected to the national grid many years ago (Energy, 2015a). To address the electricity crisis, the South African government has set a target 17,800MW of new electricity to be produced from renewable energy sources, primarily solar, and wind energy (Energy, 2015b). The South African government has also introduced a renewable energy programme in 2011, which to date has delivered 92 independent power producers currently generating 6327MW of power to the national grid (Energy, 2015b). The renewable energy sources contribute to the diversification of energy mix and the creation of green economy jobs in South Africa (Energy, 2015b). The national department of energy (DoE) has collaborated with Eskom Holdings SOC Ltd and various municipalities to initiate and implement multiple electrical engineering projects.

Eskom Holdings SOC Ltd distribution projects are classified into five categories namely strengthening projects, refurbishment (reliability) projects, direct customers projects, infills projects and electrification projects (Eskom, 2014). These high priority projects still encounter severe delays which impact South African economic growth and population negatively (Energy, 2015a).

### 2.7.1 Project Planning

Project planning is part of project management, which relates to the use of schedules such as Gantt charts to plan and subsequently report progress within the project environment (Kerzner & Kerzner, 2017). Deducing from the explanation above, it can be noted that project planning as a process is output-oriented. It is concerned with deciding in advance what, when, how, and who will take the necessary actions to accomplish established objectives. In this context, planning is a pervasive management function which is achieved by all levels in the project hierarchy, the difference being scope, detail, and the magnitude of the effort. Planning forms the foundation for future actions, using the past as a guide.

### 2.7.2 Eskom Holdings State Owned Company Ltd Project Life Cycle Model Manual (PLCM)

It is the policy of Eskom Holdings SOC Ltd that all projects undertaken by its divisions and subsidiaries conform to the company's standard project life cycle governance framework to govern the delivery of the projects. The Eskom Holdings SOC Ltd reference project life cycle model (PLCM) has been developed to adopt best practices to formulate a process designed to address the diverse and unique requirements within Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution Department to deliver projects within the company effectively(Mathobela, 2009).

The PLCM aligns with the approach of project front end planning and implementation recommended by the Independent Project Analysis Inc. (IPA) and Construction Industry Institute (CII). It is structured to facilitate the planning and development of project work and deliverables; so that the delivery of the solution is developed and delivered in accordance with a logical progression of increasing detail and certainty (Mondi, 2018). It is also used to govern the work of the project and approval of the project investment.

As a single, PLCM cannot adequately cater for all the project types across the business, hence a standardised suite of project life cycle versions were created to cater for these differences. These different versions of the Reference Eskom Holdings SOC Ltd PLCM are known as Subset PLCM Manual. This manual is a compendium of documents that have been developed to outline the Wires Business PLCM Subset to be used for the delivery of Transmission projects. The transmission PLCM Subset contains the life cycle of a project and integrates the processes of all the functions (for example governance, project management, engineering, finance, commercial, environment, health and safety, quality, etc.) involved to deliver projects effectively (Vorster and Marais, 2014).

2.7.3 Transmission PLCM Subset Key Roles

The transmission PLCM Subset is intended to provide a framework that will ensure that certain minimum requirements are met at critical stages of the project. The intention is to allow the project manager enough flexibility so that the details of the project management methods used can be tailored to suit a particular project (Mathobela, 2009). The model is based on the principle that there are four essential parties on every project and that the roles and responsibilities of each of these parties must be clearly defined. Amongst the four essential parties, is the project manager who is the person appointed by the programme manager to manage the delivery of the project. Transmission PLCM Subset Key Roles during the project life cycle are shown in Table 8 below.

Table 7. Transmission PLCM Subset Key Roles

Phases	Pre-Project Planning		Concept		Definition	Execution			Finalisation	Post Project
Stages	Define Need	Initiate the Project	Develop Design Alternatives	Select Single Design Solution	Develop Solution	Finalise Solution	Implement	Handover and Commissioning	Close Project	Realise Benefits
Sponsor										
Acc. Manager										
Project Management										
Engineering										

Table eight shows the different stages from pre-project planning till post project and the different stakeholders that are involved.

2.7.4 Procurement Process

According to Fourie (2015), procurement is a process whereby goods and services are acquired from external providers to meet the developmental needs of a government. In this process, procurement is used as a social and economic tool to improve the livelihood of inhabitants (Fourie, 2015). Drawing from the explanation above, it can be noted that the procurement process is a method by which items are purchased from external suppliers.

2.7.5 Wires PLCM Subset structure

2.7.5.1 PLCM Phases and Stages

The transmission PLCM subset consists of six phases, ten stages and seven gates in the Wires PLCM Subset. A phase / stage-gate is a predefined decision control point where the approving authority reviews deliverables within the PLCM to assess technical and investment performance against predefined parameters, and which authorises work to the next phase / stage as shown in Table 9 below (Vorster and Marais, 2014).

Table 8: Wires PLCM Subset six phases, ten stage and seven gates (Energy, 2015a)

PHASES	Pre-Project Planning		Concept		Definition	Execution			Finalisation	Post Project
	STAGES	Define Need	Initiate the project	Develop Design Alternatives	Select Single Design Solution	Develop Solution	Finalise Solution	Implement	Handover and Commissioning	Close Project
GOVERNANCE			CRA	DRA	ERA	IRA	HOA	FRA		BRA

The procurement process is found in the execution phase, in finalise solution stage, which is after the Execution Release Approval (ERA) gate. It encompasses the approval of the project definition and authorisation to proceed with the execution of the project and to obtain investment approval for the execution phase. The objective of the **execution phase**, which is the fourth of the six phases of the transmission PLCM Subset, is to execute and hand over the project. It is made up of three stages, namely:

1. **Finalise Solution**
2. Implement.
3. Handover and Commissioning.

The purpose of the **finalise solution stage** is to develop each discipline to a detailed level, to interface and integrate and ready for implementation. The work packages outlined in Table 10 are found in the final solution stage.

Table 9. Work Packages

Work Package	Description
1. Construction Design	The detailed design is to be finalized ready for construction.
<b>2. Project Sourcing &amp; Procurement</b>	<b>Following Execution Release Approval (ERA), tenders can be issued, bids received and evaluated, and contracts awarded. Procurement of services, resources and materials for Implementation can commence.</b>
3. IRA Submission Pack	Finalize all required documentation and obtain necessary signatures and authority to commence the work of implementation and construction. Assemble all documents in a central location as per configuration and document management standards for review.

Table ten lists the three different work packages being construction design, project sourcing and procurement and IRA Submission Pack and then defines each work package.

Table 10. Finalise Solution Stage: Work Package-Project Sourcing and Procurement (Eskom,2014)

Introduction	Pre-Project Planning	Concept	Definition	Execution	Finalisation	Post Project
<b>Finalise Solution Stage: WP - Project Sourcing &amp; Procurement</b>						4 of 20
ACT NO	ACTIVITY NAME			OUTPUTS		
6.1.1	Compile technical tender documentation			1. Confirmation of placed Material Reservations		
6.1.2	Review complete Contracting Pack			2. Confirmation of Awarded contracts		
6.1.3	Issue inquiry			3. Confirmation of Placed Purchase orders		
6.1.4	Evaluate Vendor Response			4. Approved Site Management Plan		
6.1.5	Provide recommendation on Evaluated Tenders			5. Approved Health & Safety Plan		
6.1.6	Award Contracts			6. Approved Construction Execution Plan		
				7. Updated Project Stakeholder Matrix and Organogram		
				8. Confirmation from Treasury of Bonds & Guarantees (if applicable e)		
ROLES AND RESPONSIBILITIES						
Responsible		Accountable		Consulted		Informed
Project Buyer		Project Manager		Core Team		
RELATED DOCUMENTATION						
Level 4 PCMs		Other Documentation			Forms and Templates	
240-44682850 Provide Engineering During Project Sourcing		32-1033 Eskom's Procurement and Supply Chain Management Policy.			NEC Template	
240-42385239 Contracts Management PCM		32-1034 Eskom's Procurement and Supply Chain Management Procedure. Practice Note Number 2-2014 PPPFA.				

Table eleven shows the finalised solution stage. Breaking down the different activities and outputs and the roles and responsibilities of the different stakeholders. As well as the different documentation involved.

### 2.7.6 Variables

There are specific activities involved during the procurement process. These activities are variables. The study seeks to determine what causes each activity to go beyond its time that eventually increases the expected ninety days. The twenty-four identified variables are shown in Table 12 below (Mvelase, 2015).

Table 11. Table of Identified Variables (Energy, 2015a)

<b>ACTIVITY</b>	<b>RESPONSIBLE PERSON</b>	<b>TIME TAKEN</b>	<b>REASONS WHY</b>
Meeting with Cross-functional team engagement	Project Manager		
Compilation and signing of Scope of Work	Engineer		
Compilation of Contract (Procurement Method)	Project Manager		
Compilation of Bill of Quantities & Estimate	Quantity Surveyor		
Compilation of Safety Specification	Safety Officer		
Compilation of Environmental Management Plan	Environmental Officer		
Compilation of Quality Inspection Plan	Quality Officer		
Creation of Purchase Requisition	Project Officer		
Approval of Purchase Requisition	Procurement Manager		
Assigning of Buyer	Procurement Manager		
Kick-off & Contracting Strategy meeting	Buyer		
Strategy sign off by Project team	Buyer		
Development of enquiry pack	Buyer		
Submission of enquiry to Tender Committee	Buyer		
Tender Committee Presentation and approval	Buyer		
Issue Tender Enquiry into the market	Buyer		

Closing of Enquiry	Buyer		
Evaluation	Cross-Functional Team		
Compilation and Submission of report	Appointed Professional		
Submission of enquiry to Tender Committee	Buyer		
Tender Committee Presentation and approval	Buyer		
Negotiation with Prospect Supplier	Buyer		
Award (within parameters)	Buyer		
<b>Total days</b>			

Table twelve identifies different variables that cause delays and mentions the person who is responsible.

**2.8 Recommendations for minimizing delays**

2.8.1 Owner/Clients

Funding levels should be determined during the planning stage of a project. This is to ensure that regular payments are made to the contractor for work done. Clients should work closely with financing bodies and institutions to have payment of schedules released. Clients need to minimize regular interference and making drastic changes to requirements. Frequent interference from clients causes inordinate project delays. When clients select contractors, they should ensure that they pick the most capable contractor and not just based on the lowest bid. Owners should verify the capabilities and resources that contractors have before awarding the contract. The selected contractor should have the experience, sufficient manpower, financial capability and technical capability to execute the project. Coordination and communication amongst project parties should be efficient. The project site must be handed over once the contract has been awarded.

### 2.8.2 Consultants

Project drawings should be clear and include the scale and dimensions to avoid ambiguity when construction commences. Project designs should be checked and approved to avoid design rework after they submitted. Site investigation should be performed to avoid design errors. A control system should be established to control and evaluate variation in orders that are initiated by the owner. Drawings should be prepared and approved on time. Consultants should ensure proper coordination and communication among all project stakeholders.

### 2.8.3 Contractor

Contractors should bid for projects they have expertise in completing. They should have an excellent system to manage the construction site and proper supervision, which develops projects scheduling and planning. Contractors should calculate an optimistic and realistic duration to execute the project efficiently. Contractors need to plan ahead and provide full schedules to the clients, as well as to ensure they have stable financial backing.

### 2.8.4 Power sector

The power sector can minimise delays by following the methods listed below (Goutom, 2019):

1. Paying attention to demographic information and legal issues
2. Smooth project funding and speedy approval of project documentation
3. Performing effective communication protocols with project parties and appointing efficient project managers to prioritize and update planned schedules
4. Appointing experienced consultants and contractors
5. Obtaining approved designs and drawings

### 2.8.5 Work environment

Project environments can be very dynamic, which can cause conflict. Project participants must acknowledge that conflict is inevitable and when resolved, can be beneficial towards a project. Conflict management practice should be available to deal with conflict as soon as possible.

## **2.9 Gaps Identified**

The literature review above has provided insight on the key factors that influence pre-contract procurement delay in infrastructure projects. The literature focused on overall pre-contract procurement delays because they affect the time of procurement including that of electrical

infrastructure ((Antoun, et al 2019). Regardless of the type of infrastructure the procurement processes that are followed are usually the same with minimal differences (Tadelis, 2017). The case studies outlined did not focus on electrical infrastructure but are relevant because of the pre-contract procurement processes that are followed. The study will contribute towards electrical infrastructure pre-contract procurement delays research because the majority of available research focuses on building infrastructure. This study aims to contribute to this knowledge gap.

## **2.10 Summary**

Delays have affected construction projects for a very long time whether the cause of delay is known or unknown (Aydin and Mihlayanlar, 2017). Delay prediction is crucial towards preventing delays. The vital role of drawings during the early design stage of a project must be recognised through coordinated planning and proper communication (Shebob, 2012). The design and planning stage of a project can either affect the project life cycle positively or negatively. Design and planning that is precise, accurate and adequate can ensure that construction activities are completed on time (Shebob, 2012). Delay changes in the scope of works, inexperienced consultants and the late reviewing of design documentation are delays that are caused by consultants and are considered critical (Al-Kharashi and Skitmore, 2009). According to Arditi *et al.* (1985), inadequate site inspection and delays in design work as main consulted related delays.

According to Aydin and Mihlayanlar (2017), slow decision making and delays in having projects design documents approved as a client related delay. Quick decision making and personal involvement by the client during the initial phase of the project will accelerate projects progress. Inaccurate cost estimates can cause high-cost escalations in construction projects. According to Doloi (2010), cost estimates are a vital part of project management and assists towards good decision making, resource management, time management and cost schedules. The sooner accurate information is available to contract negotiation, delays can be mitigated. Reasonable estimations during the early stages of a project are helpful towards tender evolution, contract administration and construction planning (Toussi, 2015). Project management and clients when entering into contracts, need to pay close attention to pre-contract negotiation and agreements made with contractors.

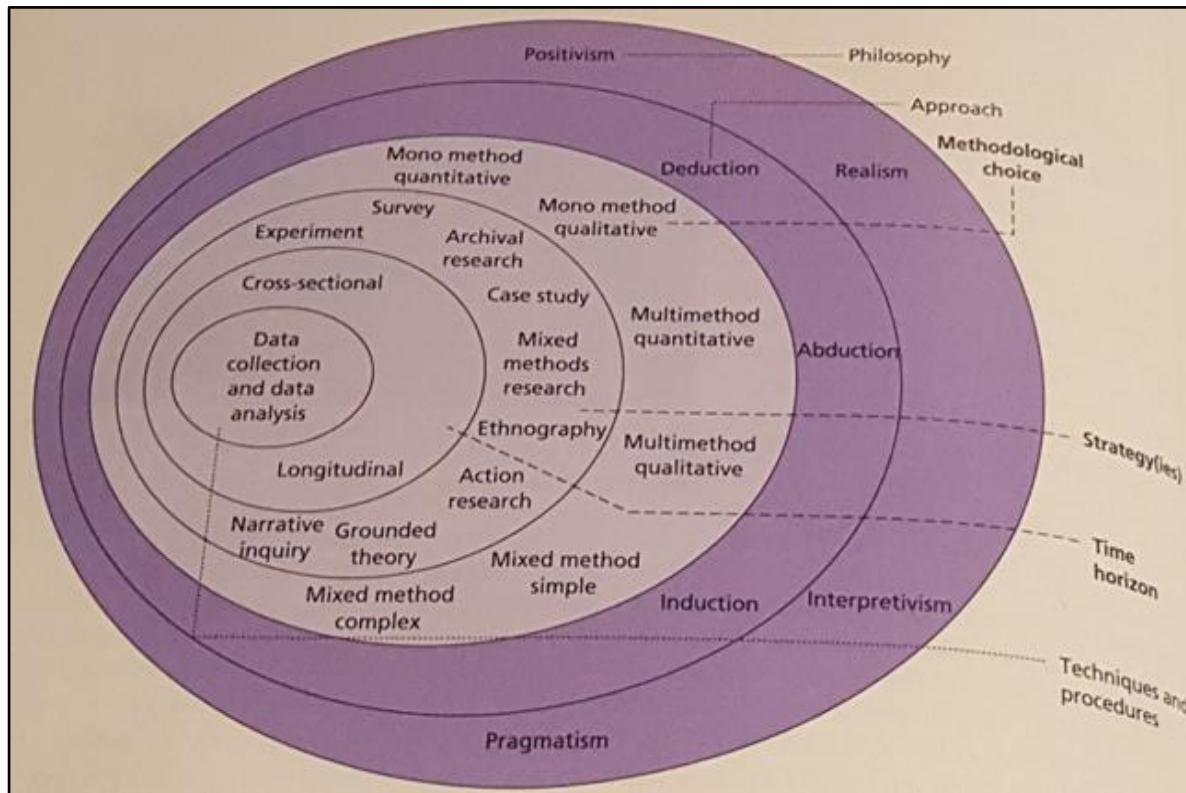
# Chapter 3: Research Methodology

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This chapter gives a description of the sampling design, questionnaire/instrument design, data collection technique, and data analysis approach. According to Zikmund *et al.* (2010), a research design provides guidelines and instructions to be followed when addressing the research problem. Carriger (2002) defines it as the strategy, plan, and the structure of conducting a research project. The goal of a research design is to align how the research objective will be achieved, address research questions and hypotheses, bearing in mind the real concerns and limitations of the project (Klopper, 2008). Furthermore, a research design seeks to answer these questions – is the research design reliable, realizable and carefully clarified – in other words, is it logical?

A research design obtains appropriate evidence, and it will do so with utmost efficiency to secure useable, unbiased and precise answers to the research questions (Hair, *et al.*, 2007). A research design includes how data is to be acquired; what instruments will be employed; how the research instruments will be utilized; and the intended means for analyzing data collected (Hair *et al.*, 2007). Essentially, and in keeping with the approach stated above, during the distribution of questionnaires, participants were allowed to describe and pinpoint the challenges that result in delays experienced in the procurement process of electrical infrastructure projects for this study.

This chapter discusses and describes the methodological procedures undertaken in this study. Bryman and Becker (2012) defines research methodology as the means of understanding the full research process, which includes logical assumptions, moral principles, socio-organisational contexts and the political impact of new knowledge from the research venture that will be employed in this study. Saunders' research onion was used as a guide for the research design, as shown in Figure 1.



**Figure 1.** Research Onion (Saunders *et al.*, 2016)

In his article Peeling Saunders’s Research Onion, 2016, Arunaditya Sahay mentioned that he is a great admirer of Saunders ‘Research Onion.’ I firmly believe that the young researchers, just like peeling the onion, should go from the outer layer to the inner layer of the research onion. Though most researchers design their research to answer a question or address a problem, they begin by working out what data are needed and what method, tools or techniques should be used. This means that they start peeling the onion from the center. Can an onion be peeled from the center?” He further states that it should be clearly understood that it is the researcher’s understandings and associated decisions with regard to outer layers of the onion that provide the context and boundaries within which data collection techniques, processing of data and analysis procedures should be selected. The planning and designing stage of a research is most important.

The final elements, the core of the research onion, need to be considered in line with other design elements which are contained in the outer and middle layers of the research onion. In kitchen, generally, the first layer of the onion, after peeling, is thrown away. But in research, the outer layers of the onion form the root and the middle layers the building blocks of the research.

They are crucial to the development of an appropriate research design which is coherent with the objectives and the research questions. The research design should be such that it can be both justified and explained. One will start peeling these layers starting from outer layer and elaborate their importance. The first layer constitutes research philosophies and their implications followed by choices, strategy, approaches, time horizons, techniques and procedures.

### **3.1 Research philosophy and approach**

#### **3.1.1 Research Philosophy**

The term research philosophy relates to the development of knowledge and the nature of that knowledge. Philosophy is a ‘thinking activity’ that is intended to enhance our comprehension about the world and ourselves (Das, 2014). Philosophy provides a criterion for determining whether progress has occurred within a given field or not, and it facilitates the ability to express and support ideas (Das, 2014). Research philosophy is therefore, a belief about how data about a phenomenon should be gathered, analysed and used (St. Pierre & Jackson, 2014). According to Abdul-Rahman (2010), the philosophical aspect is as important as the methods employed, helping us to reflect more clearly and comprehensively about why we do what we do. When referring to the philosophy of a particular field, it does not intend to solve historical, physical or legal questions as to the concepts of the study that create such thinking but rather to establish foundations and to propose suppositions (Sefotho, 2015). Abdul-Rahman (2010) further contends that philosophy should not seek to examine hypotheses in terms of their truth or fabrication, but rather whether they contribute to the problem-solving process or not. Philosophy provides a criterion for determining whether progress has occurred within a given field or not, and it facilitates the ability to express and support ideas (Sefotho, 2015). The positivist philosophy creates distance between the researcher and respondents, which is crucial to develop emotional detachment to be able to get a clear distinction between reason and feeling (Bondi, 2005). It is therefore for this reason, that this philosophy is best suited for this study.

### 3.1.2 Research Approach

The research approach for the study is deductive and is associated with a positivist philosophy. In the deductive approach, a theory is not developed, instead an existing theory developed from a thorough literature survey and data collection is tested (Saunders & Thornhill, 2011). Deductive approach can also be used to verify theories through research questions (Creswell, 2014). According to Bordens and Abbott (2011), deductive approach starts from the general and narrowed down to the specific. The questionnaires were initially emailed to more than forty professionals including project managers employed by Eskom Holdings SOC Ltd with no response. The questionnaires were further emailed to fifteen and of the fifteen PMs emailed, only two did not respond. This indicates a reasonable response rate from the participants.

### 3.2 Methodological Choice

The choice layer of the research onion provides option of deductive and inductive research. This is a basic but important choice researchers need to make while designing their research; the deductive choice, generally, leading to the use a quantitative method or methods while inductive choice leads to a qualitative method or methods. There can be a combinative research design which uses a mixture of both. The design encompasses all; methodology, methods, tools and techniques. Among the researchers interviewed, some had used a single method while some others had used multiple methods; single (mono) method could be qualitative or quantitative whereas multi method could be qualitative, quantitative or a combination of both (Arunaditya Sahay, 2016). Quantitative research design is aimed at discovering how many people think, act or feel in a specific way. Quantitative research is defined as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Quantitative research collects information from existing and potential customers using sampling methods and sending out online surveys, online polls, questionnaires, etc., the results of which can be depicted in the form of numerical. After careful understanding of these numbers to predict the future of a product or service and make changes accordingly. This study employed quantitative methodology. The questionnaires were initially emailed to more than forty professionals including project managers (PMs) employed by Eskom Holdings SOC Ltd with no response.

The questionnaires were further emailed to fifteen and of the fifteen PMs emailed, only two did not respond. This indicates a reasonable response rate from the participants. Data was collected from fifteen different participants. According to Creswell (2009), a quantitative research approach is an investigation into a social or human problem, based on testing a theory composed of variables, measured with numbers, and analysed with numerical procedures. This method is associated with the positivist philosophy and the deductive approach (Saunders & Thornhill., 2011). The table below illustrates the self-administered questions.

### **3.3 Population and Sampling**

Population refers to the aggregate of all the units that are eligible to participate in a study (Salkind, 2012). A population is defined by Welman *et al.*, (2011), as a group of entities with a common set of characteristics. The study population was limited to construction industry practitioners working at Eskom Holdings SOC Ltd, Transmission Division, Asset Management Execution department. These professionals included the following:

1. Project managers (PM)
2. Contract Managers (CM)
3. Quantity Surveyors (QS)
4. Commercial Managers (Comm. M)
5. Engineers (Eng.)
6. Health & Safety Officers (HSO)
7. Environmental Officers (EO)
8. Quality Officers (QO)

### **3.4 Sampling technique**

Dahlberg and Mccaig (2010) assert that there are two methods for sampling, namely probability and non-probability sampling. A convenience sampling strategy was used to identify Eskom Holdings SOC Ltd employees who were convenient to the researcher. Convenience sampling allowed for the researcher to have several respondents to be furnished with questionnaires within a relatively short period (Malhotra 2010).

Moreover, the convenience sampling procedure was used in selecting the participants because of the ease of the researcher's access to the employees and management at Eskom. The next section focuses on elucidating on the data collection process. A sample can be defined as a portion of a larger population (Dube, Roberts-Lombard & Van Tonder 2015). Roets (2013) defines the sample size as the count of factors involved in the study. Kumar (2014), as well as Gupta (2011), posit that the number of subjects in a study is called the sample size, and refers to the elements to be included in a research study. The determination of the sample size is influenced by several factors, including the research design; the average sample size used in similar studies, the number of variables and proposed methods of data analysis (Malhotra 2010). The questionnaires were initially emailed to more than forty professionals including project managers employed by Eskom Holdings SOC Ltd with no response. The questionnaires were further emailed to fifteen and of the fifteen PMs emailed, only two did not respond. This indicates a reasonable response rate from the participants. This research study comprised of fifteen participants within the department.

### **3.5 Data Collection Procedure**

According to Berndt and Petzer (2011), data collection comprises the actual collection of responses from the identified sample. The data was collected through a self-administered pre-contract procurement process questionnaire which was initially emailed to more than forty professionals including project managers (PMs) employed by Eskom Holdings SOC Ltd with no response. The questionnaires were further emailed to fifteen project managers employed by Eskom Holdings SOC Ltd, Transmission division, Asset Management Execution department in Gauteng province and of the fifteen PMs emailed, only two did not respond. The first section of the questionnaire survey was pertaining to the project details, that is, the project code and value in Rands. The subsequent section, contained information regarding the factors that are causing time overruns within the projects, which are 1) pre-tender preparations, 2) contracting and procurement and 3) tender evaluations. These subsections had a list of questions that were developed in relation to the process of pre-contract procurement to identify the factors that cause delays. The questions were based on the researcher's own experience and being familiar with the procurement process, as well as the project life cycle model that is usually followed. The duration (expected duration=A, actual duration=B and the delays duration between expected and actual (A-B)) was calculated in days.

A negative number depicts delays in days, a positive number depicts early delivery and a zero depicts delivery on time/expected time. The questionnaire is shown in Appendix A.

Questionnaires are useful for the following reasons:

1. To save time and cost
2. To conduct a study across a broader population
3. To provide the respondent with more time to understand and analyse the questions
4. Easy to analyse data
5. Easy to compare the response, establish themes and commonalities

### **3.6 Data Analysis Procedure**

The term data refers to a collection of information (McLeod & O'Connor, 2020). It denotes “pieces” of information that are a direct reflection of the phenomenon under study, autonomous from those who gathered it (Polkinghorne, 2005). The data was coded and analysed using Microsoft Excel. Coding entails allocating a number to each answer of a survey question and was done to identify the common themes within the data provided. The factors identified were coded based on the commonalities within the data and thereafter themes were identified and subsequently coded for the data analysis procedure in order to quantise the quantitative data. The questionnaire responses were captured on Microsoft Excel, and data obtained were analysed descriptively in order to identify themes that emerged from the participants’ responses.

The Relative Importance Index (RII) was used to identify the most significant factors that contributed to delays in the procurement process. The participants were requested to rank the identified factors using the Likert scale to rank them according to their order of importance. The rankings were thereafter used to calculate the RII. To identify the project activities that are prone to delay, a frequency analysis technique was used to measure the rate of occurrence for each activity. The frequency in which each activity was mentioned was used in ranking each activity and thereafter the frequencies were put into percentages. The frequency analysis was used to identify the activities that are most prone to delay.

### **3.7 Ethical Consideration**

In order to ensure that this research project was handled in an ethical manner and that the dignity, rights and well-being of participants were considered, the project was guided by the following principles:

1. Privacy and confidentiality;
2. Voluntary participation,
3. Obtain informed consent,
4. Minimise risk of harm and data security.

A participant information sheet was shared with the participants; the information sheet included all the information pertaining to ethics. The participants were informed that their identity will be kept anonymous and that partaking in the survey is voluntary. The participants signed a consent form indicating that they understood the aim and objectives of the research including any other issues related to ethics. During the data collection procedure there were no issues pertaining to ethics.

# Chapter 4: Data, Analysis and Results

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This chapter presents data collection, data presentation, data analysis and the results obtained from the self-administered questionnaire survey. The data was collected through a self-administered pre-contract procurement process questionnaire which was initially emailed to more than forty professionals including project managers (PMs) employed by Eskom Holdings SOC Ltd with no response. The questionnaires were further emailed to fifteen project managers (PMs) employed by Eskom Holdings SOC Ltd, Transmission division, Asset Management Execution department in Gauteng province. The first section of the questionnaire survey was pertaining to the project details, that is, the project code and value in Rands. The subsequent section, contained information regarding the factors that are causing time overruns within the projects, which are 1) pre-tender preparations, 2) contracting and procurement and 3) tender evaluations. These subsections had a list of questions that were developed in relation to the process of pre-contract procurement to identify the factors that cause delays. The questions were based on the researcher's own experience and being familiar with the procurement process, as well as the project life cycle model that is usually followed. The duration (expected duration=A, actual duration=B and the delays duration between expected and actual (A-B)) was calculated in days. A negative number depicts delays in days, a positive number depicts early delivery and a zero depicts delivery on time/expected time. The questionnaires were emailed to fifteen project managers (PMs) employed by Eskom Holdings SOC Ltd. Out of the fifteen PMs that questionnaires were emailed to, only two did not respond. This indicates a reasonable response rate from the participants.

The study findings are presented according to the study objectives, which are as follows:

1. To identify factors causing significant delays in the electrical infrastructure projects pre-contract procurement process.
2. To identify specific aspects of the of the electrical infrastructure projects that are prone to significant pre-contract procurement delays.
3. To investigate the specific causes of the delays in the electrical infrastructure projects pre-contract procurement process.

#### 4.1 Activities prone to delays

Regarding the activities that are prone to delays, the results were analysed using the frequency in which the stages were selected as being prone to delays and the percentage distribution. Frequency (*n*) refers to the number of times at which the same reason was given by the participant to an activity. These results are divided per the project stages within the pre-contract phase, as shown in Table 13 below. The raw data for all participants' responses on the activities prone to delays are summarised in Appendix B. For detailed summary of all the participants' responses on the activities prone to delays, see Appendix A which provides the summation of raw data obtained from the individual responses of the research participants. Appendices B to N gives a more detailed outline of each of the research Participants Individual Raw Data.

Table 12. Project Activities prone to delays

<b>PROJECT ACTIVITIES</b>	<b>Frequency <i>n</i></b>	<b>Percentage %</b>
<b>PRE-TENDER PREPARATIONS</b>		
Compilation BoQ	11	85%
Compilation of SoW and Drawings	10	77%
Compilation of SHE spec	8	62%
<b>CONTRACTING AND PROCUREMENT PROCESS</b>		
Assign Buyer	11	85%
Release of Documents by tender Office	13	100%
Commercial verifications	9	69%
<b>TENDER EVALUATIONS</b>		
Technical evaluation	11	85%
SD&L	7	54%
Financial(QS) Evaluation	8	62%
Negotiation	10	77%

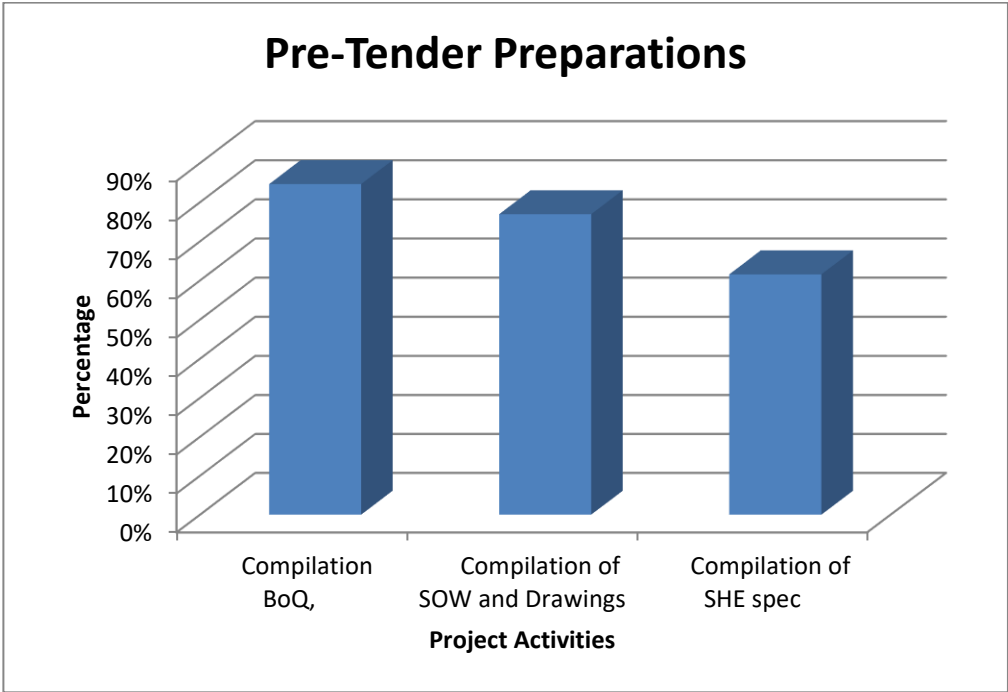
Table 13 systematically categorises the project activities that are prone to delays across the various pre-contractual stages of electrical projects. Each of these listed activities are outlined under the main headings and are categorised according to their frequency (*n*) which correlates with an accompanying

percentage (%). The results in Table 1 indicate that in the pre-tender preparation stage, most participants reported the compilation of the Bill of Quantities (BoQ) ( $n=11$ , 85%) as being the most prone to project delays. (See Appendix B-N for the responses given by respondents with regards to the BOQ as cause of delay in the pre-tender stage). The BoQ also referred to as the BQ is often prepared by the cost consultant, in most cases the quantity surveyor, and includes the specifications of the measured quantities of items required for the work which is illustrated in the drawing specifications of the tender document (Zima, 2017). The BoQ as a cause of delay is confirmed in literature by Atout (2016) for example who cited the inability of a consultant to effectively manage and prepare contract document including bill of quantities and the approved drawings. It was further explained that the ineffective preparation and management of the BOQ create omission in quantities and large margin of errors (Atout, 2016). Furthermore as mentioned by Odenigbo (2020) a contractors failure to do work based on the bill of quantities was ranked as one of the causes of project delays, and defunct BOQ compilation could be a significant cause of project delay.

This was followed by the Scope of Works and Drawings, which was reported by ( $n=10$ , 77%). The scope of work took long as the specialists had to verify the condition of the existing reactors as the project took long to reach execution. The delay attributed to scope of works is confirmed by Amri, and Marey-Pérez (2020), Batool and Abbas (2017) and Gondia, *et al.*, (2020) who mention major scope of works changes and also approval of scope of work changes as causes of delays in construction projects. Muhlezi *et al.*, 2014 and Shebob, 2012 also confirm scope of work changes as causes of delay in the literature review chapter. Aibinu & Odeyinka, 2006 and Mulenga also mention delays in issuing drawings as major setbacks contribute to delays. Muhlezi *et al.*, 2014 cite inadequate and unclear drawings as causes of delays also.

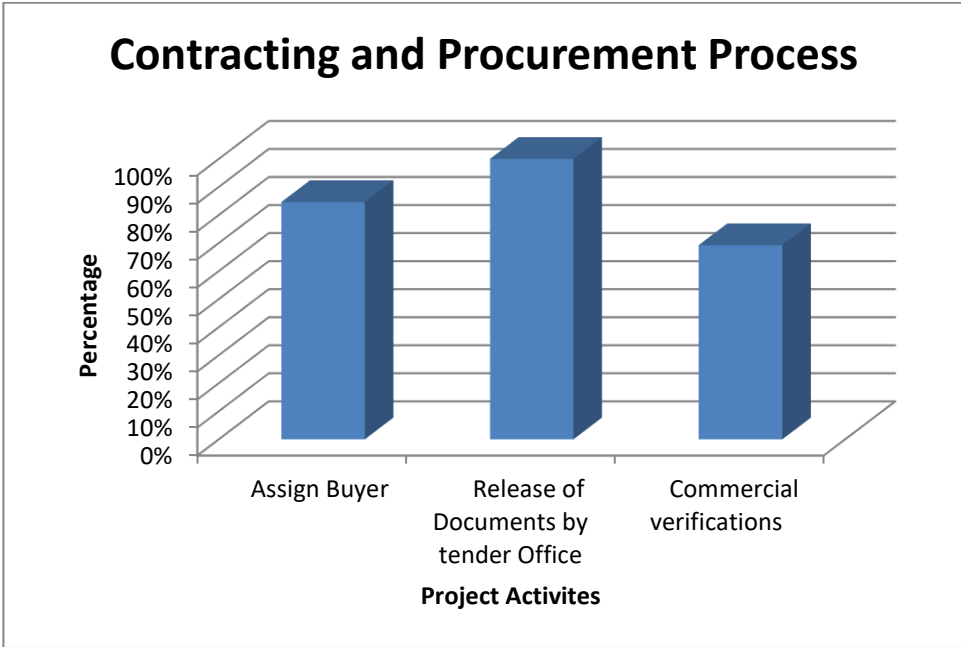
Safety Health Equipment specifications which was reported by (62%,  $n=8$ ). Most delays within this stage occur within these activities. Safety Health Equipment specifications was also reported by (62%,  $n=8$ ) as a cause of delay and is confirmed by Lessing, Thurnell and Durdyev (2017) who state that health and safety specification issues often led to construction program delays. In summary, most delays that occur within the pre-tender preparation stage fall within the ambit of the three afore discussed activities shown in table 13 which are also illustrated in figure 2. Figure 2 is a graphical presentation of the significant activities causing delays within the pre-tender preparation stage.

Figure 2 shows the graphical presentation of the activities.



**Figure 2.** Pre-Tender Preparation Activities prone to delay.

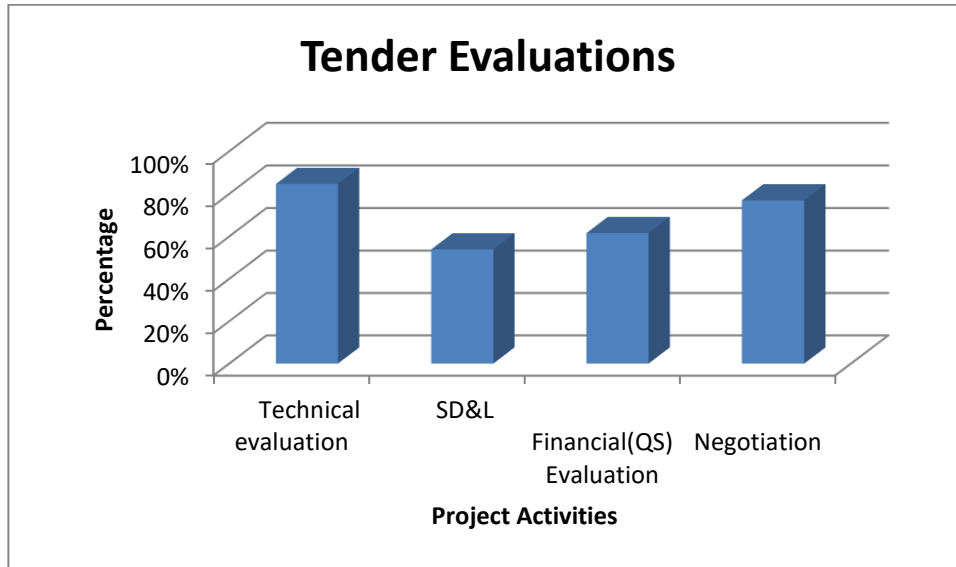
In the contracting and procurement stage, assigning of buyer ( $n=11$ , 85%), release of documents by tender office ( $n=13$ , 100%), commercial verifications ( $n=9$ , 69%) are project activities that prone to delays. Figure 3 is a graphical presentation of the activities in the contract and procurement process stage that cause significant delays. The most significant cause of delays in this stage is the release of documents by the tender office ( $n=13$ ), followed by the activity of assigning a buyer ( $n=11$ ), and then the activity of commercial verifications ( $n=9$ ). Lindhard and Larsen (2016) mentioned long processing times of tender document as a cause of project delays. The delays in release of tender documents could be a result of inaccuracies, deficiencies in preparing the tender documents, and/or a lack of competencies in tender document revision before the tendering process (Byram, 2017).



**Figure 3.** Contracting and Procurement Process Activities prone to delays.

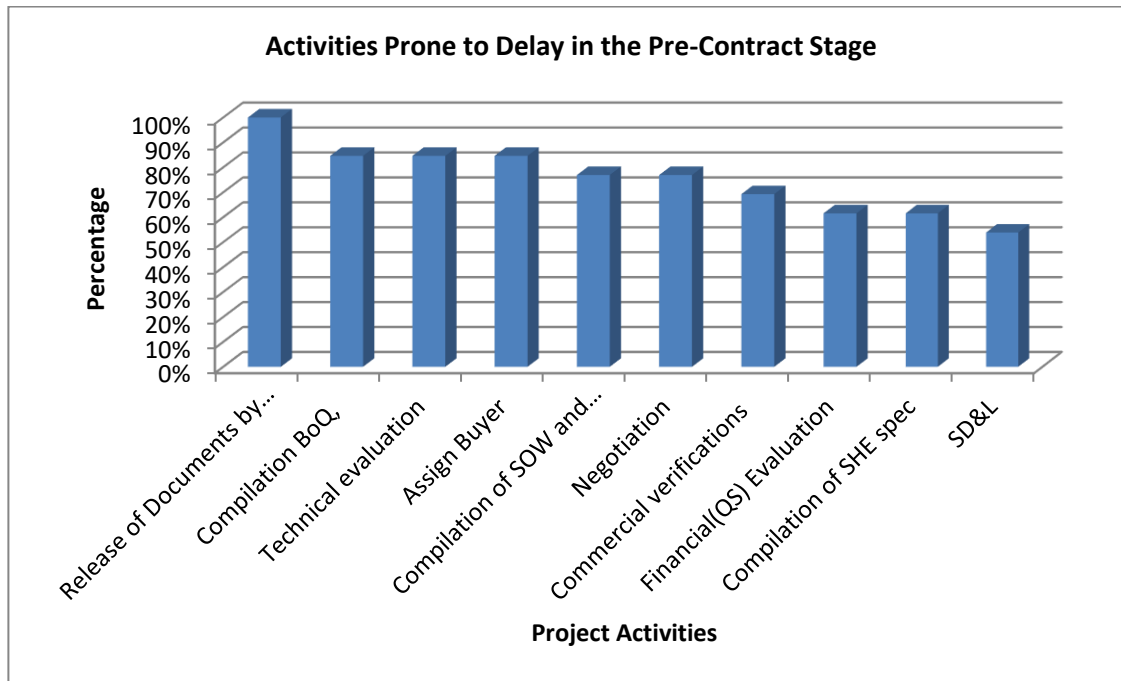
Within the tender preparation stage, delays frequently occur in the technical evaluation ( $n=11, 85\%$ ), supplier development and localisation (SD&L) ( $n=7, 54\%$ ), which was confirmed by Byram 2017 and was attributed to a lack of the presence of a competent authority to evaluate the tender documents.

Amandin and Kule (2016) warns that Some tendering strategies ignored by contractors, such as front-loading of rates during tender examination, especially regarding items with tentative quantities are to be avoided. Financial Evaluation ( $n=8, 62\%$ ), and Negotiation ( $n=10, 77\%$ .) was found to be the second most frequent cause of delays followed by Financial (QS) Evaluation (62%,  $n=8$ ) and Supplier Development and Localisation (SD&L) ( $n=7, 54\%$ .) Figure 4 illustrates these activities according to their percentages. Their corresponding frequencies are illustrated in table 13.



**Figure 4.** Tender Evaluation Activities prone to delays.

The results as summarised in figure 5, indicate that the main activities within the pre-contract stage that are found to be extremely prone to delays are the Release of the documents by the tender office, the Compilation of the BoQ, the Technical evaluation of tenders, Assigning of buyers, Compilation of SOW and Drawings and Negotiations.



**Figure 5.** Activities prone to delay in the Pre-Contract Stage

## 4.2 Factors causing delays in the Pre-contract stage

The factors causing delays to the activities mentioned above were analysed using the RII and ranked according to their order of importance. This method is frequently used by many scholars within the same area of study and is calculated as follows:

### Equation 1.

$$RII = \frac{\sum W}{A \cdot N} (0 \leq RII \leq 1)$$

Where;

W = Weight given to each factor by the participants

A = Highest weight (which is 5 in this case)

N = Total number of respondents

The results for the factors causing delays in the critical activities, as mentioned above, are shown in Table 14 below.

Table 13. Factors causing delays in critical activities

Main Factors	RII	Ranking
Staff Work load	0.69	1
Lack of QS resources	0.46	2
Unavailability of all stakeholders at the same time for negotiation	0.46	2
Procurement manager took time to assign buyer due to unavailability	0.46	2
Unexpected number of tenders received.	0.38	3
Consultation with the engineer on key information required on the BoQ	0.31	4
The negotiation had to be rescheduled as there was no agreement between the parties.	0.31	4
The lines department took longer to produce the drawings due to lack of resources	0.31	4
More number of tenders received	0.31	4
Assigning of buyer depends on the manager's availability	0.18	5
Time taken by the engineer on-site verification information	0.14	6

Signatures process can take up to 2 days max	0.09	7
The BoQ for this project was done by engineering, and the QS only added the Provisional and general information only. This took some time to be concluded by all parties	0.08	8
Had to have site walk down to collect and verify information.	0.06	9
The drawings were delayed due to the supplier on the national contract availing them late before the engineers could use them for footprints	0.05	10
The scope of work took long as the specialists had to verify the condition of the existing reactors as the project took long to reach execution.	0.05	10
Approval process delayed due to scope creep	0.05	10
Project prioritisations and signing off by management delayed the process	0.05	10
The buyer was allocated after checking the loading of other buyers	0.05	10
The lines department compiles the BoQ, and they did not include the hardware in the BoQ, which led to it being redone and sent to the QS to cost and include the preliminaries and generals.	0.03	11
Each WBS must have its own document.	0.03	12

The results in Table 14 indicate that the main factors that are causing a delay in the critical activities are staff workload (RII=0.69), in which (Asim, Deep & Ahmad, 2017) advise that workload must be levelled out in construction projects because insurmountable or unmanageable workload on staff reduces their efficiency and slows down their rate of work by promoting sickness such as fatigue which proves to be a major hindrance to project progress. Regarding electrical projects in Hong Kong, project delays that were mentioned was the same ‘workload of project staff’ (Chiu, & Lai, 2017). Lack of QS resources (RII= 0.46), in which confirmed as a precursor to poor QS practices (Weerakoon, et al., 2020) was the second ranked cause of project delay and was at par with the Unavailability of all stakeholders at the same time for negotiation (RII=0.46) and Procurement managers delay in assigning buyer due to unavailability (RII=0.46). The department took longer to produce the drawings due to lack of resources (RII=0.31), More numbers of tenders received (RII=0.31). Unexpected number of tenders received (RII=0.38) is also another cause of delays, in addition to Consultation with the engineer on key information required on the BoQ (RII=0.31), The rescheduling of negotiations due to a lack of agreement between the parties (RII=0.31), The lines department took longer to produce the drawings due to lack of resources (RII=0.31), More number

of tenders received (RII=0.31). These aforementioned delay causing factors are listed due to their significance. All the other factors that scored RII less than 0.22 were considered less significant and are therefore not included. A summation of the individual responses given to generate these results can be found in Appendix B-N.

### **4.3 Summary of Results**

As per research objective of this study, the main activities within the pre-contract stage that are extremely prone to delays are the Release of the documents by the tender office, the Compilation of the BoQ, the Technical evaluation of tenders and Assigning of buyers. As per the second research objective of this study, the most significant factors that are causing delays in the critical activities are staff workload, lack of QS resources, and unavailability of all stakeholders at the same time for negotiation, Procurement manager took time to assign due to availability respectively. These results are explained and discussed in greater detail in the next chapter.

#### **4.3.1 Objective 1**

The identified factors that are causing significant delays in the pre-contract stage of the procurement process are staff workload, lack of QS resources, and unavailability of all stakeholders at the same time for negotiation, procurement manager took time to assign due to availability respectively. These results are explained and discussed in greater detail in the next chapter.

#### **4.3.2 Objective 2**

The aspects/activities within the pre-contract stage that are extremely prone to delays are the Release of the documents by the tender office, the Compilation of the BoQ, the technical evaluation of tenders and assigning of buyers.

#### **4.3.3 Objective 3**

The investigation shows that the main causes of delays in the pre-contract stage are staff workload, unavailability of personnel at the same time for evaluations and the time taken to assign the buyers.

# Chapter 5: Discussion of findings

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This chapter focuses on addressing the research objectives, which in turn addresses the main research question. This research aimed to identify factors causing significant delays in the electrical infrastructure projects pre-contract procurement process, to identify specific aspects of the of the electrical infrastructure projects that are prone to significant pre-contract procurement delays and to investigate the specific causes of the delays in the electrical infrastructure projects pre-contract procurement process. The main aim is to identify factors causing significant delay in the pre-contract procurement process of electrical infrastructure projects with a view to prevent project time and cost overrun using Eskom holdings SOC Ltd, Transmission division, Asset management execution department in Gauteng province as a context for data collection. All the research participants were employees at Eskom Holdings SOC Ltd possessing over five years of working experience at the time of data collection. Therefore their responses provided substantive and relevant information. The literature review helped to identify some of the significant factors causing delays in various construction projects. Discussions begin with a discussion of the activities that are prone to delays. The identified factors that cause delays in the pre-contract stage ensue. Each of the aspects and causes of delays are categorised into sub-sections. Comparison of the findings from the secondary data collection phase is then made with the findings that were extracted from the literature review phase of this study.

## **5.1 Aspects/activities prone to delays**

This section is in connection to the first research objective which is ‘to identify specific aspects of the electrical infrastructure projects that are prone to significant pre-contract procurement process delays’. As stated by Kgosi (2018) delays in project are attributable to various aspects of project management shortcomings. The issue within the project management aspect is confirmed in other studies. A study conducted on Eskom’s electrical projects also revealed that inadequate proficiency of a project managers was the major cause of delays on modification projects at Koeberg Nuclear Power Station (Ntoyanto, 2016). Out of the listed 24 activities that were prone to delays, the results from this study indicate that the main activities within the pre-contract stage that are extremely prone to delays are; the release of the documents by the tender office, the compilation of the BoQ, the

technical evaluation of tenders, assigning of buyers, compilation of scope of works (SOW) and drawings, and negotiations. These activities are directly linked to the identified factors that are causing delays in the pre-contract stage. The release of the tender documentation by the tender office is an activity that is prone to delays due to among others. These include too much workload from the procurement office, delay in assigning the buyer, too many tenders submitted that are also unexpected, unavailability of all stakeholders for negotiations and disagreements in those negotiations. The compilation of the bill of quantities is due to lack of quantity surveying and engineering resources, too much work overload and consultation with the engineers on certain information required on the bill of quantities. The technical evaluation of tenders is due to work overload within all the relevant departments, that is quantity surveying, engineering department, and the procurement department. It is also due to lack of quantity surveying and engineering resources.

Assigning of a buyer is also an activity that is prone to delays due to work overload from the procurement department, the unexpected number of tenders received and that are large in numbers. Compilation of the scope of works and drawings is due to lack of resources from the engineering department, which results in a delay in the production of drawings. Just like the other activities, it is also due to work overload within all the relevant departments. Negotiations are prone to delays due to unavailability of all stakeholders at the same time for negotiations to take place and disagreements amongst the stakeholders in reaching a consensus about various matters about the project mostly the tender price. The activities also have a direct relationship with each other in that certain activities are prerequisites of others. Therefore if the preceding activity is delayed, the succeeding activity will eventually be delayed. For example, if assigning the buyer from the procurement manager is delayed, the release of tender documents will be delayed because the buyer is responsible for administering the entire tender process. Thus all the other subsequent activities will be delayed.

## **5.2 Factors causing delays in the Pre-contract stage**

The results indicate that the main factors that are causing delay at Eskom Holdings SOC Ltd are staff workload (RII=0.69), lack of QS resources (RII= 0.46), unavailability of all stakeholders at the same time for negotiation (RII=0.46), procurement manager took time to assign due to availability (RII=0.46), an unexpected number of tenders received (RII=0.38), consultation with the engineer on key information required on the BoQ (RII=0.31), the negotiation had to be rescheduled as there was

no agreement between the parties (RII=0.31), the lines department took longer to produce the drawings due to lack of resources (RII=0.31), more number of tenders received (RII=0.31).

### 5.2.1 Workload

Eskom Holdings is one of the state-owned companies that is perceived by the general public to be "overstaffed". However, according to the findings of the study, it can be argued that the organization may be overstaffed in certain departments but not in the power delivery projects and asset management departments. The results indicate that one of the main factors contributing to the delays within the pre-contract stage is the fact that the organization's personnel is understaffed. As a result, certain internal processes are delayed. Due to the number of projects initiated by the organization, the internal staff is overloaded with work. As a result, the projects are delayed, which may also result in errors in the tender documents that are issued to the market. This may subsequently result in disputes between the organization and its contractors during the construction stage if these errors are not rectified on time. This is line with Al-Najjar's (2008) findings on owner-related delay factors wherein he found discrepancies between contract documents as one of the significant delay factors from the owner/client.

### 5.2.2 Lack of QS resources

The role of quantity surveyors is significant in any construction project from inception to close-out. In the pre-contract stage, mainly the documentation and procurement stage, the quantity surveyors are responsible for (SACQSP, 2015):

1. Attending design and consultants' meetings
2. Assisting the principal consultant in the formulation of the procurement strategy for contractors, subcontractors and suppliers
3. Reviewing working drawings for compliance with the approved budget of construction cost and/or financial viability
4. Preparing documentation for both principal and subcontract procurement
5. Assisting the principal consultant with calling of tenders and/or negotiation of prices
6. Assisting with preparation of contract documentation for signature and for which the following deliverables are applicable:
7. Budget of construction cost

8. Tender documentation
9. Financial evaluation of tenders
10. Priced contract documentation

Given their role in the documentation and procurement stage, the quantity surveyors are instrumental in preparing the tender documentation and subsequently the appointment of contractors. This study found that the second main factor that causes a delay in the pre-contract stage is the lack of quantity surveyors within Eskom. As a result, the tender documentation such as the BoQ and various other estimates are delayed for various projects. As a result, the appointment of the contractor and the execution of the project is delayed.

### 5.2.3 Stakeholder unavailability for negotiations

Unavailability of all stakeholders at the same time for negotiation was identified as a third factor that causes a delay in the pre-contract stage. All negotiations are approved and mandated through various committees which comprise of professionals from different departments, and for all the procurement activities the tender committee is responsible for granting approvals. According to the organization's internal processes, a quorum must be met before all tender negotiations can take place, and due to unavailability of some members due to workload, negotiations are often delayed. This further delays the project team, which comprise of the project manager, engineer, buyer, and the quantity surveyor in negotiating with the contractor before contract execution. This delay then results in the decision-making process to be slow and delayed because negotiations are not held in time. When the negotiations are finally held, there is a probability that parties may not agree on certain decisions, and thus the project is further delayed. These findings concur with those reported by Denini (2010), who found slowness in the decision-making process as the major owner-related factor that causes a delay in construction projects. In his study on the cost and schedule overruns on construction projects in South Africa, Mulenga (2014) also found that slowness in the decision making process is one of the causes of the delay in construction projects that are caused by clients/owners. Furthermore, Trauna (2009), Denini (2010), Shebob (2012), Mulenga (2014) and Aydin & Mihlayanlar (2018) identified slow decision making by the clients as one of the significant factors that cause delays in construction projects. Rivera et al., (2020) in their study on causes of delay in road construction projects across 25 developing countries, identified delays in decision making by client and slow decision making and administration in client organisation as one of the

main causes of delays. Unavailability of all stakeholders at the same time for negotiation can also be linked to excessive bureaucracy towards the client's administration given the hierarchy of Eskom Holdings SOC Ltd and various committees and stakeholders involved in the decision-making process which has limited authority regarding making decisions about the project.

#### 5.2.4 Procurement manager delay in assigning buyer due to unavailability

Procurement management delay to assign the buyer due to unavailability was also identified as a significant factor. Before issuing the tender to the public, the project team led by the project manager must be assigned a buyer by the procurement manager to administer the entire tender process until the appointment of the contractor. However, the buyers are limited in number and often overloaded with work, and as a result, they are often unavailable on time. Their unavailability causes a delay in initiating projects because they administer every project at the tender stage. Therefore no project can be initiated without their involvement.

#### 5.2.5 Unexpected number of tenders received

An unexpected number of tenders received is also one of the identified factors that cause delays in the pre-tender stage. Given an already understaffed procurement department, having large number of tenders makes it difficult for them to coordinate and administer tenders, and to do so in a short space of time. These findings are in line with Pall et al., (2019), whose study was titled "Causes of Delay in Power Transmission Projects". In their study, Pall et al. (2019) identified poor communication and coordination among the project parties as one of the factors that cause delays. Having a really high number of tenders indicates that there is a lack of communication and collaboration among various internal stakeholders which may result in poor planning of projects/tasks and subsequently work overload in certain departments which in turn results in delays. Trauna (2009) also identified poor communication and coordination as one of the causes of schedule overrun that are client-related.

#### 5.2.6 Consultation with the engineer on key information required on the BoQ

Consultation with the engineer on key information required on the BoQ has also been identified as one of the factors that cause delays in the pre-tender stage. The Bill of Quantities (BoQ) is prepared based on the engineer's drawings and forms part of the tender documentation issued for inquiry. Therefore, if there are delays in compiling the BoQ, the finalization of the tender process will

ultimately be delayed. The engineers are understaffed and as a result, take time to address enquiries from other stakeholders. This procedure delays the procurement process in that the engineer's information is essential in preparing the BoQ and other tender documents. Similar findings were reported by Pall *et al.* (2019) who reported that drawing /design-related problems were one of the factors that cause a delay in the power transmission projects. Furthermore these findings resonate with the findings of Ntshangase (2017) who stated that Eskom contractors have constructed projects with a lot of defects. Projects were found not be accordance with drawings, and specifications.

#### 5.2.7 Rescheduled negotiations due to lack of agreement

Rescheduling of negotiations due to lack of agreement among various stakeholders forms part of the identified factors causing delays in the pre-contract stage. As stated previously, negotiations are subject to disagreements, and this might prolong the negotiation process, thus causing delays in the consequent processes that form part of the procurement process within the pre-contract stage. Given the organisation's internal procedure, if there is a delay in the decision-making process, it will lead to delay in negotiations. When negotiations are finally held, they may be further delayed due to disagreements. This delay is as a result of lack of coordination among the project stakeholders. Trauna (2009) and Shebob (2012) also identified poor coordination by the client with the project team as one of the main client-related factors that cause delays in projects. Additionally, Mulenga (2014) identified poor coordination as one of the main owner-related factors that cause delays in projects.

#### 5.2.8 Delay in producing drawings due to lack of resources

This study also identified that time taken by the lines/engineering department to produce much needed drawings due to lack of resources within the department as one of the factors that cause delays during the pre-tender stage. As mentioned previously, the engineering drawings form part of the tender documentation, and the bill of quantities is prepared from these drawings. Therefore, a delay in finalising the drawings will ultimately delay the whole tender preparation process. However, it should be noted that the lines department, just like the procurement department, among others, is understaffed and as a result, they are overloaded with work. This is due to the high number of tenders and more other tenders submitted. Pall *et al.* (2019) also found that drawing /design-related problems

were one the factors that cause a delay in the power transmission projects. Therefore this study finding is in line with Pall *et al.*, (2019) findings.

#### 5.2.9 Additional tenders received

The influx of additional tenders is closely related to the point made in section 5.2.5. Additional tenders received add to the high number of already-received tenders which then causes insurmountable workload.

### 5.3 Summary of findings

Pertaining to the factors that cause delays in the pre-contract stage particularly in the procurement process, the study identified workload from staff, lack of QS resources, unavailability of all stakeholders at the same time for negotiation, procurement manager taking time to assign due to availability, an unexpected number of tenders received, consultation with the engineer on key information required on the BoQ, the negotiation had to be rescheduled as there was no agreement between the parties, the lines department took longer to produce the drawings due to lack of resources. A higher number of tenders received as the main activities that are causing delays. Activities that are prone to delays are the release of the documents by the tender office, the compilation of the BoQ, the technical evaluation of tenders, assigning of buyers, compilation of scope of works (SoW) and drawings, and negotiations. The study also found that there is a relationship between the factors that are causing delays and the activities that are prone to delays. The study further found that there is a relationship amongst the various activities that are prone to delays which further results in delays and that if some of the delays were to be mitigated, the relationship amongst these activities would be a good take-off point to implement the mitigating measures. However, one of the main findings from the study is that various technical departments within the organisations are understaffed with the key personnel required and that there is lack of coordination and communication among the various stakeholders and or departments.

# Chapter 6: Conclusion and Recommendations

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## 6.1 Introduction

This study examined the factors causing significant delays in the pre-contract procurement process of electrical infrastructure projects in the South African context, using Eskom as a case study. In seeking to answer the main research question of the study, the following research objectives were examined:

1. To identify factors causing significant delays in the electrical infrastructure projects pre-contract procurement process.
2. To identify specific aspects of the of the electrical infrastructure projects that are prone to significant pre-contract procurement delays.
3. To investigate the specific causes of the delays in the electrical infrastructure projects pre-contract procurement process.

These research objectives were addressed through the review of existing literature and a self-administered questionnaire. The findings of the study are based on them.

This section presents the research methodology used, the limitations of the study, how the research question and objectives were addressed, in addition to presenting the study's key findings and the recommendations.

The research methodology of the study was purely quantitative. Project managers were required to answer the questions in the self-administered questionnaire survey. The questionnaire survey, however, did not enable the respondents to elaborate further and articulate their responses.

However, through the set of questions provided by the researcher, this limitation was addressed adequately by allowing the respondents to elaborate on all the questions. Eskom Holdings SOC Ltd was used as a case for collecting empirical data, and thus the findings cannot be generalised. Therefore, similar research must be conducted in other companies that are responsible for electrical projects and other state-owned companies.

The main research question is what are the specific causes of the delays in the pre-contract procurement process of electrical infrastructure projects? The findings indicated that there are factors that cause delays in the pre-contract stage particularly in the procurement process.

The study identified the following as factors causing delays in the pre-contract procurement process: workload from staff, lack of QS resources, unavailability of all stakeholders at the same time for negotiation, procurement manager took time to assign due to availability, an unexpected number of tenders received, consultation with the engineer on key information required on the BoQ, the negotiation had to be rescheduled as there was no agreement between the parties; the lines department took longer to produce the drawings due to lack of resources. Receipt of high number of tenders was also identified as an activities causing delays.

## **6.2 Key findings**

Regarding the factors that cause delays in the pre-contract stage particularly in the procurement process, the study identified a high staff workload, lack of QS resources, unavailability of all stakeholders at the same time for negotiation, procurement manager took time to assign due to availability, an unexpected number of tenders received, consultation with the engineer on key information required on the BoQ, the negotiation had to be rescheduled as there was no agreement between the parties, the lines department took longer to produce the drawings due to lack of resources. More number of tenders received as the main activities that are causing delays.

Activities that are prone to delays are the release of the documents by the tender office, the compilation of the BoQ, the technical evaluation of tenders, assigning of buyers, compilation of SoW and drawings, and negotiations. The study also found that there is a relationship between factors that are causing delays. The study further found that there is a relationship amongst various activities that are prone to delays. It is important to identify such delays so that they can be mitigated. The relationship amongst these activities would be a good take-off point to implement the mitigating measures. However, one of the main findings from the study is that various technical departments within the organisations are understaffed with the key personnel required, and that there is lack of coordination and communication among the various stakeholders and or departments.

### **6.3 Implication of findings**

From the findings of the study, it is evident that the technical departments are understaffed and lack resources and that more resources should be directed in these departments through additional personnel. It can also be argued that the understaffed, in this context to some extent, may be associated with a lack of capacity in handling the various tasks. There is a lack of coordination amongst the various departments; hence it is evident that more unexpected tenders are submitted to the procurement department, which is already understaffed. Therefore, this could imply that there is inadequate coordination amongst these departments in that the department that initiates the tenders is not aware of the current projects that are under procurement. There is no systematic planning and strategy of initiating these tenders and staffing the resources accordingly. These are identified factors, aspects and causes causing significant delays in the electrical infrastructure projects pre-contract procurement process. The study contributes to the local knowledge as well as the Policymakers to consider revising old policies to suit the current situation.

### **6.4 Recommendations**

The study provided an insight into the factors causing significant delays in the pre-contract procurement process of electrical infrastructure projects, using Eskom Holdings SOC Ltd as a case for data collection. Based on the findings of the study, the following are recommended:

1. There should be additional resources/personnel in the quantity surveying, engineering and procurement departments
2. There should be systematic coordination amongst various departments regarding the tender process and other tasks
3. There should be a strategy in initiating tenders based on the order of priority of the project(s)

### **6.5 Limitations and future research directions**

The following limitations were identified. This study is limited to one specific construction Energy Company in this case, Eskom Holdings SOC Ltd, Transmission Division., Asset Management Execution Department since it is the primary energy company in the country. The unprecedented

times of COVID-19 experienced, posed limitations on the study to do self-administered questionnaires only and not substantiating these questionnaires with face to face interviews.

Furthermore, the questionnaires were initially emailed to more than forty professionals including project managers employed by Eskom Holdings SOC Ltd with no response. The questionnaires were finally disseminated to fifteen project managers. The non-responsiveness of participants could be due to the volatile situation around the company in the country although security of anonymity was thoroughly discussed and explained, participants did not respond.

The following should be considered for future research:

1. A similar study must be conducted but using other types of projects and state-owned companies as contexts for data collection; using a higher sample so that the data is more generalisable.
2. A comparison study within the same area of research must be conducted, comparing both the public sector and private sector companies within South Africa;
3. A similar study must be conducted but with a particular focus on understanding the reason behind the factors causing delays in the pre-contract procurement process.
4. A study must be conducted to measure the capacity of the personnel to execute their respective tasks, and for the data to actually be distributed to concerned organisations and used to make improvements.

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## Appendix A:

**Project Code:** 00

**Project Value:** In Million Rands (R'M)

**Duration is in days.**

- 1. Negative number depicts:** Delays in days
- 2. Positive number depicts:** Early delivery in days
- 3. Zero number depicts:** Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>PRE-CONTRACT PROCUREMENT PROCESS</b>	<b>90</b>	<b>95</b>	<b>-5</b>	
<b>Pre-tender preparation</b>	<b>24</b>	<b>26</b>	<b>-2</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	2	3	
Compilation BoQ,	5	7	-2	
Compilation of SoW and Drawings	5	8	-3	
Compilation of SHE specification	1	2	-1	
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	1	1	
Submission of Documents to Commercial	1	1	0	
<b>Contracting and procurement</b>	<b>40</b>	<b>45</b>	<b>-5</b>	
Assign Buyer	1	4	-3	
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	3	2	
Review of enquiry pack by review committee	5	6	-1	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	4	-2	
Commercial verifications	2	3	-1	
<b>Tender evaluations</b>	<b>26</b>	<b>24</b>	<b>2</b>	
Technical evaluation	2	3	-1	
SHEQ	3	1	2	
SD&L	1	1	0	
Financial(QS) Evaluation	2	1	1	
Final Report	3	5	-2	
Tender Committee Submission	5	2	3	
Tender Committee Presentation	5	3	2	
Negotiation	2	3	-1	
Submission of documents to supplier	1	1	0	
Supplier's response	1	2	-1	
Contract Award	1	2	-1	

**Appendix B: Raw Data Summary**

Project Activities	Project No: 1	Project No: 2	Project No: 3	Project No: 4	Project No: 5	Project No: 6	Project No: 7	Project No: 8	Project No: 9	Project No: 10	Project No: 11	Project No: 12	Project No: 13
<b>PRE-CONTRACT PROCUREMENT PROCESS</b>	<b>-5</b>	<b>-15</b>	<b>-17</b>	<b>-16</b>	<b>-17</b>	<b>-39</b>	<b>-48</b>	<b>-91</b>	<b>-60</b>	<b>-51</b>	<b>-38</b>	<b>-32</b>	<b>-28</b>
<b>Pre-tender preparations</b>	<b>-2</b>	<b>-6</b>	<b>-8</b>	<b>-6</b>	<b>-6</b>	<b>-17</b>	<b>-22</b>	<b>-48</b>	<b>-30</b>	<b>-18</b>	<b>-14</b>	<b>-9</b>	<b>-4</b>
Project Handover to PM	0	0	0	0	0	0	0	-1	0	0	0	0	0
Cross functional team planning meeting	0	0	0	-1	-1	0	-4	-1	-3	0	0	0	0
Compilation PM Appointment letter, NEC, Budget Letter,	3	1	1	0	0	-1	-5	-5	-5	0	0	0	0
Compilation BoQ	-2	-3	-3	-2	-2	0	-5	-10	-15	-5	-5	-5	0
Compilation of SoW and Drawings	-3	-3	-4	-4	-4	0	-5	-15	-5	-5	-5	0	0
Compilation of SHE specification	-1	-2	-3	0	0	-4	0	-4	0	0	-1	-1	-1
Compilation of EMP	0	0	0	0	0	-4	1	-4	0	-4	-1	-1	-1
Compilation of Quality requirements	0	0	0	0	0	-4	0	-4	0	0	-1	-1	-1
PR Creation	0	0	0	0	0	0	0	0	0	0	-1	-1	-1
PR Release	1	1	1	1	1	0	0	0	0	0	0	0	0
Submission of Documents to Commercial	0	0	0	0	0	-4	-4	-4	-2	-4	0	0	0
<b>Contracting and procurement process</b>	<b>-5</b>	<b>-6</b>	<b>-6</b>	<b>-9</b>	<b>-9</b>	<b>-11</b>	<b>-12</b>	<b>-19</b>	<b>-20</b>	<b>-12</b>	<b>-7</b>	<b>-7</b>	<b>-7</b>
Assign Buyer	-3	-3	-3	-3	-3	-2	-2	0	0	-2	-1	-1	-1
CFT Kick off & Contracting Strategy meeting	0	0	0	-2	-2	-4	-4	0	-4	0	0	0	0
Strategy sign off	0	0	0	0	0	-3	-3	-3	-3	-3	0	0	0

Development of enquiry pack by buyer	2	2	2	2	2	0	0	0	0	0	0	0	0
Review of enquiry pack by review committee	-1	-2	-2	-2	-2	0	0	0	0	0	0	0	0
Issue Enquiry	0	0	0	0	0	0	0	-10	-10	0	0	0	0
Site Clarification Meeting	0	0	0	0	0	1	0	0	0	0	0	0	0
Tender closure	0	0	0	0	0	0	0	0	0	-4	0	0	0
Release of Documents by tender Office	-2	-2	-2	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Commercial verifications	-1	-1	-1	-1	-1	0	0	-3	0	0	-3	-3	-3
<b>Tender evaluations</b>	<b>2</b>	<b>-3</b>	<b>-3</b>	<b>-1</b>	<b>-2</b>	<b>-11</b>	<b>-14</b>	<b>-24</b>	<b>-10</b>	<b>-21</b>	<b>-17</b>	<b>-16</b>	<b>-17</b>
Technical evaluation	-1	-1	-1	-1	-2	0	-4	-8	-3	0	-5	-5	-5
SHEQ	2	2	2	2	2	0	0	0	0	0	-2	-2	-2
SD&L	0	0	0	0	0	-4	-4	-4	0	-4	-1	-1	-1
Financial(QS) evaluation	1	1	1	1	1	-4	-2	-8	-8	-5	-12	-12	-12
Final Report	-2	-3	-3	-3	-3	0	0	0	3	-2	0	0	0
Tender Committee Submission	3	3	3	3	3	0	0	0	0	0	0	0	0
Tender Committee Presentation	2	2	2	2	2	0	0	0	0	-5	3	4	3
Negotiation	-1	-2	-2	-2	-2	-3	-3	-4	-2	-2	0	0	0
Submission of documents to supplier	0	0	0	0	0	0	1	0	0	0	0	0	0
Supplier's response	-1	-2	-2	0	0	0	-2	0	0	-3	0	0	0
Contract Award	-1	-3	-3	-3	-3	0	0	0	0	0	0	0	0

## Appendices C to O: Detailed Individual Project Raw Data Sheet

**Project Code:** 01, **Project Value:** R2.282M

**Ranking:** Duration is in days.

1. Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>95</b>	<b>-5</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>26</b>	<b>-2</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	2	3	
Compilation BoQ,	5	7	-2	Had to have site walk down to collect and verify information.
Compilation of SoW and Drawings	5	8	-3	Had to have site walk down to collect and verify information.
Compilation of SHE specification	1	2	-1	Delays due to work load
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	1	1	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>45</b>	<b>-5</b>	
Assign Buyer	1	4	-3	Procurement manager took time to assign due to unavailability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	3	2	
Review of enquiry pack by review committee	5	6	-1	Unavailability of some team members
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	4	-2	Unexpected more number of tenders received.
Commercial verifications	2	3	-1	Unexpected more number of tenders received.
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>24</b>	<b>2</b>	
Technical evaluation	2	3	-1	More number of tenders received
SHEQ	3	1	2	
SD&L	1	1	0	
Financial(QS) Evaluation	2	1	1	
Final Report	3	5	-2	More work load from other projects.
Tender Committee Submission	5	2	3	
Tender Committee Presentation	5	3	2	
Negotiation	2	3	-1	Unavailability of all stake holders at the same time.
Submission of documents to supplier	1	1	0	
Supplier's response	1	2	-1	Supplier requested further consultations before final respond
Contract Award	1	2	-1	Project officer had a challenge on placing a contract on SAP.

**Project Code:** 02, **Project Value:** R2.199M

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>105</b>	<b>-15</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>30</b>	<b>-6</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	4	1	
Compilation BoQ,	5	8	-3	Consultation with the engineer on the information required to use on BoQ
Compilation of SoW and Drawings	5	8	-3	Time taken by the engineer on site verification information
Compilation of SHE specification	1	3	-2	Delays due to work load
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	1	1	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>46</b>	<b>-6</b>	
Assign Buyer	1	4	-3	Procurement manager took time to assign due to unavailability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	3	2	
Review of enquiry pack by review committee	5	7	-2	Unavailability of some team members
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	4	-2	Work load from Tender office
Commercial verifications	2	3	-1	Unexpected more number of tenders received.
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>29</b>	<b>-3</b>	
Technical evaluation	2	3	-1	Number of tender documents received
SHEQ	3	1	2	
SD&L	1	1	0	
Financial(QS) Evaluation	2	1	1	
Final Report	3	6	-3	More work load from other projects.
Tender Committee Submission	5	2	3	
Tender Committee Presentation	5	3	2	
Negotiation	2	4	-2	Unavailability of all stake holders at the same time.
Submission of documents to supplier	1	1	0	
Supplier's response	1	3	-2	Supplier requested further clarity on negotiated amount before responding
Contract Award	1	4	-3	Project officer had a challenge on placing a contract on SAP resulting to the manner on which PR was created

**Project Code:** 03, **Project Value:** R2.199M

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>107</b>	<b>-17</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>32</b>	<b>-8</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	4	1	
Compilation BoQ,	5	8	-3	Consultation with the engineer on the information required to use on BoQ
Compilation of SoW and Drawings	5	9	-4	Time taken by the engineer on site verification information
Compilation of SHE specification	1	4	-3	Delays due to work load
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	1	1	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>46</b>	<b>-6</b>	
Assign Buyer	1	4	-3	Procurement manager took time to assign due to availability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	3	2	
Review of enquiry pack by review committee	5	7	-2	Unavailability of some team members
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	4	-2	Work load from Tender office
Commercial verifications	2	3	-1	Unexpected more number of tenders received.
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>29</b>	<b>-3</b>	
Technical evaluation	2	3	-1	Number of tender documents received
SHEQ	3	1	2	
SD&L	1	1	0	
Financial(QS) Evaluation	2	1	1	
Final Report	3	6	-3	More work load from other projects.
Tender Committee Submission	5	2	3	
Tender Committee Presentation	5	3	2	
Negotiation	2	4	-2	Unavailability of all stake holders at the same time.
Submission of documents to supplier	1	1	0	
Supplier's response	1	3	-2	Supplier requested further clarity on negotiated amount before responding
Contract Award	1	4	-3	Project officer had a challenge on placing a contract on SAP resulting to the manner on which PR was created

**Project Code: 0, Project Value: R6.435M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>106</b>	<b>-16</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>30</b>	<b>-6</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	2	-1	First meeting could not materialise due to poor attendance
Compilation PM Appointment letter, NEC, Budget Letter,	5	5	0	
Compilation BoQ,	5	7	-2	Consultation of QS with the engineer on the information required to use on BOQ
Compilation of SoW and Drawings	5	9	-4	Time taken by the engineer on site verification information
Compilation of SHE specification	1	1	0	
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	1	1	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>49</b>	<b>-9</b>	
Assign Buyer	1	4	-3	Procurement manager took time to assign due to availability
CFT Kick off & Contracting Strategy meeting	1	3	-2	Lack of response from team members.
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	3	2	
Review of enquiry pack by review committee	5	7	-2	Unavailability of some team members
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	Delays from tender office.
Commercial verifications	2	3	-1	Unexpected more number of tenders received.
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>27</b>	<b>-1</b>	
Technical evaluation	2	3	-1	Number of tender documents received
SHEQ	3	1	2	
SD&L	1	1	0	
Financial(QS) Evaluation	2	1	1	
Final Report	3	6	-3	More work load from other projects.
Tender Committee Submission	5	2	3	
Tender Committee Presentation	5	3	2	
Negotiation	2	4	-2	Unavailability of all stake holders at the same time.
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	4	-3	Project officer had a challenge on concluding a contract on SAP due to delays on approvals.

**Project Code: 05, Project Value: R8M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>129</b>	<b>-39</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>41</b>	<b>-17</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	6	-1	Budget letter took longer because the project had 5 substations each with their own WBS's
Compilation BoQ,	5	5	0	
Compilation of SoW and Drawings	5	5	0	
Compilation of SHE specification	1	5	-4	Each WBS must have its own document.
Compilation of EMP	1	5	-4	Each WBS must have its own document.
Compilation of Quality requirements	1	5	-4	Each WBS must have its own document.
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	5	-4	Each WBS must have its own document.
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>51</b>	<b>-11</b>	
Assign Buyer	1	3	-2	This is dependent on the loading of the buyers
CFT Kick off & Contracting Strategy meeting	1	5	-4	This was dependent on the availability of the cross functional team
Strategy sign off	2	5	-3	Stakeholders took time to each go through the documents
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	0	1	There was no need for a clarification meeting as the scope was simple
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	The documents are stamped first before release. There were many responses
Commercial verifications	2	2	0	
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>37</b>	<b>-11</b>	
Technical evaluation	2	2	0	
SHEQ	3	3	0	
SD&L	1	5	-4	There is only one resource for SD&L who is overloaded.
Financial(QS) Evaluation	2	6	-4	There were too many responses and this took time to complete
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	5	0	
Negotiation	2	5	-3	There were disagreements with the supplier as the project is deemed to be small, so they were not willing to negotiate. An agreement was met after changing the % requested
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code: 06, Project Value: R3M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>129</b>	<b>-39</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>41</b>	<b>-17</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	6	-1	Budget letter took longer because the project had 5 substations each with their own WBS's
Compilation BoQ,	5	5	0	
Compilation of SoW and Drawings	5	5	0	
Compilation of SHE specification	1	5	-4	Each WBS must have its own document.
Compilation of EMP	1	5	-4	Each WBS must have its own document.
Compilation of Quality requirements	1	5	-4	Each WBS must have its own document.
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	5	-4	Each WBS must have its own document.
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>51</b>	<b>-11</b>	
Assign Buyer	1	3	-2	This is dependent on the loading of the buyers
CFT Kick off & Contracting Strategy meeting	1	5	-4	This was dependent on the availability of the cross functional team
Strategy sign off	2	5	-3	Stakeholders took time to each go through the documents
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	0	1	There was no need for a clarification meeting as the scope was simple
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	The documents are stamped first before release. There were many responses
Commercial verifications	2	2	0	
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>37</b>	<b>-11</b>	
Technical evaluation	2	2	0	
SHEQ	3	3	0	
SD&L	1	5	-4	There is only one resource for SD&L who is overloaded.
Financial(QS) Evaluation	2	6	-4	There were too many responses and this took time to complete
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	5	0	
Negotiation	2	5	-3	There were disagreements with the supplier as the project is deemed to be small, so they were not willing to negotiate. An agreement was met after changing the % requested
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code: 07,Project Value: R22M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>138</b>	<b>-48</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>46</b>	<b>-22</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	5	-4	One 1 specialist for Cap banks in the department / not always available
Compilation PM Appointment letter, NEC, Budget Letter,	5	10	-5	The scope of work in the NEC is compiled by the specialist
Compilation BoQ,	5	10	-5	
Compilation of SoW and Drawings	5	10	-5	The drawings were delayed due to the supplier on the national contract availing them late before the engineers could use them for footprints
Compilation of SHE specification	1	1	0	
Compilation of EMP	1	0	1	Lack of resources and interpretation of the scope into the EMP takes a while
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	5	-4	It took while for commercial to accept the documents as some were not correct / the technical evaluation criteria was not signed off
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>52</b>	<b>-12</b>	
Assign Buyer	1	3	-2	The buyer was allocated after checking the loading of other buyers
CFT Kick off & Contracting Strategy meeting	1	5	-4	The stakeholders were not available at the same time.
Strategy sign off	2	5	-3	Stakeholders take time to go through the documents for signature
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	The tender office took a week to release the documents due to lack of resources and the tender office had too many tenders through.
Commercial verifications	2	2	0	
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>40</b>	<b>-14</b>	
Technical evaluation	2	6	-4	The availability of the specialist was a problem
SHEQ	3	3	0	
SD&L	1	5	-4	Only 1 person was available to do the evaluation and he was overloaded.
Financial(QS) Evaluation	2	4	-2	There were too many responses to go through
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	5	0	
Negotiation	2	5	-3	The negotiation had to be rescheduled as there was no agreement between the parties.
Submission of documents to supplier	1	0	1	
Supplier's response	1	3	-2	The supplier took time to go through the document before signature
Contract Award	1	1	0	

**Project Code: 08,Project Value: R137M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>181</b>	<b>-91</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>72</b>	<b>-48</b>	
Project Handover to PM	1	2	-1	The scope was too varied and could not be handed over in one day
Cross functional team planning meeting	1	2	-1	The team wanted to understand what they were responsible for and some specialists were called in.
Compilation PM Appointment letter, NEC, Budget Letter,	5	10	-5	The NEC took long because there are many clauses that needed to be checked and verified by legal.
Compilation BoQ,	5	15	-10	The BoQ for this project was done by engineering and the QS only added the Provisional and general information only. This took some time to be concluded by all parties
Compilation of SoW and Drawings	5	20	-15	The scope of work took long as the specialists had to verify the condition of the existing reactors as the project took long to reach execution.
Compilation of SHE specification	1	5	-4	This was dependent on the scope and the different sites included
Compilation of EMP	1	5	-4	This was dependent on the scope and the different sites included
Compilation of Quality requirements	1	5	-4	This was dependent on the scope and the different sites included
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	5	-4	Many meetings were held with everyone so as to have a conclusive submission
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>59</b>	<b>-19</b>	
Assign Buyer	1	1	0	
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	5	-3	The cross functional team took a while to go through the strategy before signing off.
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	30	-10	The tenderers requested additional time to understand the specification of the reactors
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	Too many responses took too long for stamping and release
Commercial verifications	2	5	-3	Too many responses take longer for verifications and especially when the scope is too complex
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>50</b>	<b>-24</b>	
Technical evaluation	2	10	-8	There are many engineers included in the reactor space who must evaluate and compile as per their speciality
SHEQ	3	3	0	
SD&L	1	5	-4	Only one resource allocated for the project's space which makes it difficult for him to commit to the project
Financial(QS) Evaluation	2	10	-8	This exercise is done by the QS and the specialists
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	5	0	
Negotiation	2	6	-4	There were many meetings between the two parties which led to negotiations taking longer.
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code: 09, Project Value: R59M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>150</b>	<b>-60</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>54</b>	<b>-30</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	4	-3	The meeting was between the lines and the different grids which made it difficult to meet at the same time.
Compilation PM Appointment letter, NEC, Budget Letter,	5	10	-5	The NEC was checked by legal for compliance which took longer than planned
Compilation BoQ,	5	20	-15	The BoQ is compiled by the lines department and they did not include the hardware in the BoQ which led to it being redone and sent to the QS to cost and include the preliminaries and generals.
Compilation of SoW and Drawings	5	10	-5	The lines department took longer to produce the drawings due to lack of resources
Compilation of SHE specification	1	1	0	
Compilation of EMP	1	1	0	
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	3	-2	The documents had to be checked by all stakeholders after submission and resent due to some not being compliant
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>60</b>	<b>-20</b>	
Assign Buyer	1	1	0	
CFT Kick off & Contracting Strategy meeting	1	5	-4	The cross functional team were not available at the same time so they had to be re scheduled again.
Strategy sign off	2	5	-3	The team takes turns going through the strategy before sign off
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	30	-10	The enquiry was extended as per the request of tenderers so they could source the prices for the conductors
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	The responses were too many which led to the office releasing the documents after the planned dates
Commercial verifications	2	2	0	
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>36</b>	<b>-10</b>	
Technical evaluation	2	5	-3	The resources involved had to evaluate one after the other for technical
SHEQ	3	3	0	
SD&L	1	1	0	
Financial(QS) Evaluation	2	10	-8	Specialists had to first evaluate and send the report to the QS to include the final report.
Final Report	3	0	3	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	5	0	
Negotiation	2	4	-2	The negotiations did not well on the 1st day and a compromise was reached after parties met again for the second time
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code: 10,Project Value: R6M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>141</b>	<b>-51</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>42</b>	<b>-18</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	5	0	
Compilation BoQ,	5	10	-5	Lack of QS resources
Compilation of SoW and Drawings	5	10	-5	Project prioritisations and signing off by management delayed the process
Compilation of SHE specification	1	1	0	
Compilation of EMP	1	5	-4	Lack of resources and interpretation of the scope into the EMP takes a while
Compilation of Quality requirements	1	1	0	
PR Creation	1	1	0	
PR Release	2	2	0	
Submission of Documents to Commercial	1	5	-4	It usually takes some time to get all documents correct for submission
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>52</b>	<b>-12</b>	
Assign Buyer	1	3	-2	The procurement manager takes 3 days to check their resource availability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	5	-3	The team does not sign at the same time they each turn going through the document before signoff
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	5	-4	
Release of Documents by tender Office	2	5	-3	The stamping of documents took long because of the low staff numbers
Commercial verifications	2	2	0	
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>47</b>	<b>-21</b>	
Technical evaluation	2	2	0	
SHEQ	3	3	0	
SD&L	1	5	-4	Few resources allocated for projects make it impossible to commit to time
Financial(QS) Evaluation	2	7	-5	One QS is allocated per province / so availability is a problem
Final Report	3	5	-2	Buyer took 1 week to finalise report because the QS report was late
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	10	-5	The tender committee did not sit due to the quorum not being met
Negotiation	2	4	-2	This is dependent on the availability of the contractor
Submission of documents to supplier	1	1	0	
Supplier's response	1	4	-3	They needed some time to go through the contract before signing off
Contract Award	1	1	0	

**Project Code: 11,Project Value: R1.500M**

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>128</b>	<b>-38</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>38</b>	<b>-14</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	5	0	
Compilation BoQ,	5	10	-5	Due to shortage of QS's
Compilation of SoW and Drawings	5	10	-5	Approval process delayed due to scope creep
Compilation of SHE specification	1	2	-1	Signatures process can take up to 2 days max
Compilation of EMP	1	2	-1	Signatures process can take up to 2 days max
Compilation of Quality requirements	1	2	-1	Signatures process can take up to 2 days max
PR Creation	1	2	-1	The creation process has changed
PR Release	2	2	0	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>47</b>	<b>-7</b>	
Assign Buyer	1	2	-1	Assigning of buyer depends on the manager's availability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	Two days is not sufficient based on my experience
Commercial verifications	2	5	-3	Two days is not sufficient based on my experience
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>43</b>	<b>-17</b>	
Technical evaluation	2	7	-5	It depends on the number of responded
SHEQ	3	5	-2	
SD&L	1	2	-1	
Financial(QS) Evaluation	2	14	-12	This project took 14 days
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	2	3	Presentation takes two days for mandate to negotiate and conclude
Negotiation	2	2	0	
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code:** 12,**Project Value:** R1.500M

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>122</b>	<b>-32</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>33</b>	<b>-9</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	5	0	
Compilation BoQ,	5	10	-5	Due to shortage of QS's
Compilation of SoW and Drawings	5	5	0	
Compilation of SHE specification	1	2	-1	Signatures process can take up to 2 days max
Compilation of EMP	1	2	-1	Signatures process can take up to 2 days max
Compilation of Quality requirements	1	2	-1	Signatures process can take up to 2 days max
PR Creation	1	2	-1	The creation process has changed
PR Release	2	2	0	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>47</b>	<b>-7</b>	
Assign Buyer	1	2	-1	Assigning of buyer depends on the manager's availability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	Two days is not sufficient based on my experience
Commercial verifications	2	5	-3	Two days is not sufficient based on my experience
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>42</b>	<b>-16</b>	
Technical evaluation	2	7	-5	It depends on the number of responded
SHEQ	3	5	-2	
SD&L	1	2	-1	
Financial (QS) Evaluation	2	14	-12	This project took 14 days
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	1	4	Presentation takes two days for mandate to negotiate and conclude
Negotiation	2	2	0	
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	

**Project Code:** 13,**Project Value:** R2.300M

**Ranking:** Duration is in days.

Negative number: Delays in days; Positive number: Early delivery; Zero number: Delivery on time (on expected time)

Project Activities	Expected Duration (A)	Actual Duration (B)	Delays Duration (A-B)	List Of Reasons For Delays
<b>Pre-Contract Procurement Process</b>	<b>90</b>	<b>118</b>	<b>-28</b>	
<b>PRE-TENDER PREPARATIONS</b>	<b>24</b>	<b>28</b>	<b>-4</b>	
Project Handover to PM	1	1	0	
Cross functional team planning meeting	1	1	0	
Compilation PM Appointment letter, NEC, Budget Letter,	5	5	0	
Compilation BoQ,	5	5	0	
Compilation of SoW and Drawings	5	5	0	
Compilation of SHE specification	1	2	-1	Signatures process can take up to 2 days max
Compilation of EMP	1	2	-1	Signatures process can take up to 2 days max
Compilation of Quality requirements	1	2	-1	Signatures process can take up to 2 days max
PR Creation	1	2	-1	The creation process has changed
PR Release	2	2	0	
Submission of Documents to Commercial	1	1	0	
<b>CONTRACTING AND PROCUREMENT PROCESS</b>	<b>40</b>	<b>47</b>	<b>-7</b>	
Assign Buyer	1	2	-1	Assigning of buyer depends on the manager's availability
CFT Kick off & Contracting Strategy meeting	1	1	0	
Strategy sign off	2	2	0	
Development of enquiry pack by buyer	5	5	0	
Review of enquiry pack by review committee	5	5	0	
Issue Enquiry	20	20	0	
Site Clarification Meeting	1	1	0	
Tender closure	1	1	0	
Release of Documents by tender Office	2	5	-3	It took 5 days to get the documents
Commercial verifications	2	5	-3	It depends on the number of responded
<b>TENDER EVALUATIONS</b>	<b>26</b>	<b>43</b>	<b>-17</b>	
Technical evaluation	2	7	-5	It depends on the number of responded
SHEQ	3	5	-2	
SD&L	1	2	-1	
Financial(QS) Evaluation	2	14	-12	Both evaluations took 14 days due to evaluator's availability
Final Report	3	3	0	
Tender Committee Submission	5	5	0	
Tender Committee Presentation	5	2	3	Presentation takes two days for mandate to negotiate and conclude
Negotiation	2	2	0	
Submission of documents to supplier	1	1	0	
Supplier's response	1	1	0	
Contract Award	1	1	0	