**UNIVERSITY OF KWAZULU-NATAL**

# The Effects of Capital Projects Delays on Project Budget and Quality: Company in Richards Bay

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*A dissertation submitted to the Graduate School of Business and Leadership in partial fulfillment of the requirement for the award of the degree of Master of Business Administration, University of Kwazulu Natal*

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## DECLARATION

I declare that this dissertation of, **"The effects of capital projects delays on project budget and quality: Company in Richards Bay"** is my own, unaided work (except for the referenced portion). All the sources that were used have been included in the reference list and this has never been submitted previously by me for a degree at another university. It is being submitted for the award of the degree of Master of Business Administration at the University of Kwazulu Natal.

**…….**

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## DEDICATION

This dissertation is especially dedicated to my one and only love, my husband Delani Derick Cele. Christ is the head of every man, and the man is the head of a woman, and God is the head of Christ. 1 Corinthians 11:3. You always keep me on the right direction. You complete me, I love you and I respect you so much.

Husbands love your wives, just as Christ also loved the church and gave Himself up for her, so that He might sanctify her. He who loves his own wife loves himself; for no one ever hated his own flesh, but nourishes and cherishes it, just as Christ also does the church, because we are members of His body. Ephesians 5:22-30. My husband you are supportive, loving, caring, you always wish me the best, you have thought me what is true love, you have loved me unconditionally, you love me without trying to change me and I respect you for that.

Ndosi, Nombedu, Khumbuza, Nkomo kayivuswa, Nkom'isengwa ilele, Wayisenga imile iyakhahlela, Squnga esihle esingahlalwa nyoni, Siqunga esizalela amasakabula. Mkhokheleli owakhokhela isizwe ekugqilazweni, Dubandlela, Vico akagezanga, Obuye nensil'emfuleni, Magaye. Without you I would have not done half of the things I have achieved. You have registered me for this Master's degree, you believed I can do it and you have been with me through the tough times when I thought I was losing my mind, through the sleepless nights and lots of travelling, being away from home from you, you have supported me, thank you. Cele sithandwasami, thank you so much for everything and for loving me. I pray god keep us together and bless you abundantly. Inkosi ikugcine sthandwasami ikubusise ingaphezi, ngikuthanda kakhulu kakhulu.

Ephesians 5:22-24 says, "Wives, submit to your husbands as to the Lord, for the husband is the head of the wife as Christ is the head of the church, his body, of which he is the Savior. Now as the church submits to Christ, so also wives should submit to their husbands in everything." I will always submit, respect, care and love you.

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## ABSTRACT

On time delivery of projects, within budget and of the level of quality standard required by the customer is the core of successful project delivery. This dissertation aimed at understanding the capital project delays, identifying the factors causing capital project delays and investigating effects of project delays on project budget and quality at Company Capital Projects (CCP) in Richards Bay. The researcher covered the general background on project schedule outside and inside CCP in Richards Bay. In-depth literature review has served as a guide in scrutinizing the project management in terms of the project schedule, project finance and project deliverables. This literature review allowed comparing the effects of project delays in CCP with that on the literature review. Quantitative research method was used and the method of data collection involved survey with questionnaire which was distributed to 22 participants of the project management team that works directly with projects namely the Project Director, Principal Project Manager, Project Managers, Project Planners, Project Quantity Surveyors, Project Cost Engineers, Project Contract Administrators, Project Accountants and Project Quality Officer. The findings of the study were based on 20 questionnaires that were completed, response rate of 90.9%. The result of the questionnaire survey has helped identify factors that caused capital project delays and 46 critical factors were identified in this study that caused project delays and were further categorised into four underlying clusters namely: (i) owner related delay factors; (ii) consultant related delay factors; (iii) contractor related delay factors; and (iv) external related delay factors. The investigated effects of project delays on project cost and quality in CCP, the study revealed that project delays impact on budget and quality of a project. The outcome of this study should be that the project management team at CCP will be aware of the extent to which project delays can impact on their project delivery, it should guide efforts to enhance project performance, and should enable the avoidance or minimisation of project delays at CCP.



*Keywords:* Capital projects delays, project budget, project quality.

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## ABBREVIATIONS

| | |
|---|---|
| **AHP** | **- Analytical Hierarchy Process** |
| **CAPEX** | **- Capital Expenditure** |
| **CCP** | **- Company Capital Projects** |
| **COD** | **- Company Operating Divisions** |
| **FEL** | **- Front End Loading** |
| **FR** | **- Fright Rail** |
| **GDP** | **- Gross Domestic Product** |
| **GFB** | **- General Freight and Bulk** |
| **ICT** | **- Information and Communication Technology** |
| **KZN** | **- KwaZulu-Natal** |
| **NMPP** | **- New Multi-Product Pipeline** |
| **NPA** | **- National Port Authority** |
| **PCN** | **- Project Change Notification** |
| **PL** | **- Pipeline** |
| **PLP** | **- Project Lifecycle Process** |
| **PM** | **- Project Management** |
| **PMBOK** | **- Project Management Body of Knowledge** |
| **PMI** | **- Project Management Institute** |
| **PMM** | **- Project Management Methodology** |
| **PT** | **- Port Terminal** |
| **REIPPP** | **- Renewable Energy Independent Power Producer Procurement** |
| **SA** | **- South Africa** |
| **SOE** | **- State Owned Enterprise** |
| **SoS** | **- System of Systems** |
| **SPSS** | **- Statistical Package for the Social Scientists** |
| **SWOT** | **- Strengths, weaknesses, opportunities and threats** |

# 1. CHAPTER ONE: INTRODUCTION

## 1.1. Introduction

The aim of this study was to identify and understand what the common and significant factors are that cause capital project delays, and how one can learn from these findings to avoid or minimise capital project delays and their effects. This section of the study thus provides some background information on the effects of capital projects delays on project budget and quality, specifically in Company Capital Projects (CCP) in Richards Bay, KwaZulu-Natal (KZN) in South Africa (SA). It also touches on the problem statement that this study seeks to resolve, the research objectives and questions, and the significance of the study. The chapter finally presents a brief summary of the research methodology used, as well as the scope and structure of the study.

## 1.2. Research Context: Background

Project Management (PM) as defined by Schwalbe (2015:8) is, “the practical use of knowledge, talent, tools and systems to meet project requirements through project actions”. The main fundamentals of the framework consist of tools and techniques, project management teams, project stakeholders, knowledge areas, project accomplishments, and the input of a portfolio of projects to the success of the whole enterprise.

Varajao, Dominguez, Ribeiro and Paiva (2014) described PM as a discipline that is accountable for the business and managing of resources, with the objectives of completing a project within a pre-determined period and cost. PM offers enterprise powerful tools to improve its ability to strategise, implement and control the actions of its staff and all its resources.

Parker, Parsons and Isharyanto (2015), meanwhile, defined PM as a form of work, and criticised project management for its emphasis on a project’s internal dynamics as the main contributors to achieving a successful project.

According to Ngacho and Das (2013), project management success has traditionally been assessed by projects being on time, within budget and of a standard required by the customer. Yet given that projects are unique in their characteristics and goals,

and considering the changes that take place in a project environment, project management success has become increasingly diversified and both technical and societal needs must be assessed.

Neverauskas, Bakinaite and Meiliene (2013) defined project management success as having three main characteristics: stakeholders' integration, principal managers' support and a clear understanding of requirements. These days the environment is unreliable and unpredictable, so project managers must be trained with adaptive contemporary knowledge and have advanced working experience on how to achieve a successful project.

This study has identified the capital project delays at CCP, evaluated the factors that caused the delays, and investigated the effects of the delays on project budget and quality. As per Gobodo, Xabiso and Nkonki (2014), CCP provides transport for freight using different modes, i.e. sea, land and rail, and has as its objective to be a cost-effective and efficient transport service provider. The company is a State Owned Enterprise (SOE), which is owned by the South African Government. CCP is the most important player in Southern Africa's transport infrastructure. Ngacho and Das (2013) stated that development projects are very important to the economic growth of developing countries, as these projects contribute to their Gross Domestic Product (GDP), create employment and provide a global market for the exchange of goods and services.

According to Gobodo et al. (2014), CCP is a specialised entity that plans, develops and executes capital projects on behalf of the Company Operating Divisions (CODs) namely Fright Rail (FR), National Port Authority (NPA), Pipeline (PL) and Port Terminal (PT). CCP is currently experiencing an increase in deferred projects awarded by the CODs, making the budget and quality of projects even more critical. CCP has eight different streams into which it divides and allocates projects according to different specialisations and skills:

- Stream 1 specialises in constructing projects for the Port of Richards Bay.
- Stream 2 specialises in Rail (Coal Line) projects.

- Stream 3 is in charge of General Freight and Bulk (GFB) Gauteng/Maputo Link projects.
- Stream 4 conducts Port of Durban and Surrounds projects.
- Stream 5 conducts the Manganese Export project in Port Elizabeth.
- Stream 6 conducts the Iron Ore line and Cape Town projects.
- Stream 7 conducts the Pipelines Projects.
- Stream 8 conducts “Dig Out Port” and the Ports of Eastern Cape projects.

The CODs allocate all projects to be conducted by CCP; however Aibinu and Jogboro (2002) confirmed that seven out of ten projects surveyed have been delayed when it comes to project execution. When projects are delayed there is a slow-down of work and a loss of productivity, resulting in late project completion and increased costs related to time lost, as well as an increase in claims by the service providers or a cancellation of contracts. Delivering projects on schedule assists CCP to achieve its mandate, i.e. to provide fit-for-purpose infrastructure safely, on schedule, within budget and according to specification for the better operation of the CODs (Gobodo et al., 2014). This study thus evaluated the factors causing capital project delays and investigated the effects of project delays on project budget and quality at CCP.

### 1.3. Problem Statement

The problem with CCP was an increase in project delays, which then resulted in CCP requesting additional budget funding from the client to complete the project in the extended time through Project Change Notification (PCN).

As per Ismail, Mabuza, Pillay and Xolo (2014), CCP requested additional funding from the Government for the CCP’s New Multi-Product Pipeline (NMPP) project to help pay the interest, and was assigned R4.5 billion from a Grant Funding Arrangement. The project was planned to be completed in 2010, however the completion date was moved to 2013. The Projected Overall Cost was increased from R11 billion to R23.4 billion.

According to Pai and Bharath (2013), the increased number of construction project delays and the concomitant increase in costs has become normal in the construction

industry. Ismail et al. (2014) stated that in SA, project delays and costs have increased between 21% and 1329%.

## 1.4. Aim of the Study

The aim of this study was to understand the CCP's capital project delays, identify the factors causing the delays, and investigate the effects of project delays on project budget and quality at CCP. CCP's specialisation is in developing and executing infrastructure, and if it cannot deliver capital projects as per the client's specifications, within budget and on time, than it should not be considered a specialised entity of CODs.

### 1.4.1. Research Questions

The research questions were closely linked to the research objectives in order to ensure that the study achieved its purpose. For the purpose of the study, the following questions were addressed:

- What are the delays in capital projects at CCP in Richards Bay, KZN, SA?
- Which factors cause delays in capital projects at CCP in Richards Bay, KZN, SA?
- What are the effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA?

### 1.4.2. Research Objectives

The following objectives were formed from the aim of the study:

- To understand the capital project delays at CCP in Richards Bay, KZN, SA.
- To identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA.
- To investigate effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA.

## 1.5. Significance of the Study

According to Mohamed, Omar and Ahmed (2015), cost saving and time performances are usually essential to all parties involved in a construction project, i.e. the owner, contractor, and subcontractor. The effect of cost and schedule

overruns not only influence the construction industry, but the overall economy as well. The outcome of this study should be that the project management team at CCP will be aware of the extent to which project delays can impact on their project delivery, it should guide efforts to enhance project performance, and should enable the avoidance or minimisation of project delays at CCP. The outcome of the study can be used by projects in any organisation, and can also be used as a reference for future studies.

### 1.6. Research Methodology

Research design is the systematic procedure of gathering, analysing and interpreting data in order to increase an understanding of a phenomenon in which a person is interested (Saunders, Lewis & Thornhill, 2016:145). McCusker and Gunayelin (2014) stated that the quantitative method includes information collected, expressed by participants in a numerical form. Quantitative research is used for testing theories and examining relationships among variables, and was used in this study to identify the causes and effects of project delays on project budget and quality.

The study population was the Richards Bay CCP's staff complement of 55 people, which included the project management and support staff. There were 22 Project Management Team within CCP in Richards Bay, which works direct on project deliverables that formed the study sample excluding support staff. According to Acharya, Prakash, Saxenaand and Nigam (2013) in stratified random sampling: data is divided into several sub-groups (strata) sharing shared characteristics like income, sex, education, age, race, and ethnicity. A random sample is taken from each strata. The benefits are it guarantees representation of all groups in the population needed. The characteristics of each stratum can be estimated and comparisons can be made. It also reduces variability from systematic sampling. Probability stratified random sampling was used to select the sample for the research. As the research sampling chosen was per levels according to the criterion that were related to the variables under , e.g. the cost engineers gave the researcher the costs related to the projects and the project planners gave information related to the schedules of the projects.

Questionnaires were administered to the Project Director, Principal Project Manager, Project Managers, Project Planners, Project Quantity Surveyors, Project Cost Engineers, Project Contract Administrators, Project Accountant and Project Quality Officer. SPSS (Statistical Package for the Social Scientists) version 24.0, a data management and statistical analysis tool that has a very versatile data processing capability, was used in this study to help effectively read the output that was obtained and give accurate interpretations. Only capital, building and construction projects were identified in this study.

## 1.7. Scope of the Study

The study was only conducted at CCP in Richards Bay, as CCP is a specialised entity and expert in conducting capital projects and has its own project management team.

## 1.8. Structure of Dissertation

The research study consists of six chapters as follows:

**Chapter One (Overview)**

This chapter introduced the research, the problem statement, the aim of the study, the research objectives, the research questions, the research methodology used and the scope of the study.

**Chapter Two (Theoretical Framework)**

This chapter provided the theoretical framework of the study, as well as the theory applied in analysing and understanding project management.

**Chapter Three (Literature Review)**

Chapter three presented a literature review on the construction industry and project management practices internationally, as well as Africa and CCP project challenges which have led to project delays, project overruns and poor project quality.

**Chapter Four (Research Methodology)**

This chapter outlined the research method used to conduct the research. The research design, target population, sampling techniques, research process, data collection methods, data analysis and ethical considerations are also discussed.

**Chapter Five (Data Analysis and Discussion)**

Chapter five presented the results from both the literature review and the data that were informed by the questionnaires. It further discussed the results from the analysis of the primary data collected, compared to the data from the literature reviewed.

**Chapter Six (Recommendations and Conclusion)**

This chapter provided recommendations for CCP and any other project management organisation. It also provided a conclusion regarding what was observed and established during the study. Finally, the chapter provided the study limitations experienced and describes areas for further research.

## 1.9. Conclusion

Chapter one explained the benefits to be derived from the study, the focus of the study, what problems the study intends to investigate and how the study will answer the research questions. It also provided a brief summary of the research methodology used and summarised each chapter. The next chapter discusses the theoretical framework, which is based on previous research on project management.

# 2. CHAPTER TWO: THEORETICAL FRAMEWORK

## 2.1. Introduction

A theoretical framework was created to develop a good understanding and insight into what theories have been previously researched on project management, and to identify theories and frameworks that the organisation can use to conduct project management going forward. This chapter provides a brief background on the construction environment, and discusses the different stages of the Project Lifecycle Process (PLP), risk management, project uncertainty as well as complexity. Furthermore, this section also covers the Company Capital Projects (CCP) link between Portfolios, Programmes and Projects, CCP's PLP, and CCP's Programme Lifecycle.

## 2.2. Theoretical Framework

For a better understanding of construction in project management, a brief explanation about construction is necessary. PLP, risk management, complexity and uncertainty theories are also discussed below, to ascertain what knowledge other scholars have identified, captured and concluded regarding these theories.

### 2.2.1 A Brief Understanding of Construction

Antunes and Gonzalez (2015) discussed that for a person to understand where construction is situated in the project life cycle and how it relates to other fields, the project and its phases must be discussed. The first phase (feasibility) involves a set of procedures meant to recognise the most likely answer to achieve the planned industry goal wished for by the project sponsor. Furthermore, these procedures should give decision if and whether the project deliverable matches the selected answer, and whether it can truly be constructed or created. The next phase (design) includes a group of procedures carried out by the technical and project group, which scrutinises the results of the first phase. The group develops a design specification and project plan that informs the decision on how to develop an appropriate project product. The third phase (construction) sees the construction of the project according to the technical specifications and the management strategy decided on in the previous phase. The final phase (operation) brings the end project to the user, who will use the product to create benefits for themselves and their industry. The start of this phase usually determines the end of the project life cycle.

### 2.2.2 Project Lifecycles Process

The Project Management Body of Knowledge (PMBOK) (2003) stated that projects always have challenges as they are different in nature, i.e. there is an element of uncertainty which always results in a risk component being attached to a project. Projects also start out being complicated as there are various stakeholders that have different interrelated stakeholder goals that need to be achieved. To make the project simpler it is divided into project stages, which combined together form what is normally known as the project lifecycle. The project stages differ depending on the nature and type of industry in which the project stages are executed. The four stages that make up a project lifecycle in project management are the:

1) Concept and Initiation stage;
2) Design and Development stage;
3) Implementation or Construction stage; and
4) Commissioning and Handover stage.

Cullen and Parker (2014) indicated that the original method of project management recognised an order of steps to be conducted, which were usually divided into the following five components:

- Project introduction.
- Development.
- Implementation.
- Monitoring and controlling.
- Project close out.

Parker, Verlinden, Nussey, Ford and Pathak (2013) agreed with Cullen and Parker (2014) that there are five main project management process groups, while Parker et al. (2013) added that the areas of knowledge that they encompass are integration, human resource management, time, procurement, quality, communications, cost, risk management and scope.

Parker et al. (2013) described the five main project management process groups in detail below:

1) Project initiation

Project initiation talks to actions that are undertaken to make sure that realistic industry desires will be attained, and recognises stakeholders that will have an influence on the project success. It is helpful from the start of the project to involve stakeholders, as it enhances the chances of acceptance, fulfilment and shared ownership to achieve and improve the project success.

2) Project planning

Parker et al. (2013) described this stage as including those procedures done to create the entire project scope, to describe and improve the purpose, and to create the action plan needed to achieve the deliverables of the project. The actions in this stage comprise emerging the plan of the project, emerging scope requirements, generating the work breakdown structure, emerging the schedule and essential actions, emerging costs and budget, creating the human capital plan, preparing for quality, risk management, communications, engagement plans and procurement.

3) Executing a project

A project normally succeeds or fails during the execution of the plan. Implementing a project is categorised by the application of actions and measurement of development as recognised in the mandate to achieve the planned project deliverables and goals during the project planning stage.

4) Monitoring and controlling

In a project environment, reviewing and tracking the performance and progress of a project by comparing it against the original planning specification is done through the controlling and monitoring processes.

5) Closure out

As a project closes out, the essential actions involve getting sign-off by the project owner/sponsor or stakeholders. It is important to record lessons learned, document project effects and revise the project handover. In this stage the main objective is to officially end the project by making sure all procedures, project stages and groups are completed.

Parker et al. (2015) criticised the original method of project management, stating that it method implies predictability, that put strain and more focus on development, planning and design and that is unsuccessful for handling projects that are high in complexity and uncertainty.

Parker et al. (2013) also argued that while project related management makes sure that project activities are coordinated, helps provide control, plans resources and identifies risk, it is essentially ineffective at dealing with “soft issues”.

A suggestion by Shelley (2015) was that organisations bring on project leaders who recognise that current procedures are needed to maintain existing practices, and that projects are the driving tool which implement changes and innovate for the future.

### 2.2.3 Risk Management

The building industry has failed to come up with an effective method for treating the uncertainties of building projects (Kuo & Lu, 2013); the problems that usually arise due to overlooking possible risks are cost overruns and delays. Ineffective management and inadequate information about project risks also causes an undesirable impact and a bad reputation for the project team. To enhance the possibility of success and minimise the possible risks, unclear factors should be recognised, assessed and monitored, however building projects are commonly known for their exclusive and unclear features.

Hussain, Sanjay and Jaswanth (2017) stated that managing and controlling risk is an important requirement for building projects. Teller and Kock (2013) defined that risk is an indeterminate occasion or condition, which if it happens, causes a major negative or positive effect on at least one strategic portfolio objective. The authors further stated that risk management enables an organisation to cope with arising opportunities and threats.

Kikwasi (2012) highlighted that running building projects contains a large deal of handling risks, including planning, identifying, analysing, developing risk management strategies, monitoring and control. The author identified causes of risks as being changes in project scopes and requirements; design faults and omissions;

imperfectly unclear roles and responsibilities; inadequate skilled workers; force majeure; and new machinery.

Chien, Wu and Huang (2014) emphasised that the size and complexity of building projects are growing; thereby increasing the risks, adding that poor risk management remains the main barrier to risk management. As projects are normally influenced by numerous risk issues, these must be recognised throughout the risk management process. Risk management in the building industry is comprised of three key steps: risk identification, risk investigation and assessment, and risk response.

Risk management is the systematic process of recognising, investigating, and responding to project risk, and involves maximising the likelihood and impact of positive attributes and reducing the likelihood and impact of attributes that are adverse to the project's goals. Project risk is an unknown event or condition that, if it takes place, has a positive or negative effect on a project's goals (Hussain et al., 2017).

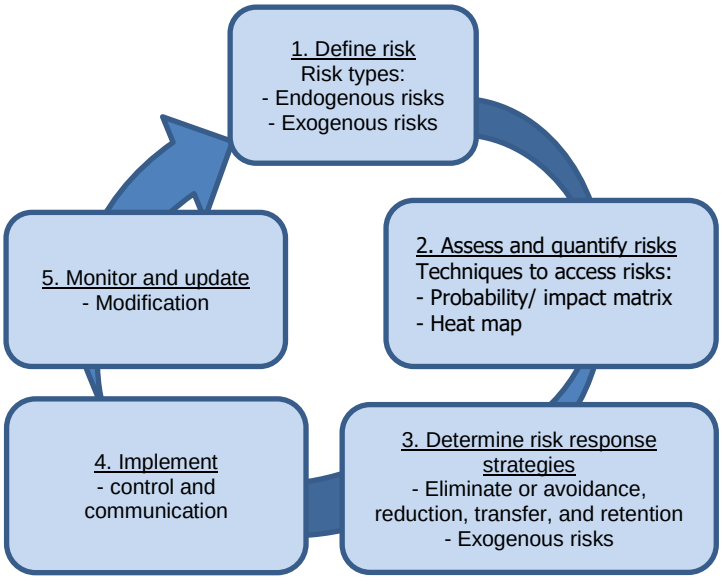



**Figure 2.1: Risk Management Process**

**Source: Kardes, Ozturk, Cavusgil & Cavusgil (2013)**

The risk management process is a nonstop cycle for identifying, evaluating, managing and monitoring risks that consists of five steps:

**Define risks**: Threats and opportunities that are both exogenous and endogenous must be recognised. Risk types can vary subject to the project, but every risk type should be cautiously defined, such as exogenous risks (social environment, industrial, political, economic, currency) and endogenous risks (operational resources, supply chain, stakeholders, etc.).

**Assess and quantify risks**: After identifying threats and opportunities, they should be evaluated and ranked. There are techniques to evaluate risk that can be used, such as identifying an impact/probability matrix to quantify the levels of the risks and ranking them before acting. Risks that have high impact and a greater likelihood of happening need the greatest attention. Building heat maps is another technique for assessing risks. Heat maps use charts to group and display risk types and use colour coding to rank and show the risk levels, e.g. green for small risk, yellow for average risk and red for great risk.

**Define risk reaction strategies**: After detecting and measuring risks, management has to decide on a risk response strategy, like the above-mentioned risk management techniques – transfer, retention, elimination or avoidance, and reduction.

**Implement:** Responses to risk should be implemented and actioned as planned. There should be established policies and procedures to control the process, as well as clear communication and information flow, to make sure that a successful and effective implementation takes place.

**Monitor and update**: Next the results are scrutinised and necessary adjustments are made. The entire process must be overseen and must restart as new risks arise or current risks change.

As Teller and Kock (2013) observed, businesses should conduct numerous projects simultaneously to maintain efficiency and flexibility. By linking information resulting from the risk management of different single projects, portfolio risk management can recognise risks that arise in numerous projects concurrently.

Teller and Kock (2013) stated that portfolio risk management involves supervision of the indefinite events and situations, as well as their interconnection at the portfolio level that cause major positive or negative outcomes on one or more planned corporate objectives, and therefore impact project portfolio success. Portfolio risk

management further helps to recognise common trends and risks for the project portfolio and makes the gained experiences easily accessible.

As per Mohamed, Omar and Ahmed (2015), there are many unknown factors in construction projects, including the performance of the service providers, availability of material, weather conditions, stakeholder involvement and contractual arrangements, which may cause delays. The main indicators for success in construction management include completion time, within budget, safe execution, within quality required and within environmental limits. These goals are dependent on each other, thus to meet a planned project completion date within budget, a schedule should be arranged properly. Due to the different nature of projects in construction, a realistic budget and schedule is key, which must be accommodated in the case of adjustments without negatively affecting the total budget and project duration. It is also important to prepare for the unknown and allocate additional budget and time for the project, to cover 'just in case' events.

| Risk | Descriptor | Description | Probability |
|---|---|---|---|
| **Very high** | Almost certain | Even chance | >50% |
| **High** | Likely | One in every 4 projects | >25% |
| **Moderate** | Possible | One in every 10 projects | >10% |
| **Low** | Unlikely | One in every 20 projects | >5% |
| **Very low** | Rare | Less than 1 in every 20 projects | <5% |

**Figure 2.2: Probability Matrix.**

**Source: Mohamed et al. (2015)**

| Risk | Schedule | Cost | Safety | Quality |
|---|---|---|---|---|
| **Very high** | >3months | >R10 million | Fatality | >10% |
| **High** | 2-3months | R5-10 million | Severe injury | 5-10% |
| **Moderate** | 1-2months | R2-5 million | Medical treatment | 3-5% |
| **Low** | 2-4 weeks | R1-2 million | First aid | 1-3% |
| **Very low** | <2 weeks | <R51 million | No injury | <1% |

**Figure 2.3: Impact Matrix.**

**Source: Mohamed et al. (2015)**

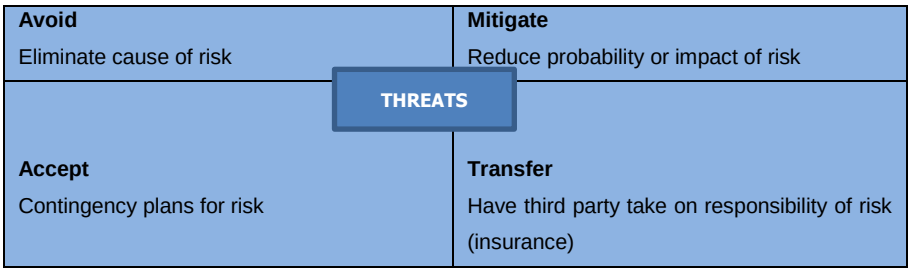



**Figure 2.4: Strategies for Negative Risks.**

**Source: Mohamed et al. (2015)**

To identify and prepare for cause that affects the increase of budget and delay on schedule, to develop charts for chances of cost impact and time impact, and to weigh the exposure impact on cost and time. The above matrix can be applied.

Bowers and Khorakian (2014) provided an appropriate reaction for each risk, which must be detailed and documented in a risk register:

- **Acceptance:** the business may choose to accept and do nothing about the project risk and its effects.
- **Avoidance:** the business may choose to walk away from the project after identifying the growing probability of failure and observing that it has an inadequate or poor project risk removal plan.
- **Transfer:** the business may realise that it does not have the knowhow or enough experience on the product, then choose to sell part of the product or subcontract the product development, handing over responsibilities and reallocating the risk.
- **Redundancy**: the great failure rate result to the use of similar paths to raise the chances of getting effective solution.
- **Mitigation**: the basis of project risk management is to reduce the uncertainty or the effect of risk.

It is key to frequently review the status of risks, close out identified risks and find new risks by using a proper risk register.

Teller and Kock (2013) suggested that a strong risk management culture is important to influence the efficiency of a risk management process. A risk management culture involves an awareness that projects are tainted with risk, a commitment to the management of risk, acceptance, communication and openness towards risk management processes.

### 2.2.4 Uncertainty

According to Ochieng, Price, Ruan, Egbu and Moore (2013), projects are formed to bring about change, but are themselves continually changing in their nature. In building projects, change occurs internally or externally.

Saunders, Gale and Sherry (2015), stated that project managers are facing challenges in understanding the bases and causes of project uncertainty, finding a way to move around uncertainty and achieve project success outcome in today's complex and socio-technical situations. Uncertainty is a multi-faceted theory: it has been discussed throughout the different types of academic disciplines including psychology, economics and engineering. These are large and long term projects that must ensure many internal and external stakeholders are satisfied in this environment of many uncertainties. In project management literature management of uncertainty has become a widely discussed and hot topic.

Saunders et al. (2015), defined uncertainty as "not able to be relied upon; not known or definite", suggesting that uncertainty is not knowing, it when an individual have no full knowledge and understanding of the situation. Managing uncertainty in projects situations is similar and more like managing of risk.

According to Ochieng et al. (2013), there are two main groups of uncertainty namely: variability uncertainty, these are normal and common problems in building projects, and indeterminate uncertainty, these are mostly as a result of design, environmental issues and financial of building project that brings unclearness in a project and must be improved or ideally removed. Building customers are strongly concerned with realising some form of invention that will decrease projects team uncertainty.

According to Ochieng et al. (2013), a rise in complexity mostly means it more difficult to understand the result of influencing one component; dealing to an increased uncertainty. Uncertainties are the interactions, relationships and components we are not aware of and do not fully understand. Complexity and uncertainty are therefore strongly related.

Saunders et al. (2015), stated that the complexity perception on the determining factor of uncertainty in a project proclaims that complexity might arise from product functional requirements, the selections of technology or from the diversity of individuals taking part in the project. Complexity adds two additional bases of uncertainty in projects: that of too much information (the size of unclear information

that must be handled) and turbulence (the speed of project facts changes, direction of change and the unpredictability of their timing).

Saunders et al. (2015), proposed two approaches of handling highly uncertain projects, namely selectionism and learning. Selectionism involves undertaking several explorations to achieve the same result and making a choice on which is best throughout or after the process. Learning includes scanning the situation to search for the unknown as well as nonstop problem solving, adapting and redirection of project when new information arises.

Antunes and Gonzalez (2015), further explained that uncertainty is an unintelligible expression without a straightforward description. “Human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation since the basis for making such calculations does not exist”. Uncertainty is beyond any forecast, prediction, and measurement particularly when considering human behaviour. The key reason to conduct a project is to achieve the value wanted by the stakeholders. Nonetheless, value is relative. Therefore, direct or indirect, internal and external stakeholders may have a dissimilar perception of the achieved project business result depending on their individual backgrounds and vantage points. That is a fertile soil for uncertainty. Inevitably, projects are conducted in an uncertain scenario.

Saunders et al. (2015), stated that at the centre of the kaleidoscope are situated the project aims, surrounded by the six elements (capability, temporal, information, complexity, individual, and environmental) that impact the level of uncertainty in the project. The probability of achieving the project goals can also be affected by rapid changes, often minor but sometimes significant, caused by the emergence or realignment of different areas of uncertainty in the project, whether due to new regulatory requirements on the project, awareness of new project data or the non-availability of skilled project resources of the requisite number at a given time.

Saunders et al. (2015), advised that uncertainty can be managed by maintaining flexibility in the project. Managing uncertainty can also be approached by means of the project manager maintaining a sense of mindfulness and vigilance throughout

the project delivery, or by managing assumptions rather than the traditional deterministic view of project planning. Soft skills such as competence, team spirit and communications can influence how successful project managers are in managing uncertainty.

Project uncertainty can be managed by extending the project risk management process to incorporate uncertainty. Strengths, weaknesses, opportunities and threats (SWOT) analyses and double probability impact matrices, enabling positive opportunities as well as negative threats to the project to be identified, analysed and, where practicable, mitigated. Also by improving the accuracy of the planning, estimating and resource allocation processes uncertainties can somehow be tamed.

### 2.2.5 Complexity

Ochieng and Hughes (2013), defined complexity as “consisting of many different and connected parts” and “not easy to understand, complicated or intricate”.

He, Luo, Hu and Chan (2015), also defined complexity as the state of being involved and intricate as a result of including many varied interrelated parts within a subject. Bakhshi, Ireland and Gorod (2016) continued to define project complexity as a complicated arrangement of diverse interrelated parts in which the essentials can change and evolve continuously with an effect on the project objectives.

He et al. (2015) mentioned that project complexity is defined as complicated characteristics of a project as a result of composing many interconnected parts within a project. Further define project complexity in terms of interdependency and differentiation.

Bakhshi et al. (2016), defined complexity in the perspective of project management, before examining project complexity, it is valuable to look at projects as a hierarchy of chaotic, complex, complicated and simple. They defined simple projects as limited actions undertaken to develop services or products with clear cause and effect relationships. In projects that are complicated, are cause and effect relationships between elements and tasks. Projects that are complicated comprise of subsections

of projects that are simple. Complicated projects are not always associated to their scale in nature, but to the issue of specialised expertise or coordination.

Antunes and Gonzalez (2015), stated that a structure is complex, if composed of several interconnected pieces, with dynamic networks of interactions, and their relationships are not aggregations of the individual static entities. Projects are complex, projects involve several interrelated stakeholders, deliverables and activities in order to deliver a strategic state change. Given that, projects, in a broad definition, show the characteristics of what is complex. Most methods are restricted to computations involving scheduling and activity relationships. Although these models provide a relative comparison of the complexity of similar projects in the same industry, they fail on a broader scale.

The Analytical Hierarchy Process (AHP) provides a more inclusive and simple approach to complexity evaluation. AHP can assess a set of pre-chosen project criteria of a variety of projects, providing a calculated numerical grade from zero to one for complexity comparison. Despite the fact that it is possible to use AHP to congregate projects into clusters, such a study does not exist. As a consequence, no explicit information comparing the complexity of projects in building construction with other industries could be traced.

According to Jallow, Demian, Baldwin and Anumba (2014), the construction process is normally known for its large amount and intensive information such as specifications, drawings, bills of quantities created mostly based in paper form, which are difficult to manage. Construction projects are frequently late, over budget and suffer from poor workmanship and materials problems.

According to Verweij and Gerrits (2013), if an infrastructure project is said to be complex, it usually means that it is perceived to be difficult. Developing infrastructure means modifying an existing system. A built area becomes even more complex if its social fabric is taken into account individuals and social groups living, working, traveling and recreating in any given area since it directly influences the existing and future infrastructure requirements.

According to Jallow et al. (2014), the different heterogeneous systems used and geographically spread teams makes it much difficult to achieve the most needed effective information communication. A typical construction project lifecycle includes different stages combining numerous stakeholders. The large and complex projects naturally experience poor project management practice. This results in project failures. This problem has been reported in nearly every business. Ochieng and Hughes (2013) cited that project success is dependent on the complexity of a project, having a direct effect on the overall project performance.

Another main factor in construction projects is the collaboration complex nature and especially the user groups in projects where diverse users have their individual needs and desires for a building. Controlling of the requirements information is essential for tracking, visibility and traceability of customer's requirements which are vital for the management of changes.

He et al. (2015), indicated that project complexity is influenced by the four dimensions factors, namely, experience and ability of organization members, project organizational structure and its exchange and coordination with other key participants, project culture, and project business process. Bryde, Broquetas and Volm (2013), agreed that complexity of projects consist of Information and Communication Technology (ICT) which has been developing at a very fast pace.

Verweij and Gerrits (2013) specified that complexity can be characterized in two ways: simplistic or generic complexity and complex or situated complexity. Generic complexity focuses on the emergence of complex processes and structures from a limited set of variables. Situated complexity focuses on the explanatory value of the contextuality of a phenomenon.

Ochieng and Hughes (2013), claimed complexity is one of the critical project characteristics that determine appropriate actions to result in successful project outcomes, with construction projects continuously displaying higher levels of complexity.

Bakhshi et al. (2016), quoted that because of the emerging characteristics and behaviour projects are increasingly becoming complex. It was reported that there are three distinctive and primary models of complexity in project, the Project Management Institute (PMI) view, the System of Systems (SoS) view and the Complexity Theories view. Complexity as an entity containing of various varied interrelated elements and parts such as interdependence, components, and tasks. Thus, all projects hold a degree of complexity. Given that many interactions are undertaken and project components do not follow simple causal relationships, complexity can be viewed as, the inability to predict the behaviour of a system due to large numbers of constituent parts within the system and dense relationships among them.

Bakhshi et al. (2016), explained that to better understand project complexity aspects and characteristics, it is essential to investigate all three views and these are delineated below:

a) The Project Management Institute view

PMI view presents complexity as a personal concept focusing on the difficulty of understanding the object. The uncertainty of methods and objectives of attaining project deliverables are also reflected as essential factors contributing to a project's complexity. Navigating Complexity, which specifies multiple stakeholders and ambiguity as the two key characteristics of project complexity.

b) The System of Systems (SoS) view

Recognise that underlying differences occur between system types. There are four categories of knowledge management to develop organisational system: chaotic, complex, complicated, and simple.

c) The complexity theories view

Time dependent, problem dependent and observer dependent are characteristics discussed in theories. Most focus needs to be given to characteristics considered in this viewpoint, such as operating at the edge of chaos, power law distributions, scale laws, fitness landscape, chaotic behaviour, fractals and adaptive cycles in the context of project management.

Bakhshi et al. (2016), viewed projects that are complex as consisting of interdependency, non-linearity uncertainty and ambiguity, unfixed boundaries,

emergent behaviours, autonomy, and unique local conditions. Factors caused by the lack of knowledge and unfamiliarity are not connected with project complexity.

De los Ríos-Carmenado, Guillén-Torres and Herrera-Reyes (2013) referred to Project Management as a main discipline for the achievement of successful projects, presently many projects for the reason that they do not achieve their goals; they are more and more complex and the traditional approaches to address them are inadequate. The term “complexity” is recognized as the connection between the state of a complex system and the understanding of it.

De los Ríos-Carmenado et al. (2013), stated the different dimensions of the projects’ complexity refer to the technological complexity. This dimension has prevailed for years; starting from the scientific rationality of the modern project leading to the first models of development planning adds organizational complexity as of the differentiation and interdependence between the operational elements of the organization. They further refer to the complexity of uncertainty and add structural complexity, referring to the underlying structure of the project. Social complexity began to be addressed in projects. From this dimension, technology, engineering and science were united with economy; society and culture have stressed the importance of this social complexity and show that projects fail due to factors related to people rather than technical aspects.

De los Ríos-Carmenado et al. (2013), further explained that social dimension of complexity is related to the ethical-social component, including attitudes, values and behaviors of people that relate to each other to direct, manage or promote projects.This dimension is therefore the root of the social system surrounding the development project and lays the “foundations” for the people come to work together, with confidence, commitment and personal freedom. In this dimension, behavioural skills are integrated with ethics and values as the most suitable elements to overcome potential moral conflicts in relation to the parties involved in the project.

Ochieng and Hughes (2013), emphasised that it is crucial that throughout the project life cycle senior managers develop plans and standardise with the purpose of

managing complexity in the most efficient way. Incessant communication and coordination during the delivery of a complex construction project facilitates effective management of project complexity.

### 2.3. Company's Link between Portfolios, Programmes & Projects

Coates et al. (2016), stated that strategic portfolio management ensures that Capital Investment Programmes are aligned to the business strategy. It proposes a three tier governance structure consisting of portfolio management, programme management and project management. The discipline of portfolio management ensures that the programmes contained in the portfolio are aligned to a particular business strategy and prioritised according to strategic criteria and priorities. Programme management ensures that programmes meet strategic business objectives necessary for strategy implementation and deliver the benefits required by stakeholders. The model in Figure 2.5 below illustrates the relationship between portfolio, programme and project management and how the 3 levels align to achieve corporate vision and objectives:

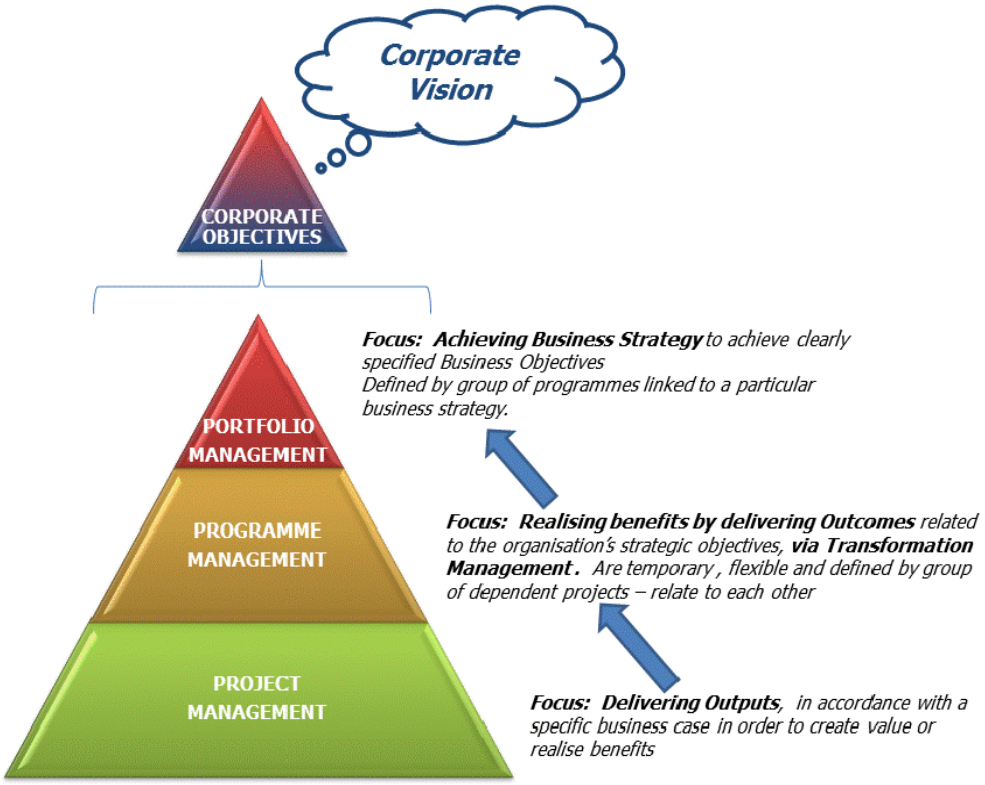



**Figure 2.5: Relationship between Portfolio, Programme and Project Management.**

**Source: Coates et al. (2016)**

### 2.3.1 Company's Project Lifecycle Process

In this study the emphasis is on major capital projects within CCP and the causes of project delays and its effects, inconsistent application of the Company Project Lifecycle might be due to the diverse types of capital investments within CCP or the management thereof according to the legacy planning and capital investment procedures. Although the Company Project Lifecycle does not differ materially with the Project Lifecycle approach as advocated by the PMBOK (2003), but it has not been aligned with the Project Lifecycle approach.

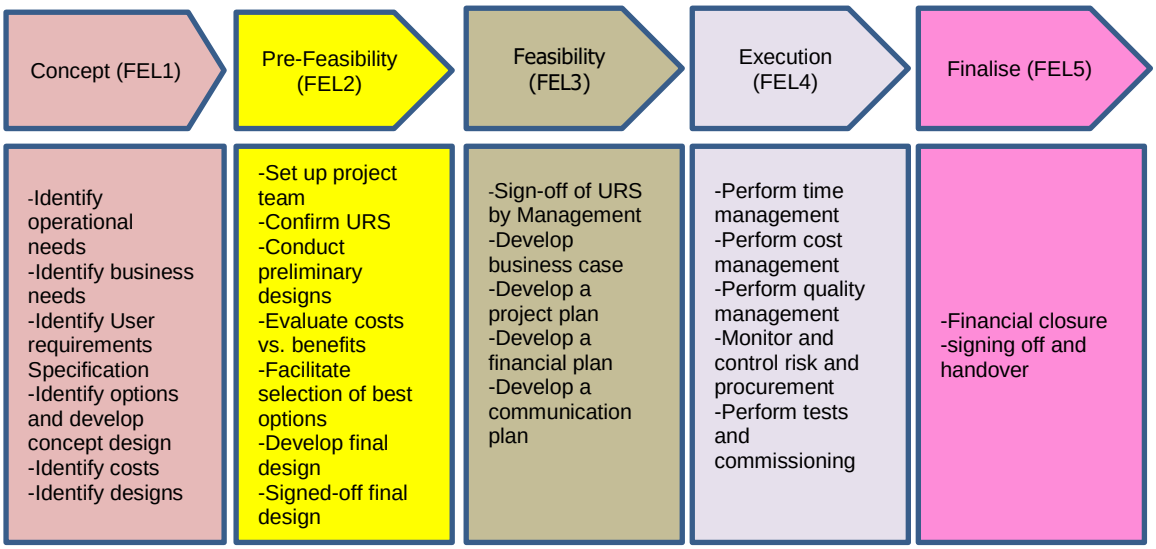



**Figure 2.6: Company's Life Cycle**

**Source: Coates et al. (2016)**

Each phase is marked by a completion which is often one of the deliverables of the project. The notable difference in CCP approach is that pre-feasibility and feasibility phases are not performed for major projects. The argument here is that the use of resources is difficult to justify. To say this has a huge effect in project performance totally depends on the scope and nature of a particular project, however contends that the most significant project phase is the feasibility phase, since the feasibility phase is the stage where most factors of the project are unknown and many decisions are taken at this phase, decisions that affect the total project budget and project duration that contributes to the project success.

### 2.3.2 Company's Programme Lifecycle

Coates et al. (2016), created a Programme lifecycle which is made up of 5 phases namely, Pre-Programme Preparation, Programme Initiation, Programme Setup, Programme Delivery of Benefits and Programme Closure. The Company's PLP or any approved project methodology is overlaid on the Programme Lifecycle illustrating the integration and fit into the life cycle. It further depicts two tranches to deliver capabilities, outcomes and benefits.

It is important to note that the programme lifecycle comprises of generally overlapping phases. It recognises that some Delivery of Benefits early works may be performed during Programme Initiation or Programme Setup phases.
Delivery of Benefits involves benefits being delivered, or realised, after capabilities have been transitioned into outcomes and these in turn have been embedded to realise the intended benefits. This process could span multiple years (or decades) and should be seen as involving three key processes, namely:

- Designing Capability
- Delivering Capability
- Realising the Benefits

It also suggests that detail planning and design (commonly known in Company PLP FEL 1 & 2) are performed during the Design & Develop Capability process of the Delivery of Benefits Phase. This may occur in parallel to the final stages of Programme Setup.

A Programme Investment Business Case is submitted and approved once planning and design (design capability) have attained a level of detail that is sufficient to inform an Investment Business Case. The programme may be gate reviewed at key milestones during the Delivery of Benefits Phase.

### 2.3.3 Interaction between the Programme Lifecycle and the PLP

According to Coates et al. (2016), the Programme Setup and Delivery of Programme Benefits Phases contain a collection of components. The components will follow the PLP or any suitable approved project management methodology. The lifecycle stages for each component will in practice not be exactly aligned. Each component

will typically be in a different stage. At the end of the programme major milestones or end of programme phase or tranche would trigger a programme gate review. Where appropriate, subordinate components should be arranged into tranches or stages. This will accelerate benefits delivery. The Programme Investment Business Case will be completed and submitted for approval once the majority of subordinate components have completed sufficient design and planning detail (e.g. engineering projects completed Front End Loading (FEL) 2). This Programme Tranche Investment Business Case may be used to acquire approval for Capital Expenditure (CAPEX) for detail designs only or, for both detail design and execution. An enhanced Programme Final Tranche Investment Business Case, post components detail designs and planning, (e.g. engineering project completed FEL3) is submitted for approval for execution. The components are embedded within the monitoring and control structure of the Programme. The components' schedules feed into the programme master schedules and each component's investment business cases feed into the programme investment business case.

The components report progress to the programme via the approved governance structure and process. The programme's policies, standards, plans, processes and procedures may be applied to the components where appropriate. The programme office will review compliance to programme standards at the component level and facilitate independent programme assurance or audit activities.

### 2.4. Conclusion

It is important to have knowledge of project management framework to be able to achieve successful projects objectives or outcomes. Projects are different in nature and size, PLP must be applied according to the nature of the project and to suit the project type. PLP provides a guide to what is expected and what to provide and perform at each phase to achieve a successful project. It is with no doubt that because projects have many uncertainties and are often complex with different stakeholders that have different but interrelated needs and benefit realization, projects will always have a risk associated to them that have to be identified, assessed, measured, monitored, controlled and recorded at all times.

Projects are created to achieve a unique product or service, which calls for innovation and the ability to adapt to the project environment. Projects deals with managing many different groups, project managers have to be able to interact with different people at different levels in different departments in different countries. Project managers must acquire soft skills to be able to achieve successful project outcome. The following chapter will discuss the literature review which will assist the study to develop a good understanding and insight of what the previous researchers have researched and concluded.

# 3. CHAPTER THREE: LITERATURE REVIEW

## 3.1. Introduction

This section assist the study to develop a good understanding and insight of what the previous researchers have researched and concluded as factors that cause capital project delays and effects on budget and quality. The literature review was sourced from the following sources: Books, Google scholar, Sage journal, published articles in the websites and company annual reports. In journal search the following filters were key words used in searching for literature: factors that cause capital project delays, project management, effects of capital projects delay, effects that causes change in capital project budget, effects that cause change in capital project quality, controls in project management. Chapter three will cover literature review on project management and literature review on capital project delays, different factors that cause capital project delays and capital project delays effect on cost and quality.

## 3.2. Definitions of Key Terms

### 3.2.1 What is a Project

Varajao, Dominguez, Ribeiro and Paiva (2014), have defined project from the Project Management Institute (PMI), as a set of defined activities assigned to create a result with a clear beginning and end date. It is a temporary endeavour planned to generate a product, service or other result. Chang, Chih, Chew and Pisarski (2013), defined project as a unique process intended to achieve target outcomes. Serrador and Pinto (2015), continued to say that projects continue to proliferate in society today, in both the public and private sectors of the economy. Investment in projects numbers in the trillions of dollars annually.

Schwalbe (2015:4), defined a project as “a temporary endeavour undertaken to create a unique product, service, or result.”

### 3.2.2 What is a Capital Project

According to Babatunde and Perera (2017), infrastructure projects comprises of airports, electricity, natural gas, rail, roads, seaports, and telecommunications sectors. Mostafavi, Abraham and Sinfield (2014) also referred to hard infrastructure as physical networks (e.g., highways, bridges, water, and wastewater systems).

Maghsoudi, Duffield and Wilson (2016), defined infrastructure as “the basic framework for delivering energy, transport, water and sanitation, and information and communication technology services to people”. It is stated that infrastructure directly impacts people’s quality of life, a nation’s economic growth and its international competitiveness. Infrastructure Australia has identified seven themes to which infrastructure projects are linked. Those are including National Freight Network, Transforming Our Cities, Adaptable and Secure Water Supplies, National Energy Market, National Broad Band Network, Essential Indigenous Infrastructure and Competitive International Gateway.

Jallow, Demian, Baldwin and Anumba (2014), described the roles of construction project management include: defining customer’s requirements; creating a good communications networks in which all stakeholders can perform effectively; developing and handling a change control processes; and monitoring all decisions and approval in respect of the programme.

Agreed was Rasul and Rogger (2013), that each civil service organization is tasked to provide various types of projects. These include construction projects: boreholes, buildings, roads and canals; as well as non-construction projects such as procurement, training, and advocacy. Moreover the types of capital expenditure on projects constitute 46% of organizational budgets in total, on average, so they undoubtedly represent an important element of what organizations are responsible for overall.

According to Ochieng, Price, Ruan, Egbu and Moore (2013), projects are created to facilitate change, but by their nature are themselves incessantly changing. They continued to elucidate and are in agreement with the previous authors that infrastructure consist of the physical structures and networks that provide the essential services for a community’s economic and social needs. This can be categorised as economic infrastructure, including:

- transport: sea ports, bridges, airport, toll roads, rail;
- utilities and energy: water, electricity, gas; and

- communications: satellite systems, telecommunication networks, mobile phone networks, as well as social infrastructure, including education, correctional facilities and healthcare.

### 3.2.3 Benefits of Capital Project

Even from 2008 improved infrastructure has been a key element in this economic growth and urbanisation in China, with effective infrastructure seen as essential for the social well-being of communities and the economic growth, business competitiveness and the effective functioning of the commercial property markets; particularly for international investors who are now seeking to increase their exposure to the China property markets, (Newell, Chau & Wong, 2009).

The construction industry plays an important role in the formation of the asset base of a nation, as the final products of construction are recorded as investment goods or capital. The construction business is one of the most innovative, dynamic and technically advanced of any sector in Sri Lanka's economy. As the construction business is extremely labour-intensive and depend on the migrant workers in many countries. Skilled transfer bringing new technology, (De Silva, Darmicka & Fernando, 2014).

Maghsoudi et al. (2015), agreed with De Silva et al. (2014), that the infrastructure industry of a nation plays a crucial role in its economic development. Infrastructure is referred to as two main factors to getting competitive internationally. Intermediate: Tangible: numbers of innovative products, patents, publication, quality change, the number of changes. Intangible: job satisfaction, customer experience. Longer and broader term: Tangible: economic benefits, environmental benefits, social benefits, health care, Intangible: knowledge, competitiveness, social benefits, quality of life and consumer experience.

Mostafavi et al. (2014), also agreed to the previous authors that the importance of infrastructure is for economic growth and public welfare. Global demand for infrastructure construction over the next 20 years is expected to be $2 trillion each year. There is need to maintain existing transportation infrastructure.

Maghsoudi et al. (2016), emphasised in a year later the importance of infrastructure in support of economic development has been fully recognized and acknowledged through research and practice. Infrastructure is determined as the second measure for assessing nations' competitiveness.

According to Muhammad, Malik and Khalfan (2013), the construction industry is an important sector of the economy which makes a significant contribution to gross domestic product (GDP), capital formation, and employment; and has backward and forward linkage effects with several other sectors. As it produces the nation's physical infrastructure and other productive assets, the industry is of critical importance in the national development of developing countries.

According to the company provides transport for freight in different modes namely by sea, land and rail. The company is the most important player in the Southern Africa's transport infrastructure. Wang and Sun (2016), has highlighted the positive impact from transportation infrastructure on the economy can be transmitted to the rural region, either directly or indirectly. In summary, such impacts can occur through the following four channels:

***a. Reducing transportation time and alleviating traffic congestion;***

A well-functioning transportation infrastructure network can lead to more reliable shipments of goods and reduce travel time. More reliable shipments of goods reduce operation costs for businesses.

***b. Increasing land values and promoting regional economic development;***

Transportation infrastructure affects not only the level of economic output, but also affects the geographic distribution of economic activities. Transportation infrastructure will increase the value of real estate, especially when these transportation infrastructures shorten people's commuting time and make public amenities more accessible, which in turn improves people's living standards.

***c. Increasing employment opportunities in related industries;***

In addition to the benefits that come from enhancing the long-term economic competitiveness, promoting innovation, improving productivity, and lowering prices of goods and services, the investment in transportation infrastructure also creates jobs directly in the short-term that will not be outsourced to foreign countries. These jobs are distributed among many different but related industries.

***d. Lowering living costs and improving family health and safety;***

A well-functioning transportation infrastructure network can help households save time and money in traveling, which can be used for other purposes such as consumption. Specifically, the impact of transportation infrastructure investment on the households is reflected on two aspects. First, it lowers the living cost of family. The transportation costs are major items in living costs for families. Second, it enhances health and safety of the family. Good transportation infrastructure can lower accident rates and improve travel safety.

### 3.2.4 Project Success

The success of construction projects is a fundamental issue for most governments, users and communities. Varajao et al. (2014), stated construction projects are commonly criticized for their delays, budget deviations, low productivity and low product quality. These problems are largely due to the fact that project management is a complex activity which often leads to a high degree of uncertainty. That is particularly true in the construction industry since uncontrollable aspects, like meteorological conditions for instance, may result in significant changes in the execution of the project regarding the original plan.

According to Bryde, Broquetas and Volm (2013), construction projects are becoming much more complex and difficult to manage. One complexity is the reciprocal interdependencies between different stakeholders, such as financing bodies, authorities, architects, engineers, lawyers, contractors, suppliers and trades. As a response to the increasing complexity of projects, information and communication technology [ICT] has been developing at a very fast pace.

According to Chang et al. (2013), across-the-board projects every so often fail to meet budget, time or quality goals in Australia and worldwide, producing output dissatisfaction, and cost and large schedule overruns. The occurrence of project failures may be due to the problems related with traditional project management theory. One criticism is that traditional project management focuses on well-organized delivery of outputs according to specifications on budget and on time (the so-called iron triangle) while ignoring the procedures of value generation. The main view that a project's only purpose is generating value for its funding organisation is

restrictive, as it overlooks other value formation aspects of projects such as value generated for other stakeholders and end users.

According to Chang et al. (2013), a fundamental modification in project management is required from “meeting fixed specifications to satisfying customers; from coming in on a fixed budget to managing cash flow and increasing shareholder value; and from just getting the project done to helping implement organisational strategy, “logic of value creation” and reconceptualised projects as “value creation processes”. Value refers to “the specific quality of a new job, task, product, or service as perceived by users in relation to their needs, such as the speed or quality of performance on a new task or the aesthetics or performance features of a new product or service. Value can be created at the society, organisational and individual levels.

According to Joslin and Muller (2015), the project management methodology (PMM), which is meant to enhance project effectiveness and increase chances of success. PMMs were developed to support project managers in achieving more predictable project success rates. Examples of internationally recognized PMMs include Prince 2, The System Development Life Cycle (SDLC), and Erickson's PROPS, whereas PMI Project Management Body of Knowledge (PMBoK) is a body of knowledge and not a methodology. When an organization's PMM is incomplete or limited (missing methodology elements), project efficiency, quality, and ultimately the probability of project success will be impacted. Among the most mentioned were limitations in methods, processes, tools, and techniques. A method is a set of procedures, to be used by humans, for selecting and applying a number of techniques and tools in order, efficiently to achieve the construction of efficient artefacts. PMMs vary in completeness and appropriateness from organization to organization. The extent that this objective is reached is unknown as projects still fail to reach their goals and a quantification of the impact of PMMs on project success is still missing source.

Project success means different thing to different people. The concept of project success is developed to set criteria and standards to aid project participants to complete projects with the most desirable results. The concept of success remains unclear among project members. Traditionally, success is sharp as the point to which goals of the project and expectations are met. A contrary definition suggested

construction project success as “having everything turn out as hoped (Alzehrani & Emsley, 2013).

Serrador and Pinto (2015) stated that reports have identified the current state of project success rates across organizations, noting that in spite of much higher visibility and importance placed on project performance, failure rates have remained high and relatively stable across over a decade of research. Varajao et al. (2014) stated success criteria for project management evaluation often refer to the traditional triangle elements (cost, time and scope).The three traditional dimensions of project efficiency: time, budget and scope, scope can have the largest role in determining project success. Thus, not only is scope an aspect of project efficiency, but it also has an impact on the customer and their satisfaction. There are other examples where the initial project objectives were met, but the client was quite unhappy with the results. Stakeholders are the best judges of overall success.

Varajao et al. (2014) wrote that in the construction sector, they have added health and safety conditions to these three traditional dimensions factors which are very important items to be taken into account and also discussed the relevance of human aspects in project success. Project success is the one that assesses both primary and secondary factors. Primary factors include meeting deadlines, budget limit and the level of expected quality. The secondary factors consist, for instance, on the agreement and acceptance of the client to provide his name as a reference, the competences of key personnel and the project complexity. Several critical aspects for success are highlighted, as for instance, detailed planning, cost control, support and communications, clear and well-defined project milestones, among others. The successful outcome of a project highly depends on the management of the relationship with the client during the project cycle.

According to Joslin and Muller (2015), project success is a multidimensional construct that includes both the short-term project management success efficiency and the longer-term achievement of desired results from the project, that is, effectiveness and impact.

Serrador and Pinto (2015), indicated that project success is the relationship of experience level of the project team. The literature has long recognized that project team members with greater experience and background in project-based work are typically more adept at completing their assignments, working together collaboratively, and performing tasks efficiently.

Serrador and Pinto (2015), further mentioned that traditional measurements of project success focused on producing a project of sufficient quality (functionality), while meeting the dual constraints of time and budget goals of a project: the so-called triple constraint. However, project success is often defined in a broader way. They also noted that much literature to that point considered “projects end when they are delivered to the customer. That is the point at which project management ends.

Alzehrani and Emsley (2013), defined project success as having “results much better than expected or normally observed in terms of cost schedule, quality, safety and participant satisfaction. Successful accomplishment of cost, time, and quality objectives were regarded as project management success. Project success deals with the final project objectives. Project management success is an internal measure of project efficiency while project success is concerned with a project's external effectiveness. Good project management can contribute towards project success but is unlikely to be able to prevent project failure. There is more to project success than just meeting time, cost and quality objectives and the project management community need to be educated regarding this.

According to Mir and Pinnington (2013), projects differ in size, uniqueness and complexity, thus the criteria for measuring success vary from project to project making it unlikely that a universal set of project success criteria will be agreed. Individuals and stakeholders often will interpret project success in different ways. Measuring project success recommends measuring: the success in the implementation process; the perceived value of the project; and client satisfaction with the result. A clear definition of project success does not exist and there is a need to develop meaningful and measurable constructs of project success.

According to Mir and Pinnington (2013), Traditional Project Management systems which exclusively pursue the success criteria of cost, time, quality and meeting technical requirements have become considered ineffective. The multiple benefits can be achieved from having a mature PM system in place and that PM is more effective than traditional functional management but limited quantifiable evidence is available on these benefits. These models are criticised for being limited to short-run gains and exclude intangible benefits. There is also some evidence that the value sought from a high performing PM system is associated with the success of projects.

Badu, Owusu-Manu, Edwards, Adesi and Lichtenstein (2013), discussed challenges of rural infrastructure development earlier studies have examined the rural construction environment and identified critical challenges confronting the sector. For example, identified delayed payments, price increases and labour shortages; lack of potable water, lack of educational facilities, lack of health care facilities and lack of quality control facilities, lack of suitable materials, finance (money), plant and equipment that could lead to project not delivered successfully.

### 3.3. Understanding the Capital Project at Company Capital Project (CCP)

The following literature review presented the study objective 1 which was to understand the capital project delays at CCP in Richards Bay, KwaZulu-Natal, South Africa.

#### 3.3.1 Capital Project Delays

According to Pai and Bharath (2013), most of the capital projects experience delay. Suspension means that the client stops work that is conducted by a service provider, while delay means work is slowing down without stopping it entirely. Delays result in work being disrupted, late project completion, abandonment or termination of service provider's term, increase in claims from third party, loss of efficiency and time related costs increase. It is significant to reduce the chances of delay taking place by managing and keeping track of project schedule and progress to identity delay events at an early stage. They further states that project delay is experienced to 70% of projects and concluded that out of 76, 45 projects were delayed.

According to Muhwezi, Acai and Otim (2014) in many developing countries, capital projects experience delays, like in Uganda. A huge change in the capacity and amount of Ugandan building sector over the past years needs a regular investigation of the delays. As there was a total delay time of 43 months to complete on Kampala road a Mapeera House, it was original planned for 13 months instead it took 56 months, (affecting the construction period); the church house building project which was scheduled to be completed in 18 months in May 2013 it was 25 months delayed and was not even close to be completed.

As stated by Owolabi, Amusan, Oloke, Olusanya, Tunji, Owolabi, Peter and Omuh (2014), in Nigeria delay is the big setback in construction industry and that the delay problem in construction industry is a worldwide problem. It was also observed that in Nigeria, construction industry's performance in terms of time was poor.

According to Ismail, Mabuza, Pillay and Xolo (2014), many projects experience delays and increase costs in South Africa, ranging from 5 to 48%. As stated by Ismail et al. (2014) the Gautrain Rapid Rail Link project like other projects have experienced problems, some led to over spending and delays. Eskom as well as Medupi's project was scheduled to start generate power at the first unit in January 2010 even in 2014 it was 54 months late.

Renewable Energy Independent Power Producer Procurement (REIPPP) programme was reported that many projects under the programme were successful in both rounds 1 and 2 and this was at the construction phase as stated by (Ismail et al, 2014). A renewable energy project was successfully commissioned and completed successfully before time.

### 3.4. Identifying which Factors Cause Capital Project Delays at CCP

The following literature review presented the study objective 2 which was to identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA.

#### 3.4.1 Different Factors Causes Capital Project Delays

Previously every construction project experience delays, the degree of these delays differs significantly from project to project. Other projects have time overrun of few

days and other projects have time overrun of years. In construction projects there are two types of delay factors, there are internal factors and external factors. It is very important to know the actual factor causing delay in order to plan, avoid and minimize the construction project delay as recorded by (Alaghbari, Kadir, Salim & Ernawati, 2007).

Aibinu and Jagboro (2002) also confirmed that even in the early 2000s the significant factors causing delays were late contract payment of work completed, lack of service provider management, non-availability of material at site, ever changing site conditions, poor contractors communication and coordination. He further classified the causes of delay via project participants and external factors. Client-responsibility delays, constant changing of scope and specifications, very slow decision making, budget constraints, poor procurement management processes, coordinating problems, planning problems, not enough site inspection conducted, lack of experience, contractor responsibility delays include budget constraints, manpower shortage, coordinating problems, planning problems, resources management problems, poor site check-up and equipment allocation problems. External causes of delay were identified as bad weather conditions, acts of God, and labour unrest.

Owolabi et al. (2014) and Memon, Rahman, Akram and Ali (2014), mentioned what could be factors that are causing construction project to delay. Internal factors as following: contractors responsibility: delays in delivery of resources on site, not enough resources on site, faulty and poor work, lack of experience and skills of contract workers, not enough site workers, budget constraints, lack of site management, lack of communication amongst contract workers, shortage and lack of proper tools on site, low workers' productivity, poor subcontractor's skills. Consultant's responsibility: no visibility of consultants on site, poor consultants' experiences in managements, supervisory and site workers, slow and delay in decision making and delay and slow in giving instructions. Owner's responsibility: poor work knowledge, slow decision making, poor coordination with service providers, constant changing of service providers, continuous changing project scope and specifications, budget constraints and delay in making payments to service providers. External factors: absence of resources on the market; absence of tools on the market; poor climate situations; poor site situations (location, ground,

etc.); unfavourable economic conditions (exchange rates, increase in prises, low employment etc.); legal and law changes; distribution delays; and external work due to public activities (public services).

Muhwezi, et al. (2014), stated that in construction projects, there are few significant factors that cause delays and over spending in developing countries like Ghana. Poor technical performance, so such work rely on mainly tools, plant and resources and work in projects may mainly be delayed due to poor procurement processes. An emphasis in proper activity coordination, use of advanced scheduling systems and regularly schedule update is very important to avoid delays in construction projects. Human capital, financial capital and material allocation is very important by skilled and experienced management to avoid causes of delays.

Ojoko, Tanko, Jibrin, Ojoko and Enegbuma (2016), stated that projects delays are caused by client interference, poor service provider experience, poor payment and financing, low labour productivity, delayed decision making, inadequate planning, and subcontractors are the mostly identified significant factors.

Hoai, Dai Lee and Yong Lee (2008), argued that capital project delays are caused by client-related group that includes financial constraints of the client, late payments of work done. Service provider's -related group includes poor management of site, bad financial position of service providers and poor site supervision. In Vietnam factors causing delays in large construction projects were unfitting building methods, incorrect estimates, unskilled subcontractor and faults during construction. Consultants-related group included poor project management support, bad contract administration, slow assessment of work completed and errors in design. Project-related group involved design alterations, scope changes and slow communication and information flow. Resources and labour group comprises of lack of resources and lack of skilled workforces. External factors-related group consists of unpredicted site environments, price variations, bad climate and problems from government.

Shehu, Endut, Akintoye and Holt (2014), stated that delays in projects are caused by design alterations, poor labour production, poor planning, owners change orders,

weather conditions, different site conditions, delay in material deliveries, economic conditions, changes in government regulations, financial difficulties.

## 3.5. Investigating Effects of Capital Projects Delays on Budget and Quality at CCP

The following literature review presented the study objective 3 which was to investigate effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA. This section will be subdivided into two sections to clearly investigate the effects of capital projects delays, first section will focus on effects of capital projects delays on budget and second section will focus on effects of capital projects delays on quality.

### 3.5.1 Effects of Capital Project Delays on Budget

Even more than a decade ago projects experienced delays and overruns as stated by Odeh and Battaineh (2002), that delays are costly and mostly lead to quarrels and claims, damage the feasibility for project clients, and delay the expansion and growth of the construction industry. Also Aibinu and Jagboro (2002), stated that related delay problems can lead to quarrels, settlement, total contract termination or abandonment and prolonged lawsuit by the parties. In few cases the contract parties from claims normally are in agreement about the extension of time and additional cost connected to the delay. It is clear that claims and expenses arise as a result of delay has significant impact on budget of the construction project.

Alaghbari et al. (2007), stated that delay is mostly recognised as the greatest common, expensive, complex and risky problem faced in building projects. Because of the foremost significance of time for the client (in performance) and the service provider (in money), it is the basis of many disagreements and claims resulting into lawsuits. He continues argues that delay is a severe problem in the building industry. It is expensive for both the client and the service provider. Clients miss out on possible profits from the use of infrastructure from the project and through increase costs for service provider's management and supervision. Service provider costs increase due to tied up investment and increase expenditure costs. Hence, identifying the factors causing delays in capital projects is important.

However Hoai et al. (2008) and Shehu et al. (2014), argued that capital project cost overruns are caused by resources cost price increase, poor quality management and increase of labour cost to environment controls. Furthermore Shehu et al. (2014), continued to argue that in India, reasons of over spending was caused by clash among project members, lack of knowledge, lack of cooperation; aggressive socioeconomic and climatic environments, slow decision making, aggressive rivalry at tender stage, and short preparation time for bid and not project delay.

**Table 3.1: Project Cost Overruns in South Africa and their Financing Method Source: Ismail et al. (2014)**

| Project | Procurement model used | Initial Budget (R bil) | Estimated or final Cost (R bil) | % over budget |
|---|---|---|---|---|
| Gautrain | PPP | 25.1 | 30.5 | 21 |
| Kusile | Corporate financing and government guarantees | 90 | 121 | 34 |
| Medupi | Corporate financing and government guarantees | 33.6 | 105 | 213 |
| Gauteng Toll Roads | Corporate financing and government guarantees | 6.3 | 90 | 1329 |
| NMPP | Corporate financing and government contribution | 11.1 | 23.4 | 111 |
| OR Tambo | Govt | 5.2 | 8.5 | 64 |
| De Hoop Dam | Govt | 7.9 | 20 | 153 |
| FIFA Stadiums | Government/municipalities | 8.1 | 18.4 | 126 |
| N4 toll roads | PPP | 2 | 3 | 50 |
| Standard Bank Building in Rosebank | Private sector financed/self | 1.1 | 2 | 82 |

Table 3.1 gives summaries of project cost overruns and the method used to finance some of the major infrastructure projects in South Africa. These include an increase in material costs, inaccurate material estimates, shortage of skilled labour, client late contract award and project complexity.

CCP increases in project cost are normally related to project delays and increase claims. As clearly explained by Ismail et al. (2014), that in NMPP project Company requested additional money from the Government to help the interest throughout the building of the NMPP and was assigned R4.5bn which was from a Grant Funding Arrangement. The project was planned to be completed on 2010, completion date was moved to 2013. The Projected Overall Cost was increased from R11bn to

R23.4bn. Ismail et al. (2014), further explained that this difference in costs was caused by improper projections of contract costs, poor expectations management of shareholder and bad procurement processes.

### 3.5.2 Effects of Capital Project Delays on Quality

According Zhang, Wu, Shen and Skitmore (2014), the construction industry provides the basic living conditions for the sustainability and development of human life on the Earth. In order to cope with an ever-increasing population, pressure on land, and growing economic activity, construction projects are in increasing demand and activity is booming in many countries, particularly in developing countries such as China.

At the same time, project organizations have to be flexible to changes and challenges in order to be able to manage the uniqueness, uncertainty and complexity of projects. Thus, control and flexibility are both needed if a project is to be managed effectively. As control and flexibility are two contradictory approaches, the achievement of an optimal balance between them is one of the greatest challenges for a project organization. Modern project organizations have to manage the coexistence of mechanistic (controlling) and organic (flexible) approaches in a way that facilitates the achievement of project objectives.

According to Osipova and Eriksson (2013) a dynamic approach implies that the identification and assessment of project risk, along with the response to it, are performed proactively and jointly throughout the project. The majority of project management tools are control-oriented, emphasizing hierarchical structures, centralized decision-making and the division of work and responsibilities. Aliverdi, Naeni and Salehipour (2013) said the complexity of managing and executing projects, the project management knowledge, standards and methods become more and more important.

Chen and Luo (2014) stated the quality of a product is shown in its capability to satisfy specified or implied needs and internal characteristics of a finished product in addition to its external design. Therefore, construction product quality can be defined as: the degree to which the specified or implied needs and the internal

characteristics are guaranteed during the process of construction. There is less focus during the construction process given to quality control; it is normally focused on at the final component. These problems largely raise the difficulties of construction management and contribute to quality defects. Therefore, hidden quality dangers are buried deep in the system which can create the potential for future construction disasters.

Chen and Luo (2014) mentioned that there were 882 cases of construction quality and safety incidents in China in 2006. During 2007–2008, at least 37 fatal accidents were due to quality failures on projects. During the first half of 2009 there were 257 cases of construction quality and safety production accidents in which 306 people died. According to the statistics, of the 147 engineering accidents collected by researchers, about 1/3 of low-rise building collapses were caused by improper construction methods or materials. Most building quality accidents during the construction phase occur in multi-story projects. 29%of the construction project accidents in Germany are directly due to construction quality problem.

Chen and Luo (2014), quoted that quality control covers inspection and testing, non-conformance reporting, and corrective action taken during the construction phase. The quality control process begins with making quality management plans based on the design drawings and specifications, which establish the quality of the material and equipment, the acceptance criteria for the work in place, and the inspection and testing to be performed. Then, through coordination between material engineers and project engineers, all the technical and quality data in the procurement requisition for material and equipment have been transmitted for procurement.

Ubani, Amade, Okorocha and Agwu (2015), stated that the incidence of building failures associated with poor construction supervision has become a major issue of concern in Nigeria's major cities. In April 24, 2013; an eight storey factory building which collapsed in Dhaka, Bangladesh, killing over a thousand people was also blamed on poor construction supervision/ systemic corruption in the building industry. Building failures related to poor construction supervision is a global occurrence. In Nigeria, it is generally believed that poor construction supervision, corruption, weak building legislation, poor structural design, faulty construction, use

of low quality materials, hasty construction, shallow foundation and poor workmanship are the common causes of most building failures. A number of cases occur during and after the construction phase of the project.

Ubani et al. (2015), reported that 50% of poor construction supervision related building failures in Nigeria is attributed to design faults, 40% to construction fault and 10% to product failures. About 37% of these failures are believed to be caused by carelessness and greed on the part of construction professionals and 22% are traceable to design faults. The cause of poor construction supervision related building failures is almost always unique to the particular building in question.

Rowlinson, Jia, Li and Ju (2014), stated that consequences of heat stress lead to managerial risk related to productivity, cost and low worker morale, and legal risk for the organization from subsequent accidents. Sites on civil engineering work such as road construction are more vulnerable to radiant heat as determined by the open site characteristics. Building sites, on the other hand, naturally have more shaded areas on site but suffer more on heat stress generated by high humidity and lack of ventilation, depends on the specific location workers are working on. Indoor work such as HAVC installation at the stage after glassing is similar to works in a confined space. The large size of civil engineering site aggravates travel difficulties in hot weather in developing countries which influence supervision.

According to Chang et al. (2013), a famous Australian project example of a value-creation process is the Sydney Opera house. It is considered both a triumph and a disaster in mega project management. Assessing the success of this project using the iron triangle measures led to the conclusion that this project was a major failure. The original cost estimate was $7 million in 1957; the project was completed ten years late in 1973 and over-budget by more than fourteen times, costing $102 million. The Opera House was labelled a ‘white elephant’, an ‘aesthetic and acoustic disaster’ by the media and the general public. Over time, the creation of this masterpiece was recognised as an achievement of engineering and project collaboration and highlighted the need for changes in planning and contracts. Yet Australia as a nation has, done and will always enjoy the value generated by this iconic mega project. This demonstrates the need to consider project success as an

on-going and long term (emergent) process of value creation, as compared to the traditional output measures. This shows that capital project delays do create masterpieces and good quality buildings or projects.

Ismail et al. (2014) also highlighted that because of the Medupi Power Station, Eskom suffered credit rating downgrade by Moody's to Baa3. The reasons provided by Moody's are attributed to 'Eskom's standalone credit quality to uncertainty over the evolution of Eskom's investment programme and financial profile over the medium term'. Project delays can also have a negative impact on quality as decided and rated by Moody's at Eskom Medupi Power Station

According to Sadaba, Ezcurdia, Lazcano and Villanueva (2014), for enterprises to effectively manage knowledge, it is crucial to record the various actions and take into account the project's experiences, in order to provide the basis for future planning of possible projects. The capitalisation and transfer of knowledge gained through projects is one of the most important tasks, as it helps the company to be successful in future endeavours. However, it is a task that is often overlooked because the project is considered finished and resources are immediately devoted to other operations. It usually happens at the end of the project, at the last indicators' monitoring, acting where appropriate, through the integration of action plans in the chosen information collection system. Because learning actually takes place throughout the life of the project (definition, planning, execution and closure) the methodology proposes doing it during its course, and summarising it at the closing meeting to ensure no knowledge has been forgotten.

## 3.6. Debate on the Topic

### 3.6.1 Objective 1: To Understand the Capital Projects Delays at CCP

Through the literature review it was clear that capital projects do experience delays and these delays are common and are a worldwide phenomenon. Time factor is so important in conducting activities and avoiding delays. According to Ismail et al. (2014), company's new multi-product pipeline project completion date was scheduled for 2010 it was moved to 2013 and is still not complete. CCP is operating in South Africa a developing country; there are different delays that will be experiences from unstable environment, poor economic conditions, labour unrest

and poor resources and technology. It has been identifies that capital project can experience no delays from the REIPPP programme, but not much is documented on projects that experience no delays to learn from.

### 3.6.2 Objective 2: To Identify which Factors Cause Capital Projects Delays at CCP

Through the literature review it was identified that common causes of capital project delays are slow decision making by client, design changes resulting in scope creep because of improper planning and delay in financing of and payment for completed works. CCP is a state owned entity and decisions are taken at the South African Parliament that will be a cause for CCP slow decision making from the clients that caused the projects to delay within CCP. Financial problem will arise as there are many signatures that need to confirm, support and approve payment at CCP for the contractor to get paid which results in contractors not continuing with activities until paid for the last work done this result in delays on capital projects. The findings of Company's NMPP project exposed the systematic failing that caused the project delay which was poor engineering, poor construction management, and poor procurement and there were too many service providers as stated by (Ismail et al., 2014).

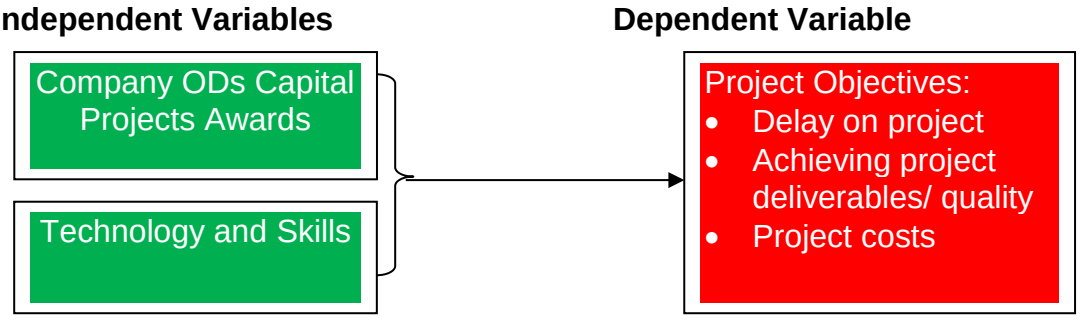
### 3.6.3 Objective 3: To Investigate Effects of Capital Projects Delays on Budget and Quality at CCP

In the above literature it was identified that delays on project are mostly expensive and frequently result in quarrels and claims. It was also identified that not only project delays cause overrun in project cost, inflation causes cost increase and labour cost increases and that are not directly connected with project delays.

Poor construction supervision, corruption, weak building legislation, poor structural design, faulty construction, use of low quality materials, hasty construction, shallow foundation and poor workmanship were the common causes of most building failures. Capital projects delays have shown to result in good quality of capital projects.

### 3.7. Conceptual Framework and Measurement of Variables

Definition by Saunders, Lewis and Thornhill (2016:233) stated that a variable is an individual element or attribute upon which data have been collected. Cooper and Schindler (2003) explained variable as a synonym for construct or the property being studied. This gives different types of variables namely independent and dependant variables. Independent variable being the variable that presumed cause, stimulus, predicted from, antecedent, manipulated and is a predictor. Dependent variable as being the variable that presumed effect, response, predicted to, consequences, measure outcome and is criterion.




**Conceptual framework of capital projects award, technology and skills (independent variable) and delays on project (dependent variable) (Source: compiled by the author)**

Company Operating Divisions (CODs) can award capital projects to CCP or choice not to award CCP and allocate project to service providers to carry the projects, decision of CODs has an effect on CCP operations. Technology and skills is already available at Company and is to be utilized in delivering project objective successfully. Delays on project are dependent on the owners decision on project awarded being deferred by the owner, slow decision making by the owner can cause delays to the project. Thus affecting the cost of carrying the project to increase to cover for the accelerated activities or add to contingency.

### 3.8. Conclusion

Gaps identified and that needs further research are that there is no clear information available on the effect of capital project delays on project quality. It is claimed that time and budgets are normally the worries of construction management. There are

different factors that cause delay in different types of capital projects, sizes, scope and location. Worldwide projects commonly experience delay and budget increase.

Almost every business is confronted with making a decision on capital budget. There are few recommends few guidelines to turn investment decision conditions from decision maker: to put attention away from profits but to incremental cash flows, to take responsibly for time (time is money), and be answerable for risk, not every project offers the same level or risk to avoid project failures. Company's goal is to improve the capacity inside the ports, and to improve and grow facilities to meet the increasing demands of the economy, at the same time contribute to offering reasonable prices of doing business in South Africa.

To reduce delays and increased costs, project owner should ensure the availability of sufficient funds, allocation of adequate time and budget at the design phase, and choosing of knowledgeable consultants and reliable service providers to carry out the work.

Money put aside for project costs incorporated in the estimate for pre-contract for the reason of safeguarding that the budget put aside is accurate and adequate to cover the risk of during construction the unexpected cost increases may arise. Research methodology and research process that was used in conduction the study is discussed on the next chapter.

# 4. CHAPTER FOUR: METHODOLOGY

## 4.1 Introduction

In order to empirically study the effects of construction delay, effect caused by delay on cost and quality were selected for more analysis. For the purpose of the investigation data on cost was obtained in respect of Company Capital Projects (CCP) in Richards Bay, Kwazulu-Natal (UKZN), South Africa (SA). The project management team was selected in the questionnaire survey. This section highlights methodology that was followed to address the aim of the study and research objective formulated in chapter one. It further discussed in details how the study was conducted in terms on the research design, location and population of the study. It also indicates the sample and sampling technique that was adopted for this study and it detailed how the construction of the research instrument was done. Towards the end it revealed how the data was collected and analysed.

### 4.1.1 Aim of the Study

The aim of this study was to understand the CCP's capital project delays, identify the factors causing the delays, and investigate the effects of project delays on project budget and quality at CCP.

### 4.1.2 Research Objectives

The following objectives were formed from the aim of the study:

- To understand the capital project delays at CCP in Richards Bay, KZN, SA.
- To identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA.
- To investigate effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA.

## 4.2 Research Methodology

Research process has three dimensions ontology, epistemology and methodology. According to Bryman and Bell (2015), research paradigm is an all-encompassing process of interrelated practice and thinking that defines the nature of enquiry. Ontology assumes multiple realities, and that these realities can be explored and constructed through human interactions. Ontology takes on a stand that realities

exist due to varying human experience including people knowledge, views and experiences. Epistemology assumes events are mental process of interpretation that is influenced by interactions with social context. Inquirer and the inquiry-into are interlocked in an interactive process. Methodology means the process of data collection by text massages, interviews and reflection sessions. Garg and Kothari (2014:7), defined research methodology as a way to systematically resolve the research problem and may be understood as a science of studying how research is done scientifically. Bryman and Bell (2015) described a paradigm as the research tradition or world view, i.e., a way of breaking down the complexity of the real world.

### 4.3 Research Design

Research design is a systematic procedure of gathering, analysing and interpreting data in order to increase an understanding of a phenomenon in which a person is interested Saunders, Lewis and Thornhill, (2016:145).

Saunders et al. (2016:166), stated that quantitative research is generally associated with positivism, especially when used with predetermined and high structured data collection techniques. Quantitative research is generally connected with a deductive approach, where the attention is on using data to test theory. However, it may also include an inductive approach, where data are used to develop theory. McCusker and Gunayelin (2014), stated that quantitative method includes information collected from the former is expressed by participants in a numerical form.

Saunders et al. (2016:166) further agreed that quantitative research examines relationship between variables, which are measured numerically and analysed using a range of statistical and graphical techniques. It is important to ensure that questions are expressed clearly so they are understood in the same way by each participant. Quantitative research design may use a single data collection technique, such as a questionnaires or structured interviews or, possible, structured observation.

According to Saunders et al. (2016:166), a qualitative research is often associated with an interpretive philosophy. It is interpreted meaning expressed about the phenomenon being studied. Many qualitative research commence with an inductive

approach to theory development, where a naturalistic and emergent research design is used to build theory or to develop a richer theoretical perspective than already exists in the literature.

Saunders et al. (2016:168), further stated that qualitative research studies respondents' meanings and the relationship between them using a variety data collection techniques and analytical procedures, to develop a conceptual framework and theoretical contribution. Data collection is non-standardised to that questions and procedures may alter and emerge during a research process that is both naturalistic and interactive. Qualitative research design may use a single data collection technique, such as semi-structured interviews, and corresponding qualitative analytical procedure.

Rose, Spinks and Canhoto (2015:87) reported that the research that uses only one family of methods (e.g. only quantitative or only qualitative) is described as mono method. Saunders et al. (2016:169) stated that mixed method research is the branch of multiple methods research that combined the use of quantitative and qualitative data collection techniques and analytical procedures.
Rose et al. (2015:87) listed few mixed method benefits, namely:

a. Triangulation, to corroborate the findings of one method with those of the other to give more confidence in the results.
b. Complementarity, the findings of one type of research can be used to clarify, elaborate upon or illustrate the findings of the other method.
c. Development, the output of one method is used to support the development of the other method.
d. Initiation, the questions or results of different methods are used to offer different perspectives or to uncover contradictions and paradoxes.
e. Expansion, the scope and range of the study can be increased by adopting different methods as appropriate for different research questions within the study.

However, for the purpose of this study the quantitative design was employed for testing theories and examining the relationship among variables. Quantitative was used to evaluate the causes and effects of project delays on project budget and

quality. Among the quantitative methods were techniques for aggregating individual study null hypothesis tests to generate a probability applicable across a series of experiments.

### 4.4 Location of the Study

The study was conducted at CCP in Richards Bay under KZN in SA because CCP was the specialised entity and expert in conducting capital projects and has the project management team within CCP.

### 4.5 Target population of the Study

Target population is a complete set of cases or group members that is the actual focus of the research inquiry, and from which a sample may be drawn as written by (Saunders et al., 2016:45).

Project Management Team within CCP in Richards Bay was the population of this study, there were 55 staff in CCP Richards Bay Office which included Stream 1 Project Management and Support staff. Population sets limits on the study units. It refers to people in the world who hold specific characteristics.

### 4.6 Sampling Techniques

Sampling is a procedure of choosing a “sample” from a population that you want for a reason of making observations and inferences about that population. Garg and Kothari (2014:13) stated that samples can be either probability samples or non-probability samples. In probability sampling, every component in the population has an equal chance of being chosen in the sample, and this chance can be precisely determined. In non probability sampling, some components of the population have zero chance of selection or where the probability of selection cannot be accurately determined. Probability sampling is further subdivided into random, stratified, cluster, and systematic sampling designs. Non probability samples are those based on convenience, judgement and quota sampling techniques. Rose et al. (2015:194) further mention purposive and snowballing non-probability sampling techniques. A brief mention of the sample designs by Rose et al. (2015:192) follows: Probability Sampling techniques

i. Simple random sampling – the required number of elements is simply drawn at random from the population so that there is a known and equal chance of selecting each one.
ii. Systematic random sampling – is a variation of simple random sampling. It starts by placing all the elements of the population in a list, picking a start point at random and then moving down the list, selecting every *n*th individual as you go. The size of *n* is known as the sampling interval.
iii. Stratified random sampling – in which the population is divided (Stratified) into separate sub-groups and sample sizes are calculated for each one.
iv. Cluster sampling- is often used in very large population and where it may be difficult to accurately identify a sampling frame. This may happen due to the geographic spread of the target population.

A brief mention of the sample designs by Rose et al. (2015:19) follows: Non probability sampling techniques

i) Convenience sample – is one in which the elements from the population are accessed through some point of contact that is convenient and practical to the researcher. This is usually done through personal contacts such as neighbours.
ii) Quota sampling – is a non- probability variant of stratified sampling in that the researcher sets out sample quotas for inclusion of specific sub-groups within population.
iii) Purposive or theoretical sampling – it is widely used in qualitative research method in which the researcher selects cases for the sample based on their theoretical relevance to the aims of the research.
iv) Snowballing sampling – the approach to sample is useful to research when complete sampling frame is difficult to identify or access.
v) Self-selection – If no prior sampling frame or access to potential participants exists, the research can use techniques to encourage relevant people too self-select for inclusion in a study.

According to Acharya, Prakash, Saxenaand and Nigam (2013) in stratified random sampling: data is divided into several sub-groups (strata) sharing shared characteristics like income, sex, education, age, race, and ethnicity. A random sample is taken from each strata. The benefits are it guarantees representation of all

groups in the population needed. The characteristics of each stratum can be estimated and comparisons can be made. It also reduces variability from systematic sampling.

Probability stratified sampling was used in sampling for this research. As the research sampling chosen was per levels according to the criterion that was related to the variables under study .i.e. Cost engineers gave the researcher the costs related to the projects and project planners gave information related to the schedules of the projects.

### 4.6.1 Sample Size

The sample size is an important feature of any study or investigation in which the aim is to make inferences about the population from a sample. In general, the sample size used in a study is determined based on the cost of data collection, and based on sufficient statistical power. Sample size is important principally due to its effect on statistical power. Statistical power is the chance that a statistical test will indicate a significant difference when there truly is one. Sampling is related with the selection of a subset of individuals from within a population to estimate the characteristics of whole population. The two main advantages of sampling are the faster data collection and lower cost (Singh & Masuku, 2014).

Project Management Team within Company Capital Projects in Richards Bay that works direct to project deliverables excluding support staff amount to 22 staff.
Please see below:

| Project management Staff | Number to sample from |
|---|---|
| Project Director | 1 |
| Principal Project Manager | 1 |
| Project Managers | 3 |
| Project Planners | 3 |
| Project Quantity Surveyors | 5 |
| Project Cost Engineers | 4 |
| Project Contract Administrators | 2 |
| Project Accountants | 2 |
| Project Quality Officer | 1 |

**Sample from CCP Richards Bay (Source: compiled by the author)**

**The amount of 22 from the above staff was the sample size from CCP Richards Bay staff of 55 total population.**

## 4.7 Research Process

Research process consists of series of actions or steps necessary to effectively carry out research.

## 4.8 The Research Instrument of the Study

According to Rose et al. (2015:211), a questionnaire is a particular type of data collection instrument that uses a standardised, structured set of questions to measure variables, such as respondent attitudes, that are of interest to the researcher. A questionnaire has the following benefits; it is low in cost, provides speed data collection, is flexible, promotes anonymity and reduces interviewer's effects.

A questionnaire was formulated to address the study objectives namely: objective 1 to understand the capital project delays at CCP in Richards Bay, KZN, SA; objective 2 to identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA and objective 3 to investigate effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA, see appendix 4. The amount of 22 questionnaires were issued to collect nominal data which uses binary choice to distinguish different categories such as gender (i.e. male/female) and ordinal data which measured non numerical concepts like satisfaction, happiness, discomfort, etc. Ordinal data that was collected from the participants was always, often, occasionally, seldom or never. Participants had multiple choice questions but needed to select one answer, numeric rating Likert-type scale questions were used and closed – ended questions were issued to the sample population. Data collected was analysed to determine the factors causing and effects of capital project delay. Questionnaires were e-mailed to the sampling size, the researcher printed questionnaires as required by the participants.

## 4.9 Pre-Testing

A pre-study was conducted on 24 April 2017 with other project assistants to ensure that the questionnaire was understandable and no bias and ambiguity in terms of the questions. To assess the relevance, eliminate misunderstanding and effectiveness of the questionnaires, a pilot study was conducted before issuing the questionnaires. To avoid wording error while phrasing the questions, the researcher needs to

imagine how the respondents will understand and answer the question and should be cognisant of the way their answers will be analysed (Hwang, Zhao & Toh, 2013). Pilot study helped the researcher to check for typographical errors and to learn from peers, improve the questions, improve on the efficiency and effectiveness of the questionnaire.

### 4.10 Validity and Reliability

Reliability can be measured in multiple ways depending on the type of instrument. The most common forms include: (a) test-retest (comparing item responses from same participants at different time points), (b) internal consistency (comparing item responses against other item responses), and (c) scorer reliability (comparing one reviewer with another reviewer in case a scorer is completing the instrument). If reliable, researchers can assume the instrument's scores are dependable, consistent, and more likely to be generalized to other samples, times, reviewers, and samples of behaviours. If inconsistent, then the error may be because of problems with the items or reviewers and will need to be examined and addressed. These problems must be addressed before evaluating the validity of score interpretation; validity cannot exist without reliability. Hagan (2014), further mentioned that measures of reliability evaluate the extent of individual differences between scores across groups of respondents.

Hagan (2014), stated that the process of establishing validity involves collecting various forms of evidence to support that the score interpretations are accurate. For the tool to be valid it should be appropriate for the purpose of which it will be used for. The instrument used was assessed on the validity verification of accuracy of an instrument reliability consistency over a period of time. Types of measures used were the survey research numerical measures. Satisfying validity was recognised by the degree to which a measure reflects the content of the domain under study.

A Cronbach's alpha coefficient is widely used as a reliable instrument to indicate how well various items are positively correlated to one another (Sekaran & Bougie, 2013). The Cronbach's alpha is based on the inter-item correlations; it is recommended that if the items in the questionnaires are strongly correlated with each other, their internal consistency is high and the alpha coefficient will be close to one. On the

other hand, if the items are poorly formulated and do not correlate strongly, the alpha coefficient will be close to zero. Sekaran and Bougie (2013) argued that a Cronbach's alpha coefficient value of 0.90 is considered to have high reliability. On other hand, a Cronbach's alpha coefficient value of 0.80 is regarded as having moderate reliability, while a Cronbach's alpha coefficient value of 0.70 is considered to have low reliability.

### 4.11 Data Collection Techniques

A written questionnaire (also referred to as self-administered questionnaire) is a data collection tool in which written questions are presented that are to be answered by the respondents in written form. Questionnaire is less expensive, permits anonymity and may result in more honest responses and it does not require research assistants.

The researcher e-mailed the questionnaires together with the informed consent forms to explain the undertaken research and clarify few rules and requested for the consent form to be signed. This was conducted once the researcher received an ethical approval. Questionnaires and informed consent forms were issued to 22 participants by email and 20 Questionnaires were completed and returned, response rate of 90.9%, two participants refused to participate, their decision was respected and no penalties were posed against them. Questionnaires were issued on the 19$^{th}$ of October 2017 and the last Questionnaire was received on 07 November 2017. It took the researcher three weeks to receive all completed questionnaires.

### 4.12 Data Analysis

Out of 22 questionnaires that were administered to participants, only 20 returned which is 90.9% return rate. Once questionnaires were returned from the participants, questionnaires were checked if they were fully and correctly completed. Data coding took place to enter data received for quantitative data analyses according to the research questions answered. The data was then interpreted using SPSS (Statistical Package for the Social Science), version 24.0. It a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. SPSS is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. SPSS was used to analyse data collected from

participants, SPSS presented data collected in bar charts and frequency tables that were simple to understand and discuss.

### 4.13 Ethical Consideration

As the researcher developed data collection techniques, the researcher needed to consider whether the research procedures are likely to cause any physical or emotional harm. The golden rule, do to others as on to you. The researcher ensured that participation was voluntary and no information was withheld from the participants. Participants' anonymously and confidentiality was protected and respected. No one was forced to participate or penalised from withdrawing from the study.

Part of the research proposals approval involve being considered and approved by the university research ethic committee (Saunders et al., 2016:189). Thus, ethical clearance was one of the requirements, which was issued by the University of KwaZulu-Natal Research Ethics Policy compliance requirements. Obtaining informed consent before the study or the interview stared and ensuring the confidentiality of the data obtained.

### 4.14 Conclusion

The research methodology that was used in the study assisted the researcher to identify correct research participants and experts. It provided a guide on what questions to ask the participants to gather relevant information to reach the desired outcome of the study. It assisted the researcher in gathering, analyzing and interpreting the data collected. The chapter gave insight onto the analytical framework that was utilised in the study to investigate the factors causing delays in capital project and the effects of capital project delay on budget and quality. This resulted in recommendations to avoid or reduce capital delays to enhance project performance. The following chapter will elaborate on the study results and discussion, data interpretation and presentation in line with the objectives of the study.

# 5. CHAPTER FIVE: RESULTS AND DISCUSSION

## 5.1 Introduction

The purpose of this chapter was to present the research results and provide a discussion of the research findings of the study. During the data collection phase quantitative approach to research was employed. The main aim of the study was to understand the common and significant factors that cause capital project delays, the cost and quality implications on capital project. The literature is analysed to draw comparisons between the study and the existing literature.

## 5.2 Response Rate

22 questionnaires were stratified randomly distributed to the Project Management team within Company Capital Projects (CCP) in Richards Bay , Kwazulu Natal (KZN), South Africa (SA) that works direct to project deliverables, namely, Project Director, Principal Project Manager, Project Managers, Project Planners, Project Quantity Surveyors, Project Cost Engineers, Project Contract Administrators, Project Accountant and Project Quality Officer excluding support staff.

The response rate is the number of people who completed the questionnaire divided by the total sample group. The findings of the study were based on 20 questionnaires that were completed, response rate of 90.9%.Two participants refused to participate and did not complete the questionnaires issued, their decision was respected and no penalties were posed against them.

## 5.3 Demographic information of the respondents

Demographic information was provided by the respondents to be used as classification of gender, age, years in the organisation, years in the industry and highest qualifications.

**Table 5.1: Frequency Table showing gender of respondents (N=20) (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Female | 6 | 30.0 | 30.0 | 30.0 |
| Male | 14 | 70.0 | 70.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

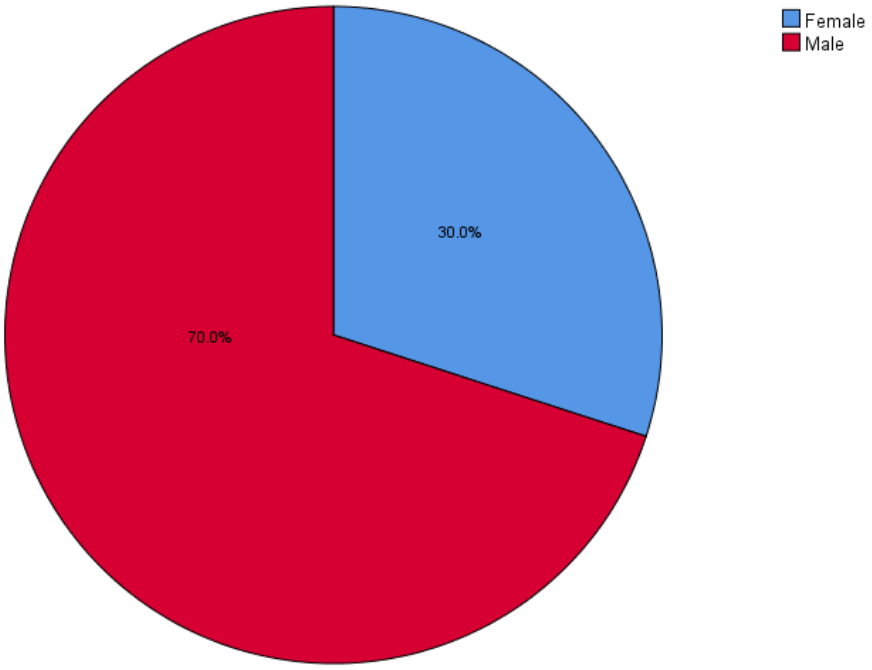



**Figure 5.1: Pie Chart showing gender of respondents (Source: compiled by the author)**

The above Frequency Table and Pie Chart shows gender of respondents. Out of the 20 respondents who participated in the study, 6 (30%) were females and 14 (70%) were males. Therefore, the majority of participants were males.

**Table 5.2: Frequency Table showing age of respondents (N=20) (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| > 46 years | 4 | 20.0 | 20.0 | 20.0 |
| 41 - 46 years | 4 | 20.0 | 20.0 | 40.0 |
| 36 - 40 years | 3 | 15.0 | 15.0 | 55.0 |
| 30 - 35 years | 5 | 25.0 | 25.0 | 80.0 |
| 20 - 29 years | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |
| | | | | |

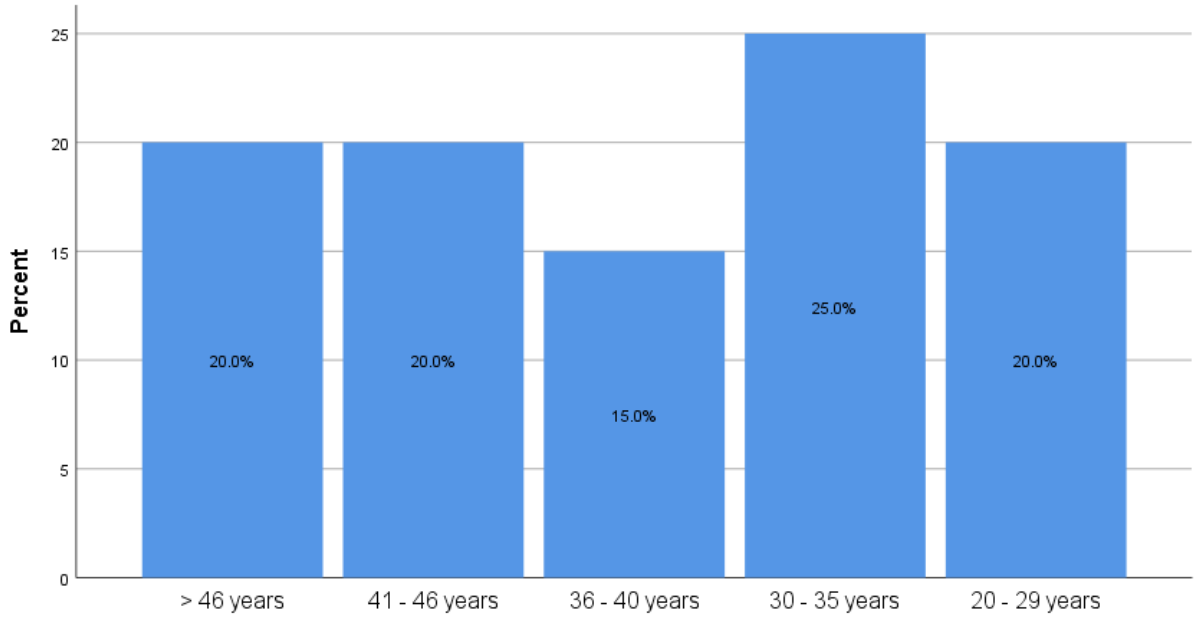



**Figure 5.2: Bar Chart showing age of respondents(Source: compiled by the author)**

Table 5.2 and Figure 5.2 above shows that 4 (20%) respondents who participated in the study were 46 years and above, 4 (20%) were 41 – 46 years, 3 (15%) were 36 – 40 years, 5 (25%) were 30 – 35 years and 4 (20%) were 20 – 29 years old. Therefore, the majority of the participants were ranging from 30 - 35 years of age followed by range of 46 years, 41-46 years and 20-29 years with the same percentage and the least been 20-29 years old.

**Table 5.3: Frequency Table showing respondents' years in the organisation (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ≥ 25 | 2 | 10.0 | 10.0 | 10.0 |
| ≥ 15 | 5 | 25.0 | 25.0 | 35.0 |
| ≥ 5 | 5 | 25.0 | 25.0 | 60.0 |
| < 5 | 8 | 40.0 | 40.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

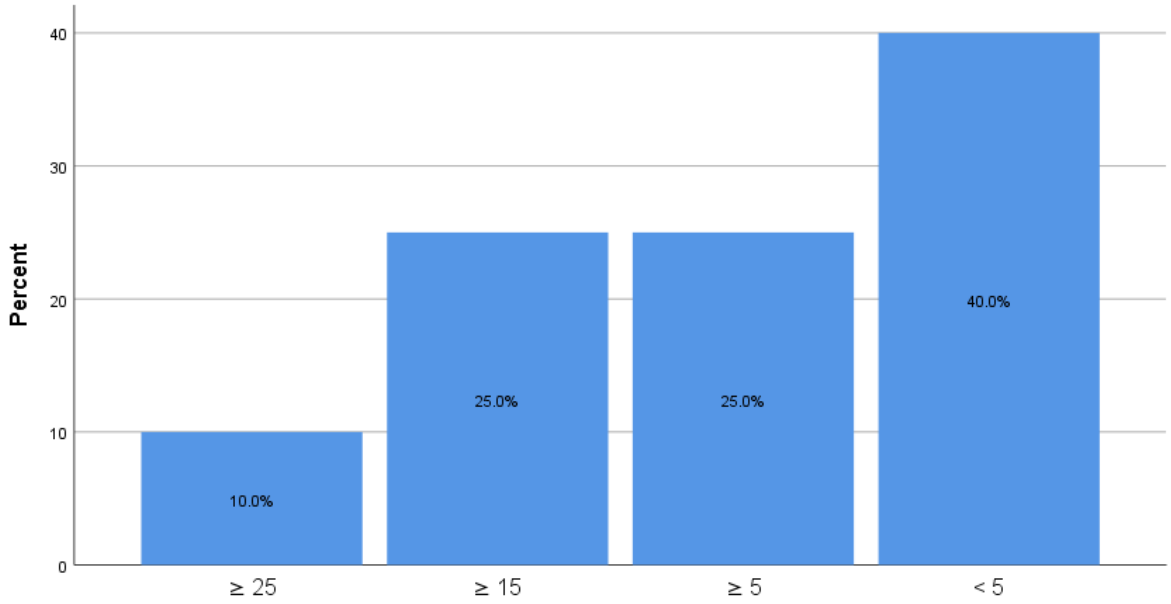



**Figure 5.3: Bar Chart showing respondents' years in the organization (Source: compiled by the author)**

Frequency Table 5.3 and Figure 5.3 above shows that 2 (10%) respondents who participated in the study had 25 years and above, 5 (25%) had 15 years and above, 5 (25%) had 5 years and above and 8 (40%) had 5 years and less in the organisation. Therefore, the majority of participants had 5 years and less in the organisation, with very few participants had 25 years and more in the organisation.

**Table 5.4: Frequency Table showing respondents' years of experience in Project Environment. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ≥ 35 | 1 | 5.0 | 5.0 | 5.0 |
| ≥ 25 | 2 | 10.0 | 10.0 | 15.0 |
| ≥ 15 | 9 | 45.0 | 45.0 | 60.0 |
| ≥ 5 | 4 | 20.0 | 20.0 | 80.0 |
| < 5 | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

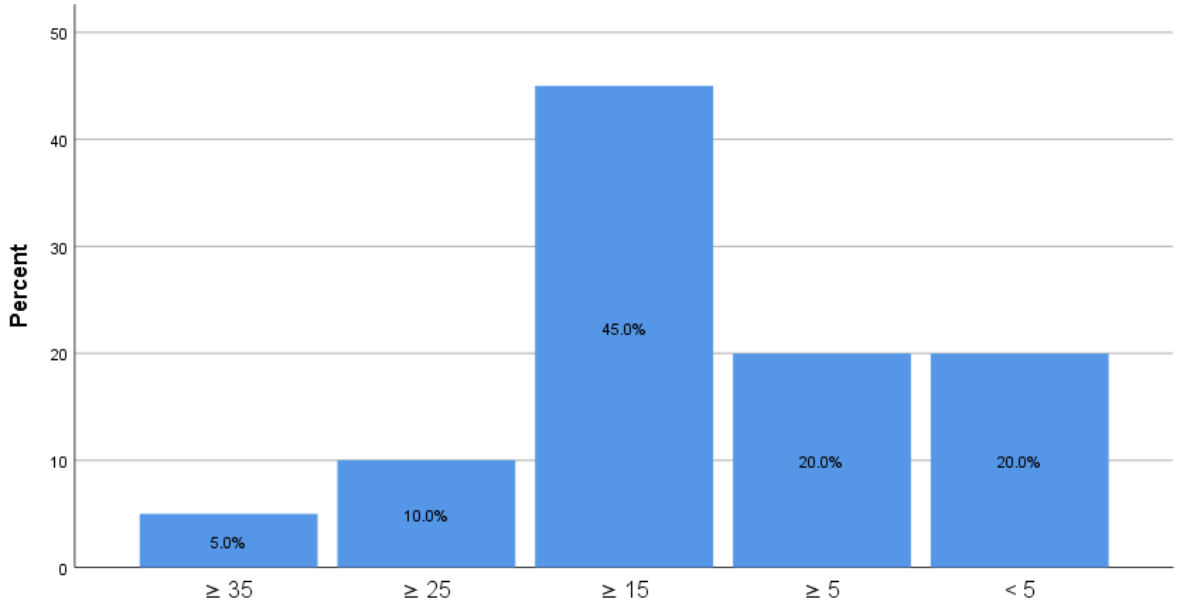



**Figure 5.4: Bar Chart showing respondents' years of experience in Project Environment. (Source: compiled by the author)**

Table 5.4 and Figure 5.4 above shows that 1 (5%) respondent who participated in the study had 35 years and above, 2 (10%) had 25 years and above, 9 (45%) had 15 years and above, 4 (20%) had 5 years and above and 4 (20%) had 5 years and less of experience in the Project Environment. Therefore, the majority of participants had 15 years and above, while the lowest was participants who had 35 years and above of experience in Project Management.

**Table 5.5: Frequency Table showing highest qualifications of respondents. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Diploma | 9 | 45.0 | 45.0 | 45.0 |
| Degree | 8 | 40.0 | 40.0 | 85.0 |
| Honours | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

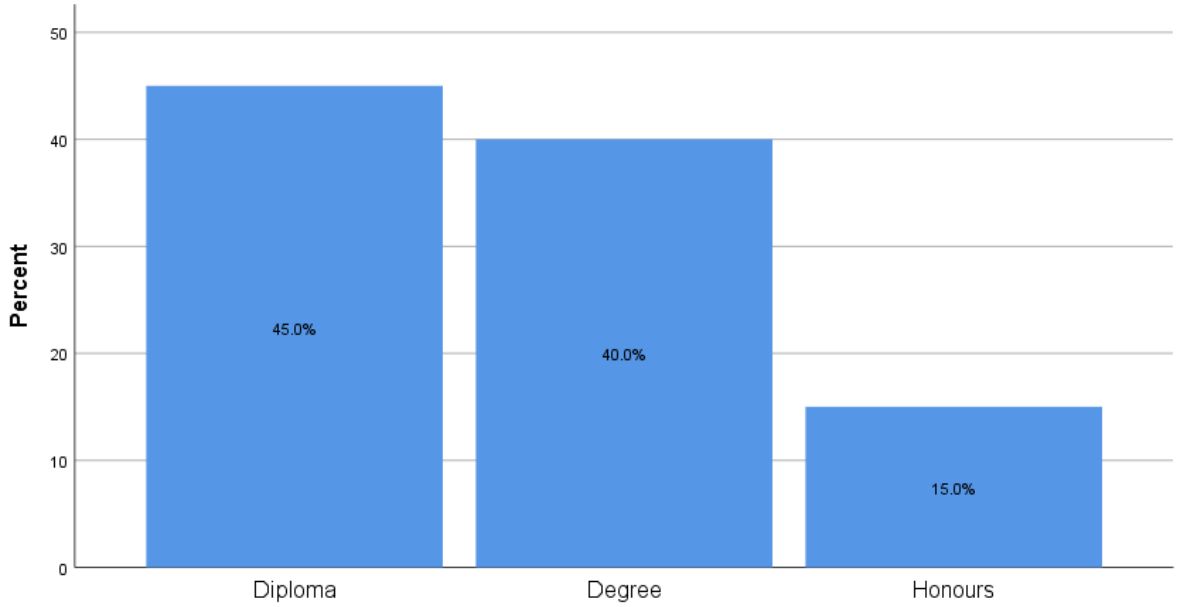



**Figure 5.5: Bar Chart showing highest qualifications of respondents. (Source: compiled by the author)**

Frequency Table 5.5 and Figure 5.5 above shows that 9 (45%) respondents who participated in the study have Diplomas, 8 (40%) have Degrees, 3 (15%) have Honours as their highest qualifications. Therefore, the majority of participants hold Diplomas and other have Degrees with the highest qualification being Honours.

## 5.4 SECTION A: PROJECT DELAYS

The first objective of the study was to understand the capital project delays at Company Capital Projects (CCP) in Richards Bay, Kwazulu Natal (KZN), South Africa (SA). Section (A) provided data collected from the respondents to gain knowledge and understanding of capital project delays.

**Table 5.6: Frequency Table showing respondents' views on whether or not projects delay. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 4 | 20.0 | 20.0 | 20.0 |
| Often | 12 | 60.0 | 60.0 | 80.0 |
| Occasionally | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

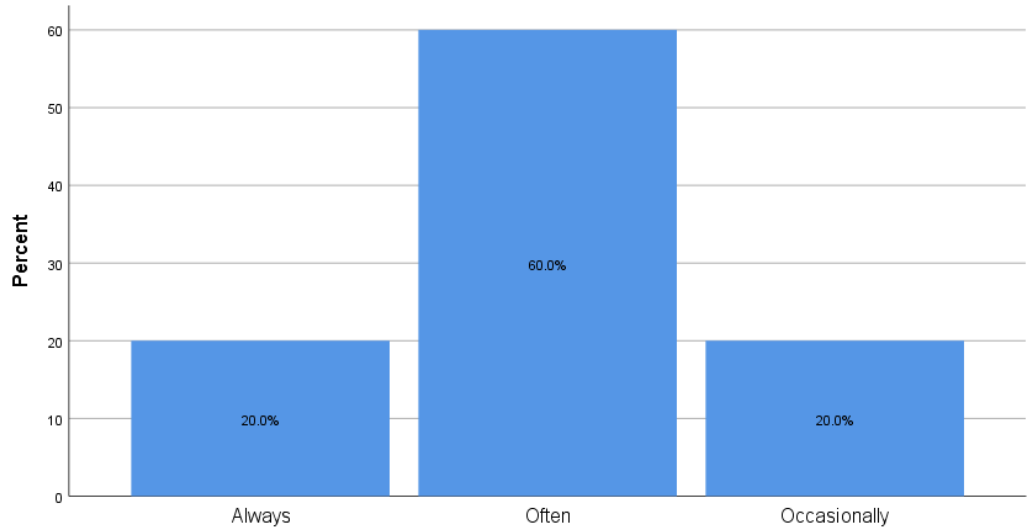



**Figure 5.6: Bar Chart showing respondents' views on whether or not projects delay. (Source: compiled by the author)**

The above Frequency Table and Bar Chart shows that more than half of the respondents 12 (60%) reported that projects often delay with 4 (20%) respondents reporting that projects always delays only 4 (20%) reported projects delays occasionally. None of the respondents reported that projects never delays.

Literature review revealed that most of the capital projects experience delay as stated by (Pai & Bharath, 2013). As stated by Owolabi, Amusan, Oloke, Olusanya, Tunji, Owolabi, Peter and Omuh (2014), in Nigeria delay is the big setback in construction industry and that the delay problem in construction industry is a worldwide problem. According to Muhwezi, Acai and Otim (2014) in many developing countries, capital projects experienced delays, like in Uganda. According to Ismail et al. (2014) many projects experience delays and increase costs in South Africa, ranging from 5 to 48%.

**Table 5.7: Frequency Table showing respondents' views on the number of years projects delay for. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Between 3 - 5 years | 3 | 15.0 | 15.0 | 15.0 |
| < 3 years | 15 | 75.0 | 75.0 | 90.0 |
| 0 years | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

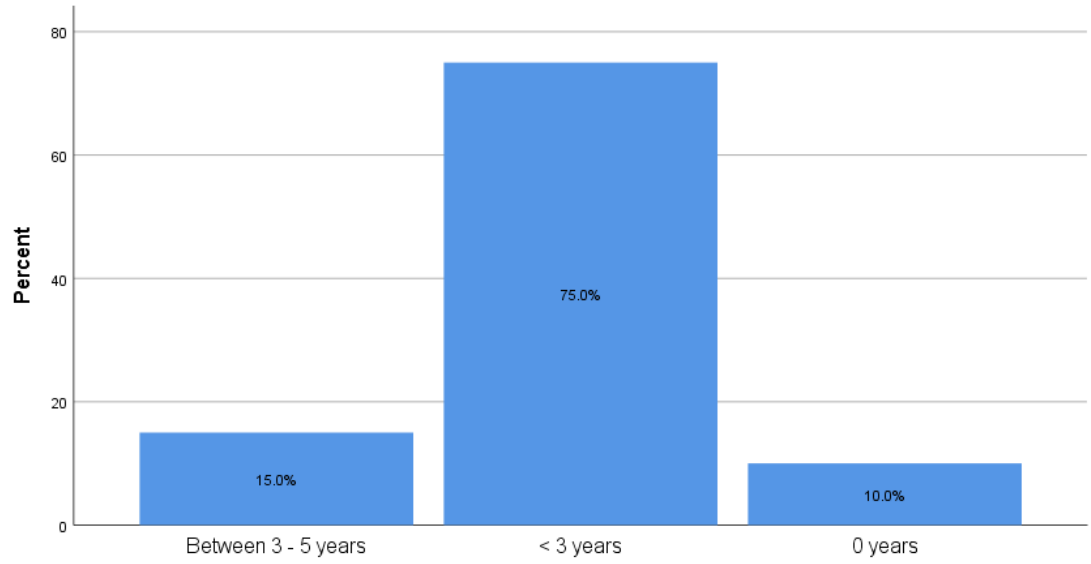



**Figure 5.7: Bar Chart showing respondents' views on the number of years projects delay for. (Source: compiled by the author)**

Frequency Table and Bar Chart above shows that most respondents 15 (75%) reported that projects delay by 3 and less years while 3 (15%) respondents reporting that projects delay by between 3 to 5 years and only 2 (10%) reported that projects delay for 0 years.

Literature review agreed that there was a total delay time of 43 months to complete on Kampala road a Mapeera House, it was original planned for 13 months instead it took 56 months, (affecting the construction period); the church house building project which was scheduled to be completed in 18 months in May 2013 it was 25 months delayed and was not even close to be completed as stated by (Muhwezi et al., 2014). According to Ismail, Mabuza, Pillay and Xolo (2014), Eskom as well as Medupi's project was scheduled to start generate power at the first unit in January

2010 even in 2014 it was 54 months late. Literature also revealed that there are projects that finished within time, as stated by Ismail et al (2014) on the Renewable Energy Independent Power Producer Procurement (REIPPP), a renewable energy project was successfully commissioned and completed successfully before time.

## 5.5 SECTION B: PROJECT DELAY FACTORS

The second objective of the study was to identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA. The amount of 47 items measured this objective.

**Table 5.8: Frequency Table showing respondents' views on whether or not project delays are caused by owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 12 | 60.0 | 60.0 | 60.0 |
| Occasionally | 4 | 20.0 | 20.0 | 80.0 |
| Seldom | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

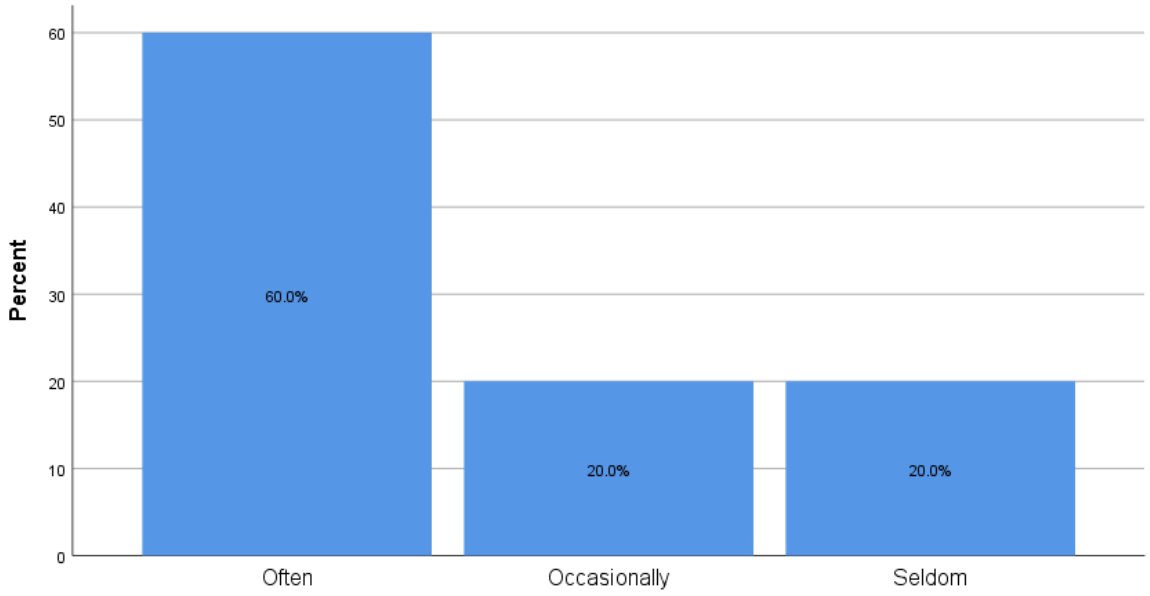



**Figure 5.8: Bar Chart showing respondents' views on whether or not project delays are caused by owner. (Source: compiled by the author)**

Table 5.8 and Bar Chart 5.8 shows that 12 (60%) respondents reported that often project delays are caused by the owner while 4 (20%) reported that occasionally and other 4 (20%) reported that it is seldom that project delays are caused by the owner.

**Table 5.9: Frequency Table showing respondents' views on whether or not project delays are caused by project consultant. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 5 | 25.0 | 25.0 | 25.0 |
| Occasionally | 10 | 50.0 | 50.0 | 75.0 |
| Seldom | 5 | 25.0 | 25.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

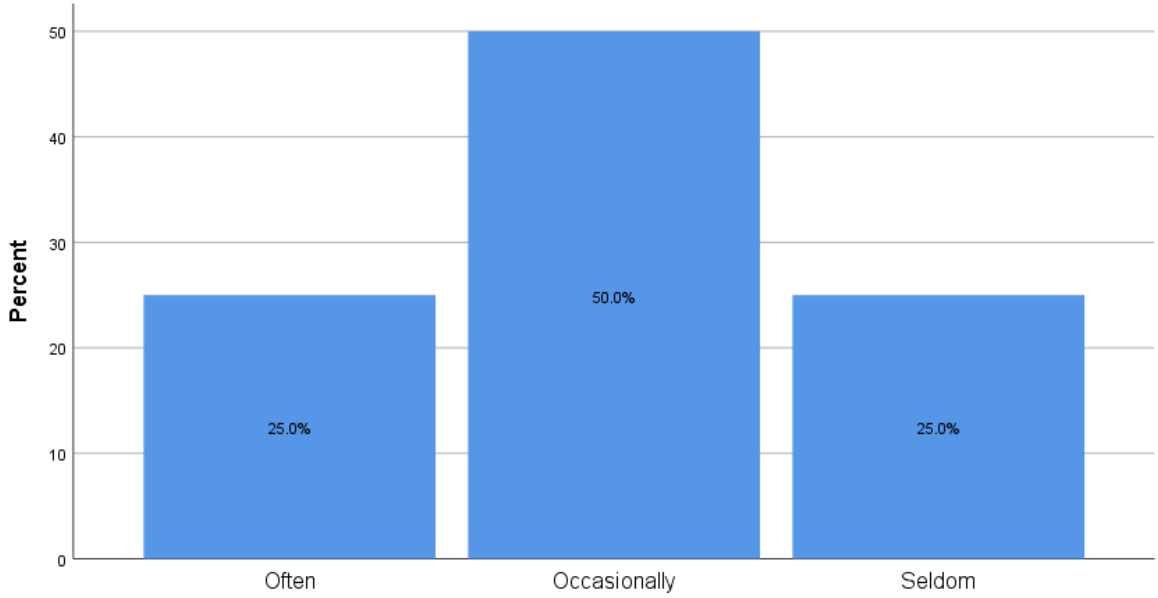



**Figure 5.9: Bar Chart showing respondents' views on whether or not project delays are caused by project consultant. (Source: compiled by the author)**

Table 5.9 and Figure 5.9 shows that half 10 (50%) of the respondents viewed that occasionally projects delays are caused by project consultant, 5 (25%) respondents viewed that often and 5 (25) respondents viewed that it is seldom that project delays are caused by project consultant.

**Table 5.10: Frequency Table showing respondents' views on whether or not project delays are caused by contractor/service provider. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 4 | 20.0 | 20.0 | 20.0 |
| Often | 4 | 20.0 | 20.0 | 40.0 |
| Occasionally | 8 | 40.0 | 40.0 | 80.0 |
| Seldom | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

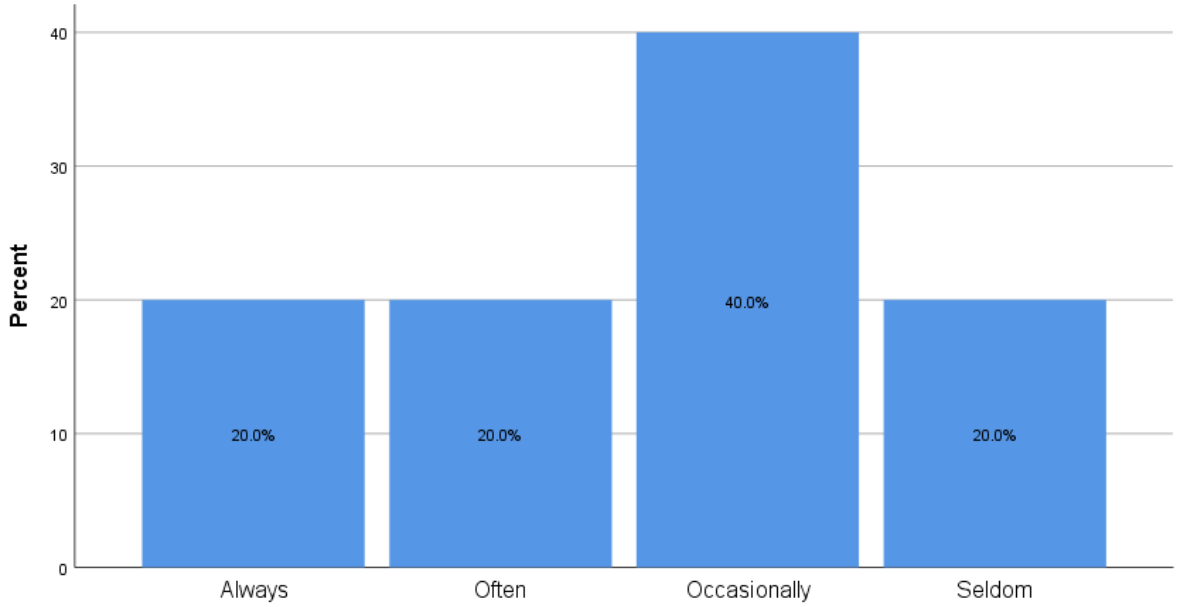



**Figure 5.10: Bar Chart showing respondents' views on whether or not project delays are caused by contractor/service provider. (Source: compiled by the author)**

Table 5.10 and Figure 5.10 shows that 4 (20%) of the respondents viewed that projects delays are always caused by contractor or service provider, 4 (20%) respondents viewed that often, 8 (40%) respondents viewed that it is occasionally and 4 (20%) respondents viewed that it is seldom that project delays are caused by contractor or service provider.

**Table 5.11: Frequency Table showing respondents' views on whether or not project delays are caused by external factors. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 9 | 45.0 | 45.0 | 50.0 |
| Occasionally | 7 | 35.0 | 35.0 | 85.0 |
| Seldom | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

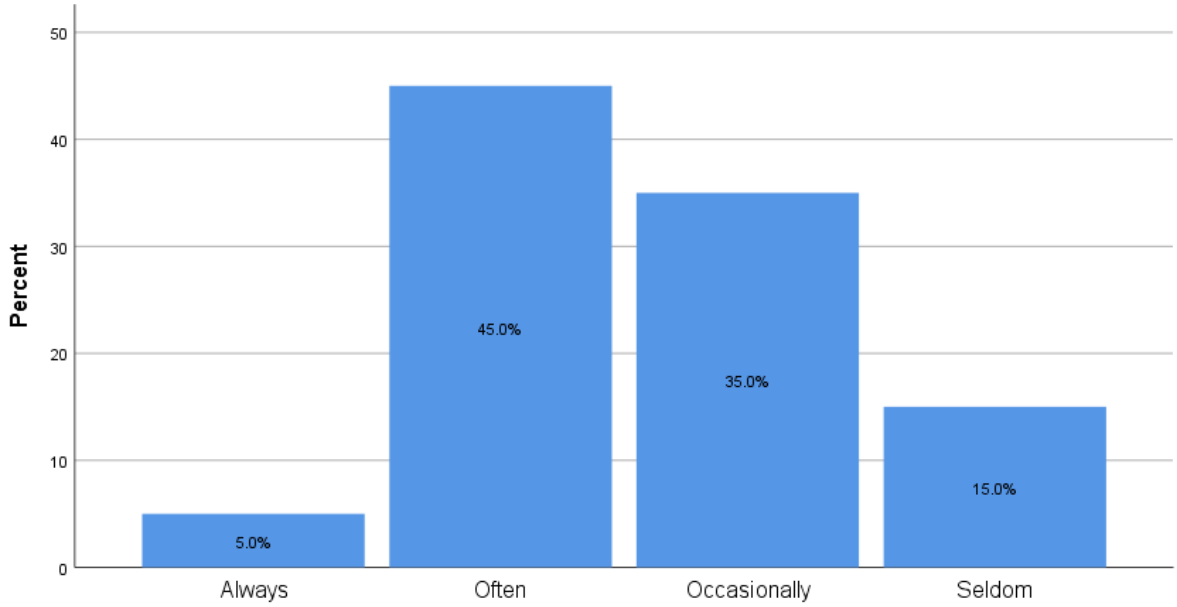



**Figure 5.11: Bar Chart showing respondents' views on whether or not project delays are caused by external factors. (Source: compiled by the author)**

Table 5.11 and Figure 5.11 shows that 1 (5%) of the respondent viewed that projects delays are always caused by external factors, 9 (45%) respondents viewed that often, while 7 (35%) viewed that occasionally and 3 (15%) viewed that it is seldom that project delays are caused by external factors.

Table 5.8, 5.9, 5.10 and 5.11 confirms that the internal and external factors are causes of project delays as Aibinu and Jagboro (2002) classified the causes of delay as project participants and external factors. External causes of delay were identified as bad weather conditions, acts of God, and labour unrest. Owolabi et al. (2014) and Memon, Rahman, Akram & Ali (2014) mentioned factors that are causing construction project to delay as internal factors namely contractor's responsibility, consultant's responsibility, owner's responsibility and external factors.

**Table 5.12: Frequency Table showing respondents' views on whether or not project delays are caused by that the original contract duration is too short. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 2 | 10.0 | 10.0 | 15.0 |
| Occasionally | 8 | 40.0 | 40.0 | 55.0 |
| Seldom | 7 | 35.0 | 35.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

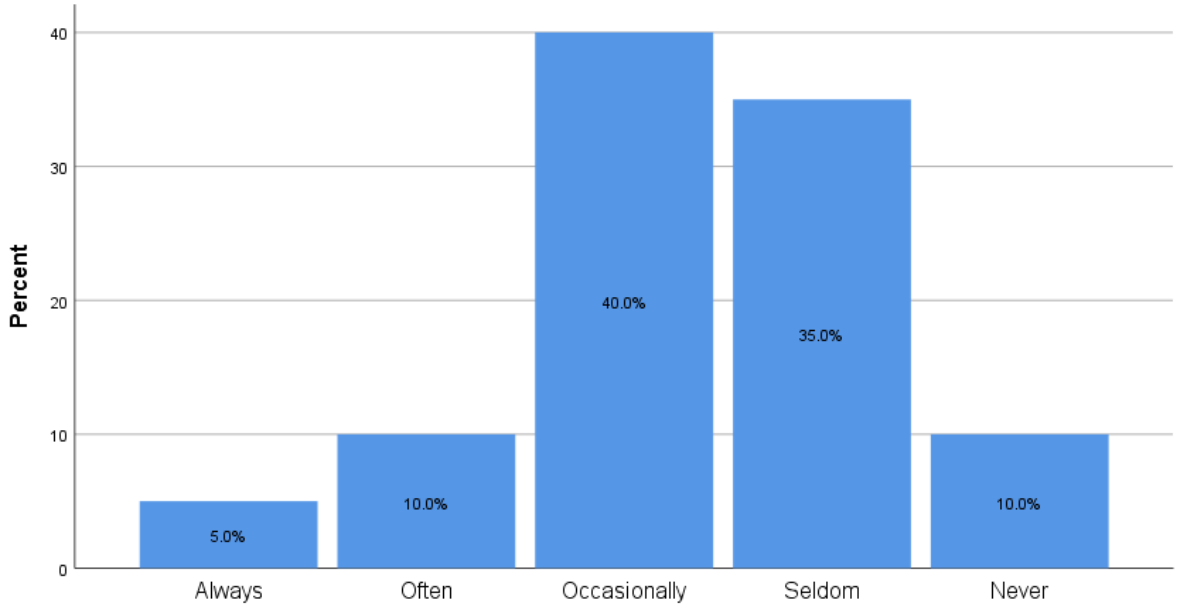



**Figure 5.12: Bar Chart showing respondents' views on whether or not project delays are caused by that the original contract duration is too short. (Source: compiled by the author)**

The Frequency Table 5.12 and Bar Chart above shows that 1 (5%) of respondent reported that project delays are caused by that the original contract duration is too short, while 2 (10%) respondents reported often, 8 (40%) respondents reported occasionally, 7 (35%) respondents reported that it is seldom and 2 (10%) respondents reported that project delays are never caused by that the original contract duration is too short.

**Table 5.13: Frequency Table showing respondents' views on whether or not project delays are caused by legal disputes between various parts. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Occasionally | 10 | 50.0 | 50.0 | 50.0 |
| Seldom | 10 | 50.0 | 50.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

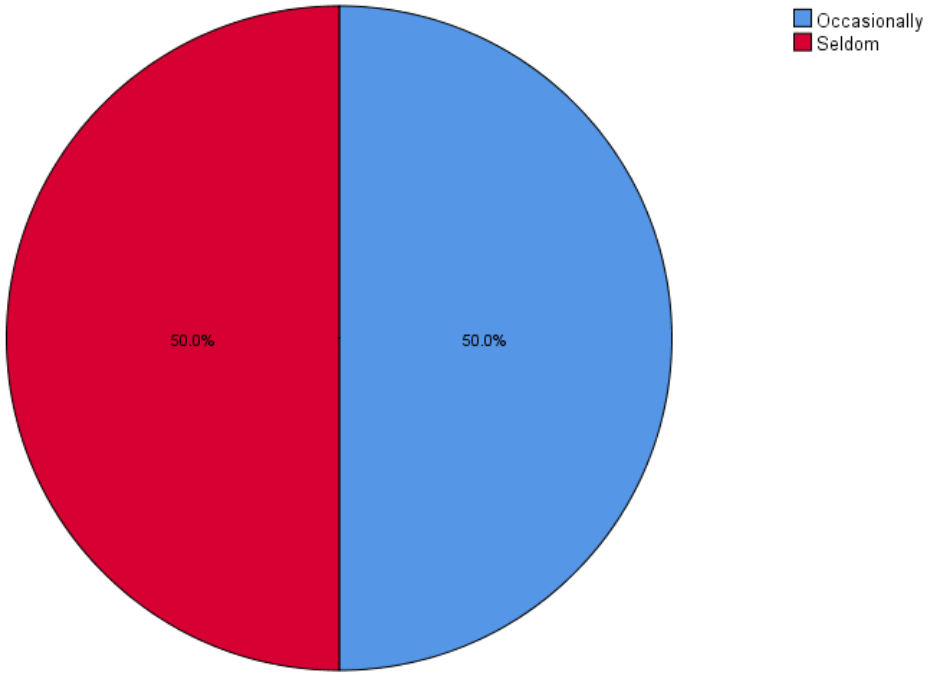



**Figure 5.13: Pie Chart showing respondents' views on whether or not project delays are caused by legal disputes between various parts. (Source: compiled by the author)**

The above Frequency Table and Pie Chart shows that 10 (50%) of respondents advised that project delays are occasionally caused by legal disputes between various parts and 10 (50%) respondents reported that is it seldom that project delays are caused by legal disputes between various parts.

**Table 5.14: Frequency Table showing respondents' views on whether or not project delays are caused by inadequate definition of substantial completion. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 3 | 15.0 | 15.0 | 15.0 |
| Occasionally | 7 | 35.0 | 35.0 | 50.0 |
| Seldom | 6 | 30.0 | 30.0 | 80.0 |
| Never | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

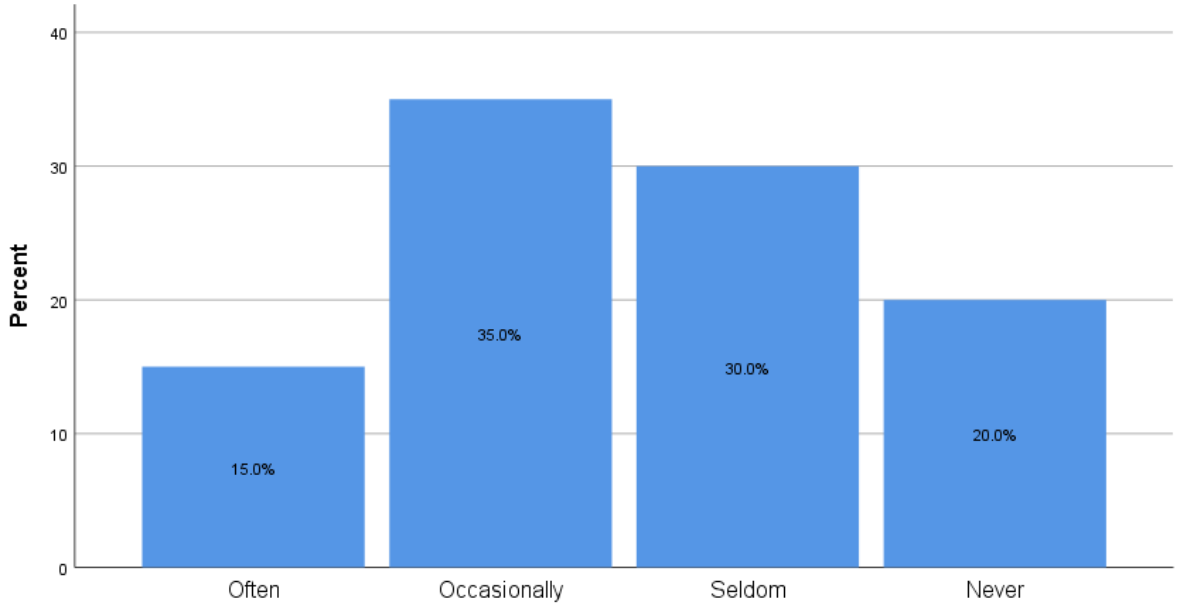



**Figure 5.14: Bar Chart showing respondents' views on whether or not project delays are caused by inadequate definition of substantial completion. (Source: compiled by the author)**

Table 5.14 and Figure 5.14 presents that 3 (15%) respondents reported that inadequate definition of substantial completion is often the cause of project delays, 7 (35%) respondents reported it is occasionally while 6 (30%) respondents reported that it is seldom and 4 (20%) respondents reported that inadequate definition of substantial completion has never been the cause of project delays.

**Table 5.15: Frequency Table showing respondents' views on whether or not project delays are caused by ineffective delay penalties. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 2 | 10.0 | 10.0 | 10.0 |
| Occasionally | 4 | 20.0 | 20.0 | 30.0 |
| Seldom | 12 | 60.0 | 60.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

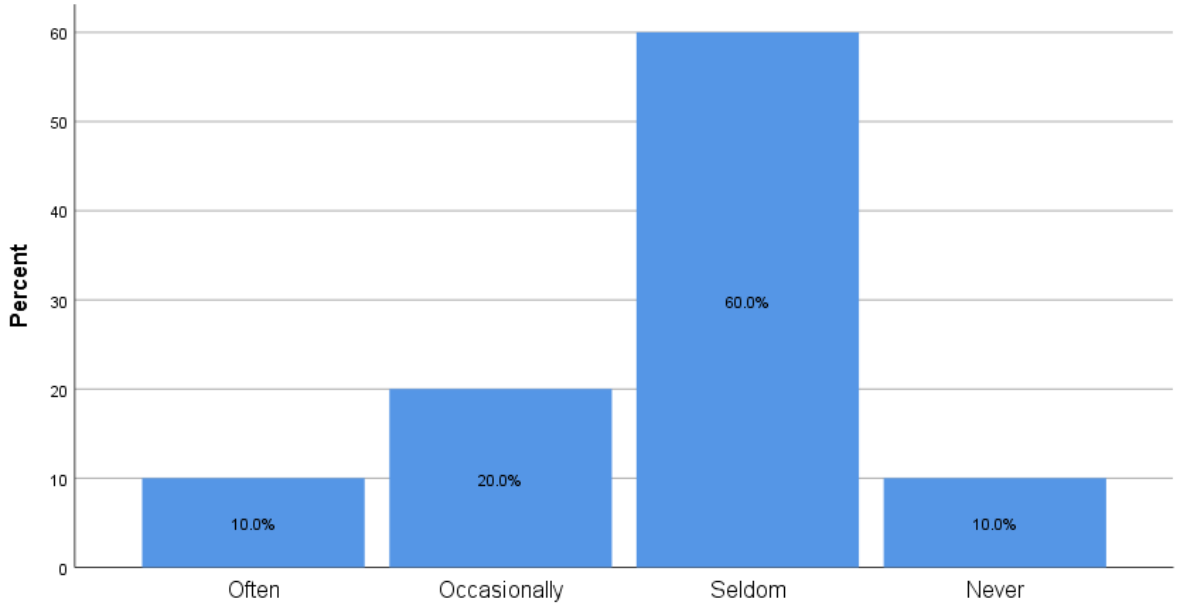



**Figure 5.15: Bar Chart showing respondents' views on whether or not project delays are caused by ineffective delay penalties(Source: compiled by the author)**

Frequency Table 5.15 and Figure 5.15 above presents that 2 (10%) respondents reported that project delays are often caused by ineffective delay penalties with 4 (20%) respondents reporting that it is occasionally while more than half 12 (60%) respondents reported that ineffective delay penalties are seldom the cause of project delays and 2 (10%) respondents reported that ineffective delay penalties have never been a cause of project delays.

**Table 5.16: Frequency Table showing respondents' views on whether or not project delays are caused by the type of project bidding and award (negotiation, lowest bidder). (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 4 | 20.0 | 20.0 | 20.0 |
| Occasionally | 9 | 45.0 | 45.0 | 65.0 |
| Seldom | 4 | 20.0 | 20.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

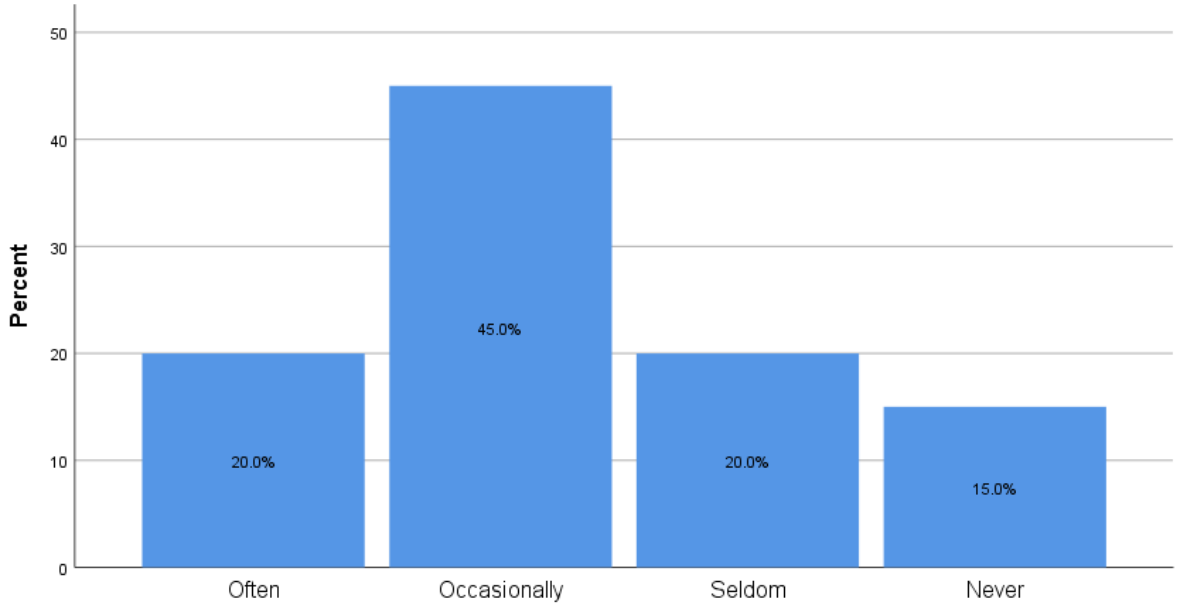



**Figure 5.16: Bar Chart showing respondents' views on whether or not project delays are caused by the type of project bidding and award (negotiation, lowest bidder). (Source: compiled by the author)**

Table 5.16 and Figure 5.16 above shows that 4(20%) respondents reported that project delays are often caused by the type of project bidding and award while 9 (45%) respondents reporting that it is occasionally, 4 (20%) respondents reported that the type of project bidding and award are seldom the cause of project delays and 3 (15%) respondents reported that the type of project bidding and award are never the cause of project delays.

**Table 5.17: Frequency Table showing respondents' views on whether or not project delays are caused by delay in progress payments by owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Occasionally | 2 | 10.0 | 10.0 | 10.0 |
| Seldom | 10 | 50.0 | 50.0 | 60.0 |
| Never | 8 | 40.0 | 40.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

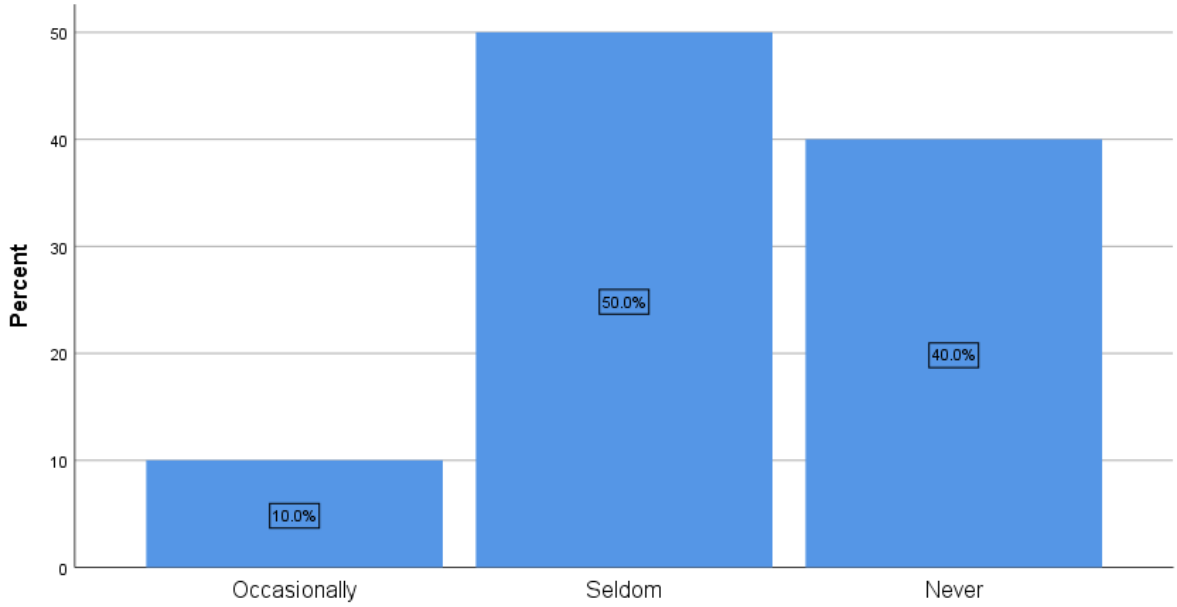



**Figure 5.17: Bar Chart showing respondents' views on whether or not project delays are caused by delay in progress payments by owner. (Source: compiled by the author)**

Table 5.17 and Figure 5.17 above shows that 2(10%) respondents reported that project delays are occasionally caused by delay in progress payments by owner while 10 (50%) respondents reported that it is seldom that project delays are caused by delay in progress payments by owner and 8 (40%) respondents reported that delay in progress payments by owner are never the cause of project delays.

**Table 5.18: Frequency Table showing respondents' views on whether or not project delays are caused by delay to furnish and deliver the site to the contractor by the owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 2 | 10.0 | 10.0 | 10.0 |
| Occasionally | 5 | 25.0 | 25.0 | 35.0 |
| Seldom | 10 | 50.0 | 50.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

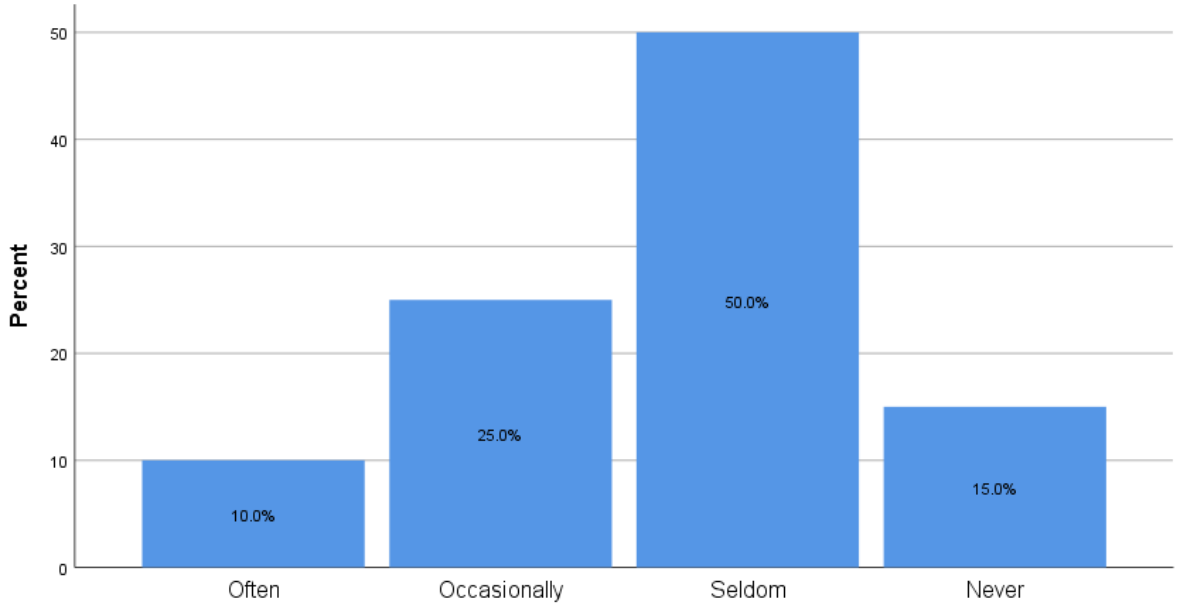



**Figure 5.18: Bar Chart showing respondents' views on whether or not project delays are caused by delay to furnish and deliver the site to the contractor by the owner. (Source: compiled by the author)**

Table 5.18 and Figure 5.18 above shows that 2 (10%) respondents reported that project delays are often caused by delay to furnish and deliver the site to the contractor by the owner, 5 (25%) respondents reporting that it is occasionally, 10 (50%) half of the respondents reported it is seldom that delay to furnish and deliver the site to the contractor by the owner are the cause of project delays and 3 (15%) respondents reported that the delay to furnish and deliver the site to the contractor by the owner has never been the cause of project delays.

**Table 5.19: Frequency Table showing respondents' views on whether or not project delays are caused by change orders by the owner during construction. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 8 | 40.0 | 40.0 | 45.0 |
| Occasionally | 8 | 40.0 | 40.0 | 85.0 |
| Seldom | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

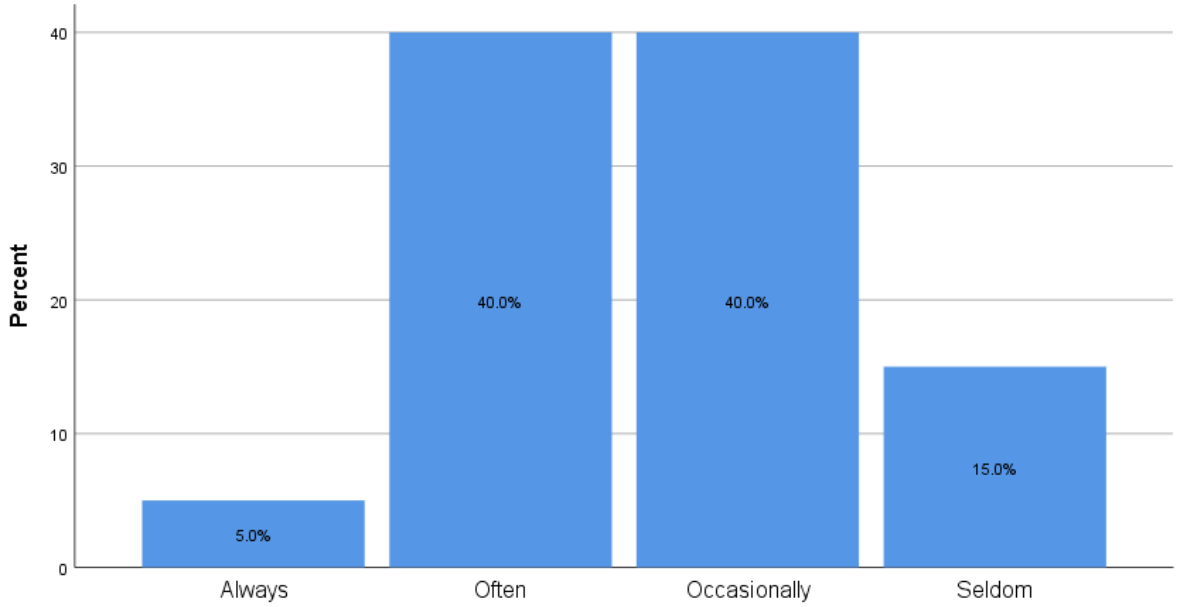



**Figure 5.19: Bar Chart showing respondents' views on whether or not project delays are caused by change orders by the owner during construction(Source: compiled by the author)**

The Frequency Table 5.19 and Bar Chart above shows that 1(5%) respondent reported that project delays are always caused by change orders by the owner during construction, 8 (40%) respondents reporting that it is often, 8 (40%) respondents reported that it is occasionally and 3 (15%) respondents reported that change orders by the owner during construction are seldom the cause of project delays.

**Table 5.20: Frequency Table showing respondents' views on whether or not project delays are caused by late revising and approving design documents by owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 10 | 50.0 | 50.0 | 55.0 |
| Occasionally | 5 | 25.0 | 25.0 | 80.0 |
| Seldom | 3 | 15.0 | 15.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

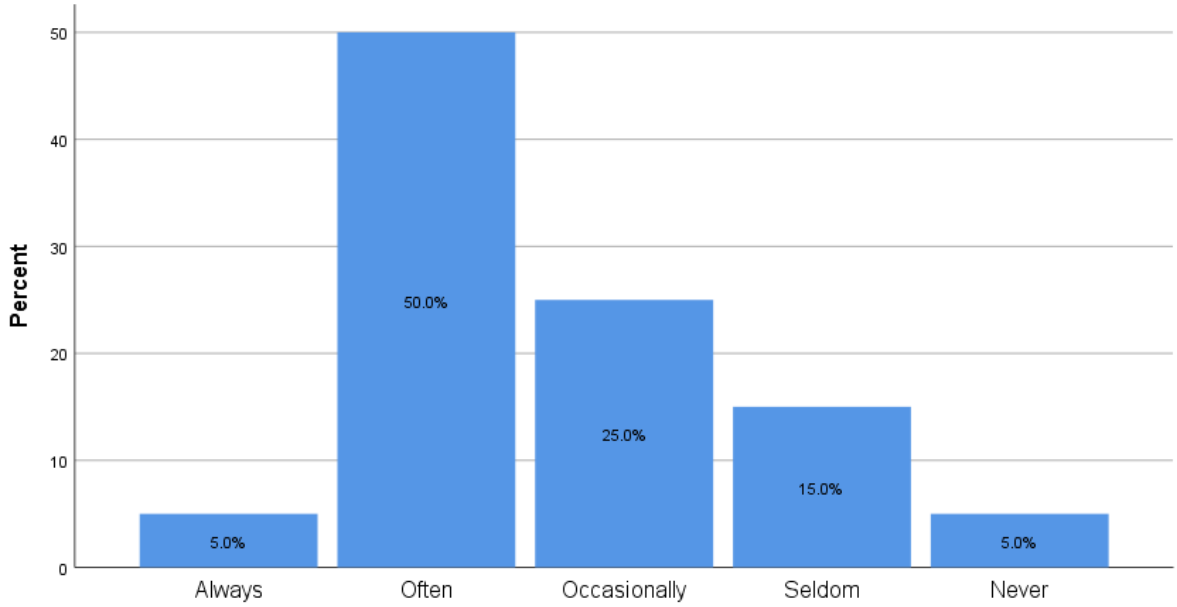



**Figure 5.20: Bar Chart showing respondents' views on whether or not project delays are caused by late in revising and approving design documents by owner. (Source: compiled by the author)**

Table 5.20 and Figure 5.20 presents that 1(5%) respondent reported that it is often that project delays are caused by late in revising and approving design documents by owner, 10 (50%) half of respondents reporting that it is often, 5 (25%) reported it is occasionally, 3 (15%) reported that it is seldom and 1 (5%) reported that late in revising and approving design documents by owner has never been the cause of project delays.

**Table 5.21: Frequency Table showing respondents' views on whether or not project delays are caused by delay in approving drawings and materials. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 8 | 40.0 | 40.0 | 45.0 |
| Occasionally | 9 | 45.0 | 45.0 | 90.0 |
| Seldom | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

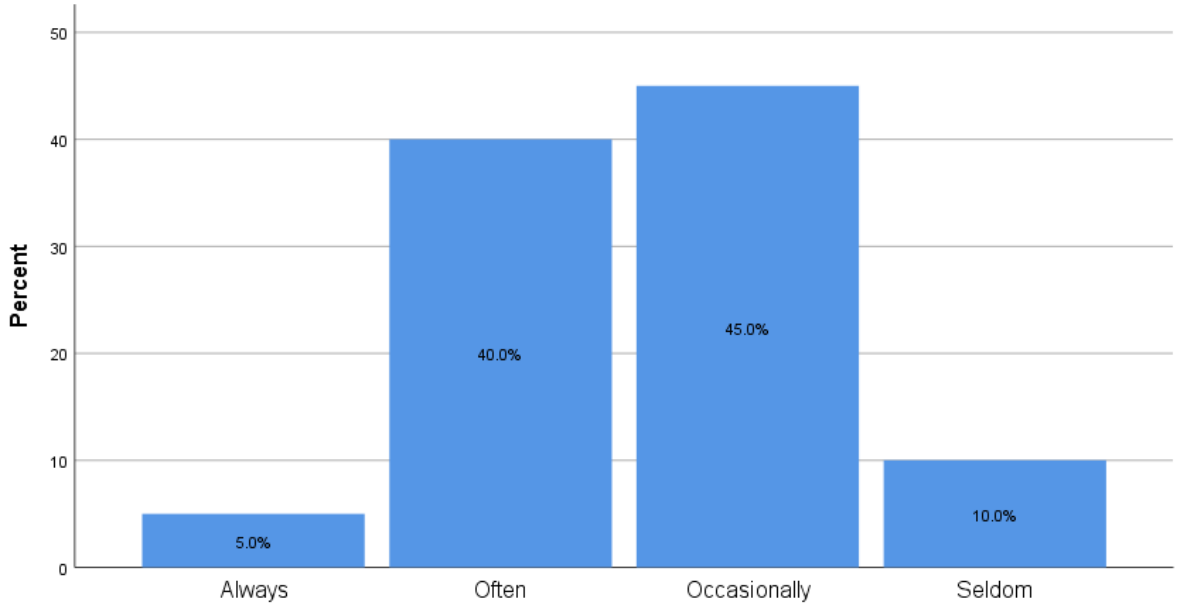



**Figure 5.21: Bar Chart showing respondents' views on whether or not project delays are caused by delay in approving drawings and materials. (Source: compiled by the author)**

Table 5.21 and Figure 5.21 above shows that 1 (5%) respondent reported that project delays are always caused by the delay in approving drawings and materials, while 8 (40%) reported that it is often, 9 (45%) reported it is occasionally and 2 (10%) reported that it is seldom that the delay in approving drawings and materials will cause the project delay.

**Table 5.22: Frequency Table showing respondents' views on whether or not project delays are caused by poor communication and coordination by owner and other parties. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 3 | 15.0 | 15.0 | 15.0 |
| Often | 6 | 30.0 | 30.0 | 45.0 |
| Occasionally | 5 | 25.0 | 25.0 | 70.0 |
| Seldom | 5 | 25.0 | 25.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

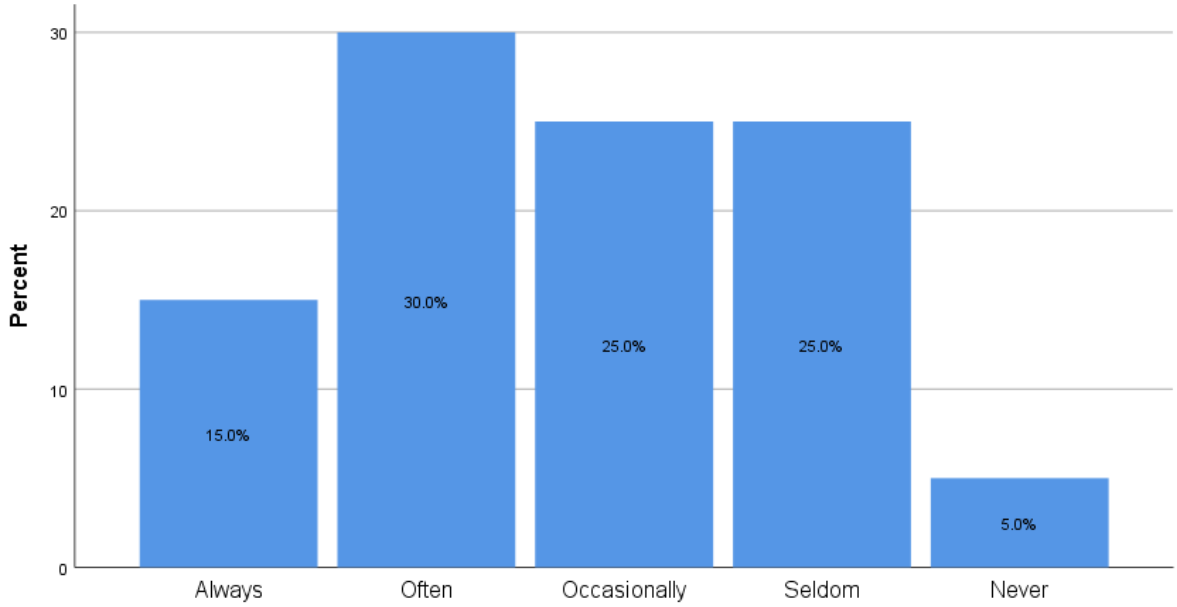



**Figure 5.22: Bar Chart showing respondents' views on whether or not project delays are caused by poor communication and coordination by owner and other parties. (Source: compiled by the author)**

Frequency Table 5.22 and Figure 5.22 above shows that 3 (15%) respondents stated that poor communication and coordination by owner and other parties are the cause of project delay, 6 (30%) reported that often, 5 (25%) reporting that it is occasionally while 5 (25%) reported that it is seldom and 1 (5%) respondent reported that poor communication and coordination by owner and other parties are never the cause of project delays.

**Table 5.23: Frequency Table showing respondents' views on whether or not project delays are caused by slowness in decision making process by owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 4 | 20.0 | 20.0 | 20.0 |
| Often | 9 | 45.0 | 45.0 | 65.0 |
| Occasionally | 3 | 15.0 | 15.0 | 80.0 |
| Seldom | 3 | 15.0 | 15.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

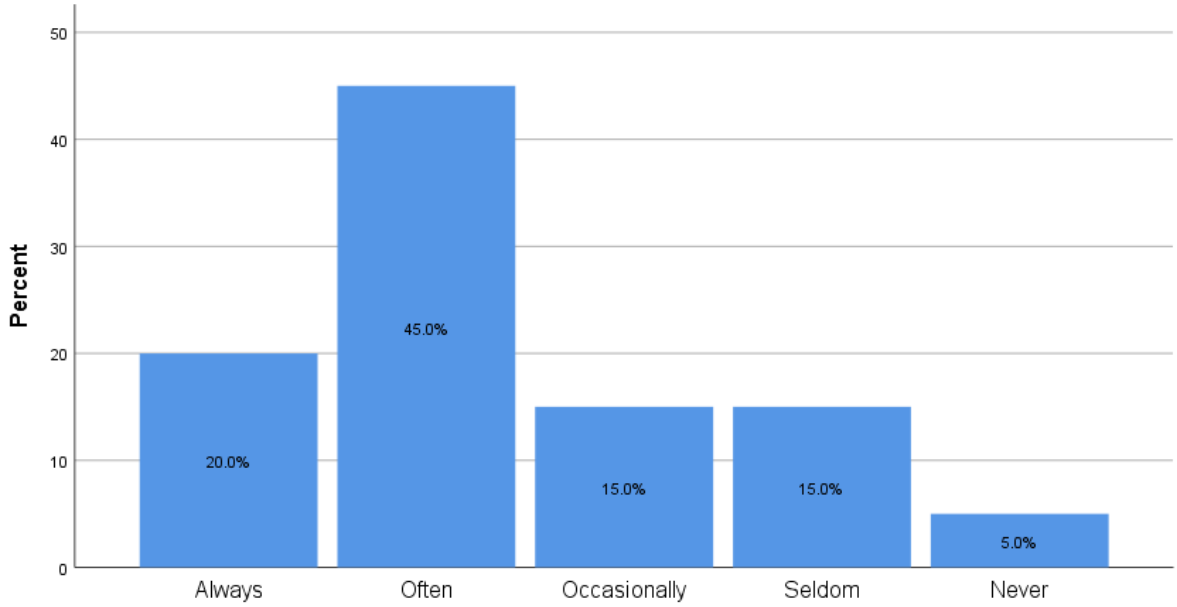



**Figure 5.23: Bar Chart showing respondents' views on whether or not project delays are caused by slowness in decision making process by owner. (Source: compiled by the author)**

4(20%) respondents reported it always, while 9 (45%) respondents reporting that it is often, 3 (15%) respondents reported that it is occasionally, 3 (15%) respondents reported that it is seldom and 1 (5%) reported that project delays have never been caused by the slowness in decision making process by owner.

**Table 5.24: Frequency Table showing respondents' views on whether or not project delays are caused by conflicts between joint ownership of the project. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 4 | 20.0 | 20.0 | 25.0 |
| Occasionally | 2 | 10.0 | 10.0 | 35.0 |
| Seldom | 9 | 45.0 | 45.0 | 80.0 |
| Never | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

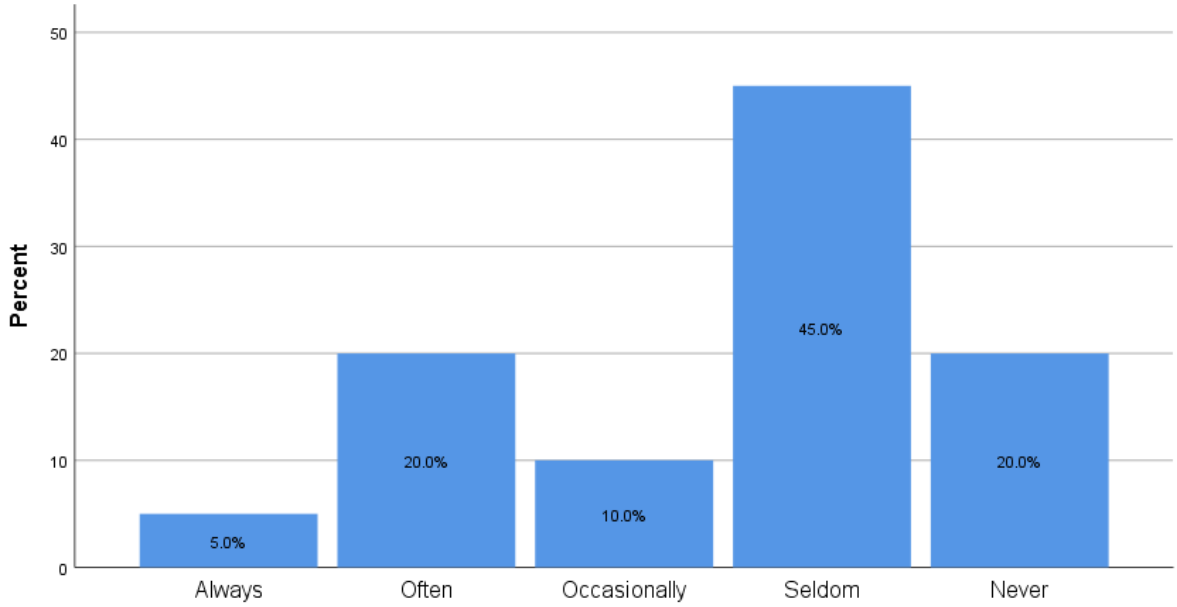



**Figure 5.24: Bar Chart showing respondents' views on whether or not project delays are caused by conflicts between joint ownership of the project. (Source: compiled by the author)**

Table 5.24 and Figure 5.24 above shows that 1 (5%) respondent reported that project delays are always caused by conflicts between joint ownership of the project, 4 (20%) reported that often, 2 (10%) reporting that it is occasionally, 9 (45%) reported that it is seldom and 4 (20%) reported that conflicts between joint ownership of the project are never the cause of project delays.

**Table 5.25: Frequency Table showing respondents' views on whether or not project delays are caused by unavailability of incentives for contractor for finishing ahead of schedule. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 4 | 20.0 | 20.0 | 20.0 |
| Occasionally | 3 | 15.0 | 15.0 | 35.0 |
| Seldom | 6 | 30.0 | 30.0 | 65.0 |
| Never | 7 | 35.0 | 35.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

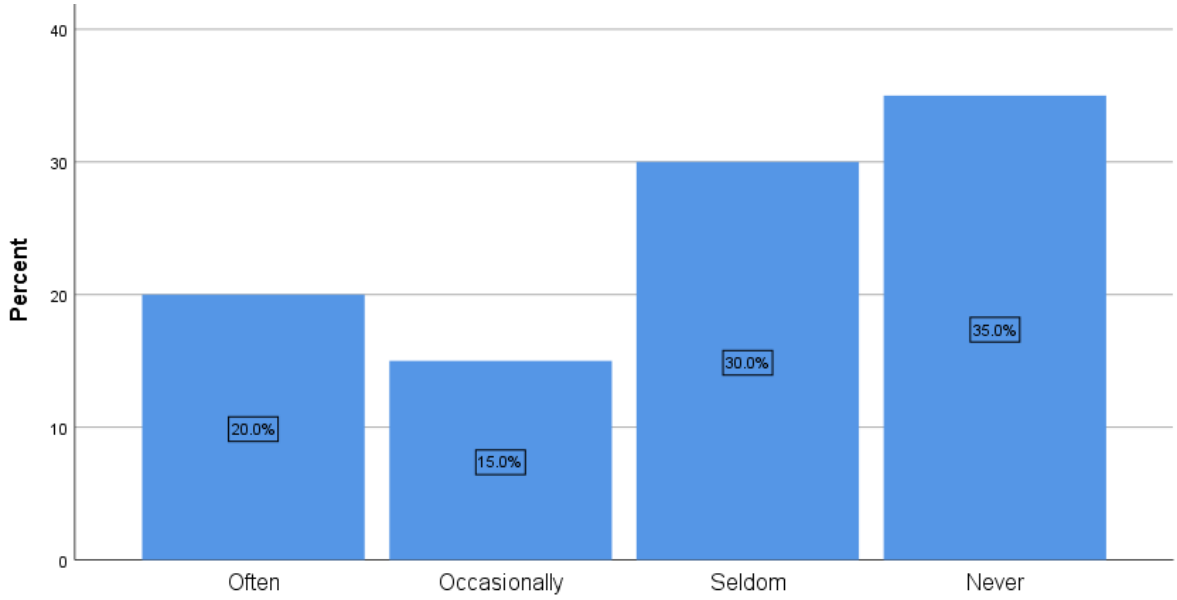



**Figure 5.25: Bar Chart showing respondents' views on whether or not project delays are caused by unavailability of incentives for contractor for finishing ahead of schedule. (Source: compiled by the author)**

Table 5.25 and Figure 5.25 above shows that 4 (20%) respondents reported that project delays are often caused by unavailability of incentives for contractor for finishing ahead of schedule, while 3 (15%) respondents reporting that it is occasionally, 6 (30%) respondents reported that it is seldom and 7 (35%) respondents reported that the unavailability of incentives for contractor for finishing ahead of schedule has never caused the project to delay.

**Table 5.26: Frequency Table showing respondents' views on whether or not project delays are caused by suspension of work by owner. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 3 | 15.0 | 15.0 | 15.0 |
| Occasionally | 4 | 20.0 | 20.0 | 35.0 |
| Seldom | 7 | 35.0 | 35.0 | 70.0 |
| Never | 6 | 30.0 | 30.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

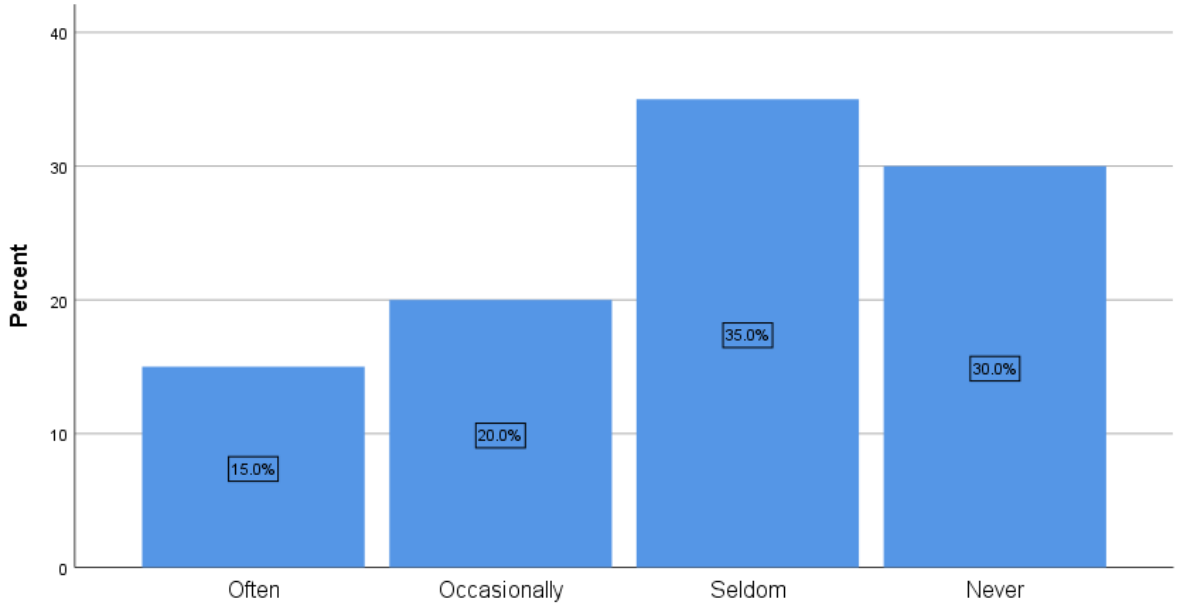



**Figure 5.26: Bar Chart showing respondents' views on whether or not project delays are caused by suspension of work by owner. (Source: compiled by the author)**

Table 5.26 and Figure 5.26 above shows that 3 (15%) respondents reported that often, 4 (20%) respondents reporting that it is occasionally, 7 (35%) respondents reported that it is seldom and 6 (30%) respondents reported that the suspension of work by owner has never caused the project to delay.

**Table 5.27: Frequency Table showing respondents' views on whether or not project delays are caused by difficulties in financing project by contractor. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Occasionally | 10 | 50.0 | 50.0 | 50.0 |
| Seldom | 8 | 40.0 | 40.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

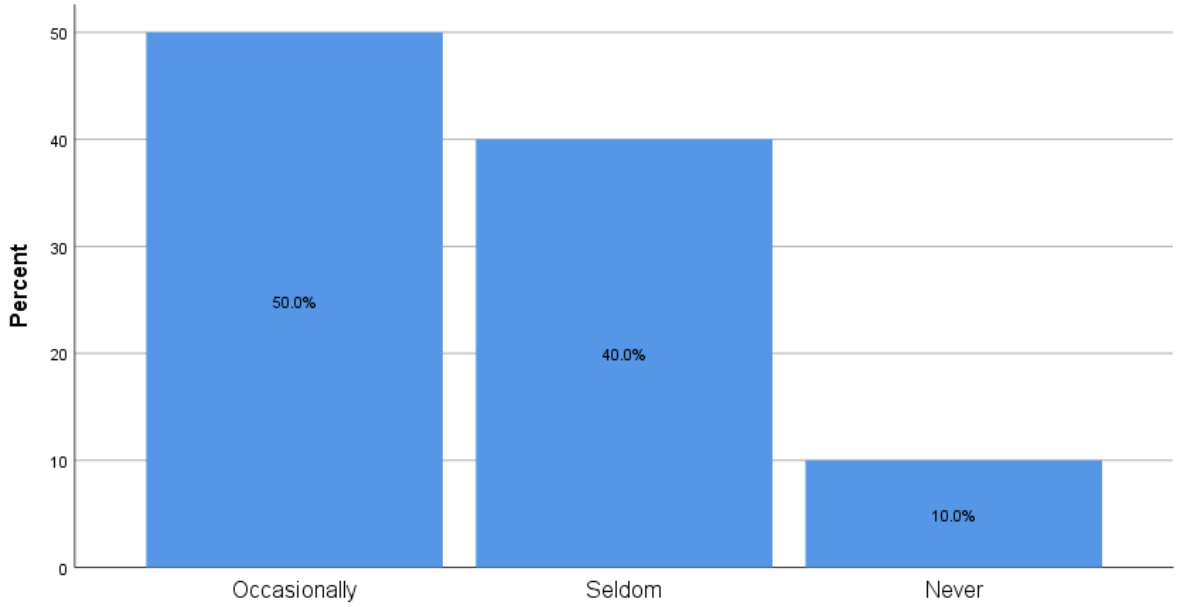



**Figure 5.27: Bar Chart showing respondents' views on whether or not project delays are caused by difficulties in financing project by contractor. (Source: compiled by the author)**

The Frequency Table and Bar Chart above shows 10 (50%) half of the respondents reported that project delays are Occasionally caused by the difficulties in financing project by contractor while 8 (40%) reporting that it is seldom and 2 (10%) reported that difficulties in financing project by contractor has never been a cause of project delays.

**Table 5.28: Frequency Table showing respondents' views on whether or not project delays are caused by conflicts in subcontractors schedule in execution of the project. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 3 | 15.0 | 15.0 | 20.0 |
| Occasionally | 10 | 50.0 | 50.0 | 70.0 |
| Seldom | 5 | 25.0 | 25.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

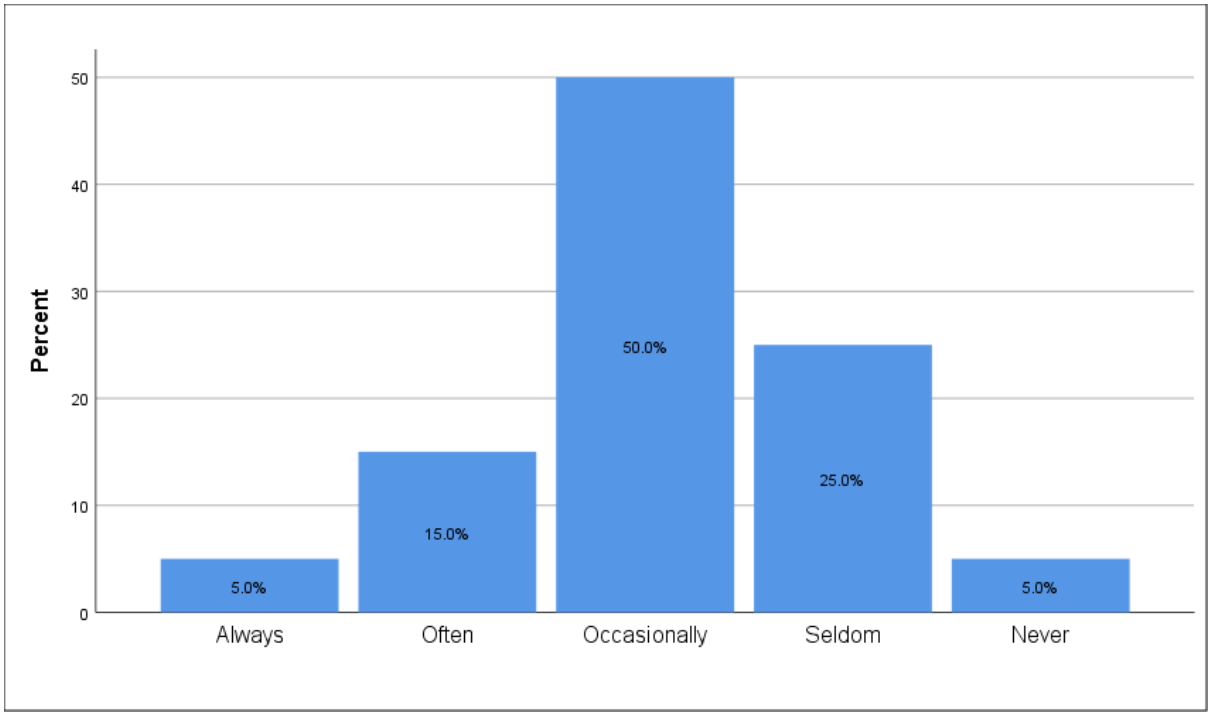



**Figure 5.28: Bar Chart showing respondents' views on whether or not project delays are caused by conflicts in subcontractors schedule in execution of the project. (Source: compiled by the author)**

Table 5.28 and Bar Chart 5.28 shows 1 (5%) respondent reporting that it is always, 3 (15%) reporting that it is often, 10 (50%) half of respondents reported that it is occasionally, 5 (25%) reported that it is seldom and 1 (5%) respondent reported that the conflicts in subcontractors schedule in execution of the project has never been the cause of project delays.

**Table 5.29: Frequency Table showing respondents' views on whether or not project delays are caused by rework due to errors during construction. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 3 | 15.0 | 15.0 | 15.0 |
| Often | 6 | 30.0 | 30.0 | 45.0 |
| Occasionally | 7 | 35.0 | 35.0 | 80.0 |
| Seldom | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

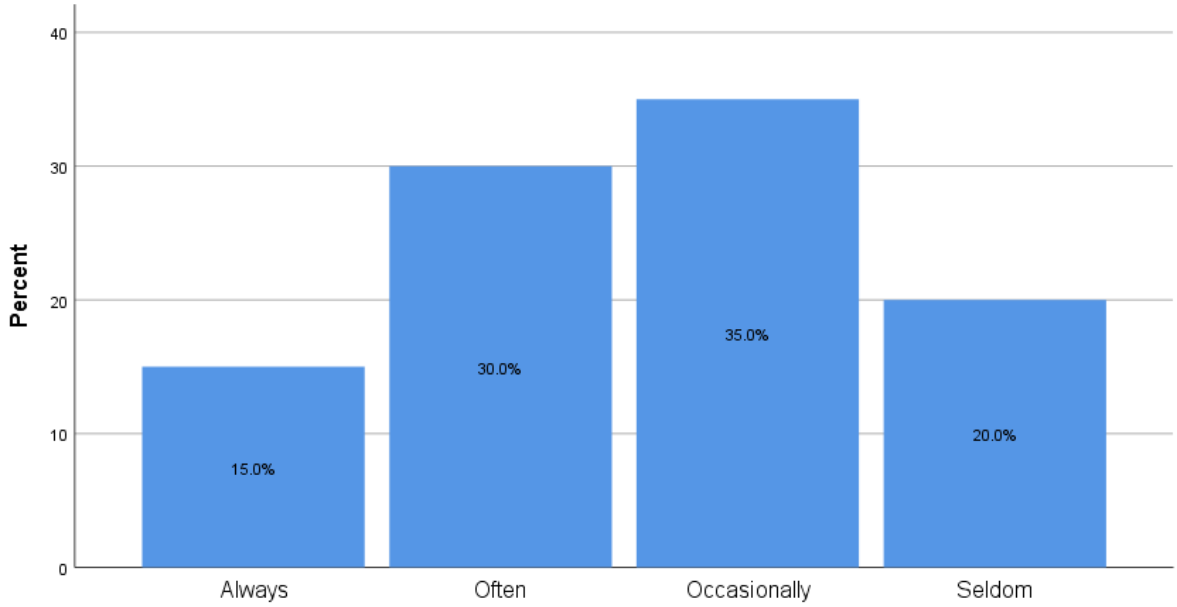



**Figure 5.29: Bar Chart showing respondents' views on whether or not project delays are caused by rework due to errors during construction. (Source: compiled by the author)**

Table 5.29 and Figure 5.29 above shows that 3 (15%) respondents reported that it always, 6 (30%) reported that it is often, while 7 (35%) reported that it is occasionally and 4 (20%) respondents reported that rework due to errors during construction are seldom the cause of project delays.

**Table 5.30: Frequency Table showing respondents' views on whether or not project delays are caused by conflicts between contractor and other parties (consultant and owner) (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 3 | 15.0 | 15.0 | 15.0 |
| Occasionally | 13 | 65.0 | 65.0 | 80.0 |
| Seldom | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

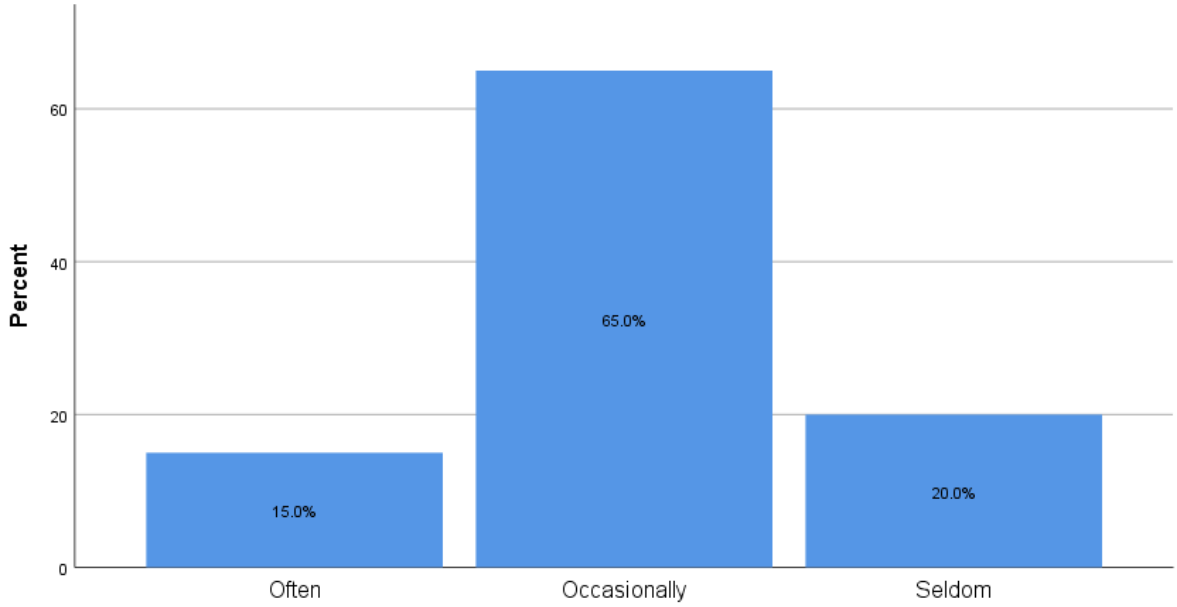



**Figure 5.30: Bar Chart showing respondents' views on whether or not project delays are caused by conflicts between contractor and other parties (consultant and owner). (Source: compiled by the author)**

Table 5.30 and Figure 5.30 shows that 3 (15%) respondents reported that it often, more than half 13 (65%) reported that it is occasionally and 4 (20%) reported that it is seldom that the conflicts between contractor and other parties will be the cause of project delays.

**Table 5.31: Frequency Table showing respondents' views on whether or not project delays are caused by poor site management and supervision by the contractor. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 4 | 20.0 | 20.0 | 25.0 |
| Occasionally | 8 | 40.0 | 40.0 | 65.0 |
| Seldom | 7 | 35.0 | 35.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

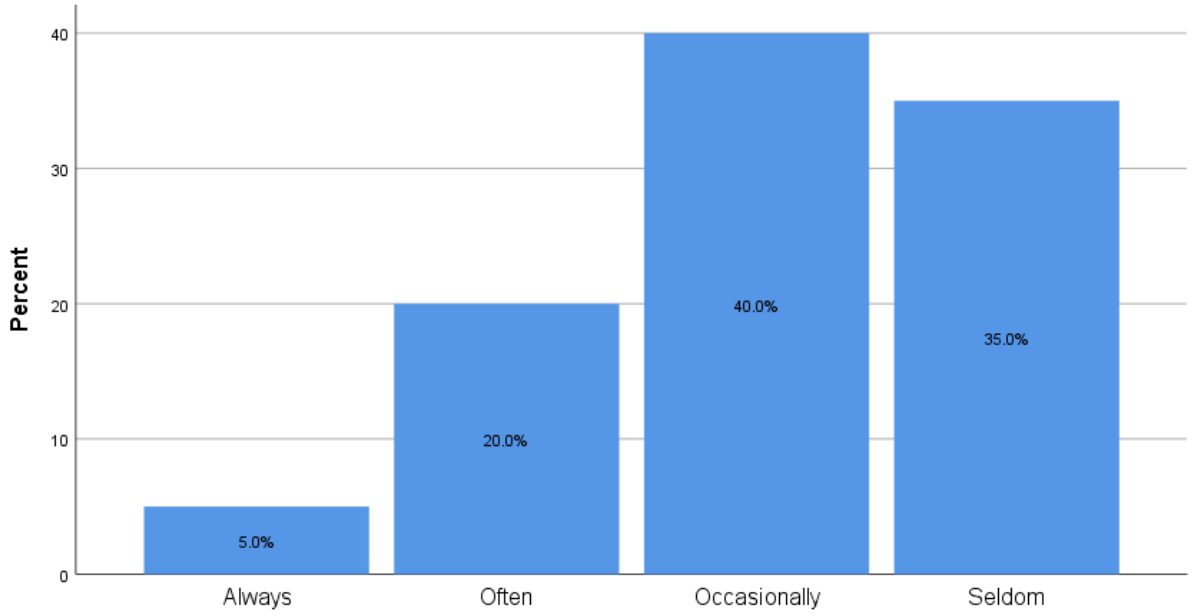



**Figure 5.31: Bar Chart showing respondents' views on whether or not project delays are caused by poor site management and supervision by the contractor. (Source: compiled by the author)**

Table 5.31 and Bar Chart 5.31 above presents that 1 (5%) respondents reported that project delays are always caused poor site management and supervision by the contractor, while 4 (20%) reported that it is often, 8 (40%) reported that it is occasionally and 7 (35%) respondents reported that poor site management and supervision by the contractor are seldom the cause of project delays.

**Table 5.32: Frequency Table showing respondents' views on whether or not project delays are caused by poor communication and coordination by contractor with the other parties. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 2 | 10.0 | 10.0 | 15.0 |
| Occasionally | 11 | 55.0 | 55.0 | 70.0 |
| Seldom | 4 | 20.0 | 20.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

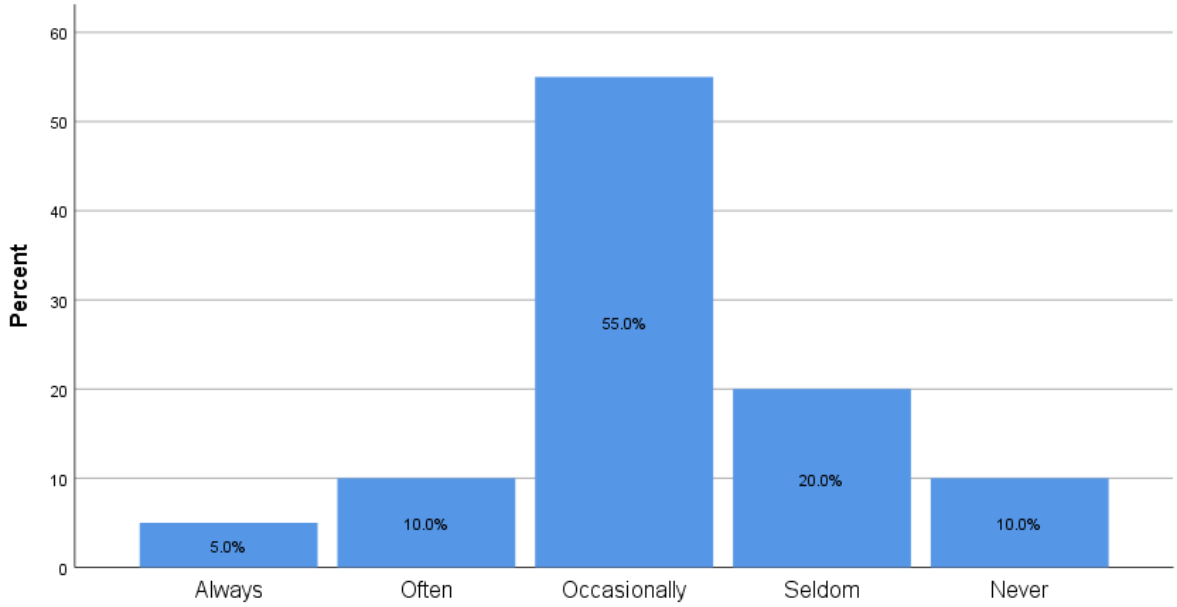



**Figure 5.32: Bar Chart showing respondents' views on whether or not project delays are caused by poor communication and coordination by contractor with the other parties. (Source: compiled by the author)**

Table 5.32 and Figure 5.32 above shows that 1 (5%) respondent reported that it is always, 2 (10%) respondents reporting that it is often, more than half 11 (55%) of respondents reporting that it is occasionally, 4 (20%) respondents reported that it is seldom and 2 (10%) respondents reported that the poor communication and coordination by contractor with the other parties has never the cause of project delays.

**Table 5.33: Frequency Table showing respondents' views on whether or not project delays are caused by ineffective planning and scheduling of project by contractor. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 2 | 10.0 | 10.0 | 10.0 |
| Often | 6 | 30.0 | 30.0 | 40.0 |
| Occasionally | 8 | 40.0 | 40.0 | 80.0 |
| Seldom | 3 | 15.0 | 15.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

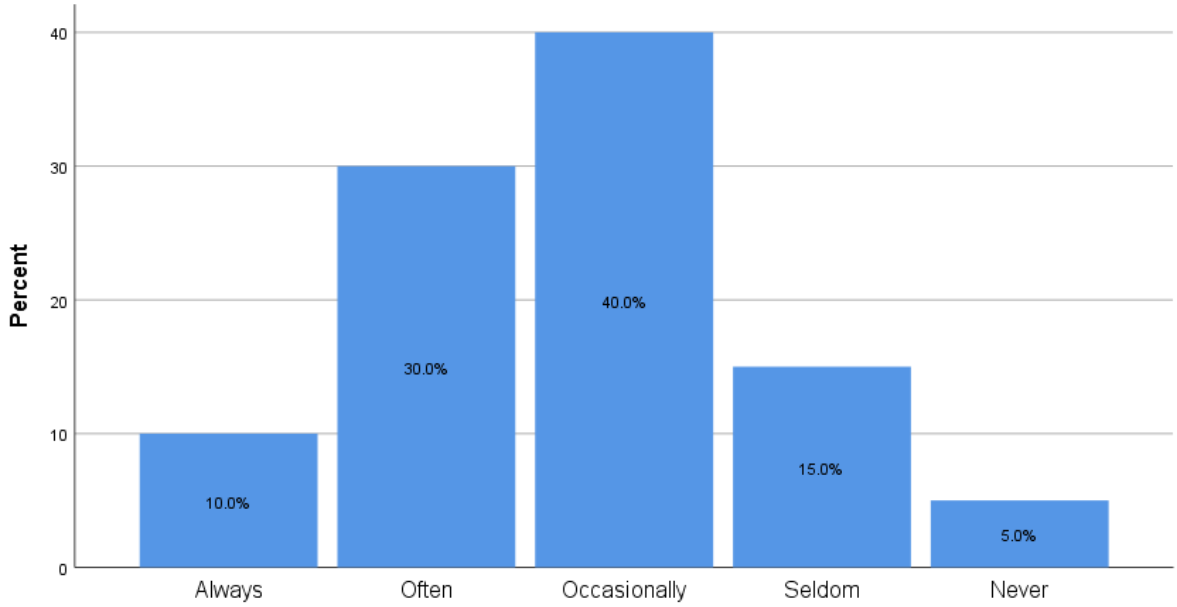



**Figure 5.33: Bar Chart Table showing respondents' views on whether or not project delays are caused by improper construction methods implemented by contractor. (Source: compiled by the author)**

The Frequency Table 5.33 and Bar Chart 5.33 shows that 2 (10%) respondents reported that it is always, 6 (30%) reported that it is often, 8 (40%) reported that it is occasionally, 3 (15%) reported that it is seldom the cause of project delays and 1 (5%) respondent reported that the ineffective planning and scheduling of project by contractor are never the cause of project delays.

**Table 5.34: Frequency Table showing respondents' views on whether or not project delays are caused by improper construction methods implemented by contractor. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 3 | 15.0 | 15.0 | 20.0 |
| Occasionally | 5 | 25.0 | 25.0 | 45.0 |
| Seldom | 9 | 45.0 | 45.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

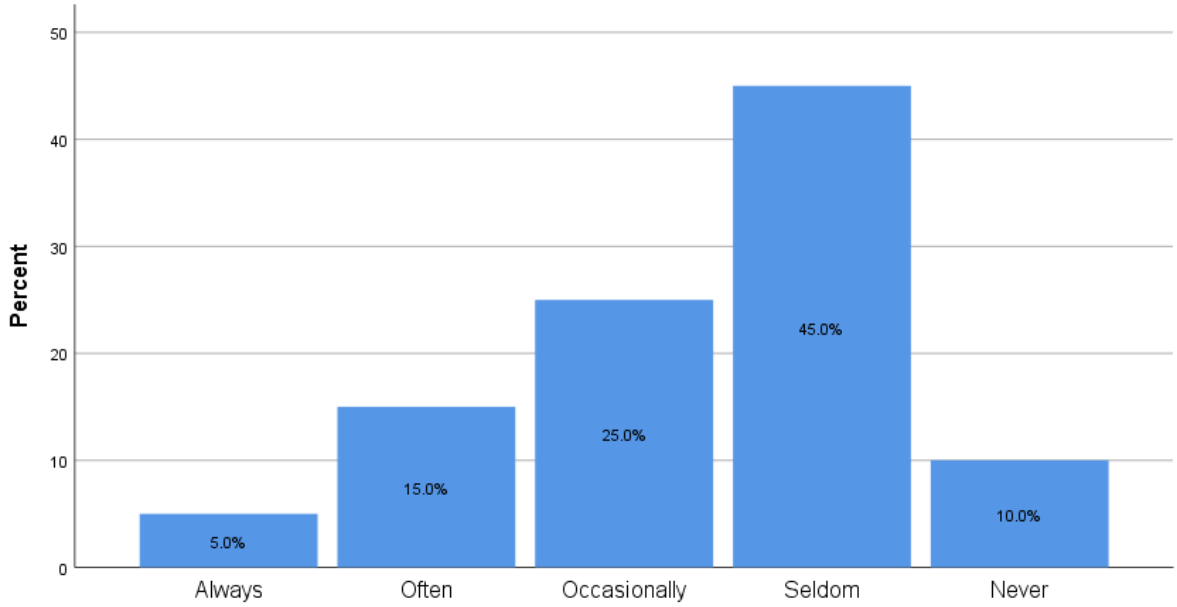



**Figure 5.34: Bar Chart Table showing respondents' views on whether or not project delays are caused by improper construction methods implemented by contractor. (Source: compiled by the author)**

Table 5.34 and Figure 5.34 above shows that 1 (5%) respondent reported that it is always, 3 (15%) reported that it is often, 5 (25%) respondents reporting that it is occasionally, 9 (45%) respondents reported that it is seldom and 2 (10%) respondents reported that improper construction methods implemented by contractor are never the cause of project delays.

**Table 5.35: Frequency Table showing respondents' views on whether or not project delays are caused by delay's in sub-contractor's work. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 3 | 15.0 | 15.0 | 15.0 |
| Occasionally | 9 | 45.0 | 45.0 | 60.0 |
| Seldom | 8 | 40.0 | 40.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

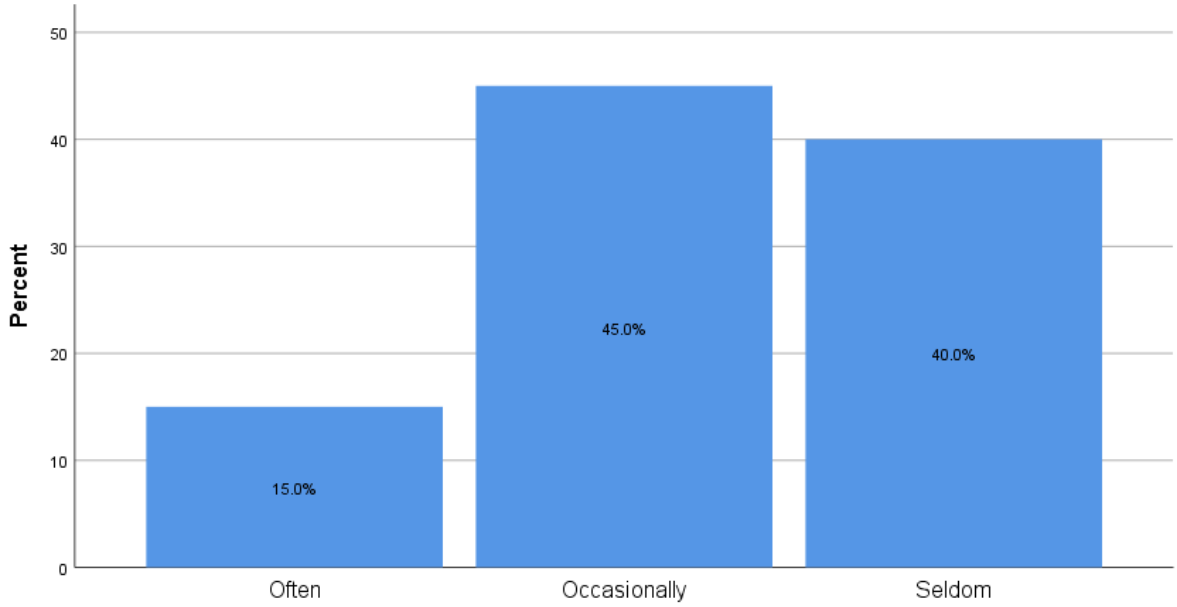



**Figure 5.35: Bar Chart showing respondents' views on whether or not project delays are caused by delay's in sub-contractor's work. (Source: compiled by the author)**

Table 5.35 and Figure 5.35 above shows that 3 (15%) respondents reported that often, while 9 (45%) respondents reporting that it is occasionally and 8 (40%) reported that it is seldom that project delays are caused by delay's in sub-contractor's work.

**Table 5.36: Frequency Table showing respondents' views on whether or not project delays are caused by inadequate contractor's work. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 3 | 15.0 | 15.0 | 20.0 |
| Occasionally | 7 | 35.0 | 35.0 | 55.0 |
| Seldom | 9 | 45.0 | 45.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

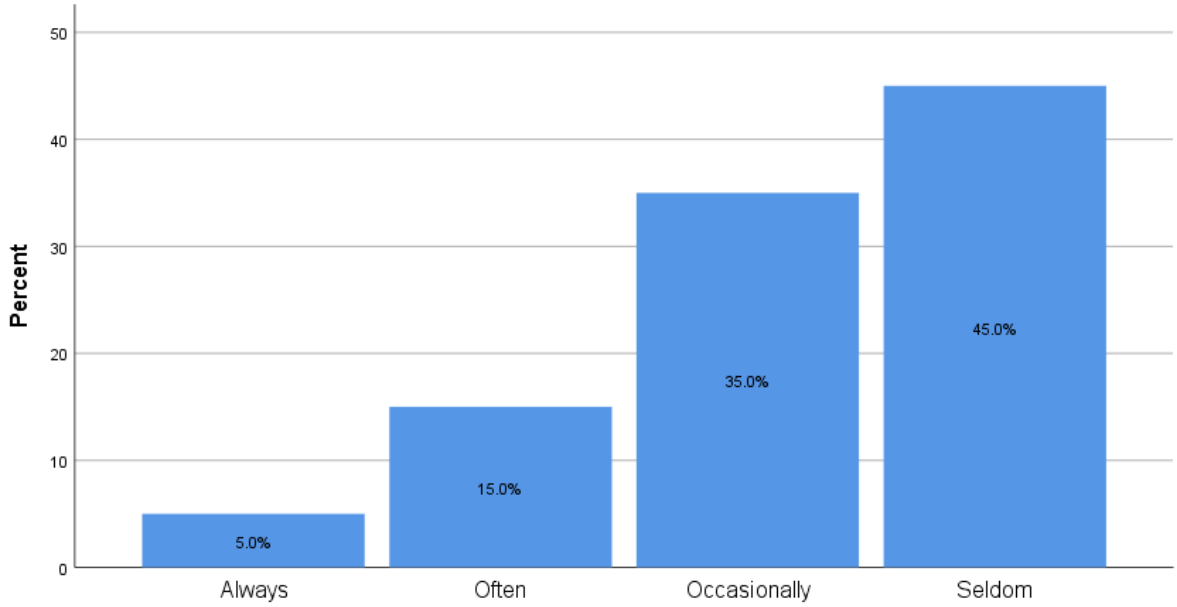



**Figure 5.36: Bar Chart showing respondents' views on whether or not project delays are caused by inadequate contractor's work. (Source: compiled by the author)**

Frequency Table 5.36 and Figure 5.36 above presents that 1 (5%) respondent reported that project delays are always caused by inadequate contractor's work, 3 (15%) reported that it is often, 7 (35%) reporting that it is occasionally and 9 (45%) reported that the inadequate contractor's work are seldom the cause of project delay.

**Table 5.37: Frequency Table showing respondents' views on whether or not project delays are caused by frequent change of sub-contractor's because of their inefficient work. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 2 | 10.0 | 10.0 | 10.0 |
| Occasionally | 5 | 25.0 | 25.0 | 35.0 |
| Seldom | 11 | 55.0 | 55.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

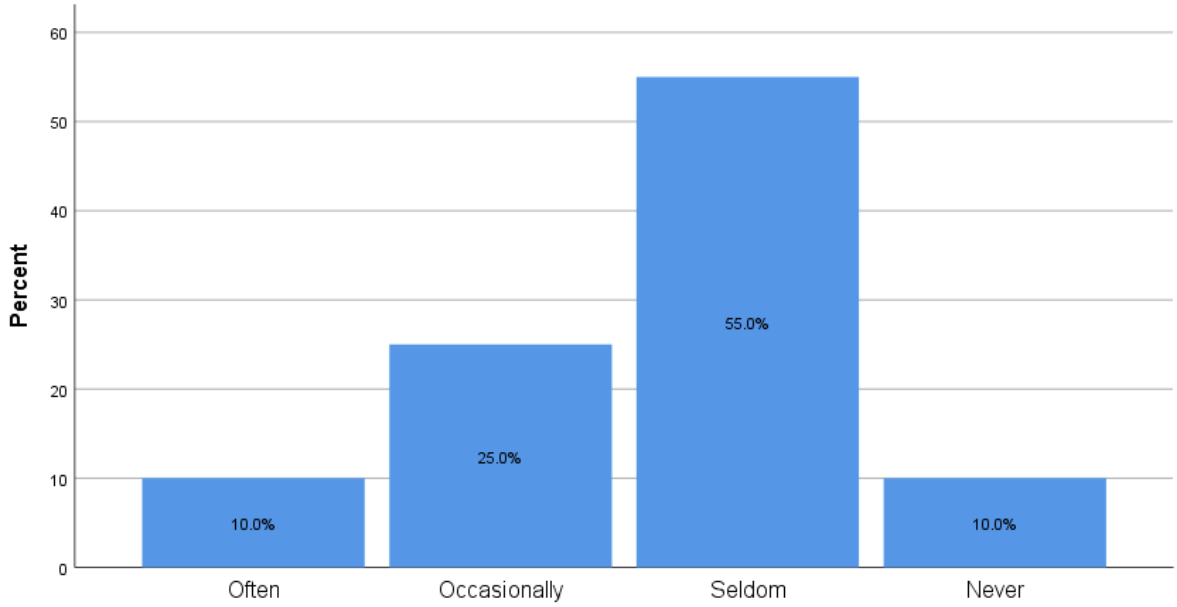



**Figure 5.37: Bar Chart showing respondents' views on whether or not project delays are caused by frequent change of sub-contractor's because of their inefficient work. (Source: compiled by the author)**

The Table and Bar Chart above shows that 2 (10%) respondents reported that often, 5 (25%) respondents reporting that it is occasionally, more than half 11 (55%) respondents reported it is seldom and 2 (10%) respondents reported that the frequent change of sub-contractor's because of their inefficient work is never the cause of project delays.

**Table 5.38: Frequency Table showing respondents' views on whether or not project delays are caused by poor qualification of the contractor's technical staff. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 1 | 5.0 | 5.0 | 10.0 |
| Occasionally | 5 | 25.0 | 25.0 | 35.0 |
| Seldom | 8 | 40.0 | 40.0 | 75.0 |
| Never | 5 | 25.0 | 25.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

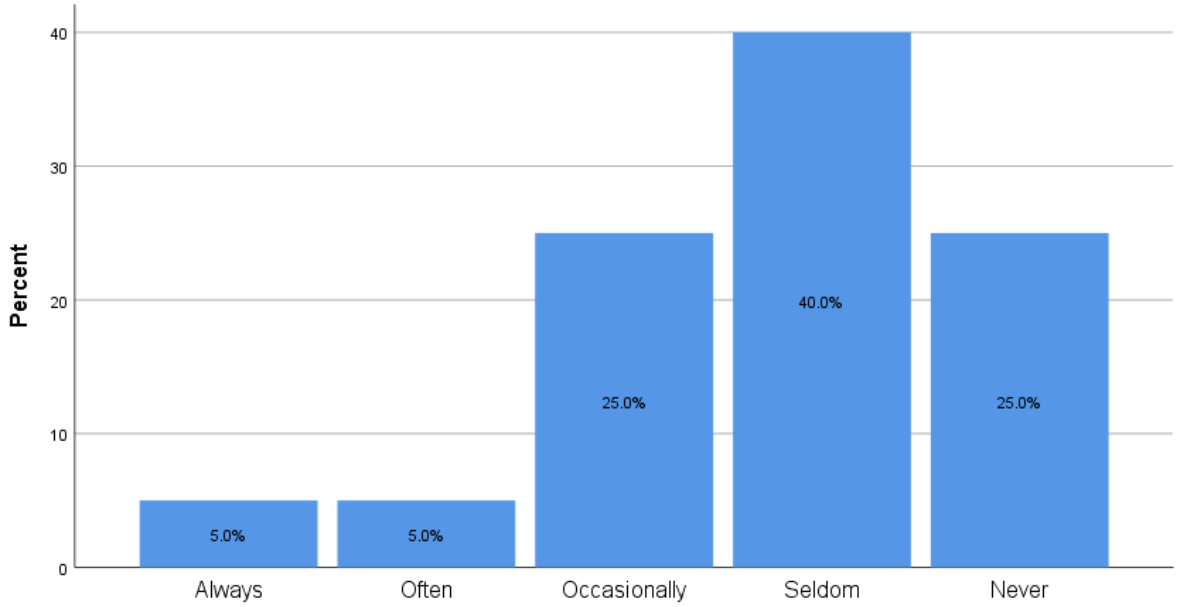



**Figure 5.38: Bar Chart showing respondents' views on whether or not project delays are caused by poor qualification of the contractor's technical staff. (Source: compiled by the author)**

Above Table 5.38 and Figure 5.38 shows that 1 (5%) respondent reported that always, 1 (5%) respondent reporting that it often, 5 (25%) reported that it is occasionally, 8 (40%) respondents reported that it seldom and 5 (25%) respondents reported that poor qualification of the contractor's technical staff has never been the cause of project delays.

**Table 5.39: Frequency Table showing respondents' views on whether or not project delays are caused by delay in site mobilization. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 1 | 5.0 | 5.0 | 10.0 |
| Occasionally | 10 | 50.0 | 50.0 | 60.0 |
| Seldom | 4 | 20.0 | 20.0 | 80.0 |
| Never | 4 | 20.0 | 20.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

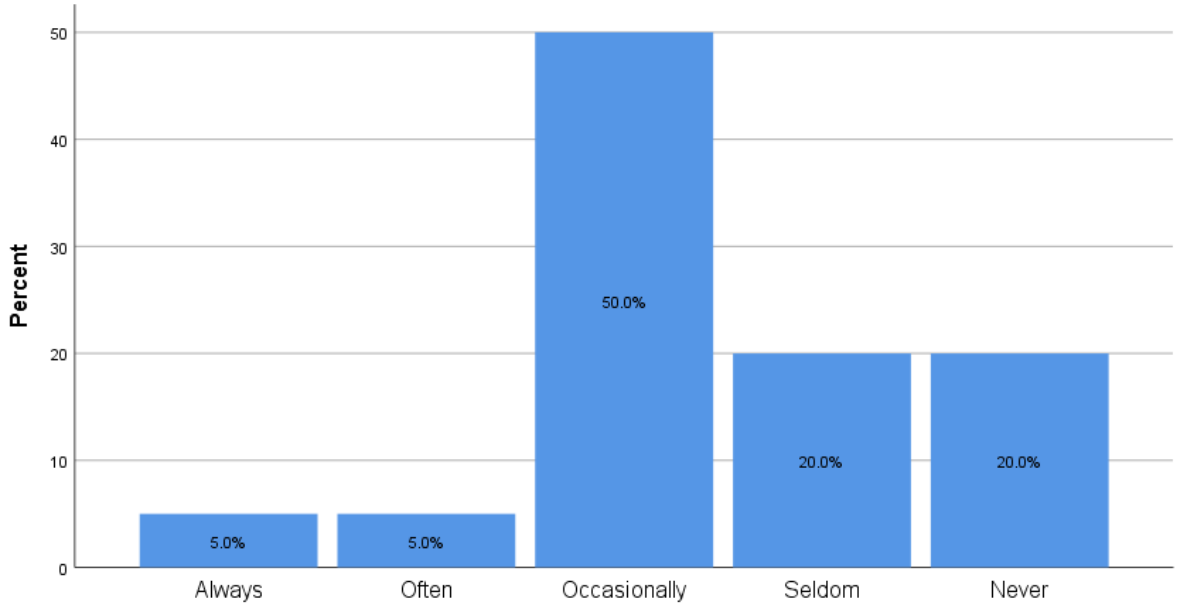



**Figure 5.39: Bar Chart showing respondents' views on whether or not project delays are caused by delay in site mobilization. (Source: compiled by the author)**

Table 5.39 and Figure 5.39 presents that 1 (5%) respondent reported always, 1 (5%) reported that are often, while half 10 (50%) reported that it is occasionally, 4 (20%) reported that it is seldom and 4 (20%) reported that delays in site mobilisation are never the cause of project delay.

**Table 5.40: Frequency Table showing respondents' views on whether or not project delays are caused by delay in performing inspection and testing by consultant. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 2 | 10.0 | 10.0 | 10.0 |
| Often | 2 | 10.0 | 10.0 | 20.0 |
| Occasionally | 4 | 20.0 | 20.0 | 40.0 |
| Seldom | 11 | 55.0 | 55.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

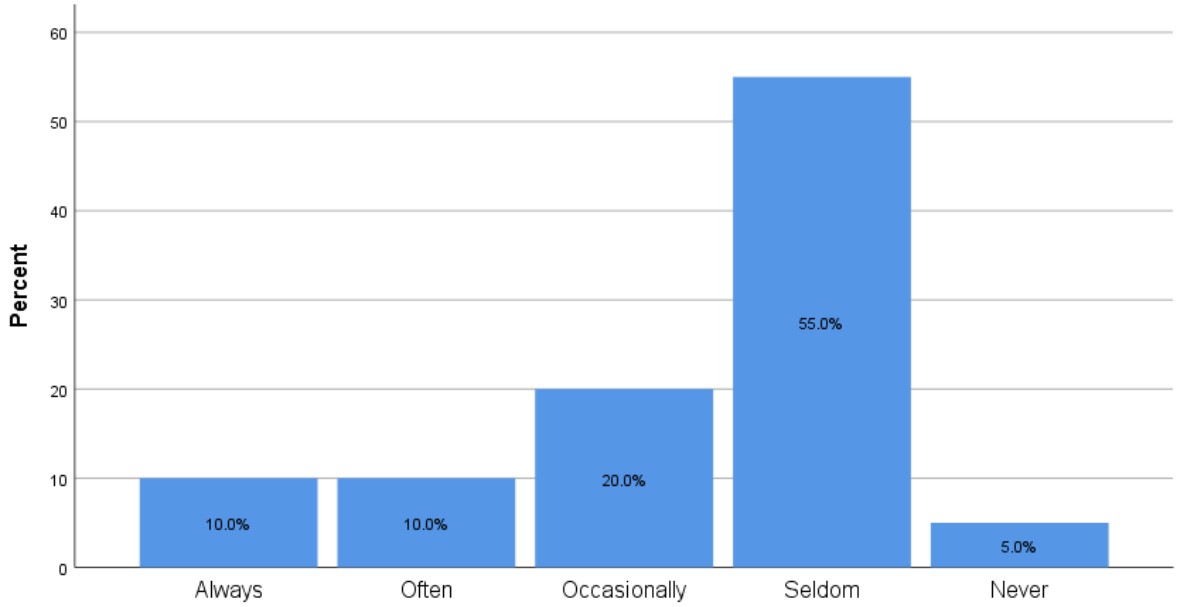



**Figure 5.40: Bar Chart showing respondents' views on whether or not project delays are caused by delay in performing inspection and testing by consultant (Source: compiled by the author)**

Table 5.40 and Figure 5.40 above shows that 2 (10%) respondents reported that project delays are always caused by delay in performing inspection and testing by consultant, 2 (10%) reported that it is often, 4 (20%) respondents reporting that it is occasionally, more than half 11 (55%) respondents reported that it is seldom and 1 (5%) reported that project delays are never caused by delay in performing inspection and testing by consultant.

**Table 5.41: Frequency Table showing respondents' views on whether or not project delays are caused by delay in approving major changes in the scope of work by consultant. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 3 | 15.0 | 15.0 | 15.0 |
| Often | 2 | 10.0 | 10.0 | 25.0 |
| Occasionally | 6 | 30.0 | 30.0 | 55.0 |
| Seldom | 8 | 40.0 | 40.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

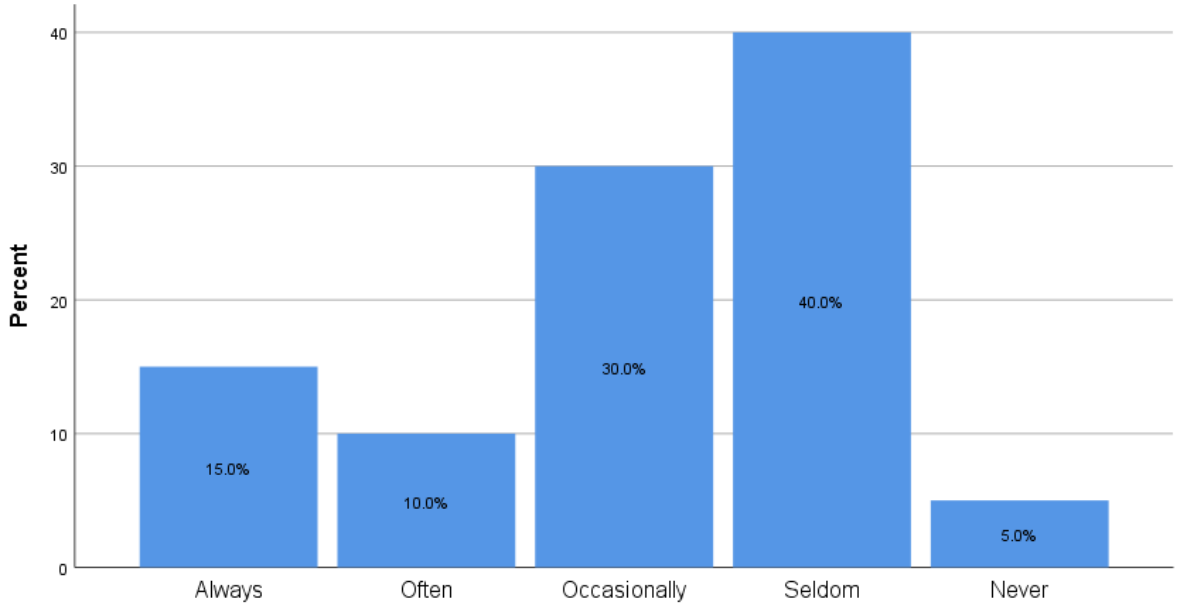



**Figure 5.41: Bar Chart showing respondents' views on whether or not project delays are caused by delay in approving major changes in the scope of work by consultant. (Source: compiled by the author)**

Table 5.41 and Figure 5.41 presents that 3 (15%) respondents reported that project delays are always, 2 (10%) reported that it is often, 6 (30%) reported that it occasionally, 8 (40%) reported that it is seldom and 1 (5%) reported that project delays are never caused by delay in approving major changes in the scope of work by consultant.

**Table 5.42: Frequency Table showing respondents' views on whether or not project delays are caused by inflexibility of consultant. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 4 | 20.0 | 20.0 | 20.0 |
| Occasionally | 5 | 25.0 | 25.0 | 45.0 |
| Seldom | 10 | 50.0 | 50.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

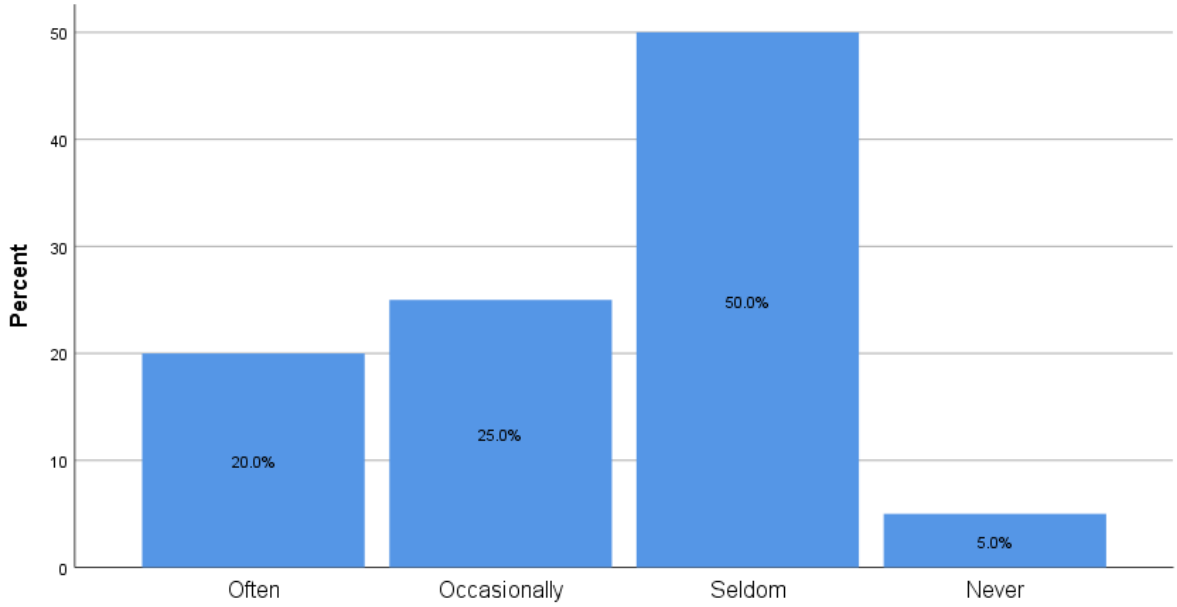



**Figure 5.42: Bar Chart showing respondents' views on whether or not project delays are caused by inflexibility of consultant. (Source: compiled by the author)**

The Frequency Table 5.42 and Figure 5.42 presents that 4 (20%) respondents reported that project delays are often by inflexibility of consultant, 5 (25%) reported that inflexibility occasionally cause project delays, half 10 (50%) respondents reported that inflexibility of consultant is seldom the cause of project delays and 1 (5%) reported that inflexibility of consultant has never caused project delays.

**Table 5.43: Frequency Table showing respondents' views on whether or not project delays are caused by poor communication/coordination between the consultant and other parties. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 2 | 10.0 | 10.0 | 15.0 |
| Occasionally | 7 | 35.0 | 35.0 | 50.0 |
| Seldom | 7 | 35.0 | 35.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

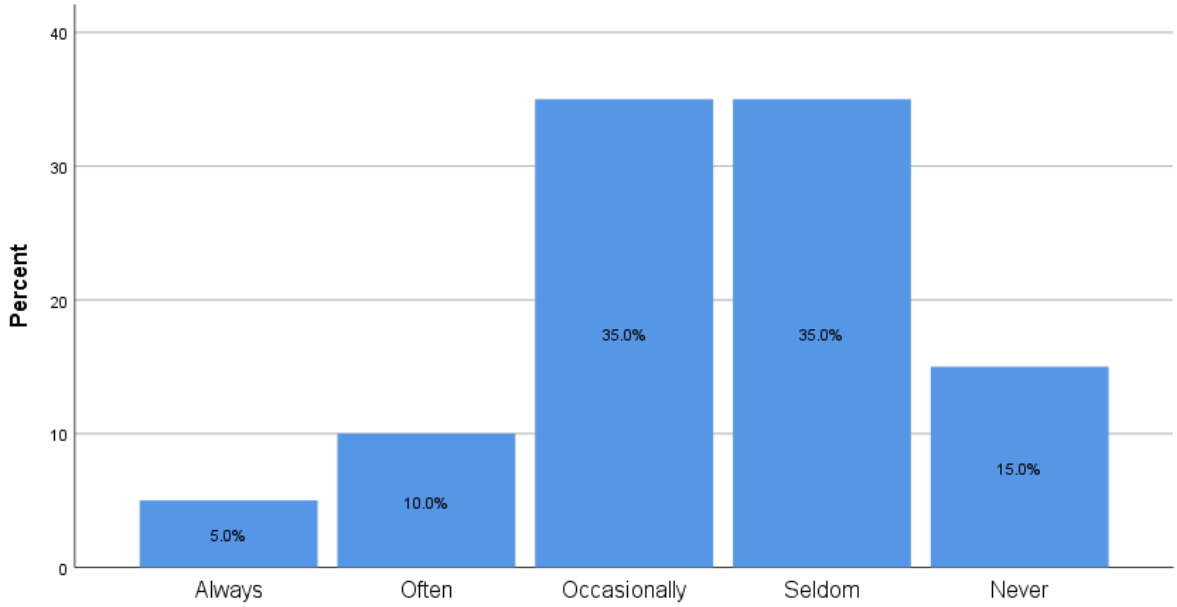



**Figure 5.43: Bar Chart showing respondents' views on whether or not project delays are caused by poor communication/coordination between the consultant and other parties. (Source: compiled by the author)**

Table 5.43 and Figure 5.43 above shows that 1 (5%) respondent reported that it always, 2 (10%) reported that it often, 7 (35%) reported that it occasionally, 7 (35%) reported that it seldom and 3 (15%) reported that project delays are never caused poor communication or poor coordination between the consultant and other parties.

**Table 5.44: Frequency Table showing respondents' views of design documents by consultant on whether or not project delays are caused by late reviewing and approving. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 4 | 20.0 | 20.0 | 25.0 |
| Occasionally | 9 | 45.0 | 45.0 | 70.0 |
| Seldom | 5 | 25.0 | 25.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

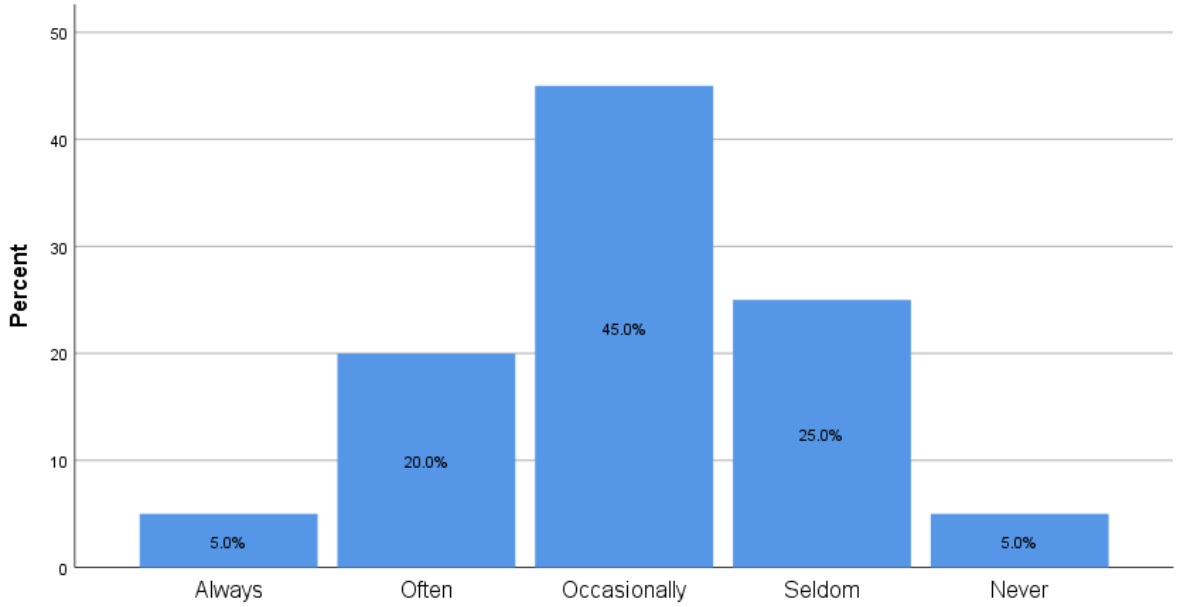



**Figure 5.44: Bar Chart showing respondents' views on whether or not project delays are caused by late reviewing and approving of design documents by consultant. (Source: compiled by the author)**

The Frequency Table and Bar Chart above presents that 1 (5%) respondent reported it is always, 4 (20%) reported that it is often, while 9 (45%) respondents reporting that it is occasionally, 5 (25%) respondents reported that it seldom and 1 (5%) respondent project delays are never caused by late reviewing and approving of design documents by consultant.

**Table 5.45: Frequency Table showing respondents' views on whether or not project delays are caused by conflicts between consultant and design engineer. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 3 | 15.0 | 15.0 | 15.0 |
| Occasionally | 8 | 40.0 | 40.0 | 55.0 |
| Seldom | 8 | 40.0 | 40.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

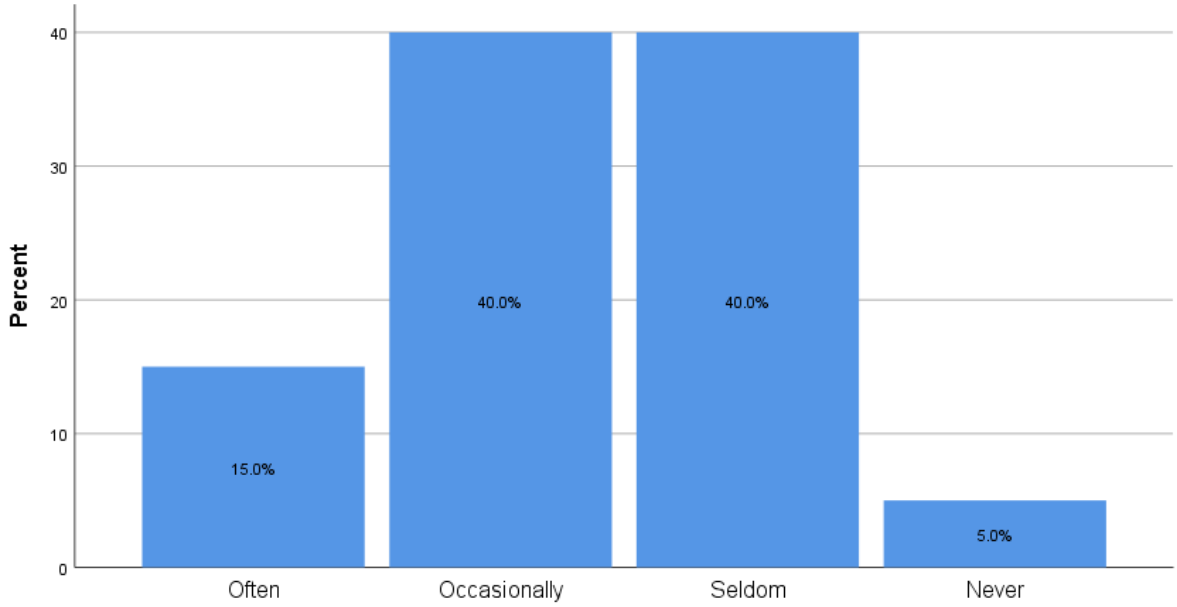



**Figure 5.45: Bar Chart showing respondents' views on whether or not project delays are caused by conflicts between consultant and design engineer. (Source: compiled by the author)**

Table 5.45 and Figure 5.45 above shows that 3 (15%) respondents reported that often, 8 (40%) respondents reporting that it is occasionally, 8 (40%) respondents reported that it seldom and 1 (5%) respondent reported that conflicts between consultant and design engineer are never the cause of project delays.

**Table 5.46: Frequency Table showing respondents' views on whether or not project delays are caused by inadequate experience of consultant. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 3 | 15.0 | 15.0 | 20.0 |
| Occasionally | 5 | 25.0 | 25.0 | 45.0 |
| Seldom | 9 | 45.0 | 45.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

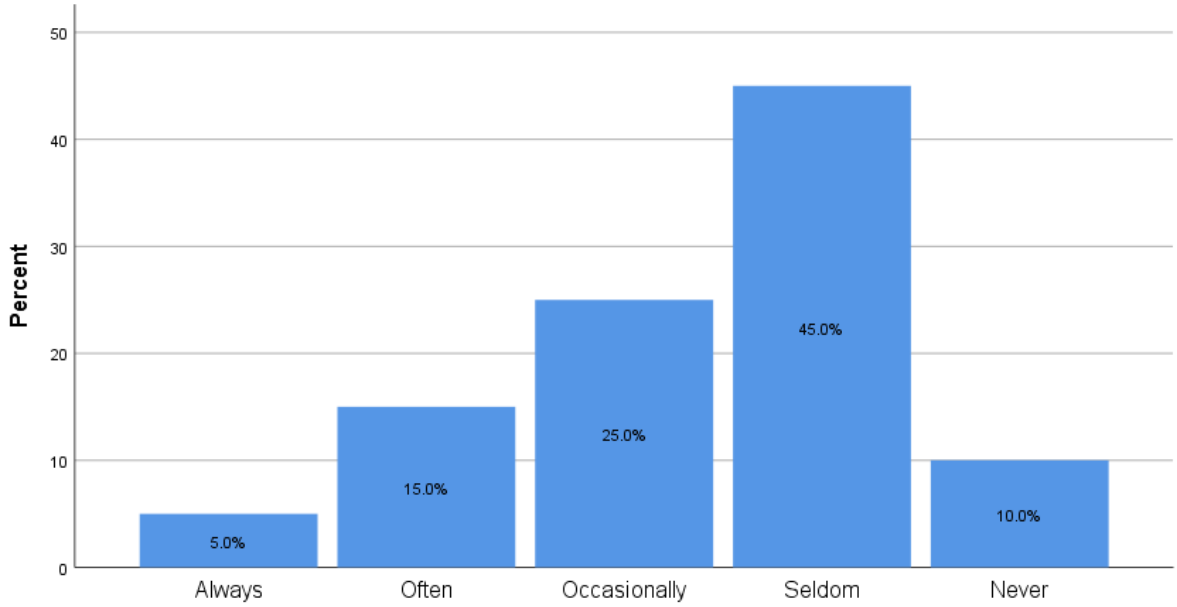



**Figure 5.46: Bar Chart showing respondents' views on whether or not project delays are caused by inadequate experience of consultant. (Source: compiled by the author)**

The Frequency Table Figure 5.46 and Figure 5.46 above presents that 1 (5%) respondent reported it is always, 3 (15%) reported that it is often, while 5 (25%) respondents reporting that it is occasionally, 9 (45%) respondents reported that it seldom and 2 (10%) respondents project delays are never caused by inadequate experience of consultant.

**Table 5.47: Frequency Table showing respondents' views on whether or not project delays are caused by effects of subsurface conditions (e.g. Soil, high water table). (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 9 | 45.0 | 45.0 | 45.0 |
| Occasionally | 4 | 20.0 | 20.0 | 65.0 |
| Seldom | 6 | 30.0 | 30.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

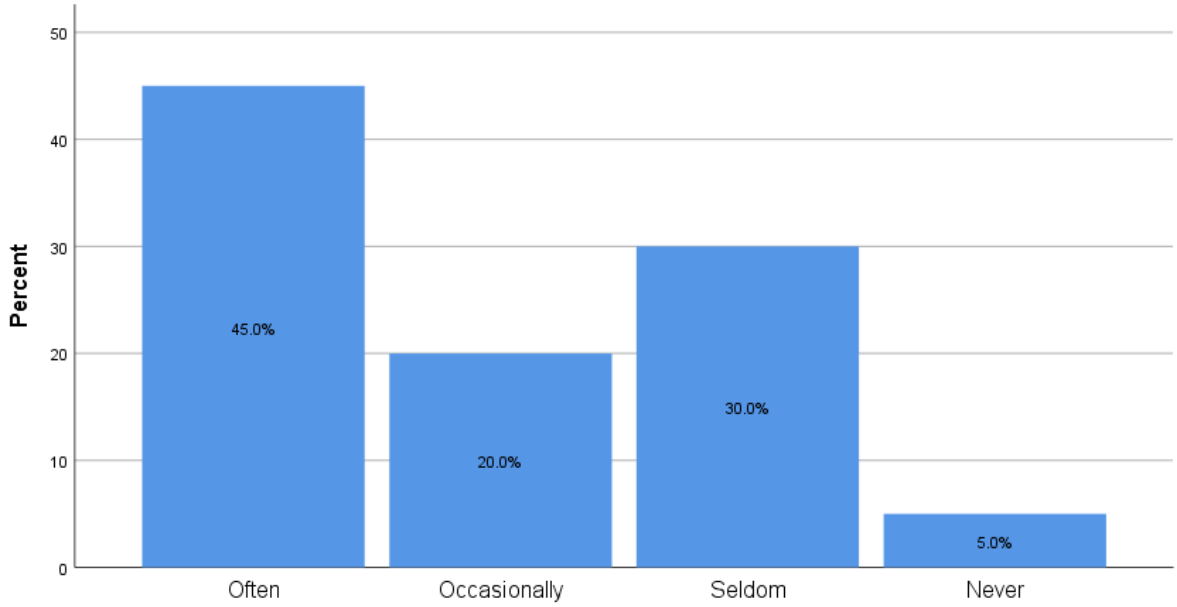



**Figure 5.47: Bar Chart showing respondents' views on whether or not project delays are caused by effects of subsurface conditions (e.g. Soil, high water table). (Source: compiled by the author)**

Table 5.47 and Figure 5.47 above shows that 9 (45%) respondents reported that project delays are often caused by effects of subsurface conditions, 4 (20%) respondents reporting that it is occasionally, 6 (30%) respondents reported that it seldom and 1 (5%) respondent reported effects of subsurface conditions are never the cause of project delays.

**Table 5.48: Frequency Table showing respondents' views on whether or not project delays are caused by delay in obtaining permits from municipality. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 6 | 30.0 | 30.0 | 30.0 |
| Occasionally | 5 | 25.0 | 25.0 | 55.0 |
| Seldom | 9 | 45.0 | 45.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

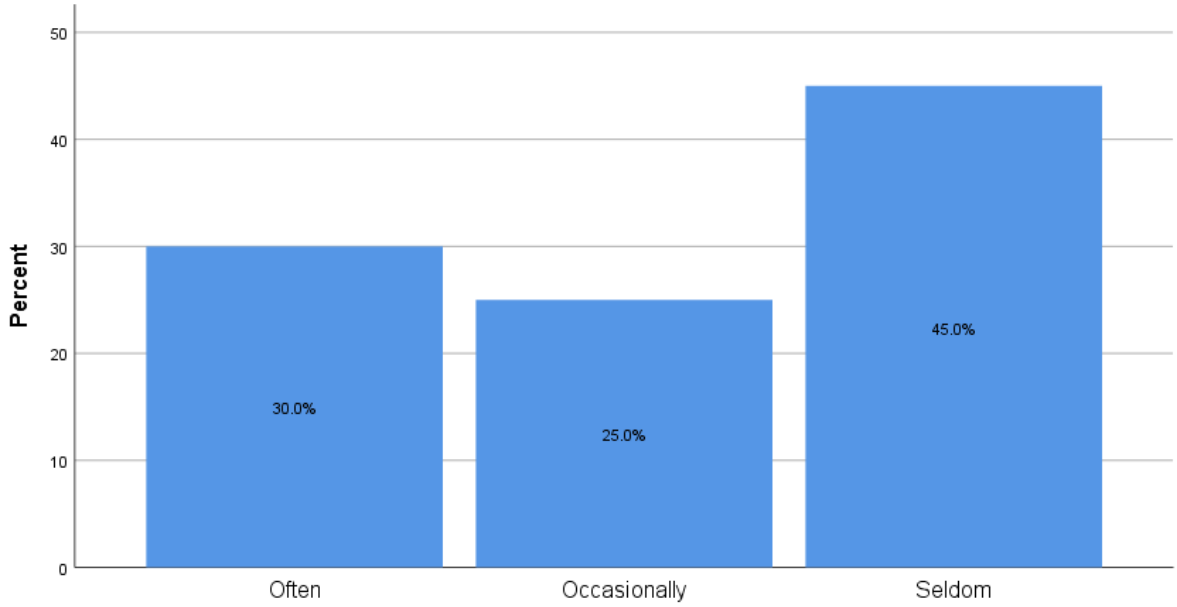



**Figure 5.48: Bar Chart showing respondents' views on whether or not project delays are caused by delay in obtaining permits from municipality(Source: compiled by the author)**

The Frequency Table and Bar Chart above shows that 6 (30%) respondents reported that project delays are often caused by obtaining permits from municipality while 5 (25%) respondents reporting that it is occasionally and 9 (45%) respondents reported that obtaining permits from municipality is seldom the cause of project delays.

**Table 5.49: Frequency Table showing respondents' views on whether or not project delays are caused by weather conditions (Rain and heat) effect on construction activities. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Occasionally | 10 | 50.0 | 50.0 | 55.0 |
| Seldom | 7 | 35.0 | 35.0 | 90.0 |
| Never | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

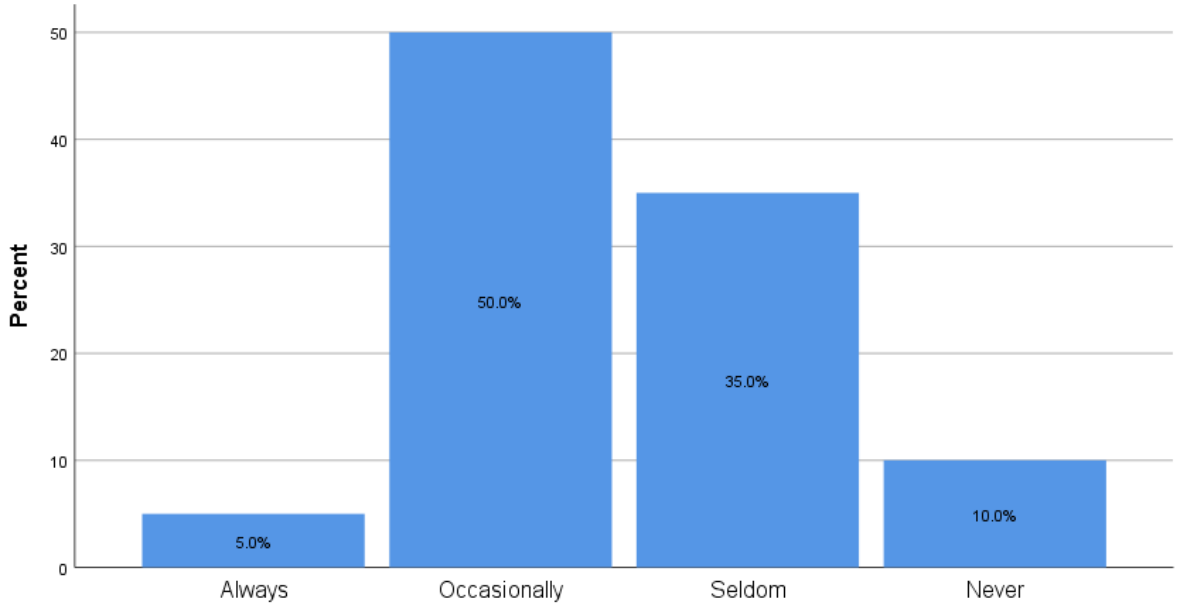



**Figure 5.49: Bar Chart showing respondents' views on whether or not project delays are caused by weather conditions (Rain and heat) effect on construction activities. (Source: compiled by the author)**

Table 5.49 and Figure 5.49 above shows that 1 (15%) respondent reported that always, half 10 (50%) respondents reported that it is occasionally, 7 (35%) respondents reported that it is seldom and 2 (10%) respondents reported that weather conditions are never the cause of project delays.

**Table 5.50: Frequency Table showing respondents' views on whether or not project delays are caused by unavailability of utilities in site (such as water, electricity, telephone, etc.) (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Occasionally | 3 | 15.0 | 15.0 | 15.0 |
| Seldom | 9 | 45.0 | 45.0 | 60.0 |
| Never | 8 | 40.0 | 40.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

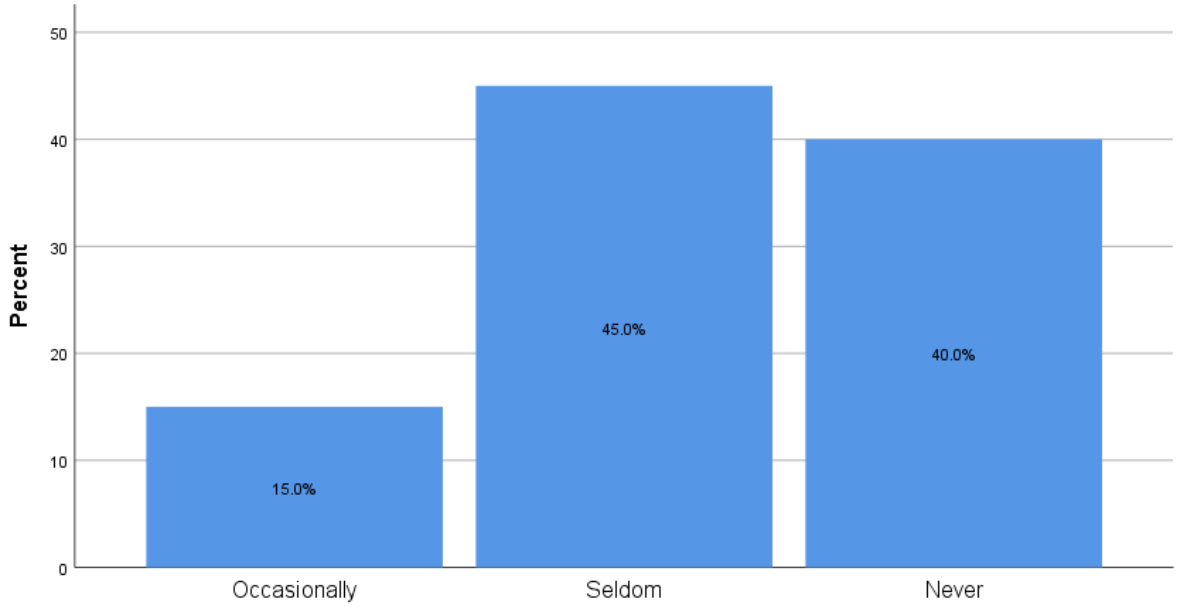



**Figure 5.50: Bar Chart showing respondents' views on whether or not project delays are caused by unavailability of utilities in site (such as water, electricity, telephone, etc.) (Source: compiled by the author)**

Table 5.50 and Figure 5.50 above shows that 3 (15%) respondents reported that it is occasionally, 9 (45%) respondents reported that it seldom and 8 (40%) respondents reported that the unavailability of utilities in site have never been the cause of project delays.

**Table 5.51: Frequency Table showing respondents' views on whether or not project delays are caused by effect of social and cultural factors. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Occasionally | 2 | 10.0 | 10.0 | 10.0 |
| Seldom | 11 | 55.0 | 55.0 | 65.0 |
| Never | 7 | 35.0 | 35.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

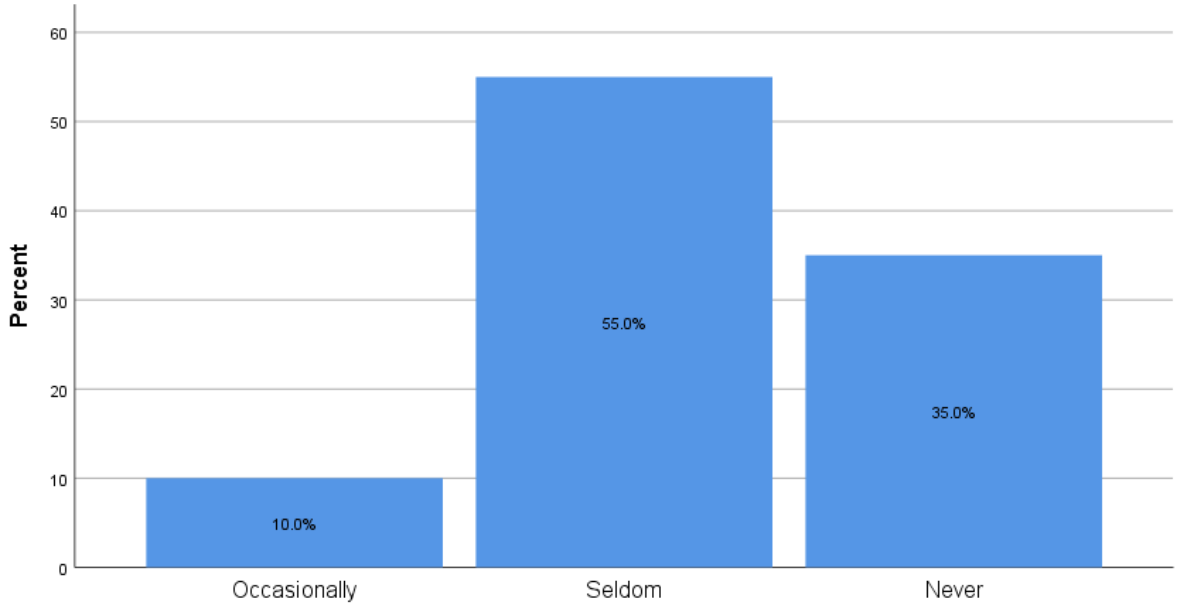



**Figure 5.51: Bar Chart showing respondents' views on whether or not project delays are caused by effect of social and cultural factors. (Source: compiled by the author)**

The table and Bar Chart above shows that 2 (10%) respondents reporting that it is occasionally, more than half 11 (55%) respondents reported that the effect of social and cultural factors are seldom the cause of project delays and 7 (35%) respondents reported that the effect of social and cultural factors are never the cause of project delays.

**Table 5.52: Frequency Table showing respondents' views on whether or not project delays are caused by traffic control and restriction at job site. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 2 | 10.0 | 10.0 | 10.0 |
| Occasionally | 4 | 20.0 | 20.0 | 30.0 |
| Seldom | 11 | 55.0 | 55.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

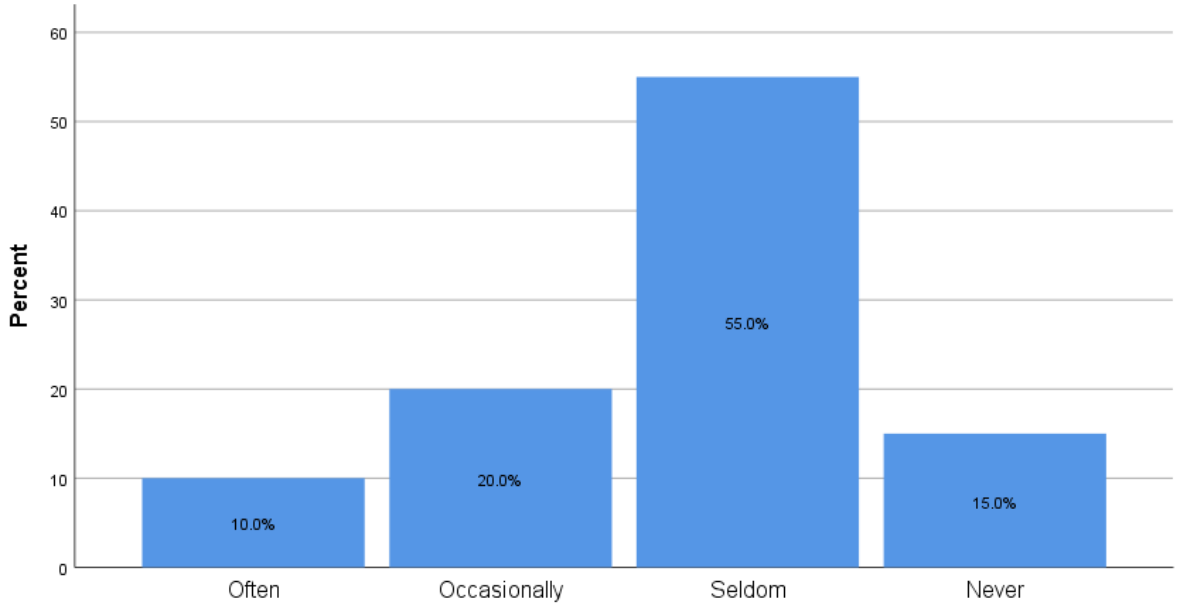



**Figure 5.52: Bar Chart showing respondents' views on whether or not project delays are caused by traffic control and restriction at job site. (Source: compiled by the author)**

Frequency Table 5.52 and Figure 5.52 shows that 2 (10%) respondents reported often, 4 (20%) respondents reporting that it is occasionally, 11 (55%) respondents reported that it seldom and 3 (15%) respondents reported that traffic control and restriction at job site are never the cause of project delays.

**Table 5.53: Frequency Table showing respondents' views on whether or not project delays are caused by accident during construction. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 1 | 5.0 | 5.0 | 5.0 |
| Occasionally | 3 | 15.0 | 15.0 | 20.0 |
| Seldom | 11 | 55.0 | 55.0 | 75.0 |
| Never | 5 | 25.0 | 25.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

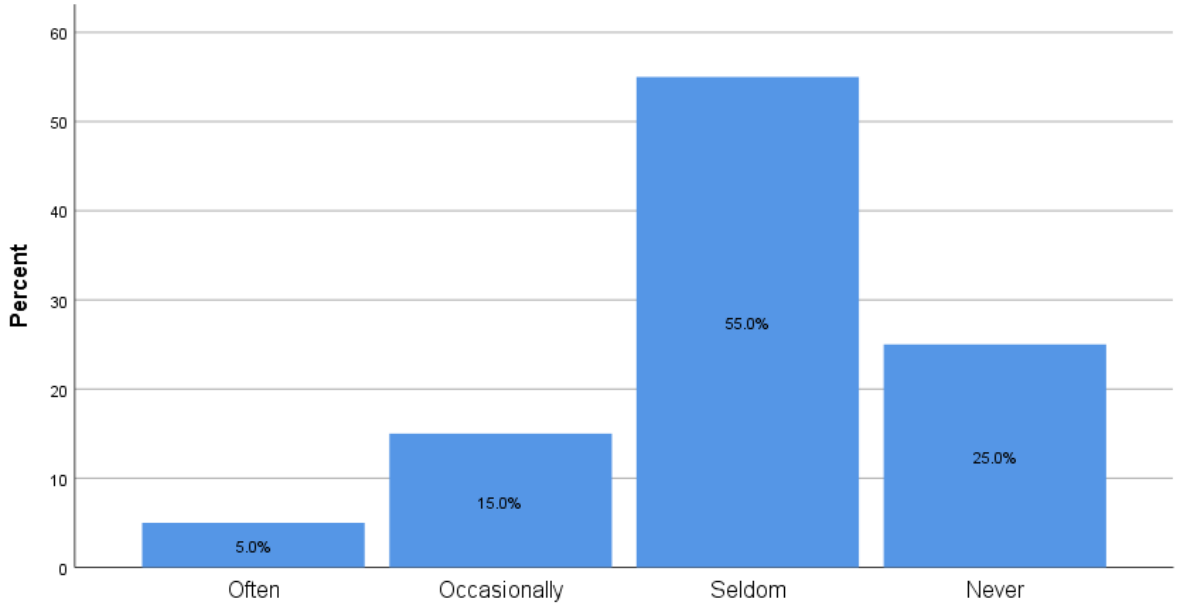



**Figure 5.53: Bar Chart showing respondents' views on whether or not project delays are caused by accident during construction. (Source: compiled by the author)**

Table 5.53 and Figure 5.53 above shows that 1 (10%) respondent reported that often, 3 (15%) respondents reporting that it is occasionally, 11 (55%) respondents reported that it is seldom and 5 (25%) respondents reported that accident during construction are never the cause of project delays.

**Table 5.54: Frequency Table showing respondents' views on whether or not project delays are caused by different site (ground) conditions. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 1 | 5.0 | 5.0 | 5.0 |
| Occasionally | 8 | 40.0 | 40.0 | 45.0 |
| Seldom | 8 | 40.0 | 40.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

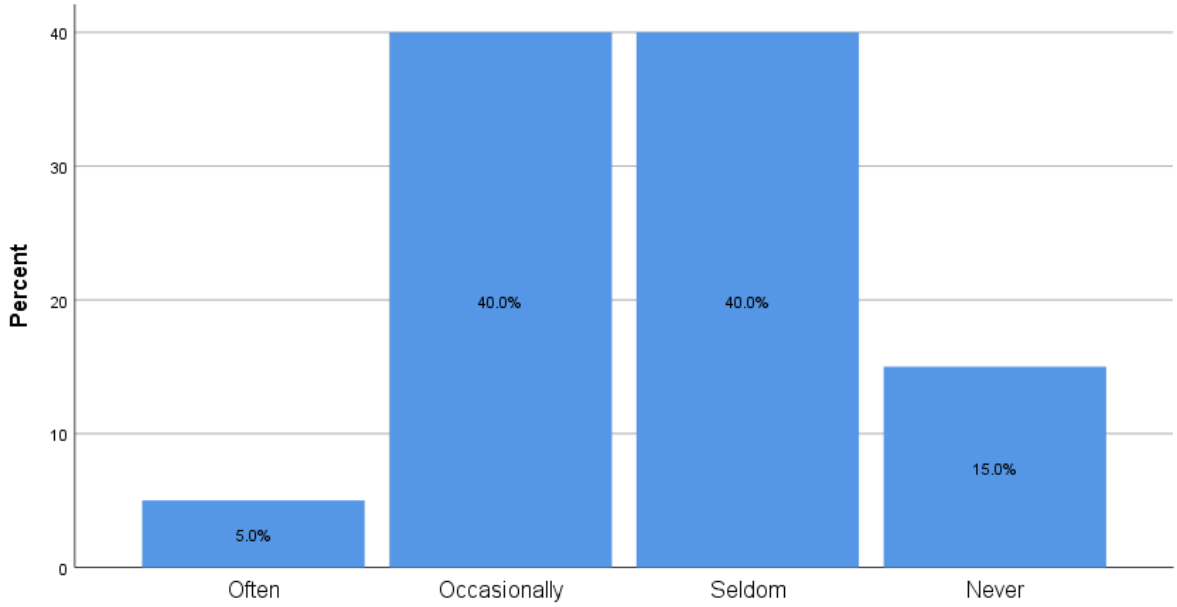



**Figure 5.54: Bar Chart showing respondents' views on whether or not project delays are caused by different site (ground) conditions. (Source: compiled by the author)**

Table 5.54 and Figure 5.54 above shows that 1 (10%) respondent reported that often, 8 (40%) respondents reporting that it is occasionally, 8 (40%) respondents reported that it is seldom and 3 (15%) respondents reported that different site (ground) conditions are never the cause of project delays.

**Table 5.55: Frequency Table showing respondents' views on whether or not project delays are caused by changes in government regulations and laws. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 2 | 10.0 | 10.0 | 10.0 |
| Occasionally | 7 | 35.0 | 35.0 | 45.0 |
| Seldom | 10 | 50.0 | 50.0 | 95.0 |
| Never | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

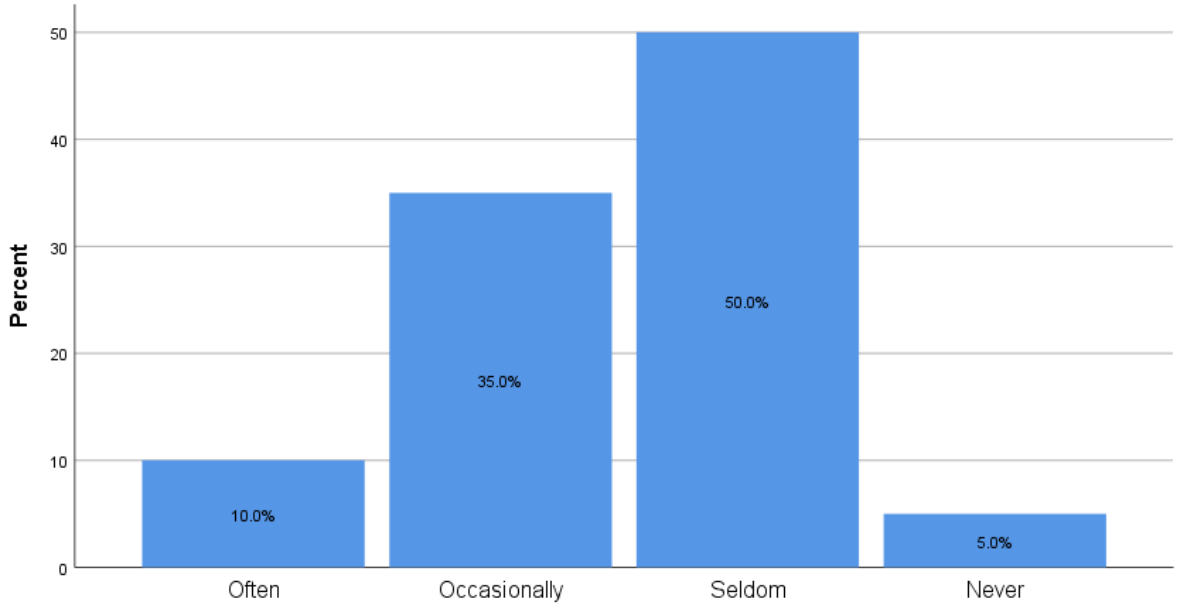



**Figure 5.55: Bar Chart showing respondents' views on whether or not project delays are caused by changes in government regulations and laws. (Source: compiled by the author)**

Table 5.55 and Figure 5.55 shows that 2 (10%) respondents reported that often, 7 (35%) respondents reporting that it is occasionally, half 10 (50%) respondents reported it is seldom and 1 (5%) respondent reported that the changes in government regulations and laws are never the cause of project delays.

**Table 5.56: Frequency Table showing respondents' views on whether or not project delays are caused by delay in providing services from utilities (such as water, electricity). (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Often | 1 | 5.0 | 5.0 | 5.0 |
| Occasionally | 5 | 25.0 | 25.0 | 30.0 |
| Seldom | 9 | 45.0 | 45.0 | 75.0 |
| Never | 5 | 25.0 | 25.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

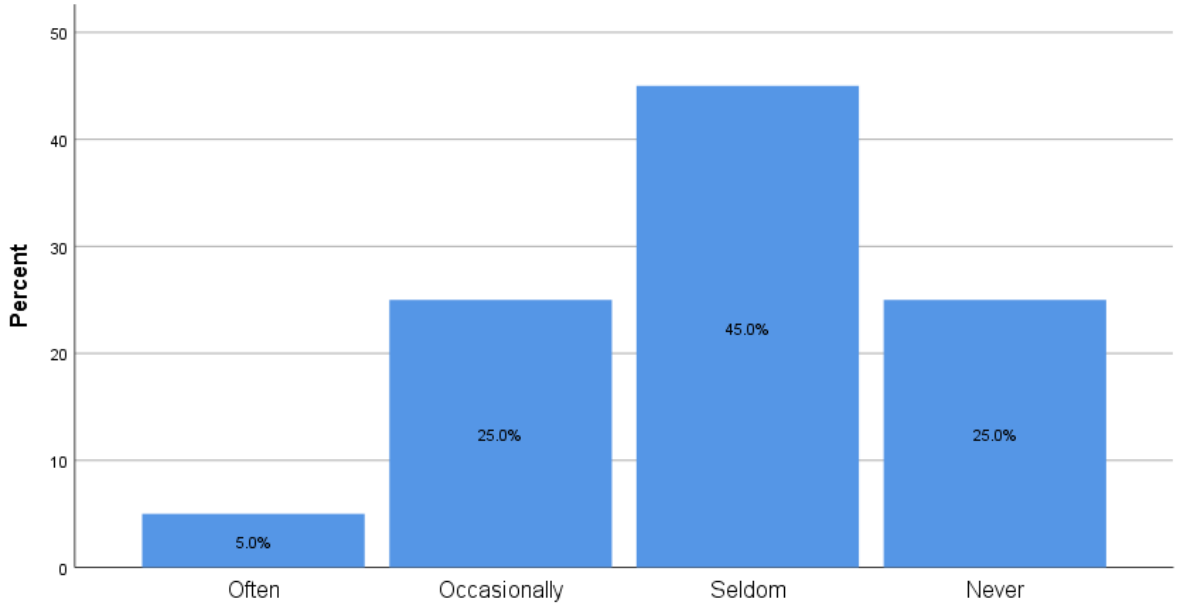



**Figure 5.56: Bar Chart showing respondents' views on whether or not project delays are caused by delay in providing services from utilities (such as water, electricity). (Source: compiled by the author)**

Table 5.56 and Figure 5.56 above shows that 1 (5%) respondent reported often, 5 (25%) respondents reporting that it is occasionally, 9 (45%) respondents reported that it is seldom and 5 (25%) respondents reported that delay in providing services from utilities (such as water, electricity) are never the cause of project delays.

**Table 5.57: Frequency Table showing respondents' views on whether or not project delays are caused by delay in performing final inspection and certificate by a third party. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 1 | 5.0 | 5.0 | 5.0 |
| Often | 1 | 5.0 | 5.0 | 10.0 |
| Occasionally | 6 | 30.0 | 30.0 | 40.0 |
| Seldom | 9 | 45.0 | 45.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

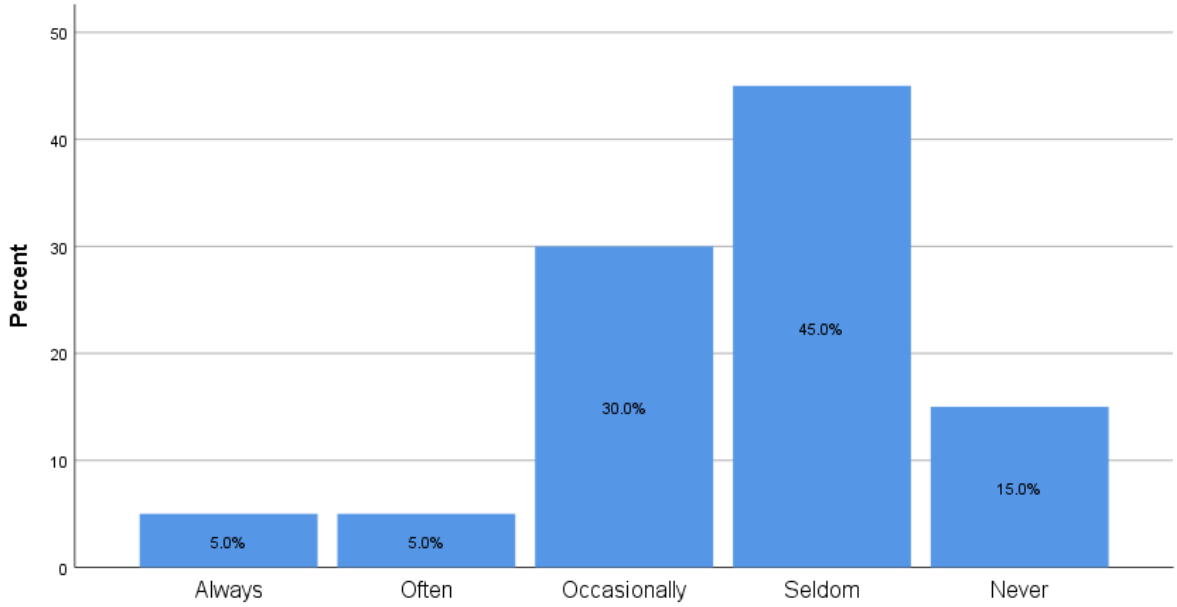



**Figure 5.57: Bar Chart showing respondents' views on whether or not project delays are caused by delay in performing final inspection and certificate by a third party. (Source: compiled by the author)**

The Frequency Table and Bar Chart above presents that 1 (5%) respondent reported it is always, 1 (5%) reported that it is often, while 6 (30%) respondents reporting that it is occasionally, 9 (45%) respondents reported that it seldom and 3 (15%) respondents project delays are never caused by delay in performing final inspection and certificate by a third party.

**Table 5.58: Frequency Table showing respondents' views on whether or not project delays are caused by other. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Poor Specification and rush of awarding contracts | 1 | 5.0 | 14.3 | 14.3 |
| Scope creep by client, occasionally | 1 | 5.0 | 14.3 | 28.6 |
| Late approval of business case by owner | 1 | 5.0 | 14.3 | 42.9 |
| Deferment of projects by owner | 1 | 5.0 | 14.3 | 57.1 |
| Poor planning in the conceptual phase of the project | 1 | 5.0 | 14.3 | 71.4 |
| Unclear scope which lead to scope creeps | 1 | 5.0 | 14.3 | 85.7 |
| Undefined roles and responsibilities | 1 | 5.0 | 14.3 | 100.0 |
| Sub-Total | 7 | 35.0 | 100.0 | |
| No Response | 13 | 65.0 | | |
| Total | 20 | 100.0 | | |

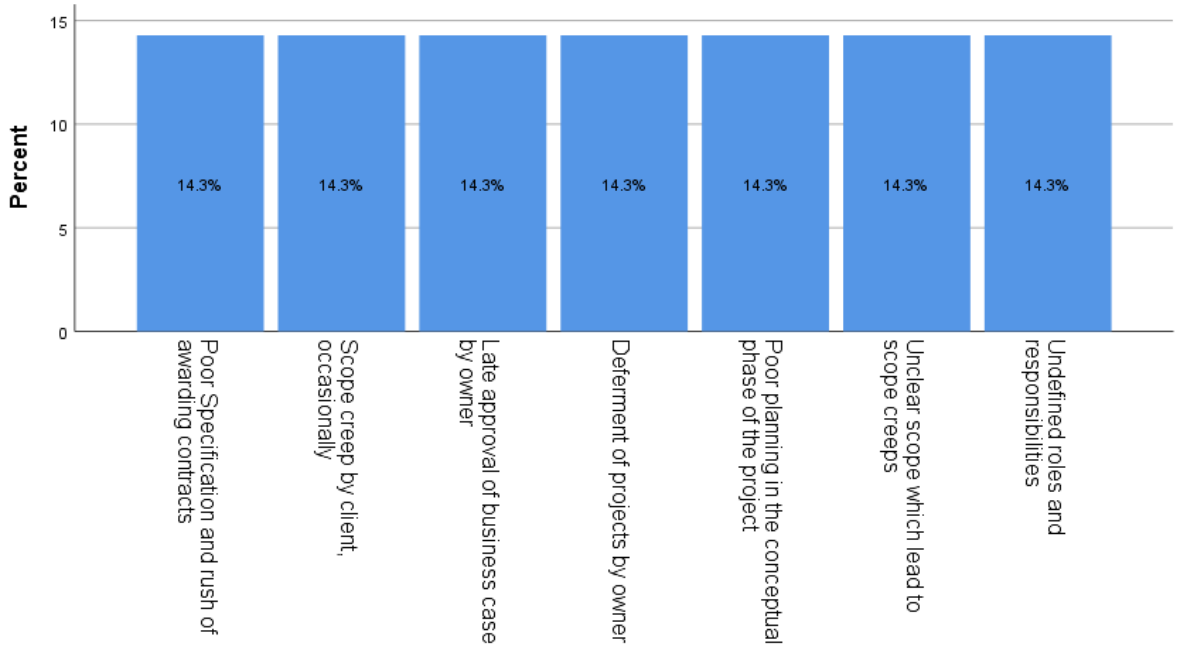



**Figure 5.58: Bar Chart showing respondents' views on whether or not project delays are caused by other. (Source: compiled by the author)**

The above Table and Bar Chart presents project delays caused by other factors. 1 (5%) reported that project delays are caused by poor specification and rush of awarding contracts. 1 (5%) reported that project delays are occasionally caused by scope creep by client. 1 (5%) reported that project delays are caused by late approval of business case by owner. 1 (5%) reported that project delays are caused by deferment of projects by owner. 1 (5%) reported that project delays are caused by poor planning in the conceptual phase of the project. 1 (5%) reported that project delays are caused by unclear scope which lead to scope creeps. 1 (5%) reported that project delays are caused by undefined roles and responsibilities.

## 5.6 SECTION C: PROJECT DELAYS EFFECTS

The third objective investigated the effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA. Two subsections measured this objective, first section measured the project delays effects on budget and second section measured project delays effects on quality.

**Table 5.59: Frequency Table showing respondents' views on whether or not project delays impact on budget. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 11 | 55.0 | 55.0 | 55.0 |
| Often | 7 | 35.0 | 35.0 | 90.0 |
| Occasionally | 2 | 10.0 | 10.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

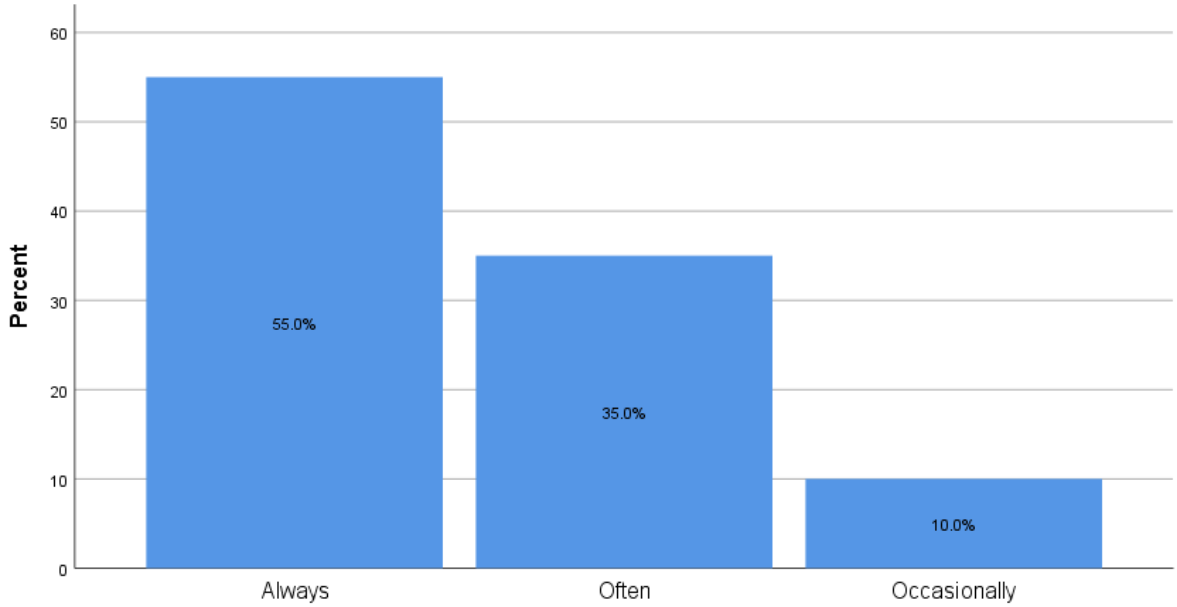



**Figure 5.59: Bar Chart showing respondents' views on whether or not project project delays impact on budget. (Source: compiled by the author)**

The Frequency Table above presents that more than half 11 (55%) respondents reported project delays always impact on budget, 7 (35%) reported that it is often, and 2 (10%) respondents reporting that project delays occasionally impact on budget.

**Table 5.60: Frequency Table showing respondents' views on how much cost overrun do project delay cost. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| > 5 (R Mil) | 4 | 20.0 | 20.0 | 20.0 |
| Between 3 - 5 (R Mil) | 7 | 35.0 | 35.0 | 55.0 |
| < 3 (R Mil) | 8 | 40.0 | 40.0 | 95.0 |
| 0 (R Mil) | 1 | 5.0 | 5.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

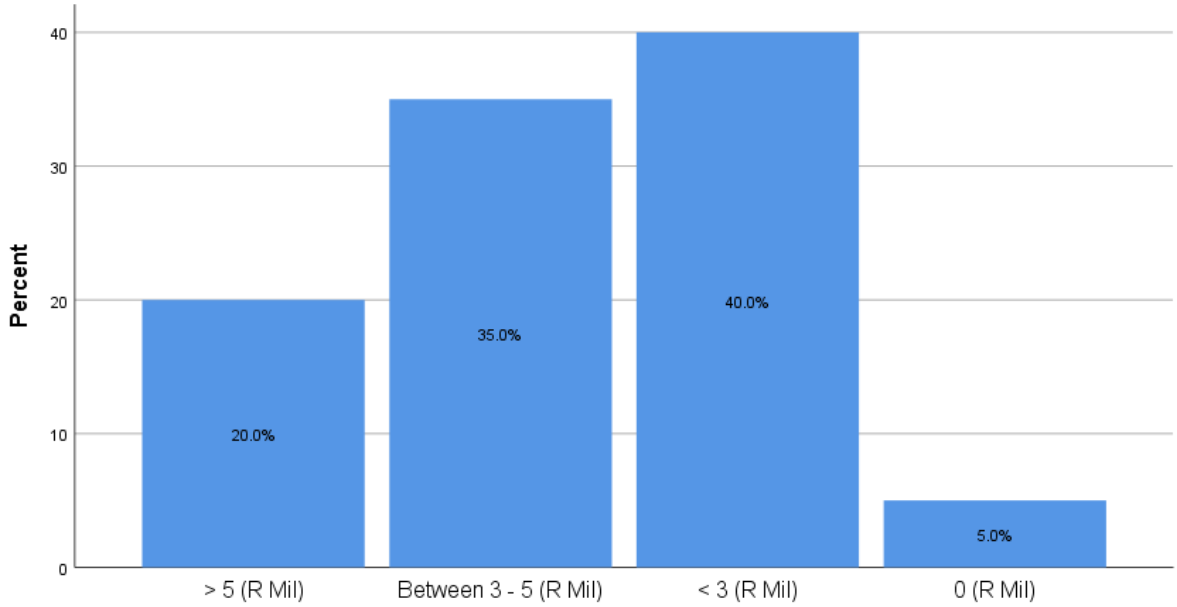



**Figure 5.60: Bar Chart showing respondents' views on how much cost overrun do project delay cost (Source: compiled by the author)**

Frequency Table 5.60 and Figure 5.60 above shows that 4 (20%) respondents reported that project delays cost 5million and more, 7 (35%) reported that it costs between 3 to 5 million, 8 (40%) reported that it costs 3million and less and 1 (5%) reported that project delays have no cost overrun.

**Table 5.61: Frequency Table showing respondents' views on other reasons. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Dependent on the additional scope required by the owner and delay damages per day | 1 | 5.0 | 100.0 | 100.0 |
| No Response | 19 | 95.0 | | |
| Total | 20 | 100.0 | | |

Out of the 20 respondents, only 1 (5%) listed other reason. Even more than a decade ago projects experienced delays and overruns as stated by Odeh and Battaineh (2002) that delays are costly and mostly lead to quarrels and claims. Alaghbari et al. (2007) stated that delay is a severe problem in the building industry. It is expensive for both the client and the service provider. It is explained by Ismail et al (2014) that In NMPP project Company requested additional money from the

Government to help the interest throughout the building of the NMPP and was assigned R4.5bn which was from a Grant Funding Arrangement. The project was planned to be completed by 2010, completion date was moved to 2013. The Projected Overall Cost was increased from R11bn to R23.4bn. Shehu, Endut, Akintoye & Holts (2014), argues that capital project cost overruns are caused by resources cost price increase, poor quality management and increase of labour cost to environment controls.

**Table 5.62: Frequency Table showing whether or not project delays impact on quality. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Always | 3 | 15.0 | 15.0 | 15.0 |
| Often | 5 | 25.0 | 25.0 | 40.0 |
| Occasionally | 7 | 35.0 | 35.0 | 75.0 |
| Seldom | 2 | 10.0 | 10.0 | 85.0 |
| Never | 3 | 15.0 | 15.0 | 100.0 |
| Total | 20 | 100.0 | 100.0 | |

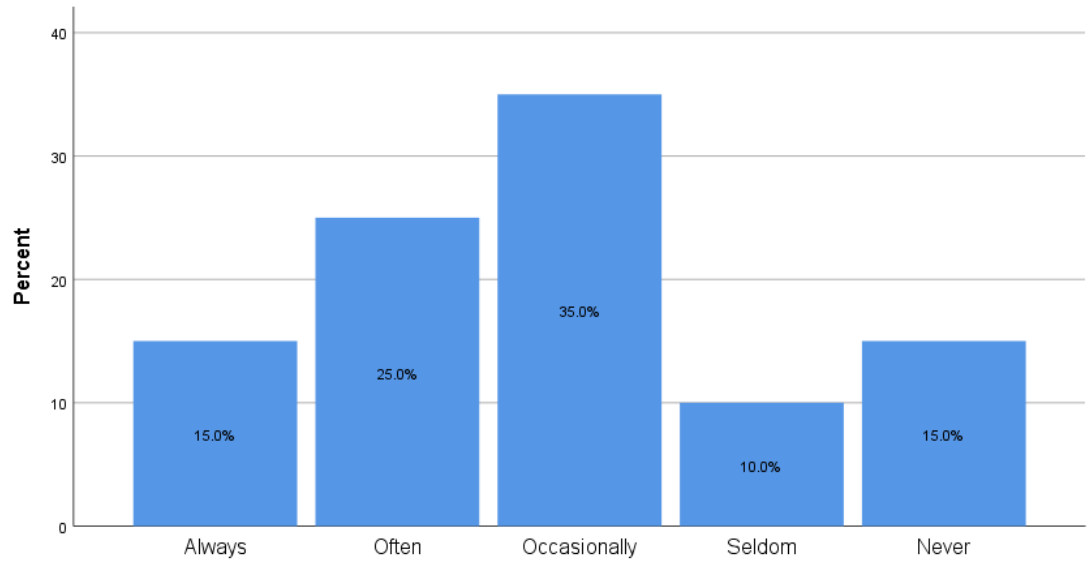



**Figure 5.61: Bar Chart showing whether or not project delays impact on quality. (Source: compiled by the author)**

The Frequency Table and Bar Chart above presents that 3 (15%) respondents reported that project delays always impact on quality, 5 (25%) reported that it is often, 7 (35%) reported that it is occasionally, 2 (10%) reported that it seldom and 3 (15%) respondents reporting that project delays never impact on quality.

**Table 5.63: Frequency Table listing what impact do project delays cause on quality/deliverable. (Source: compiled by the author)**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Poor quality of materials/ products, shortcuts and inconsistency | 4 | 20.0 | 36.4 | 36.4 |
| Rushing of the project to meet objectives and deadlines | 2 | 10.0 | 18.2 | 54.5 |
| Inconsistency | 2 | 10.0 | 18.2 | 72.7 |
| Costs increase, rework and loss of scarce skills | 1 | 5.0 | 9.1 | 81.8 |
| Extension of completion dates and exceeding budget | 1 | 5.0 | 9.1 | 90.9 |
| Quality, approval process and increasing costs | 1 | 5.0 | 9.1 | 100.0 |
| Sub-Total | 11 | 55.0 | 100.0 | |
| No Response | 9 | 45.0 | | |
| Total | 20 | 100.0 | | |

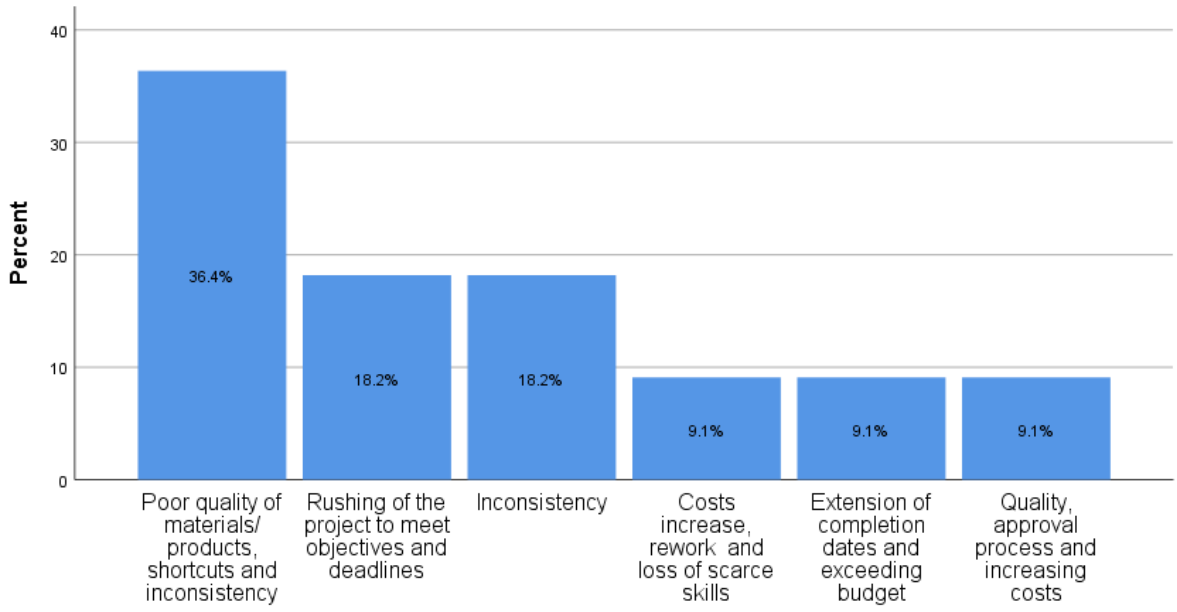



**Figure 5.62: Bar Chart listing what impact do project delays cause on quality/deliverable. (Source: compiled by the author)**

The above table presents project delays impact on quality. 4 (20%) reported that project delays caused poor quality of materials or products, shortcuts and

inconsistency. 2 (10%) reported that project delays caused rushing of the project to meet objectives and deadlines. 2 (10%) reported that project delays caused inconsistency. 1 (5%) reported that project delays caused costs increase, rework and loss of scarce skills. 1 (5%) reported that project delays caused extension of completion dates and exceeding budget. 1 (5%) reported that project delays caused quality, approval process and increasing costs.

Ubani, Amade, Okorocha and Agwu (2015), states that the incidence of building failures associated with poor construction supervision has become a major issue of concern in Nigeria's major cities. Chen and Luo (2014), highlights that there were 882 cases of construction quality and safety incidents in China in 2006. About 1/3 of low-rise building collapses were caused by improper construction methods or materials.

Ismail et al. (2014) highlighted that because of the Medupi Power Station, Eskom suffered credit rating downgrade by Moody's to Baa3. The reasons provided by Moody's are attributed to 'Eskom's standalone credit quality to uncertainty over the evolution of Eskom's investment programme and financial profile over the medium term. Project delays can also have a negative impact on quality as decided and rated by Moody's at Eskom Medupi Power Station

## 5.7 Conclusion

Chapter 5 presented data collected result and discussion on determining capital project delays, identifying factors that cause capital project delays and investigated effects of capital project delay on budget and quality at CCP in Richards Bay , Kwazulu Natal, South Africa compared to literature reviewed. Data collected seem to be in agreement or correspond with the literature review consulted in the study. Chapter 6 will present recommendations and the study conclusion.

# 6. CHAPTER SIX: RECOMMENDATIONS AND CONCLUSION

## 6.1 Introduction

This final chapter responded to the objectives and aim of the study that was presented in the first chapter, it also presented the findings of the study from chapter five with in-depth discussion on the analysis. Therefore, this final chapter provided the recommendations of the study based on findings and for future research. It concluded on the limitations encountered during the study.

## 6.2 How the Objectives of the Study were Achieved

To achieve the aim of the study, three objectives were specified and utilised as the guideline to conduct the research. The aim of the study was to understand the capital project delays, identify the factors causing capital project delays and investigate effects of project delays on project budget and quality at Company in Richards Bay. Below is the list of the research study objectives:

**a) Objective 1: To understand the capital project delays at Company Capital Projects (CCP) in Richards Bay, Kwazulu Natal (KZN), South Africa (SA).**

It was noted that at CCP majority of the project management staff were males, there was a high gender inequality, as there were very few females working at CCP project management. Majority of participants were ages between 30 and 35, there was a good spread of different age groups.

Literature has confirmed that for the past decades capital projects have experienced delays (Pai and Bharath, 2013). Projects often delays at CCP and there was never a project that did not experience delays and was completed on schedule. Projects often delay by months or years.

**b) Objective 2: To identify which factors cause capital project delays at CCP in Richards Bay, KZN, SA**

The majority of CCP project management staff had five years and less experience in CCP, with very few staff that had 25 years and more experience in the company. The majority of CCP project management staff had 15 years and above, while the lowest had 35 years and above of experience in Project Management. It was noted that most CCP project management staff obtained Diplomas and very few staff

obtained Honours as the highest qualification and none of the staff obtained Masters Qualification. Project management experience and expertise of the project management team are very important in executing and achieving a successful project.

46 project delays factors were identified at CCP namely as follows:

1. Original contract duration is too short
2. Legal disputes between various parts
3. Inadequate definition of substantial completion
4. Ineffective delay penalties
5. Type of project bidding and award (negotiation, lowest bidder.)
6. Delay in progress payments by owner
7. Delay to furnish and deliver the site to the contractor by the owner
8. Change orders by owner during construction
9. Late in revising and approving design documents by owner
10. Delay in approving drawings and materials
11. Poor communication and coordination by owner and other parties
12. Slowness in decision making process by owner
13. Conflicts between joint ownership of the project
14. Unavailability of incentives for contractor for finishing ahead of schedule
15. Suspension of work by owner
16. Difficulties in financing project by contractor
17. Conflicts in subcontractors schedule in execution of the project
18. Rework due to errors during construction
19. Conflicts between contractor and other parties (consultant and owner)
20. Poor site management and supervision by the contractor
21. Poor communication and coordination by contractor with the other parties
22. Ineffective planning and scheduling of project by contractor
23. Improper construction methods implemented by contractor
24. Delay's in sub-contractor's work
25. Inadequate contractor's work
26. Frequent change of sub-contractors because of their inefficient work
27. Poor qualification of the contractor's technical staff
28. Delay in site mobilization

29. Delay in performing inspection and testing by consultant
30. Delay in approving major changes in the scope of work by consultant
31. Inflexibility of consultant
32. Poor communication/coordination between the consultant and other parties
33. Late in reviewing and approving design documents by consultant
34. Conflicts between consultant and design engineer
35. Inadequate experience of consultant
36. Effects of subsurface conditions (e.g. soil, high water table)
37. Delay in obtaining permits from municipality
38. Weather conditions (rain and heat) effect on construction activities
39. Unavailability of utilities in site (such as water, electricity, telephone, etc.)
40. Effect of social and cultural factors
41. Traffic control and restriction at job site
42. Accident during construction
43. Different site (ground) conditions
44. Changes in government regulations and laws
45. Delay in providing services from utilities (such as water, electricity)
46. Delay in performing final inspection and certificate by a third party

**c) Objective 3: To investigate effects of capital projects delays on budget and quality at CCP in Richards Bay, KZN, SA.**

Project delays at CCP had resulted in dispute, legal costs and increase in project budget. The impact of project delays resulted in additional project budget up to millions in rand. At CCP project delays had impacted on the project budget.

Project delays at CCP had impacted on quality. The project delays had negative impact on project quality because of work rushed to meet the deadline resulting in short cuts in approval processes, inconsistency, and rework. It was interesting to learn that some CCP projects which experienced delays had no impact on quality and there was not enough reported on no quality impacted project at CCP.

## 6.3 Findings

In this study, the findings revealed that the project management team in construction projects and their success was closely related to contractors. They start their main duties when the project reaches the construction or execution stage where the actual work of the project is accomplished. In addition, identifying what went right and what went wrong in a post construction evaluation before moving to the next project.

46 critical factors were identified in this study that causes project delays and other factors identified were poor specification and rush of awarding contracts, late approval of business case by owner, deferment of projects by owner, poor planning in the conceptual phase of the project, undefined roles and responsibilities, scope creep by client and unclear scope which lead to scope creeps. The study revealed that the identified project delays factors were caused by different project management groups. Delay elements were identified and further categorised into four underlying clusters namely: (i) owner related delay factors; (ii) consultant related delay factors; (iii) contractor related delay factors; and (iv) external related delay factors.

The study has revealed that projects experienced delays; delays were costly and mostly led to disputes and claims. One respondent reported that project delays impacted on budget as a result of additional scope required by the owner and delay damages per day.

The study showed, highest percentage of the sample that project delays impacted on quality, it was interesting to learn that there was a lowest percentage of the sample who felt that project delays had no impact on quality. The quality impact that project delays have was listed as poor quality of materials/ products, shortcuts and inconsistency, rushing of the project to meet objectives and deadlines, costs increase, rework and loss of scarce skills, extension of completion dates and exceeding budget and quality, approval process and increasing costs.

## 6.4 Recommendations for the Company

The following were recommendations to solve the research problem of increase in project delays, which then result in CCP requesting additional budget funding from the client/owner to complete the project for the extended time through Project Change Notification (PCN).

### Owner Related Recommendations

- Owners must make sure that their demand in scope changes during the construction period must have no huge effects on the critical actions so as to avoid causing delays.
- Every change order demands must be assessed to evaluate and measure their scope, cost and effect on quality of work expected, potential claims and disturbance to work so as to avoid unnecessary disputes and lawsuit.
- Owners must ensure that proper costing and planning of all works are made during the initiation phase so as to avoid stoppage of works as a result of funding restrictions since this not only increases the construction period but also affects the contractors overhead costs and costs associated with mobilization and demobilization during the phase within which the works were suspended.
- Owners must ensure that interim payment certificates are paid in time within the specified time-frame as to avoid paying interest penalty clauses raised, but also to facilitate the progress of works to ensure timely completion.

### Consultant Related Recommendations

- Consultants must make sure that changes in design during the execution are managed openly while not affecting the stipulated deliverable of the project.
- Design errors created by the consultant must be corrected immediately to avoid delay in work progress.
- The consultant must make sure that adequate site inquiries is done at both the feasibility study and conceptual design, as to make sure that correct measures are conducted through the detailed design phase to avoid deferment of project work during construction phase to attend to design challenges.
- All working drawings must be clearly drawn indicating all the dimensions and labels to scale so as to avoid ambiguity during construction.

- The consultant must make sure that there is a proficient representative on the site to make speedy decisions that are binding and to make certain that works that have to be measured prior to covering are done so as to facilitate preparation of interim payment certificates.
- The lead consultant must make sure that there is accurate, timely and adequate communication between all stakeholders during pre-contract, contract and post-contract period.
- The consultants have to make sure that sufficient due diligence is made prior to endorsing a service provider for award of project to make certain that the right service provider with the required competences is sieved out of the bidders.

**Contractor/Service Provider Related Recommendations**

- Service providers must pay particular attention to the specified requirements of the assignment during the pre-contract and bidding period so as to go for works that they have competitive advantage.
- Service providers should ensure that they have enough cash flow to execute the works and desist from the practice of diverting particular project funds to non-project activities to avoid being cash-strapped during the execution of the works.
- The service providers should ensure that they have adequate experience for a required assignment, deploy competent project team and employ appropriate construction methods for the required assignment.
- The service providers should make sure appropriate planning and forecast of the works and make certain effective site management and supervision of the works so as to keep watch on critical activities and strive to complete projects within the stated time while meeting cost and quality requirements.

**External Related Recommendations**

- All stakeholders should make sure that appropriate planning is done to cater for unpredicted events that may stretch the construction period, rise cost and result in damage to property and cause harm to project team members. Such risks should be reassigned to competent stakeholders like insurance companies so as to help reduce the effect of costs in the event of delay occurrence.

### 6.4.1. Recommendations for future research

- More studies to be done on what is a project success.
- More studies on the project delays and the effect on quality of the project.
- A study on the entire Company in South Africa on project delays and their impact.
- A study on experience and knowledge impact in project management.
- More studies comparing project management performance in different companies.
- A study on impact of project support staff on project deliverables.
- A study on impact of political interference on capital projects in South Africa.

## 6.5 LIMITATIONS

- Questionnaires distributed to the project management team were not all answered and took time to be returned.
- The language that was used in constructing a questionnaire was English only because it is a language that most employees used to communicate within Company in Richards Bay.
- Project management team felt fearful to answer questionnaires fearing for their jobs. I encouraged the participants that participation is voluntary, no one was forced to take part on the study and that participants would have withdrawn from the study at any time and with no consequences. I ensured anonymously and confidentiality of the participants to the study.
- Gatekeeper's approval letter with a condition not permitted to use the company name.

## 6.6 CONCLUSION

The traditional triangle of delivering project on time, within budget and within scope still remains the critical factors on which a project success is measured. The study provides different project successors and identified factors that are causing time, cost and quality impact on CCP projects. The study provided recommendations to the project management team at CCP to be aware of the extent to which project delays can impact on their project delivery, should guide efforts to enhance project performance, and should enable the avoidance or minimisation of project delays at

CCP, and which can be used by projects in any organisation, and can also be used as a reference for future studies.

The project management team is very important in carrying projects successfully; therefore it has been recommended that project management team be skilled to operate in the volatile project environment. A project involves so many stakeholders; working together and support from all project stakeholders is crucial and an effective communication system is required to deliver project successfully.

Proper planning of work, committed leadership and management, and effective communication system can be very helpful in improving time performance. Adequate construction budget, timely issuing of information, finalization of design and project management skills should be the main focus of the parties in project.

Consider requirements information management as a lifecycle process and not to be focused in the early phases only. This will make sure the needs and wishes of the client are adequately carried forward in all phases and effectively managed. This will be useful in reducing assumptions, claims and disputes thereby increasing the likelihood of producing quality facilities that will meet the needs of client and users will be very high.

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## 8. APPENDICES

### Appendix 1: Gatekeeper's Letter

## Appendix 2: Ethical Clearance

## Appendix 3: Informed Consent Letters

## Appendix 4: Questionnaire

## Appendix 5: Editor's Certificate

## Appendix 6: Turn it in Report