

**AN INVESTIGATION INTO THE CAUSES OF CONSTRUCTION DELAYS
IN CAPITAL PROJECTS IN NAMIBIA**

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ABSTRACT

The majority of capital projects in Namibia do not get completed within the initially set targets in terms of time. Project delays frustrate the process of development, have an immeasurable cost implication on the society and also lead to loss of reputation of the parties involved in the projects' execution. There has been an increase in expenditure in recent years towards capital projects in the country, yet those that are to benefit from the projects are concerned with completion of these infrastructures. The purpose of this study was to investigate the causes of construction delays in capital projects in Namibia. Forty (40) causes of capital project delays were identified through literature review. Questionnaires were administered across stakeholders that included project coordinators at the Ministry of Works and Transport (Department of Works) Architects, Quantity Surveyors and Engineers registered with the different professional bodies, to gather their views on causes of construction delays. A mixed method approach was applied for this research. The study grouped the causes of delay into four main groups of client/user – client related, consultant related, contractor related and external related. They were then assessed for their impacts on delay using the Relative Importance Index (RII) as a basis for analysis and ranking of the causes of delays. In addition to the identified causes of delays, the sampled experts were also request to provide expert opinions on what they deem to be factors causing delay on the construction of capital projects, as well as the mitigating measures thereof. The most important causes were slowness in decision making by the client due to bureaucracy, delayed payments for work done by the client to the contractor, stoppage of work on-site due to cashflow constraints on the part of the client, financial indiscipline on the part of the contractor, poor site management and supervision on the part of the contractor and difficulties in financing the project by the contractor. The study submits a number of recommendations in mitigating delays for the client/user client, consultants, contractors and for external related delays which amongst others include hastening the decision-making process on the part of the client and timely settlement of interim payments to contractors. Also, improved communication amongst consultants, financial discipline for the contractors and the timely analysis of environmental and soil conditions ahead of actual construction.

Key words: Construction Delays, Capital Projects, Clients, User – Clients, Consultants, Contractors, RII.

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LIST OF ABBREVIATIONS/ACRONYMS

NPC – National Planning Commission

DoW – Department of Works

NIA – Namibia Institute of Architects

ACEN – Association of Consulting engineers in Namibia

INQS – Institute of Namibian Quantity Surveyors

NCAQS – Namibian Council of Architects and Quantity Surveyors

BoQs – Bills of Quantities

RII – Relative Importance Index

KPIs – Key Performance Indicators

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Above all, I thank the Lord Almighty for giving me the strength and courage to cope with the pressure of work to be able to come this far with the course. May all the glory be unto Him!

DEDICATION

I dedicate this thesis to my late father Urbanus Barney Katuzuu Karuumombe whose passion for education always stood out. I dedicate it to my mother Bertha Kaijere Karuumombe and husband Peterson Petii Uakotoka Tjitemisa, who have always been my strength and inspiration. Without their attention, love, care and support, I wouldn't have made it this far!

DECLARATIONS

I **Cathy Tjitemisa**, hereby declares that this study is my own work and is a true reflection of my research, and that this work, or any part thereof has not been submitted for a degree at any other institution.

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Date

CHAPTER 1 - INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

This chapter commenced with the orientation of the study, along with the statement of the problem that necessitated the carrying out of the research. The chapter also presented the research objectives and the significance of the study. Lastly, the Chapter gave the limitations and delimitations of the study, before concluding with a summary of the chapter.

1.2 Orientation of the study

A considerable proportion of the state's annual spending goes towards capital projects and this is not only the case in Namibia, but also in other developing and developed countries (IPPR, 2011). However, in developing countries such as Namibia, the construction sector plays a vital economic role and most people, especially the unskilled and semi-skilled, rely on the sector for employment and livelihood.

In a perfect world, every project would be completed in time and within budget, but the real situation on the ground tells a different story. The Guide to the Project Management Body of Knowledge (PMBOK Guide) (2017) defines a project as a temporary endeavour that is undertaken to create a unique product, service or result. A project has a defined commencement and end date, and consequently a defined scope and resources. A project has a set target and it is not a routine operation.

According to Alzahrani and Emsley (2013) the construction industry forms an integral part in the advancement of any country and the progress of projects such as roads, bridges, power stations and buildings is a measure of economic growth. Kwatsima (2016) observes that in most developing countries, construction has a noteworthy

consideration in that it can nourish the growth of other industrial sectors. Therefore, an improvement in the efficiency of the construction industry through mitigated delays, would promote cost savings at a national level. Bundi (2011) supports the views of Kwatsima (2016) by asserting that government agencies give priority to investments in construction projects such as roads and other transport-related projects not to foster economic development alone but to ensure that the country's inhabitants also realise other associated benefits.

According to Aydin and Mihlayanlar (2018) delays in the construction industry are vital aspects and identification of the factors causing delays is vital for the control, prevention and supervision of the delay. A study on large construction projects in Kenya by Kwatsima (2016) reveals that the construction industry is volatile and the complexity caused by delays are time consuming and lead to the depletion of materials. This results in negative effects such as increased cost, loss of revenue and possible termination of contracts. Hussain *et al.* (2018) carried out a study in Pakistan to explore the critical delaying factors in public sector building projects. The authors stated that project delays can distinctively affect project cost, the duration of the project and the needs of the community.

The Namibian government continues to allocate huge financial resources towards Capital projects. For the budget year 2018-2019, an allocation of 7.8 billion was set aside for capital project implementation and by the third quarter of the budget year, 73% of this allocation had not been spent (Cloete, 2019). While there have been notable completed projects around the country that are visible to the eye, such as schools, clinics, roads linking different cities and towns, regional council offices and others, the delays in capital projects are still a concern (Mutorwa, 2017).

The study on public sector capital projects in the construction sector by the researcher, does not necessarily mean that private sector construction projects have no delays in their construction. The researcher's interest is particularly in the delays related to the construction of capital projects in the public sector given the national expenditure towards these types of projects as detailed in the national annual budgets.

As noted above, different studies looking into causes of delays in projects, have been carried out around the world. Each of these studies looked into different groups, different numbers and different locations. The researcher deemed this study vital in order to establish empirical evidence on capital project delay factors in Namibia.

1.3 Statement of the problem

The success of a construction project is critically affected by the capacity of the implementing firms, design variations, nature of the contract and stability of the economic environment. However there seems to be no agreement among scholars and practitioners as to the nature of the causes of delays in construction projects. There also seems to be lack of consensus as to the principal causes of delays in public construction projects (Kwatsima, 2016).

The increase in project delays in the construction industry impair the economy because it results in wastage of resources, enhanced costs of projects and frustration among the end-users, yet construction is one of the principal sectors that can revitalize economic growth. Delays in large construction projects particularly roads and buildings, will continue to plague the construction industry in the foreseeable future unless strategic measures are taken by the industry (IPPR, 2011).

An increase in the number of delayed capital projects in Namibia has raised concerns

as to where the root-cause of delays in the construction of capital projects is (Cloete, 2019). The insinuation that parties that are meant to drive project implementation are not delivering, prompted this study. The presence of several studies that have looked into delays in Africa and overseas appear to lack the needed remedy in addressing the Namibian case.

The reason for undertaking this study was to establish the country specific delays of capital projects for Namibia in an attempt to assist decision makers in mitigating these delays.

1.4 Objectives of the study

The overall objective of this study was to investigate the causes of construction delays in Capital Projects in Namibia and to assess their level of impact.

The specific objectives of this study were:

- (i) To investigate the causes of construction delays in capital projects in Namibia.
- (ii) To assess the level of the impact of the delay factors in the construction of capital projects in Namibia by ranking them.

1.5 Significance of the study

This study was significant because it clarified the causes of delays in the construction of capital projects in Namibia. With this discovery, the study became vital in helping the construction industry and the national government to work on the best strategies that will bring an end to project delays and assist the construction industry as a whole in effectively and efficiently managing delays relating to the construction of capital projects.

The study was significant for infrastructure planning by the central government as its findings and recommendations are expected to create awareness for government when it comes to ways of addressing the causes of delays in the construction of capital projects. To the student, who is an Office Manager in an architectural firm, the study would assist in addressing issues hindering timely completion of capital projects from a professional architecture firm's perspective.

The study contributes country specific delays on capital projects to the Namibian literature. The study would assist in changing the future of construction in Namibia and also encourages others to further research in other industry related areas.

1.6 Limitations of the study

The researchers' involvement in the construction industry, as an office manager in a prominent architectural firm, created an aversion for the experts being contacted for the study. About a third of the respondents requested for additional assurance that their details will not be shared. This implied a degree of fear of expression and might be a slight weakness in the research.

As a mitigatory factor at the time of the actual study, the researcher did provide assurance in writing form to the concerned respondents to confirm that the information is required purely for the purpose of the research and will in no way be used for ulterior reasons. This limitation is hoped to yield very minimal influence on the research findings if any.

1.7 Delimitations of the Study

While undertaking the study, the researcher encountered challenges in ascertaining the number of registered contractors in the country thus limiting the ability to be able to draw a representative sample from the side of Contractors to sample from. In turn, though the study focused on capital projects delay factors in relation to Clients/User-Clients, Consultants, Contractors and External Factors; the Contractors themselves did not form part of the population for the study.

Furthermore, the research focused only on Capital Projects and only those delays were studied. Causes of delay for construction projects in the private sector were excluded from the study. Accordingly, generalization of the findings is limited to Capital projects.

1.8. Summary

The main purpose of this chapter was to introduce the research topic. The chapter, in general, gives an overview on projects and their significance to national importance. Also, the chapter captured looked at the statement of the problem, the objectives of the study as well as the limitations and delimitations of the study. The next chapter focused on the literature review of the study.

CHAPTER 2 - LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature regarding the causes of delays in construction projects in the world and Namibia with specific emphasis on capital projects. It presents an overview of previous work on related topics that provide the necessary background for purposes of this study. It further structures the work into various sub-topics that are guided by the objectives of the study.

2.2 Theoretical framework

This study is underpinned by the agency theory, prospect theory and the theory of constraints and these are discussed below.

2.2.1 Agency Theory

Agency theory finds its roots from the evolution of economic theory of agency which outlines agency as a universal principle and not just a theory of a firm (Gitahi & Tumuti, 2019). The agency theory is a relationship between two parties where principal (project owner) engages an agent (contractor) to act on his behalf and has all rights to perform as per the contract requirements (Bendickson, Liquori & Davis, 2016). Agency theory is pertinent in construction projects because of its simplistic nature of defining the relationship between the principal and the agent. There is increase in risks when an agent is engaged in contract by the project owner. This is as a result of increased complexities in execution of project work (Jager, 2011).

Agency theory was utilized to show the challenges the project owner referred as a client/user-client experience when there is asymmetrical flow of information from the agent to principal (Panda & Leepsa, 2017). The hidden information from the principal agent/ project manager overseeing the actual implementation of the project causes the moral risk to the main contractor and the client. By the agent trying to maximize his gains from a construction project he may cause damage to the principal. Emmitt and Gorse (2014) argued that participant in a project mainly in agency relationship needs to bring in all the relevant information concerning the project in order for the project to become successful. Winch (2010) also asserts that the contract can be opportunist and embezzle the funds allocated for execution of the project before the project owner realizes. After discovery of the fictitious deals it can be very difficult for the project owner to withdraw the contract which can be detrimental to the project.

Bowen et al., (2013) utilized agency theory to show that construction projects experienced malpractices orchestrated by team leaders such as corruption, dishonesty and unfair practices affecting project performance. The contractor holds the client at ransom during project execution from the moment contract is signed up to the point the project is handed over at completion. This theory is relevant because it envisage all the risks during the agency relationship during the contract period and assist the main contractor and client in planning ahead to ensure timely completion of the project.

The study proposed to use the agency theory to exhibit how the contractor influences the performance of the project when complexities arise between the contractor and client. From this theory the study showed the influence the contractor has on the construction project. The study used agency theory as a risk management tool to limit

principal exposure and enable better management of contractors to ensure they perform to required standards.

2.2.2 Prospect Theory

Chen, Zhang, Liu & Hu, (2015) applied prospect theory to determine the level of risk during bidding at tendering stage to select the suitable contractor. They noted that construction projects involved large amount of cash and use of behavioural economics and more precisely prospect theory was essential in understanding how the evaluators make the bidding decisions to choose the most suitable bidder in a construction project. Therefore, the prospect theory was deemed to be vital for this study in trying to establish how the project owner/clients selects the contractor after bidding and how the selection criteria reduce the anticipated risks related to the contract.

Ahn, Lee & Steel., (2014) shows that construction projects can utilize the prospect theory through determining social norms on typical construction project problem such as absence behaviour and other small decisions. The small decisions of selecting the contractors to perform small works may not seem to matter but when aggregated together they present non negligible amount compared to the project budgets which may lead to project failure.

The theory was utilized in this study to show that the main contractor has the responsibility of making day to day decision on the construction projects by evaluating the project in the two scenarios of risk. Those decisions will have a significant influence on cost and schedule of a project. The application of prospect theory in this study is derived from common decisions made during the selection and supervision of contractors. This will help to the project owner to prevent losses generated by illogical behavioural patterns emanating from the project team. The project owner will also

utilize prospect theory in early detection of contracting problems and correct them accordingly to avoid negligible delays in the construction projects.

2.2.3 Theory of Constraints

The theory was developed to assist organizations that are challenged by various constraints that affect performance. The theory links all the processes that influence organization performance by focusing on all the weak points which are constrictions in organizations. The theory consist of three related concepts, namely logistics, performance measurement process and logical thinking. (Naor, Bernardes & Coman, 2012).

The construction industry has utilized the theory of constraint in prioritizing activities in the project that improves the performance of a project in terms of increased profit, improved capacity, reduced lead times and fast improvement of project (Al-Fadhali & Zainal, 2017). Theory of constraints consists of different steps that are sequential and concentrates efforts towards achieving required performance. The first step is process of continuous improvements involving the identification system constraints. The second step is decision on how to exploit the system constraint while the third step is to support everything else in previously mentioned decision. The fourth step is increasing productivity of a constraint towards achievement of project objective if the constraint is overcome as a result of continuous improvement the process starts again (Trojanowska & Dostatni, 2017). The concept of performance measurement process in this theory was utilized to reflect on how the constraints of project information and resources influenced the project time, project cost and client satisfaction. The theory was relevant to this study in understanding and managing construction projects delays.

2.3 Conceptual Framework

The concepts that are discussed in this section include capital projects and construction delays. These concepts are important because they guided the research and provided the structure by which this study was conducted.

A capital project is a type of asset acquisition or maintenance project that adds to, builds upon or improves a capital asset. Capital projects are usually large in scale and cost more money than other types of investment projects. Because of their nature, organizations often discuss these products greater detail and create the needed plans to find the most efficient way to carry them through (PwC, 2019).

Capital projects can function in either the private or public sector. In the public sector, some common capital projects include infrastructure, like building roads or bridges. In the private sector, corporations with lots of financial and human resources may invest in new equipment, manufacturing projects or the development of plants or offices.

According to Deloitte (2016), delivering on capital projects in Africa is a complex process that requires integrating several variables that include effectively employing people as well as the appropriate project tools, methodology and technology. Large capital projects are designed to meet the growing demand of customers aiming to make a positive contribution to the economy and society. Successful projects involve constantly measuring progress, evaluating plans, and taking corrective action in good time. The key to successful capital projects is to identify, evaluate, define, build and operate.

According to Seboru (2015) capital projects are defined to include state acquisition of capital assets or improvements and additions to these. They include the reconstruction and major alterations of any capital assets that are state-owned or used for state purposes. For the purposes of this study, capital projects are defined in line with Seboru's definition as being government funded public projects relating to the construction of new infrastructure, renovations, additions and alterations to existing infrastructure or the acquisition of assets by the national government for national use.

Msafiri (2015) affirms that in the construction industry, the term delay is used to describe the time overrun of a project beyond the time agreed to contractually. This can be as a result of the parties concerned in the contract, who are the, client, contractor and the consultants. Marzouk and El-Rasas (2014) agrees with Msafiri (2015) by defining a construction delay as a time overrun beyond the agreed contract date for the delivery of the project, the authors went further to clarify that a construction delay is an act that extends the required time for the completion of works manifested as additional days as defined by the scope in the contract. Project delays have an immense cost to society, and they adversely affect the parties to the agreement (Ondari & Gakera, 2013).

Previous studies that have been conducted with regards to delays in construction projects yields different typical causes of delays. In Morocco, Bajjou and Chafi (2018) identified Forty-nine (49) different causes of delays from literature review and they were later classified into Nine (9) different categories. Similarly, Kamanga and Steyn (2013) found 72 causes of delays in Malawi and these were studied individually without being categorized in groups. It categorized delays in different groups of up to Eleven (11) in some instances. However, this study re-clustered these factors into four

main (4) categories. These categories are: client and user-client related, consultant related, contractor related and external related factors.

2.4 Client & User client related delay factors

Namakalu *et al.* (2014) confirms that the Namibian Government has identified scaling up investment in infrastructure as one of the key enablers to achieve its development objectives as set out in the fourth National Development Plan (NDP4). The funding of Capital projects in Namibia is the responsibility of the Client and the User -Client.

Hussain *et al.* (2018) conducted a study in Pakistan, looking into the critical delaying factors in public sector building projects and the study determined that delays in progress payments, dispute in land usage and poor feasibility studies were among the top critical delaying factors relating to the client. Hussain and Omran (2012) asserts that 70% of the construction projects that were abandoned in the transport construction industry of Malaysia were as a result of financial problems of funders and the local and national governments. In a related study by Piper (2011) in Malaysia and Madagascar, it was found that in the period 1999 to 2007, up to 71% of the roads and other construction projects that failed or took longer than planned or extended the dates of commencement than the planned dates were due to constrained financial allocation and the contractual time agreements that were never feasible.

A study that looked at the projects delayed in East Africa, focused on major road projects that connect Uganda, Kenya, Tanzania and by extension Burundi in 2011 and found that amongst the cited hindrances, included is poor financial management, corruption, limited financial resources due to amongst other reasons, project finances diversions. Gaba (2013) agrees with Hussain *et al.* (2018) that in most government

projects, payments take longer than the contractually agreed on time and this in turn affects the project's timely completion, resulting in delayed handover of the project. Hussein and Omran (2012) maintain that in the end, for any given project to be realised, it should retain financial viability. The authors indicated that the overall lack of finance to complete a project, or delays in the payment of the services by the project owners or clients can lead to significant problems. Alinaitwe *et al.* (2013) found that changes to the scope of works, delayed payments, poor monitoring and control were among the highest causes of delays in Uganda's public sector construction projects.

Owolabi *et al.* (2014) confirms that there are many factors that prompt delays of construction projects. In their study conducted in Nigeria, the authors looked at different factors, which included; the lack of funds to finance the project to completion; the changes in drawings; the lack of effective communication among the parties involved and the lack of adequate information from consultants. Also, the slow decision-making and contractor insolvency; the variations, the project management problem, the mistakes and discrepancies in contract documents, the equipment availability and failure and the mistakes during construction amongst others. Nyoni and Bonga (2017) found that delays in project payments by the owner, difficulties in financing the project and the change in specifications are amongst the highest-ranking factors identified in a study looking into factors affecting delays in construction projects conducted in Zimbabwe.

2.5 Consultant related delay factors

Muhwezi, Acai and Otim (2014) establishes that there are different factors related to consultants, contractors and clients that cause delays in the carrying out of construction projects. In assessing the consultants' delay factors, the researchers confirm that

consultant related factors had a high impact on building construction projects in Uganda and this was ranked as the top most cause of delays by contractors and clients on construction projects.

It was observed by the authors that the key factors that contributed most to delays in building construction projects in Uganda were: delay in assessing design variations; poor environmental impact assessments; delay in the preparation of valuations and payment certificates for contractors' payments and unclear designs. The effect of client related delay factors on building construction projects ranked second and those of contractor related delays on building construction projects ranked third.

Wambugu (2013) conducted a study in Nairobi to determine successful completion of rural electrification projects in Kenya and the study concluded that lack of supervision and inspection of construction work in a project by the consultants led to reconstruction in instances of poor workmanship and this resulted in delayed completion of the projects. These findings were also consistent with Chai and Yusof, (2013) who also identifies poor site management and supervision as ranking high in the order of causes of construction project delays in Malaysia.

The expertise of the principal agent during the period of project implementation also has an effect on the timely completion of a project. Positive attitude of principal agents and the rest of the project team surfaces as the most crucial success attributes for quality compliance at project sites (Kenig *et al*, 2012). Furthermore, the authors discerned that some of the attributes that are with high significance are all principal agent related. These are attributes such as; the effective monitoring and feedback by

the principal agent, technical capability of the principal agent, leadership quality of the principal agent, proper monitoring and feedback by the consultants.

According to Mohammed (2012) construction projects move through a number of stages. Commencing with project initiation as the initial stage, this is the stage where project identification takes place and the feasibility of the project is gauged to establish project viability. The second stage is the planning stage, which encompasses project design and the allocation of resources and necessary financing. The execution of the project is the third phase and it involves implementation of designs within the resources allocated. This execution has to comply with the three constraints of time, scope and quality.

Another delaying factor identified by Hamzah *et al.* (2012) following a study on the effects of delayed housing construction in India, Indonesia, Madagascar and Mauritius with regards to planning is: inadequate planning methods and ineffective coordination of resources. Omran, Abdalrahman and Pakir (2012) emphasised that the need for adequate advanced planning of construction project and project development paid off and it is a route worth exploring.

Van, Viet and Nicholas Taylor (2016) found that the lack of information exchange between the parties and incompetent supervision consultant are amongst the greatest contributors to project delays. This is, following a study done in Vietnam looking into delay factors affecting government construction projects.

2.6 Contractor related delay factors

Time delays in the allocation of projects negatively affects contractors' financial positions. Contractors tender on the basis of price rates quoted at the time of the tender

preparation. With delays of up to six months, the cost structure will have changed, and contractors then face cash-flow problems with tender validity extensions that go beyond acceptable time (Shahsavand, Marefat & Parchamijalal, 2018) .

Omran, Abdalrahman and Pakir (2012) carried out a study on 211 road projects in Southern Sudan, Malawi and Kenya. They found that occasions of re-doing the work are mainly attributed to unskilled labourers because of limited skills and knowledge of drawings or to incapable supervisors due to lack of experience leading to poor supervision. Hussain *et al.* (2018) identifies difficulty in financing the project by the contractor and inadequate contractor experience amongst the top eight (8) factors causing delays in building projects in Pakistan.

A study by Khoshgoftar, Bakar and Osman (2010) conclude that poor site management, poor contract administration, finance, payment for completed works, improper planning and lack of communication between the different parties to a project are the key reasons for delays in construction projects in Iran. According to Chilongo and Mbetwa (2017) project performance is affected by the lack of financial and business management skills, the risks involved in the construction industry, the very high interest rates imposed by banks and the absence of collateral. Also, late payments for completed works by clients, lack of the needed skills to properly program the resources of the project. Furthermore, other reasons included, bidding for projects that are over and above the contractor's technical and financial capacity as well as the inability to prepare documents for timely payment. These were the findings following an investigation into the factors affecting project performance among contractors in Lusaka, Zambia.

According to Alaghbari *et al.* (2018) in a study conducted in Yemen, three (3) of the Five (5) factors impacting construction projects are attributed to the contractor. These factors were identified as poor management and supervision of the project site by the contractor, inadequate experience of the contractor and lack of sufficient finances to start of the project. In a case study carried out in the Amazon by Maues *et al.* (2017) the authors found that the expertise of the construction company, the time that it operates and the start-up conditions have less influence in delaying construction projects. This is as opposed to the findings in Yemen by Alaghbari *et al.* (2018).

2.7 External related delay factors

Tabishl and Jha (2011) conducted a study in Singapore, it was concluded that thorough and detailed site investigation aids in proper planning which results in easier clarification of the scope and development of a clear understanding. This also assists in having minimal changes to the scope during construction. Omran, Abdalrahman and Pakir (2012) state that accurate planning in construction is a key determinant in ascertaining the delivery of the project within time and on budget. The World Bank (2013) report shows that the state of infrastructure in Kenya is hindered by the concept of planning as a major element whereby those involved in developing design plans do quality planning on paper that considers the project implementation and evaluation only but there is a limitation in terms of actual realisation of these.

Aydin and Mihlayanlar (2018) studied the causes and effects of project delays in Turkey and the three most prevalent causes of delay were identified as: changes in the legal regulations, delays in getting municipality permits for the construction works to commence and difficulties in financing the project. Political insecurity and instability

were found to be amongst the top 5 causes of delays in Uganda's public sector construction projects (Alinaitwe, Aplot & Tindiwensi 2013).

The absence of detailed surveys before the design and extreme weather conditions were found to be critical delaying factors in public sector building project in Pakistan (Hussain, 2018). In a comparative study of causes and effects of project delays in South Africa by Oluwaseun and Kruger (2017) strikes were ranked as the number one cause of delays in construction projects. Amongst the top 5 delays featured, were rework due to errors during construction, shortage of materials in the market, suspension of work by the client and poor communication between the parties. The authors found that the creation of stress on contractors and poor quality of work were the two (2) major effects of delays that were limited to South African projects only.

The analysis on trends, challenges and future outlook of capital projects and infrastructure in East Africa, southern Africa and West Africa by (PWC, 2014) found that political interference, policy uncertainty and delays in passing laws were stifling growth, development and investment in a number of countries in Africa. The respondents to the report consider the current policy and regulatory environment and political risk as major challenges. They blamed bureaucratic delays in decision – making and policy changes for slowing down some of their projects.

In a related study by Kamanga and Steyn (2013) in Malawi, the authors identified 72 causes of delays in road construction projects in Malawi. Amongst the ten (10) most prevalent delays were the following factors: shortage of fuel, insufficient contractor cash flow, shortage of foreign currency for the import of material and equipment, delays in relocating utilities, shortage of construction materials, slow procedures in making progress payments by clients, delays in paying compensation to land owners,

shortage of technical personnel and delays in site mobilisation. The case of Malawi differs from many of the studies reviewed. In a similar study conducted in Morocco by Bajjou and Chafi (2018) it was found that lack of employee training, poor waste management strategies, delays in payments by clients, rework as a result of errors, delays in obtaining work permits, poor planning and scheduling, unrealistic contract periods imposed by the government, lack of collective planning and an unskilled workforce ranked as the top ten (10) causes of construction delays.

Maues *et al.* (2017) conducted a study in the Brazilian Amazon on construction delays and it emerged that the size of the construction project and the physical characteristics of the designed projects have a strong influence on delaying a project. According to Simon (2017) the leading cause of delays in Tanzanian road projects is the politicians. This finding was established in a study looking into factors causing delays in road construction in Tanzania. The study confirmed that environmental conditions and the involvement and performance of other stakeholders in construction projects had a negligible influence in causing delays in road construction projects.

2.8 Summary

This chapter compared and contrasted the views of various researchers that looked into the causes of delays in construction projects. It generally provided an overview of the various approaches in understanding the factors that are causing delays in capital projects. A theoretical and a conceptual framework to the study was discussed. There was a detailed review on the causes of delays in projects delivery in different countries as propounded by different researchers. The study looked into delays in relation to clients/user-clients, consultants, contractors and external related factors.

The literature review uncovered a number of studies in different parts of the world that have essentially impressed on factors concerning project delivery. Therefore, in relation to the above, the chapter highlights the literature that is existing in relation to the delay of projects in the construction industry. The chapter reviews the literature in relation to the main objectives of the study and the factors have been looked at from the global perspective down to the scope of the study.

CHAPTER 3 – METHODOLOGY

3.1 Introduction

The previous chapter dealt with literature review relating to capital projects implementation in different countries, both in Africa and internationally. This chapter highlights the research methodology that was used in arriving at the causes of delay in capital projects implementation. The chapter analyses and deals with: research types; research design; target population; sampling; data collection; research instrument; questionnaire construction; and data analysis. Ethical considerations pertaining to the research are also discussed.

3.2 Research Design

Creswell (2014) affirms that the choice of research design is critical in every research study as it influences a large number of subsequent research activities and it forms the basis for analysis of data collected. The study used a mixed-method approach and a descriptive research design.

A mixed methods approach to research incorporates elements of both the qualitative and the quantitative approaches (Creswell, 2014). The mixed-method approach was employed because it allowed for a thorough assessment of both numerical and non-numerical data. The approach allowed for the gathering of opinions on what professionals feel could be done differently as opposed to using only a quantitative method that would not allow expressed information from the informants.

3.3 Population

According to Alvi (2016) a population refers to all the participants who meet the

particular standard stipulated for a research investigation. The study population was the stakeholders in the construction industry in Namibia and it was a total of 218 individuals. This included the 52 project coordinators at the Ministry of Works and Transport in the Department of Works; the 74 registered architectural practices registered with the Namibia Institute of Architects (NIA); the 58 Engineering firms registered with the Association of Consulting Engineers of Namibia (ACEN) and the 34 Quantity Surveying firms registered with the Institute of Namibian Quantity Surveyors (INQS).

3.4 Sample

Alvi (2016) defines a sample as a comparatively smaller group of people selected from a population for the purposes of investigation and he refers to the objects in a sample as participants. According to Marshall and Rossman (2016) there are a number of reasons why sampling is necessary and some of the major reasons include: Cost-effective procedure for quality control; Physical impossibility of checking all items in the population; High cost of studying all items in a population; Adequacy of sample results and the fact that contacting the entire population would often be too time-consuming.

The sample used was selected through stratified sampling. According to Taherdoost (2016) stratified sampling is where the population is divided into strata (or subgroups) and a random sample is taken from each subgroup. A subgroup is a natural set of items. Subgroups might be based on company size, gender or occupation. Stratified sampling is often used where there is a great deal of variation within a population. Its purpose is to ensure that every stratum is adequately represented.

A representative percentage of participants was drawn from each homogeneous portion of the population to be part of the interviews. The representative portion of 10% from each of the four strata of the population was chosen randomly for the study. The use of stratified sampling was in order to allow for a proportionate representation of the four groups forming the population.

From the population of 218, a sample of 10% resulted in 21.8, which was then rounded up and 22 was considered as the overall sample. Subsequent to which 10% of each of the strata was then used to total the 22 individuals. This consisted of Five (5) project coordinators with the Ministry of Works and Transport, Seven (7) architects, Six (6) engineers and Four (4) Quantity Surveyors.

3.5 Research Instruments

The study relied on primary as well as secondary data sources, in particular those that are pertinent to investigating the research objectives. The use of secondary data was necessary to gather existing information on delays and this data guided the identification of delay factors that were used in the formation of the questionnaires.

Primary data was collected by the use of questionnaires and the researcher administered these questionnaires. They were used to obtain first-hand information from respondents and they were guided by non-structured and structured questions since the respondents involved in the study were all professionals in their field and were accorded the freedom to give a wider view of their thinking and this was not expected to compromise the findings. Some structured questions required the respondents to tick one or more responses, while other questions required the respondents to detail their views.

3.6 Research Procedure

A mixed method approach to the research was adopted and pursued. The research employed a pragmatism philosophy. The research used questionnaires to gather information from the respondents. The questionnaires contained questions that had numerical values to them, where the respondents were required to assign a value to listed factors of delays that had been identified prior and listed in four different categories. The same questionnaire also contained non-numerical questions which required expressed opinions from the respondents.

Prior to handing out the actual questionnaires via email, a pilot study was employed to improve the validity of the questions. The purpose of the pilot test was to see whether the participants understand the questions or changes that needed to be made before handing out the actual questionnaires. Furthermore, the purpose of the pilot test was not only to identify common problems within the designed questions, but also to incorporate participants' comments that enhanced the quality of the questions in order to attain the objectives of the study.

The study was piloted to five (5) randomly selected professional consultants in the construction industry. These comprised of two (2) Architects, two (2) Engineers and one (1) Quantity Surveyor. The results of the pilot study assisted the researcher to amend the questionnaire in two different areas. Firstly, the age category was only starting from age 25 to 29 assuming the number of years it takes one to qualify in the architecture, engineering or quantity surveying fields, but it was realised during the piloting period that the age category should start from 20 – 24 as there are professionals with honours degree qualifications within the age category of 20 to 24 as well. Secondly, the initial questionnaire asked for experience in projects, without specifying

capital projects. This was then amended to also enquire on experience for capital projects as this experience is vital to the study.

Secondly, clarification of any part of the questions was done telephonically and via email, directly with the researcher. Other useful information, especially on capital project delivery timelines, was obtained from secondary sources in the form of published and non-published information.

The questionnaires were accompanied by a cover letter that explained the purpose of the study and the questions were designed to be short and precise in order to ensure accurate interpretation of the questions by respondents. The questionnaires were emailed to the respondents. Given the size of the sample covered being 22 individuals, a period of one month was used to collect the primary data from the participants. The participants had a number of commitments due to the nature of their work, which meant that one needed to be patient in and allow a lenient waiting period after which the questionnaires would be received back.

3.7 Data Analysis

Data from the study was analysed in two ways. The quantitative part was analysed using the Relative Importance Index (RII) and the production of figures and tables. The scores assigned to each factor by the respondents from the returned questionnaires were captured and assessed. The contribution of each of the recorded factors in looking at the overall delays was examined and the ranking of the factors in terms of criticality as informed by the respondents was done by use of the RII.

The RII formula is as follows;

$$RII = \Sigma W / (A * N)$$

Where: W – is the weight given to each cause by the respondents

A – is the highest weight

N – is the total number of respondents

The relative importance index for all the delay factors was calculated using the equation above. The indexes were ranked for client/user-clients, consultants, contractors and other related delays. The RII was significant as a measure of analyses as it allowed for the identification of the most significant delay factors in line with responses received from the respondents.

The qualitative portion which consisted of expert opinions requested from the respondents was analysed through thorough studies of the questions and interpretation thereof. The experts were requested to express their opinions on non-numerical questions exclusive of the delay factors presented to them for rating.

3.8 Research Ethics

Professional and academic communities are placing increasingly exacting responsibilities on their members to improve the ethical standards of research and practice within their disciplines (Vanclay, Baines & Nicholas Taylor, 2013). The research methodology employed was practically feasible. All participants were sensitised of the purpose of the research. Respondents were well informed of the risks and/or benefits that could accrue to them as a result of participating in the research. The researcher also assured the participants of the safekeeping of the raw data. The data collected is being stored in a locked cabinet for five (5) years in the researcher's office, and will be destroyed by shredding and burning when no longer required.

3.9 Summary

This chapter presented the research methodology and research design of the study as outlined therein. A detailed look at the population and sample was done. The measures taken to analyse the data and the research instruments used were also defined, with the chapter ending with research ethics considerations. The next chapter presents the results and discussions of the study.

CHAPTER 4 – RESULTS AND DISCUSSIONS

4.1 Introduction

In this chapter, the results of the data analysis are presented. The data were collected and then processed in response to the objectives of the study. A total of 20 questionnaires were received and all were usable. This chapter presents the results of the study following the analysis of the data collected from the participants who comprised of the Project Coordinators at the Ministry of Works and Transport, DoW Department, the Architects, Quantity Surveyors and Engineers registered with the respective professional bodies. The findings are presented using charts, figures, tables and detailed discussions.

Twenty-two (22) questionnaires were initially created and prepared for distribution at the inception of the research process, to the randomly selected sample as per the research design, but only Twenty (20) respondents returned the questionnaires.

4.2 Demographic Characteristics

This section presents the demographic characteristics of the respondents in relation to gender, age, work experience and job categories.

4.2.1 Gender

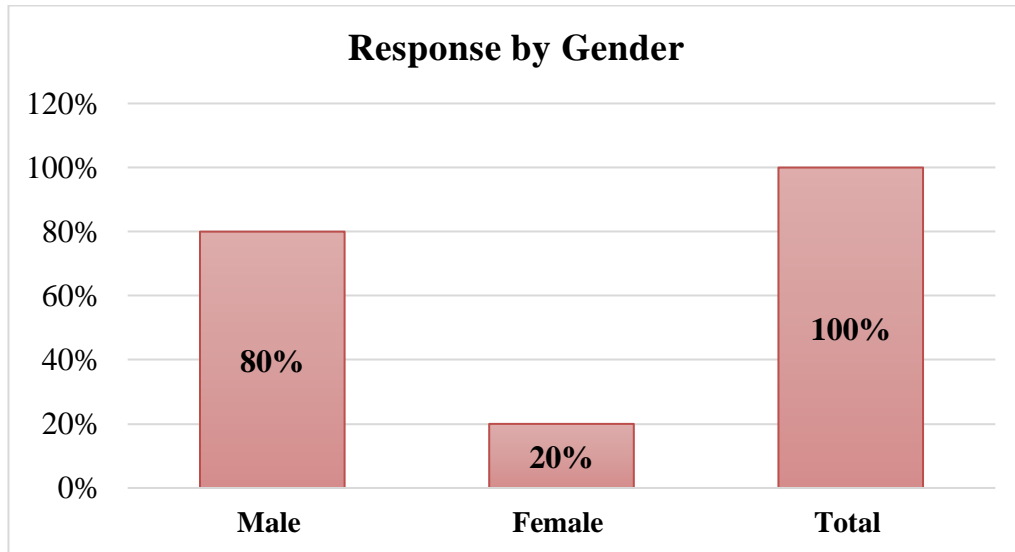


Figure 4.1: Responses by Gender

Figure 4.1 shows that there was an under representation of females in the study. The number of women participants was 4, while 16 males participated in the study. The dominating number of males in the study is due to the average number of males in general employed in technical sites of the construction industry. In terms of gender percentage, we are looking at 20% female representation and 80% male representation.

4.2.2 Age

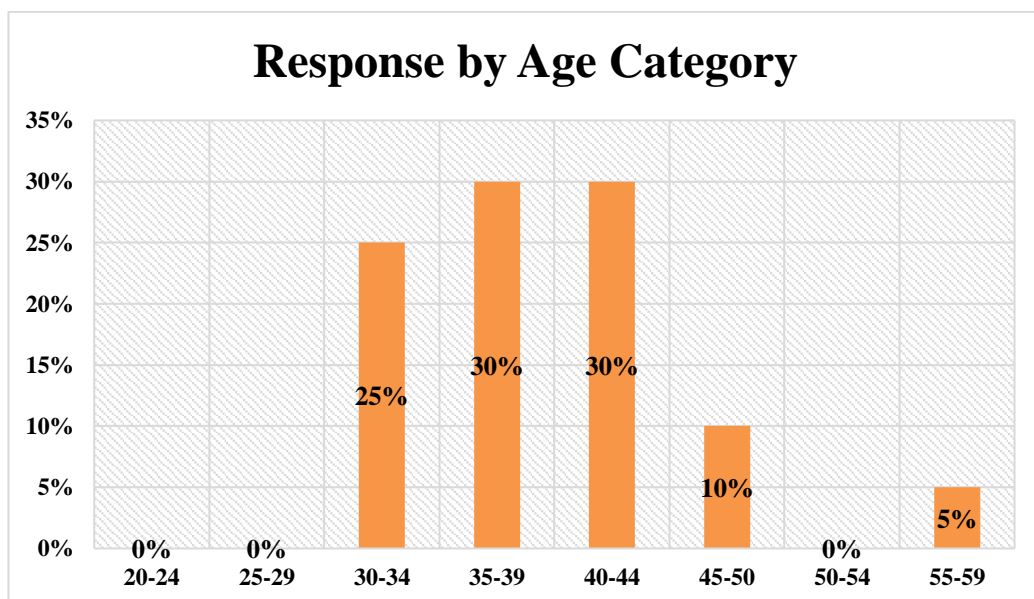


Figure 4.2: Responses by Age Category

Figure 4.2 indicates that the majority of participants were in the age group of 35 – 39 and 40 - 44. Both these two age groups combined together represented 60% of the overall participants. The categories of 45 – 50 and 55 – 59 combined had a representation of only 15% of the overall participants, whereas age groups 20 – 24, 25 - 29 as well as the 50 – 54 categories had no representation in the sampled group. The absence of people within the 29 and below age category can be attributed to the fact that architecture, quantity surveying and engineering as professions require a longer period of study to get the necessary qualification and addition to the qualification. These individuals are required to go through a process of submission of practice hours in a professional office which then qualifies one to sit for an exam that will eventually lead to the individual being registered as a member of the NCAQS, NIA, ACEN or INQS.

4.3 Capital Projects Involvement

4.3.1 Experience in previous Capital projects

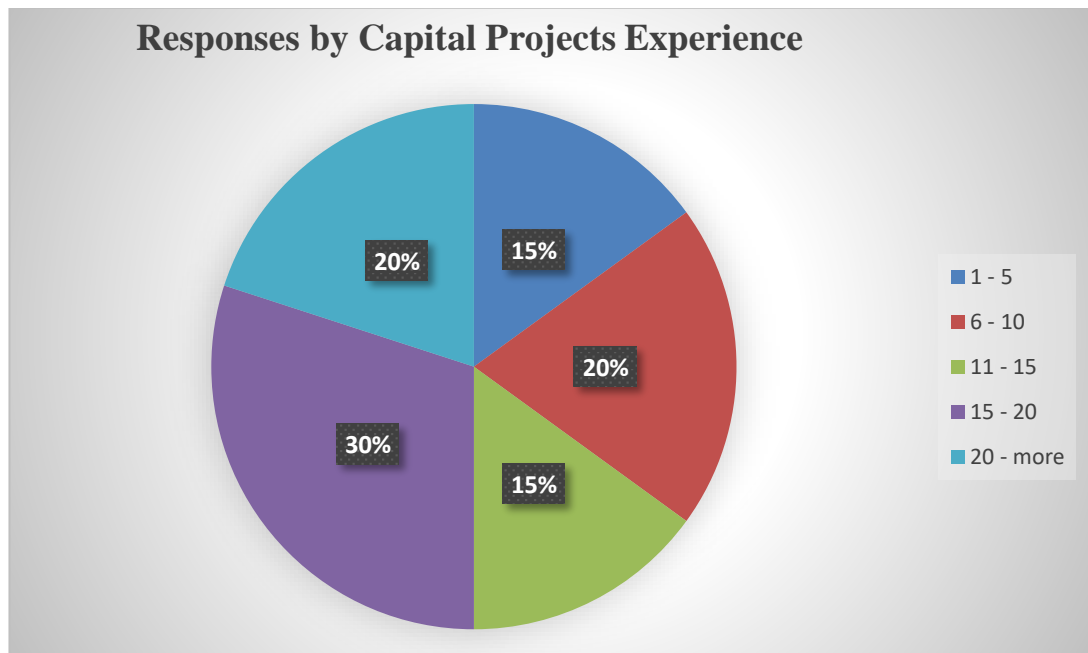


Figure 4.3. Responses by Capital Projects Experience

Figure 4.3, indicates that most participants had worked on a substantial number of capital projects. The results revealed that 85% of the participants have experience in having worked on more than 6 capital projects thus far. In line with establishing the objectives of the research, the wealth of professional experience of participants in handling capital projects is a great advantage. In the construction industry, the experience of a professional involved in the administration of a project plays a major role in project execution, this is because every project is different and nothing is routine. Thus, when one has worked on several projects and has rich experience, they are likely to detect and avoid possible pitfalls that can delay a project or cause project overruns way before these pitfalls come to be. Rich experience can positively contribute to timely project implementation, with no exception for capital projects.

4.3.2 Current Projects

The participants were requested to indicate whether the capital projects that they worked on were completed on time or delayed and here below follow their responses.

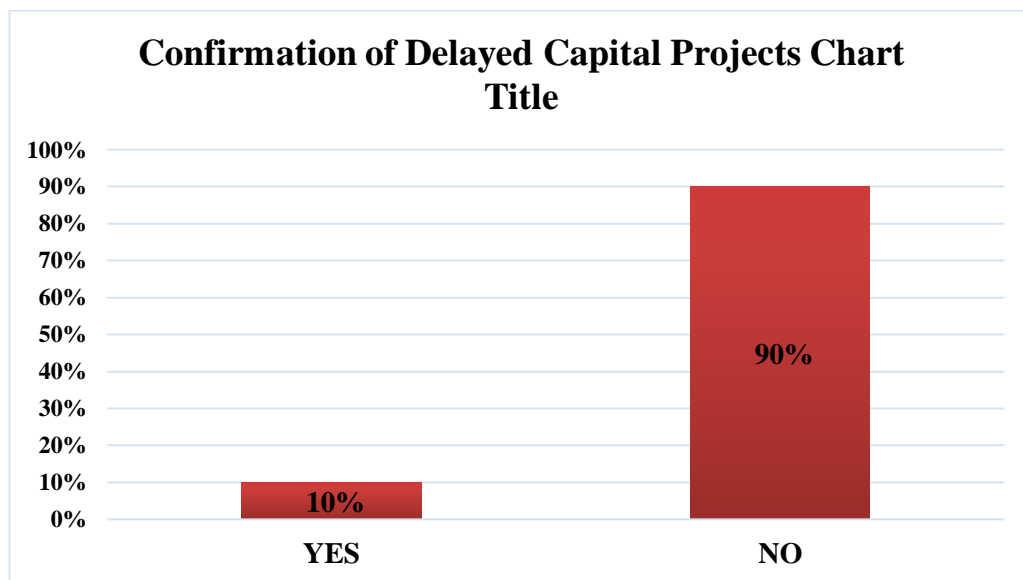


Figure 4.4: Confirmation of delayed Capital Projects

Figure 4.4 shows a graphical presentation of the responses that the participants

provided on request to confirm whether the Capital Projects that they worked on were completed on time or not. As depicted here above, it is clear that there is a need for grave concern with regards to the delays experienced in the completion of projects. The construction delays related to Capital projects in particular, requires serious and urgent mitigation measures as they are at the heart of national development. A total of 90% of the participants confirmed that they have had delays in construction for the capital projects that they have worked on, whilst only 10% confirmed having had timely completions of the projects they have worked on. The 10% which confirmed timely completions without delays are professionals who fall in the least category of experience, with regards to capital projects.

4.5 Capital Projects Construction Delays

The causes of construction delays identified through literature, were classified into four different categories and formed part of the questionnaires to the respondents. The four categories of delays used in this research are Client/User-client related delays, Consultants related delays, Contractor related delays and a final category for Other or external related delays. In each of these categories, a maximum of 10 related delays were identified and used after which the RII formula was applied. The results below depict the RII value calculated for each cause of delay and the necessary ranking per category.

4.5.1 Client/User-client related delays

Table 4.1: Client/User-client related delays

Identified Causes of Delays		RII	Rank
1	Slowness in decision-making due to bureaucracy	0.89	1
2	Stoppage of work due to cash flow constraints	0.85	2
3	Delay in payments of Contractor's claims	0.85	2
4	Design variations/changes by the client or user-client	0.75	3
5	Limited annual allocation of project funding by Client/User-client	0.73	4
6	Delay in the approval of drawings and Bills of Quantities (BoQs)	0.68	5
7	Interference by the client/user-client in the construction	0.62	6
8	Poor Communication and coordination with consultants	0.58	7
9	Lack of incentives for the Contractors to finish ahead of schedule	0.53	8
10	Change in project coordinator/representative	0.42	9

The study found that amongst the identified client /user client related delays; slowness in decision-making due to bureaucracy stood out as the main cause of delays with an RII of 0.89. The delays in payments of contractors' claims for work done as well the stoppage of work due to cashflow constraints were ranked as the second most prominent causes of delays related to clients and user clients with both these factors having an RII of 0.85. Table 4.1, also confirms that the requests by clients or the end user-clients of projects, to alter already approved designs is a significant factor in causing delays to a capital project under construction. It was understood throughout the research process from expert opinions that the possibility of having to make amends to already approved plans are inevitable in the construction of capital projects as administration changes over time and at times these types of projects have a longer span on site. Part of the reasons also gathered were related to technological changes

that are evolving and the need to stay on par with development in order to cater for the needs of the end users of capital projects, being the country's citizens.

The limited allocation of project funding was ranked as the fourth cost of delay in relation to the client and user client with an RII of 0.73. National budget for capital projects is under the NPC, where funds are allocated annually. These funds can turn to be limited on a yearly basis depending on the annual national budgets as approved by national government and as a result, there are ceilings set on an annual basis on what is available for expenditure on a given project. These ceilings would not necessarily mean the spending capacity of the project but what is available, thus limiting the amount of works that a contractor is able to execute on a project per year, causing a delay in overall progress and affecting project completion. The delay in the approval of drawings and Bills of Quantities by the client was ranked number five with an RII of 0.68. The current status quo on project documentation for capital projects is such that the consultants will prepare drawings in line with the project brief for approval by the client, following which the BoQs will then be prepared. The client, being DoW has experts in place who are qualified in their respective fields to certify these technical documents on behalf of the user-clients (respective ministries who are the project owners under government). The research confirmed that the delay in the approval of this documentation has an effect in capital projects timeline.

Interference in the actual construction process by the client or the user-client ranked sixth with an RII of 0.62. This is still a high average in relation to causing delays in capital projects construction. This happens mostly due to an unclear definition of roles on the part of the project team, where parties representing the client or the user-client

are not clear on where their role ends and where that of the appointed professionals such as architects, quantity surveyors and engineers begin.

Ranking seventh for client/user-client related causes, with an RII of 0.58 is poor communication and coordination of the part of the project owners with the appointed consultants. Situations are observable where there has been a reduction in allocated project funding or a change in design that takes longer to reach the consultants thus delaying vital decisions in project planning and in the end causing delays and a need for the contractor to request for an extension of time on the project.

Amongst the ten delays related to the client and user/client as deduced from literature and presented for ranking, the two with the least ranking as causes of delays were indicated as the lack of incentives for the contractor to finish work ahead of schedule and the change in project coordinator or representative, ranking eighth and ninth with an RII of 0.53 and 0.42 respectively. This translates to mean that the absence of incentives for contractors to push for a completion ahead of schedule or the change in who is representing the client or the user-client on a given capital project on site do have an impact on delaying capital projects completion but not as much as the slowness in decision-making due to bureaucracy or other earlier indicated causes.

4.5.2 Consultant related delays

Table 4.2: Consultant related delays

Identified Causes of Delays		RII	Rank
1	Consultants delay in issuing site instructions to contractors	0.70	1
2	Delay in reviewing and approving design changes	0.64	2
3	Inadequate consultants experience	0.56	3
4	Insufficient projection of original project duration	0.54	4
5	Design errors by consultants	0.52	5
6	Consultants' reluctance to change (rigidity)	0.48	6
7	Delay in performing site inspections	0.47	7
8	Complexity of the project	0.47	7
9	Poor use of advanced design software	0.44	8
10	Delay in the preparation of interim valuations and payment certificates	0.44	8

The consultants delay in issuing site instructions to contractors was ranked as the top most cause of delay in capital projects construction on the part of the consultant with an RII of 0.70. The issuing of instructions to the contractor on site by a consultant is a process that comes in different folds. In the greatest number of cases, an instruction will be issued accompanied by a drawing which a construction detail, directing the contractor on the change or installation that he has to effect on site.

On other occasions, an instruction will simply be via an official documented email detailing the steps to be taken on a certain aspect pertaining to construction on site or just writing down a site instruction on the site instruction book which is usually kept on site. The delay by a consultant to issue an instruction has a significant delay to

project completion as these instructions could be for construction items that are on the critical path, in other words these are items that will be holding a chain of other construction activities to take place, thus delaying overall project timeline.

The client related delay factor that was ranked second with an RII of 0.64 has a relation to the highest ranked delay. This cause is the delay in reviewing and approving design changes. The research confirmed that at times, the communication amongst the project team and the general understanding in their roles as professionals affects the speed with which they are able to reach an agreement on a design change. It happens that an architect would propose a change to the design that the structural engineer would only view it as just an aesthetical feature to beautify the projects' look and feel, which might come as a compromise to the structural integrity of the building. Whilst on the other hand, the quantity surveyor who is guarding expenditure would be concerned of what the change would do to overall project cost. All these in turn slows down project progress on site as the proposed changes might require completion ahead of other planned project activities.

Inadequate consultants experience ranked third, with an RII of 0.56. The presence of an experienced consultant on site would limit delays on capital project delays in Namibia according to the findings of the research. It is deemed that experience in terms of project complexity, magnitude and size are vital for project success and will eliminate eventual delays that might be caused by appointing consultants who will spend ages trying to get over the sheer size of a project before they commence with penning it down on paper. The inefficient projection of original project duration on the part of the consultants ranked fourth with an RII of 0.54. At the time of defining the project, the consulting team, guided by the quantity surveyor or cost consultant in other

terms, provide a project duration guided by a fair expenditure in relation to the overall project cost. It is these calculated timelines that at times guide the overall project timelines that the actual construction contracts duration is pinned to.

These timelines might be fair and well guided by the cost project consultant's expert opinion but when actual construction commences on site, the contractor might find it hard to meet this set duration due to their capacity and other related factors. This in turn causes a delay on the project as the contractor is not able to complete the project within the defined time. It is also in very rare cases that a selected contractor would refuse a set timeline in the fear of having the next best contractor who can meet the set timeline, appointed in his place.

Consultants design errors ranked as fifth with an RII of 0.52. The errors in design can cause a serious delay to a project on site as this has the potential to bring the project to complete halt on site. This could be an error that was undetected at the time of design approvals by the client or simply an issue that was overlooked. The re-designing and issuing of instructions to the contractor to proceed can have detrimental delays. Consultants' reluctance to change or which can also be referred to as consultant's rigidity was ranked as the sixth cause of delay with an RII of 0.48. There are instances where appointed consultants on the project have been to different schools of architecture or engineering and have different approaches to arriving at the same result, but each has a preference that their known method should be used.

In other instances, the consultants would have disagreement on minor variations to the design due to personal egos. All this eventually affects the pace at which a decision is made which then affects progress on site. The delay on the part of the consultants to perform site inspections as well as the complexity of the project were both ranked

seventh, with an RII of 0.47. though they are still causing delays in capital projects, they were found to be low in their potential to delay a project. One would suppose this to be the case for site inspections because it is accepted practice that for capital projects in Namibia, there are two meetings monthly where inspections can be done on site and also, the contractor has the mandate to request for an inspection on site as soon as the need arises at any given time.

At the bottom of the ranking for consultants related delays is the poor use of advanced design software and the delay in the preparation of the interim valuations and payment certificates, both ranking number eight with an RII of 0.44. In order for the next consultant to use a drawing designed by another, the two professionals have no option but to all be on the same level when it comes to software's in the market or else one renders their services unusable, which then becomes a hindrance to the project team and cause of delay to the project. Most consultants then aim to keep abreast with what is latest on the market, thus making this a cause of least delay in the construction project process.

The faster a consultant is able to produce a drawing of quality, the better, thus the need for each consulting office to strive to be at the top of the chain. The more advanced the design software, the easier it is to manage a project that might seem complex by nature. In terms of issuing the interim valuations which are prepared by the quantity surveyors following site inspections and the payment certificates which are a responsibility of the architects, the research found that these are the list causes of delay as they seem to comply with rule that compiles them to be done within seven days following the monthly progress inspection meetings.

4.5.3 Contractor related delays

Table 4.3: Contractor related delays

Identified Causes of Delays		RII	Rank
1	Delayed payments for work done	0.86	1
2	Financial indiscipline	0.85	2
3	Difficulties in financing the project by contractor	0.84	3
4	Ineffective project planning and scheduling of works	0.84	3
5	Poor site management and supervision	0.84	3
6	Delay in the appointment of sub-contractors by client	0.81	4
7	Inadequate contractor experience	0.80	5
8	Rework due to errors in construction	0.77	6
9	Unreliable sub-contractors	0.75	7
10	Poor quality of construction materials	0.49	8

The delay in payments of contractors by the client for work done was ranked as the number one cause of delay in relation to the contractor with an RII of 0.86. The research found that besides the legal requirement contractually, which requires that the client settles the payment certificates within thirty days from the date of issue by the architect, most payments are paid in excess of the 30 days, thus affecting contractor's cash flow and adversely affecting progress of works on site. This financial burden on the contractor limits his efforts to try and meet set project timelines as they are not able to secure materials in time from their supplies and subsequently affecting their credit records with suppliers who do not receive payments on time.

The contractor related cause of delay that was ranked second is the financial indiscipline with an RII of 0.85. It was found that the appropriation of finances meant

to fund the activities of the project is not correctly handled in some instances, thus affecting the scheduled execution of programmed project activities. This in turn causes delays to the construction process as tasks now have to be moved further on the project timeline, pending a project payment to be received in the future. In some cases, the misappropriated monies by the main contractor would be payment meant to pay for works completed by the sub-contractors on the project as payments for sub-contractors are done through the main contractor.

The difficulty in financing the project by the contractor ranked third with an RII of 0.84. Though not all, a significant number of contractors, in particular local contractors are not financially strong and mostly rely on the payment of progress payments by clients which gets certified on a monthly basis. As reported under the first delay cause in this section, these interim payments by clients are not done on time due to long official procedures in the approvals of payments and monthly budget ceilings on the part of the user-clients who have to request the bank of Namibia to make the eventual payments to the contractors.

Any given project needs funding in order to have timely completion and a struggle in financing the project is a serious cause of delay. Along with the difficulty in project financing by the contractor, both ineffective project planning and scheduling of works as well as poor site management and supervision ranked third with the same RII of 0.84. In the division of construction in most developing countries, the main contractor would be an individual with very limited knowledge in the field of construction, who has not set in a class to acquire a qualification in the construction field. This then makes it a difficult task for this individual and his team, to compile an effective schedule of works with clearly defined critical path items and concurrent activities. Subsequently,

this becomes a cause of delay because items that are on the critical path and should have been prioritised are overlooked and concentration on speeding up the process through an increase in labour to complete concurrent tasks falls by the way side.

The recruitment of construction experts as part of the site management team is a factor that most contractors incorporate to help mitigate delays and guide in project management and site supervision, the absence of which affects project progress significantly. With a good project manager to oversee works on site, planning is done correctly and delays are mitigated, in time.

The delay in the appointment of sub-contractors by the client to a project was ranked as the fourth delay cause with an RII of 0.81. The works of the main contractor is limited to general construction works that do not require specialist expertise. The rest of the works such as electrical and mechanical installations of telephone, bulk power, air-conditioning, fire detectors, lifts, joinery, aluminium works, sprinklers and the likes requires experts who get appointed onto the project in the form of sub-contractors. These specialists are scheduled into the project timeline at project inception as to when their services would be required on site thus prompting their appointment to be done in time for a smooth flow of the construction process.

The delay in the appointment of the sub-contractors has a delay on the overall project as their installations also affect the works of the main contractor in progressing with other works that require a certain specialist service to be installed before general construction can proceed. The fifth delay factor with an RII of 0.80 is the inadequate experience on the part of the contractor. Similar to the experience required by a consultant or a client/user-client representative, a contractor also requires experience in his line of work for a smoother execution of works. The absence of necessary

experience was found to be a cause of delay as the project ends up as a learning experience thus prolonging the time spent on executing activities that would rather be done in a shorter defined period of time.

Rework due to errors in construction, which is a related cause of delay to the inadequate experience of the contractor, ranked sixth with an RII of 0.77. It was found that in a situation where a contractor lacks experience, they are likely to spend a whole lot more time redoing work that they have already completed due to errors. It also became apparent through discussions with players in the construction industries, that the most common errors that lead to rework are failed concrete tests and installations that the contractors install without prior to consultants' sample approval on site. This causes delays in the overall project timeline as the labour resources that would have proceeded on to the next task, spent twice the time doing the same task over again.

Unreliable sub-contractors ranked as the seventh cause of delay with an RII of 0.75. This confirms that though this a cause of delay, it has a least impact. The process of appointing sub-contractors on a project goes through a procedure of finding a list of recommendable specialists who have a proven track record to execute as per detail and deliver on time. It is within this process that before a sub-contractor eventually gets appointed, elimination of what would be possible causes by the specialist to delay the project gets identified. The entire project team has a say in the selection of the sub-contractor but the client has the final decision.

It was revealed through the research that the unreliability of the sub-contractors becomes apparent when the correct merits are not used in the appointment of the sub-contractor thus risking the project and eventually realizing delays on the project. The factor with the least effect in terms of causing a delay on the project under the

contractors' category is poor quality of construction materials, ranking number eight with an RII of 0.49.

Most respondents indicated that construction of works on site uses materials as per specifications provided for by the project consultants thus making it less likely for material quality to affect project progress on site. It was confirmed that delays are still observable on site as a result of poor-quality materials due to the fact that in some instances, the contractor or his sub-contractors would still acquire sub-standard materials in an effort to cut cost and hoping that this will go undetected during site inspections. This then causes delay to the project as new lead times are now added on to receive the materials of correct quality.

The contractor related delays have the highest impact on capital construction delay.

4.5.4 External/Other related delays

Table 4.4: External/Other related causes

Identified Causes of Delays		RII	Rank
1	Unreliable suppliers	0.60	1
2	Environmental and social factors	0.59	2
3	Unexpected soil conditions	0.58	3
4	Weather Conditions	0.52	4
5	Poor supply/shortage of construction materials	0.51	5
6	Accidents during construction	0.49	6
7	Remote location of site	0.49	6
8	Price fluctuations of construction materials	0.45	7
9	Ineffective delay penalties	0.44	8
10	Local political interference	0.33	9

It was found that unreliable suppliers ranked number one as the cause of delay in the category of external or others related causes of delays with an RII of 0.60. The

expressed by the respondents indicated that most construction materials needed for projects in Namibia are imported from outside the country, either through the contractor's direct supplier based in a foreign country or through the specific supplier's local representative. This arrangement necessitates a lead time that consumes project time and causing a delay. It was also gathered that there are instances where indicated expected time of delivery is varied by a margin due to material transportation issues across borders. Subsequently, in instances where items were scheduled to finish within a given time gets altered thus prolonging the overall project timeline. Environmental and social factors had an RII of 0.59, ranking second in this category.

The research found that the environmental and social factors in Namibia present special challenges for the project team and can result in time overrun if not comprehensively attended to prior to construction commencement. The factors in this category found to be causing delays if not fully considered prior to construction commencement were immediate community engagement, poor water and road infrastructure and electricity supply in the area where a capital project construction is to be located.

Unexpected soil conditions were ranked third with an RII of 0.58. It was found that in some areas, the contractor is faced with a challenge of discovering hard rock whilst digging for foundations or a low water table which calls for a halt in construction at the onset of the process. This occurs due to the absence of proper geotechnical surveys being conducted prior to the commencement of construction works on site where a client sides cost saving or due to poor judgement on the part of the engineers using closely located projects that they have worked on as precedence to omit doing a geotechnical study.

The halt in the construction process as the team looks into options of finding a solution to the soil conditions delays overall construction, effecting project scheduling. Weather conditions was ranked fourth with an RII of 0.52. The main weather condition cited was unexpected rainfall in relation to when the project is commissioned to commence on site. The respondents indicated that a project commissioned during the rainy season is likely to have greater delays due to weather conditions because the ponding up of water in the trenches affects the construction of the foundations and the same rainfall also affects the curing of concrete in time, causing delays and affecting project time.

The poor supply or shortage of construction materials was ranked as the fifth cause of delay in the external related category with an RII of 0.51. Given the poor availability of local materials to be used in the construction industry, the process of ordering supplies from abroad inevitably lengthens the project timeline.

In instances where there was an underestimate on of materials ordered, an additional lead time to balance the numbers consumes construction time. Similarly, situations where work was poorly done and rework has to take place requires additional material which is hard to come by, thus eating on project time and causing additional delays. There could also be material shortage in situations where the building is for special needs and the required specified installations have to come in from overseas, again a cause in project delay due to material shortage.

Accidents during construction as well as the remote location of site were both ranked sixth with an RII of 0.49. It was found that generally due to the expected level of safety on a construction site and the requirement for every construction project on site to have

a safety officer, the occurrence of accidents is not so rife on a construction project but when they do occur, they affect project progress on site due to the type of media attention that they attract and the need to implement the necessary measures on the site to avoid a similar accident from happening. This invites time delays that have an impact even on the works of sub-contractors on the project.

The remote location of a capital project in a developing country such as Namibia requires adequate planning in terms of timelines because the availability of network, roads, water and electricity infrastructure are significant role players on the time that it will take the project to be completed. The absence of this infrastructure will impact the site visits as well communication between the contractor and the project team thus delaying decision-making and delaying project completion.

The cause of delay ranking seventh on the external factors is the price fluctuations of construction materials with an RII of 0.45. It was found that the change in prices of construction materials which can be due to time lapse or change in product specification as a result of change in the specified material being out of manufacture can cause a delay on a project time as amends have to be made to accommodate the variation in these materials and thus the overall project cost. The bureaucracy in approving the additional costing has time implications. Though it was confirmed that provisions are usually made during project costing at inception to accommodate the fluctuations in materials, the variations at times end up exceeding the made provisions. Ineffective delay penalties ranked eighth with an RII of 0.44.

The study found that the ineffective use of delay penalties on contractors for delays in completion of projects on time had the second least impact in project delay in the category of external related factors. The poor enforcement of delay penalties leaves

contractors reluctant in pushing to meet the set project timeline, opting to request for extensions of time that a hard to adjudicate on the part of the consultant. The local political interference was found to have the least impact in the category of external factors in delaying capital projects, ranking ninth with an RII of 0.33, which is the cause with an overall least impact on construction delay, amongst all the factors evaluated under this study. This serves to confirm that though some level of political interference has the potential to delay a capital project, there is little of that impact felt in a project to delay progress significantly. It can be argued that this factor has a great deal to play in the delay of the implementation of the project but once the project has commenced, the delay thereof is limited.

From the information in table 4.4, it is clear that the category of external related factors had the delay causes with the least impact on construction delay compared to all the other categories.

4.6 Other challenges and possible mitigating measures on Construction delays

Through the process of gathering expert opinions from the sampled experts on other possible factors that are causing construction delays, it was found that the indicated factors under the four different categories initially identified through literature adequately covered the major factors.

Additionally indicated factors included; the limited powers that consultants are given to manage a project; the limited time within which project documentation is to be completed; Government prioritising some projects thus disadvantaging others by re-channelling funding to the prioritised projects; the vetting process for contractors on high security projects and the government policy that restricts the payment of advances to Contractors.

The mitigation measures proposed hindered on the involvement of project managers over and above the current project teams which only consist of, clients, architects, Quantity Surveyors, Engineers and the Contractor. Particular emphasis to involve an independent expert for the sole purpose of overseeing all parties and ensuring adherence to the three constraints of scope, cost and time was emphasized. The need for Contractors to train in construction was also emphasized, with highlights that the greater number of those running local construction firms have limited knowledge on actual construction works and abilities to understand plans. The experts proposed the introduction of construction studies at tertiary level. The requisite to avail enough budget on the part of the clients and user-clients was indicated as a measure that could halt so many delays and save the central government immense cost. Emphasis was also placed on the use of local materials to avoid delays that might be caused as result of lead times from foreign suppliers. This was also indicated that it will be a move that will promote the growth at home strategy for Namibia.

4.7 Summary

This chapter presented an analysis of the results found by the study and comprehensively discussed the findings. In this chapter, it was clear that all the identified causes of delays from literature had a contribution to delays in the construction of capital projects though with varying rankings. Contractor related delays have the most impact of delays with external causes having the least impact. Additional factors causing construction delays and possible mitigation measures were also suggested by the sampled experts.

CHAPTER 5 – CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarises the findings of this study and provide recommendations. It also highlights the conclusions, from the findings. The closing section of this chapter presents the directions for further research.

5.2 Summary of the Findings

The study sought to investigate the causes of construction delays in capital projects in Namibia. From an analysis of the research findings and related information gathered through questionnaires, the following was found evident.

The findings of the study showed that slowness in decision-making due to bureaucracy on the part of the client and the user-client is the number one cause of construction delay in the construction of capital projects in Namibia. It was also found that the delay in payment by the client for work done by the contractor has an adverse effect on the project timeline. On average, the factors with the highest ranking in causing delays were found in the contractor related category and this included financial indiscipline, poor site management and supervision and difficulty in financing the project on the part of the contractor amongst others. The causes of delays relating to consultants and the external factors were found to be of a lower impact in terms of causing delays of construction projects in Namibia as none of the factors in each of these two categories could be found in the top 10 overall causes of delay for the construction of capital projects.

The Namibian government through the NPC, allocates immense financial resources towards the construction of capital projects on an annual basis, therefore necessitating

an investigation into the causes of delays in capital projects to help mitigate the challenge of cost overruns on the government through curbing unnecessary delays. The study confirmed that clients and contractors are major role players in the construction industry and have the potential of improving the situation in terms of delays as the main causes of delay fall within their categories.

This study also established that external related factors such as accidents during construction, weather conditions and environmental and social factors had less effect on causing delays in the construction of capital projects in Namibia.

5.3 Conclusions

Construction of capital projects is vital for the development of the country's infrastructure and economic growth, thus emphasising the need for timely completion of national projects.

The study was able to achieve its aim through the investigation of the causes of delays in the construction of capital projects and ranking of these factors. Findings have shown there is a link between the objectives of the study and what was presented in chapter 4. Therefore, in relation to the first objective that aimed to investigate the causes of construction delays in Capital Projects in Namibia, the findings confirmed that the general flow of factors that were identified through literature review, were a good guide in investigating the Namibian case. As indicated in the summary of findings above; the contractor has a major role to play in amending construction project delays as the contractor related delays attribute to the most delays. This is in line with the findings by Muhwezi, Acai & Otim (2014).

In relation to the second objective, the desired action of ranking the delay factors for the Namibian case was achieved and necessary weights were allocated to the different delay factors giving them a ranking in the list of 40 factors. It is hoped that these findings will act as a guide to policy makers, project coordinators, consultants and contractors in mitigating these causes of delays and to achieve set targets of timely project completion within budget.

This study contributes to the existing body of literature in Southern Africa in giving prominence to the significant causes of project delays in capital projects construction and more particularly to the Namibian case.

5.4 Recommendations

In light of the on the findings in this study, the following recommendations are made.

5.4.1 Recommendations to clients/user-clients

- Client need to ensure that they appoint an effective project coordinator who is able to fully represent the client and provide needed guidelines to the project team.
- The client should honour payments to contractors within reasonable time as provided for in the construction contract.
- The client and the users need to ensure there are sufficient financial resources for the project at implementation stage to avoid stoppage of work on-site due to cashflow constraints.
- There is a need for the client to limit the channels through which a decision has to pass before it is approved as this will speed up decision-making and mitigate project delays.

- Additionally, professionals in the field of architecture, quantity surveying and engineering should be added on to the workforce at the Department of Works to assist in the approval of technical documentation for projects.
- The appointment of consultants and contractors on the projects should be guided by just and fair principals and the necessary technical experience to avoid unnecessary errors in design and construction.
- Principal agents and project managers should be granted powers by the client to make a number of decisions regarding construction on site.
- Client to consider the appointment of an independent project manager whose task is strictly to run the project and streamline all processes.
- The client is to ensure timely payments of interim payment certificates to contractors.

5.4.2 Recommendations to Consultants

- There is a need for effective communication and teamwork amongst consultants to hasten the processing of project documentation in time.
- Consultants would need to constantly engage with the client to minimise or avoid the issuing of variations or the change in specifications or designs during the construction process.
- The project team leader, being the principal agent or project manager is required to bring his team to task in terms of issuing site instructions to the contractor in good time.
- All consultants to ensure that they have the latest design software for fast and efficient completion of project drawings and documents.
- The contractual principles to be applied at all times and consultants to keep proper records of all project-related correspondence.

- Openness and flexibility within reasonable means, in the approach to design and contract administration is required on the part of the consultants.
- Consultants should invest in constant learning by updating themselves with new design trends and latest construction materials in the market and embrace change and new ways of doing things.
- The consultants should consider all aspects at project inception when advising the client on a reasonable construction period to avoid unnecessary claims for extension of time by the contractor once on-site.
- Principal agents and project managers to assist the client in setting up Key Performance Indicators (KPI's) to help monitor and control project performance.

5.4.3 Recommendations to Contractors

- Enforceable skills transfer policies should be put in place by the contractor to help unskilled and semi-skilled workers to gain knowledge from the more experienced workers.
- Contractors should ensure that the project management team is well trained in running a construction project.
- Contractors need to exercise financial discipline in managing construction projects by ensuring that project funding is spent on the activities that it is meant to be used for.
- The contract needs to have an experienced team of supervisors to guide the workforce and avoid construction errors that will lead to rework.
- Contractors should abide by the purchase of specified materials to maintain quality.

- Contractors should ensure that they maintain a good financial standing for their companies to be able to have enough cash flow to keep the construction going in the case of delayed payments by the client.
- Contractors should alert the project team ahead of time, of possible delays that might occur on the project due the late appointment of sub-contractors.
- The contractor should ensure that there is proper planning and scheduling of construction activities to guarantee effective site management and supervision.

5.4.4 Recommendations on external/other related factors

- Stricter measures to be put in place in the enforcement of project delay penalties.
- The project team should try by all means to specify materials that are locally available to avoid the problems of delay and unreliability of suppliers and to promote the growth at home strategy.
- The necessary environmental impact assessments, land surveys and geotechnical surveys need to be carried out ahead of commencement of construction.
- Health and safety measures are to be strictly adhered to on all capital project construction sites to curb accidents.
- Political interference to be minimised in the construction of capital projects.

5.5 Directions for Further Research

This study investigated the causes of capital projects construction delays in Namibia and was limited to a few project coordinators and consultants. Future studies should focus on diverse groups of people within the construction industry with specific inclusion of contractors as they were not covered in this study. The outcome of such

research could yield some interesting findings and could also considerably reveal further causes of delays that were not uncovered by this study. This study was confined to capital projects construction delays. Though there is a degree of commonality in general causes of delays in construction projects, it will be ideal for further studies to look at construction project delays in their entirety instead of just capital projects. The researcher therefore suggests that further studies be conducted using a bigger population and sample which will cover more ground in the study.

This study was cross-sectional in nature. Future studies could consider a longitudinal approach.

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APPENDICES
APPENDIX A: REQUEST TO PARTICIPATE IN THE RESEARCH



I am an MBA Student from the Namibia Business School: University of Namibia. I am currently conducting research, entitled: **An Investigation into the Causes of Construction Delays in Capital Projects in Namibia.** This study is fully endorsed by the Namibia Business School Management. The findings of the study should assist the nation and the construction industry in the management of construction delays as far as capital projects are concerned. Your participation will contribute a critical part of the study.

In order to assist in my research, you will be required to complete a questionnaire. The completion of the questionnaire would require approximately 20 minutes. The sharing of your knowledge and experience as you answer the questionnaire will be valuable to me and as such will be treated with utmost confidentiality. No reference will be made to any individual and the information will be reported in an aggregated format. A summary of my findings will be provided upon your request. If you have any queries, please do not hesitate to contact me.

I thank you in advance for your kind assistance and consideration.

Yours sincerely,

.....

Cathy Tjitemisa

APPENDIX B: QUESTIONNAIRE

QUESTIONNAIRE

This questionnaire is divided into three sections. The specific information in each section is detailed as Demographic Characteristics, Capital Projects Involvement and Capital Projects Construction Delays.

1. Section 1 – Demographic Characteristics

1.1 Gender

Please tick your gender in the appropriate box

Gender	Please tick here
Male	
Female	

1.2 Age

Please tick your age category in the appropriate box. Please tick one option only.

Age Category	Please tick only one category
20 - 24	
25 - 29	
30 - 34	
35 - 39	
40 - 44	
45 - 49	
50 - 54	
55 - 59	

1.3 Work Experience

Please tick your overall work experience category in the appropriate box. Please tick only one option.

Overall Work Experience	Please tick only one category here
0 – 5 years	
6 – 10 years	
11 – 15 years	
More than 15 years	

1.4 Job Category

Please tick your job category.

Job Category	Please tick only one option
Projects Coordinator (DoW)	
Architecture	
Quantity Surveying	
Engineering	
Other (Please Indicate)	

2. SECTION 2 – Capital Projects Involvement

2.1 Experience on previous capital projects

Please indicate whether you have worked on capital projects before by ticking in the appropriate box.

Response	Please tick only one box
Yes	
No	

If you indicated yes to question 2.1 above, please state whether the project(s) where completed on time, if no state reason.

Response	Please tick only one box
Yes	
No	
	Reason (if no):

2.2 Current Projects

Please tick the approximate number of capital projects that you have worked on in the past including those that that you are currently working on in total.

Number of Projects	Please tick only one box
1 - 5	
6 - 10	
11 - 15	
15 - 20	
20 or more	

1. Section 3 – Capital Projects Construction Delays

Using the 5-point Likert scale, assign a weight to each factor, ranging from 1 to 5, where 1 is the least weight and 5 is the highest weight in terms of how the particular delay affects construction. Kindly indicate with a tick or a cross, the causes of construction delays for Capital Projects in Namibia. The factors here below were identified from existing literature and previous studies and they are listed under four different categories. You are to complete all four categories indicated here below.

1.1 Client/User- Client Related Factors

Identified Causes of Delays	1	2	3	4	5
Change in project coordinator/representative					
Delay in payments of Contractor's claims					
Design variations/changes by the client or user-client					
Interference by the client/user-client in the construction					
Stoppage of work due to cash flow constraints					
Limited annual allocation of project funding by Client/User-client					
Lack of incentives for the Contractors to finish ahead of schedule					
Delay in the approval of drawings and BoQs					
Poor Communication and coordination with consultants by client					
Slowness in decision-making due to bureaucracy					

1.2 Consultant Related Factors

Identified Causes of Delays	1	2	3	4	5
Complexity of the project					
Insufficient projection of original project duration					
Design errors by consultants					
Delay in performing site inspections					
Poor use of advanced design software					
Delay in reviewing and approving design changes					
Delay in the preparation of interim valuations and payment certificates					
Inadequate consultants experience					
Consultants' reluctance to change (rigidity)					
Consultants' delay in issuing site instructions to contractors					

1.3 Contractor Related Factors

Identified Causes of Delays	1	2	3	4	5
Ineffective project planning and scheduling of works					
Poor site management and supervision					
Rework due to errors in construction					
Unreliable sub-contractors					
Poor quality of construction materials					
Difficulties in financing the project by contractor					
Delay in the appointment of sub-contractors by client					
Financial indiscipline					
Inadequate contractor experience					
Delayed payments for work done					

1.4 Other/External Related Factors

Identified Causes of Delays	1	2	3	4	5
Unreliable suppliers					
Environmental and social factors					
Unexpected soil conditions					
Weather Conditions					
Poor supply/shortage of construction materials					
Accidents during construction					
Remote location of site					
Price fluctuations of construction materials					
Ineffective delay penalties					
Local political interference					

1.5 What do you regard as other challenges contributing to construction delays for capital projects?

1.6 What do you recommend should be done to eradicate delays in the construction of capital project?

THANK YOU FOR YOUR VALUABLE TIME!

APPENDIX C: LANGUAGE EDITING CERTIFICATE



The Rev. Dr. Greenfield Mwakipesile

ThD, MBA, HBS | mwakipg@outlook.com

CONTACT

PO Box 99539,
UNAM,
Namibia

LANGUAGE & COPY-EDITING CERTIFICATE

27th September 2021

RE: LANGUAGE, COPYEDITING AND PROOFREADING OF CATHY TJITEMISA'S THESIS FOR THE MASTER OF BUSINESS ADMINISTRATION DEGREE OF THE NAMIBIA BUSINESS SCHOOL OF THE UNIVERSITY OF NAMIBIA

This certificate serves to confirm that I copyedited and proofread **CATHY TJITEMISA's** Thesis for the **MASTER OF BUSINESS ADMINISTRATION DEGREE** entitled: **AN INVESTIGATION INTO THE CAUSES OF CONSTRUCTION DELAYS IN CAPITAL PROJECTS IN NAMIBIA**

I declare that I professionally copyedited and proofread the thesis and removed mistakes and errors in spelling, grammar, and punctuation. In some cases, I improved sentence construction without changing the content provided by the student. I also removed some typographical errors from the thesis and formatted the thesis so that it complies with the University of Namibia's guidelines.

I am a trained language and copy editor and have edited many Postgraduate Diploma, Masters' Thesis, Dissertations and Doctoral Dissertations for students studying with universities in Namibia, Zimbabwe, Eswatini, South Africa and abroad. I have also copy-edited company documents for companies in the region and abroad.

Please feel free to contact me should the need arise.

Yours Sincerely,

A handwritten signature in black ink, appearing to read "Dr. Greenfield Mwakipesile".

The Rev. Dr. Greenfield Mwakipesile



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[Dr. Greenfield Mwakipesile](#)