SCHOOL OF POSTGRADUATE STUDIES

ASSESSING THE CRITICAL PROJECT SUCCESS FACTORS IN THE ROAD CONSTRUCTION INDUSTRY IN ZAMBIA

BY

CHIMWA MWANGONDE MUTAMBO

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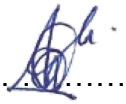
DECLARATION

By signing this, I, Chimwa Mwangonde Mutambo, affirm that this is my original work and hasn't been submitted for credit toward a degree at another university. No portion of this thesis proposal may be duplicated without the University of Lusaka's or the author's prior written consent.



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Student Signature Date

This dissertation has been submitted for examination with my approval as Supervisor.

Supervisor name: Professor. Chanda Sichinsambwe

Signature:

Date: March 2024

DEDICATION

This work is dedicated to the memory and legacy of my late parents and to my loving wife and daughter (Wezi).

ACKNOWLEDGEMENTS

My thanks go to God who gave me the strength and wisdom to come this far to complete this academic journey.

This study would have not materialized without the guidance and support from my supervisor, Professor Sichinsambwe who was always available to give me his valuable time.

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ABBREVIATIONS

GRZ	Government of the Republic of Zambia
RDA	Road Development Agency
CSF	Critical Success Factor

ABSTRACT

This study, conducted in Zambia, aimed to investigate critical success factors influencing road construction projects. Employing a positivist research philosophy, a deductive approach, and a quantitative research design, the study focused on project planning, stakeholders' involvement, project funding, contractor's capacity, and project monitoring and evaluation. Through inferential statistics using SPSS version 26, the study utilized hypothesis testing, correlation analysis, principal component analysis and regression analysis to explore relationships among variables. The research findings, based on a thorough analysis of the data collected from 115 respondents whose demographic composition has 62.6% male and 37.4% female road construction professionals. The highest number of participants had an undergraduate degree (36.5%) followed by professional qualifications at 24.1%, master's qualification 20% while those with diploma qualifications were the least at 19%. The data revealed significant correlations and impacts of the identified factors on the success of road construction projects. This data was collected over a period of less than six months due to limited time, but the KMO values which were above 0.6 show that the sample was sufficient. Project planning, stakeholder involvement and contractor capacity were the aspects which were found to have an influence on road construction project success in Zambia. The findings show that success of Zambia's road construction projects was not significantly impacted by project finance or monitoring and evaluation. The results of this research will give policy makers and players in the road construction industry the areas to focus on or which will determine if projects will be a success. They also give players information which can be used to create tools which target ensuring that project planning, stakeholder involvement and contractor capacity are done thoroughly. It would be good for future researchers to investigate other critical success factors not explored in this study.

Keywords: Critical success factors; road construction; project success; project management;

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The construction industry requires huge capital investments, but road construction projects require larger capital investments, and their success or failure has a huge impact on the economy of any country and for this reason, it's important to consider the elements that lead to road construction projects being completed successfully. There are several factors which are important to any project which are important to ensure success. These are called critical success factors (critical success factors) which are factors which lead to the successful outcome of a project (Crawford and Bryce, 2003a). While project success in project management is widely defined as finishing off a project on time, within scope, and according to budget, there are factors which enable the project to be completed according to the three agreed parameters. These are the factors which if they are not considered can affect successful completion of a project but are not success in themselves.

For a road project to be completed successfully, several factors need to be considered and these critical success factors are mainly directly related to the project itself (internal factors) and those that are external where the project or its team have very little influence on them, but they affect the success of the project (external factors). For example, for a road to be completed on time, the drawings and designs need to be complete otherwise, the project during the implementation stage will be delayed due to the need to wait for the completion of drawings. this delay is mainly a critical success factor which involves the competence of the project team and is an internal factor. Crawford and Bryce (2003) in their theory categorized critical success factors in terms of project manager and team factors, external factors, project factors and organization factors. This is a new theory which provides a better way of identifying critical success factors in terms of the four categories highlighted. According to research on critical success factors for road projects in Ghana, the most important critical success factors include donor and financial institution support, project continuation by succeeding administrations, enough project finance, and lack of political interference. (Damoah, et al 2022). This study mainly focused on external factors as being what mostly affects the outcomes of road projects in Ghana.

From literature review, there are no known studies which have identified this critical success factors for the Zambian context. The aim of this study was to identify road construction critical success factors in Zambia and their influence on project success.

The introduction chapter outlines the background of the study and gives better context of the importance of the study and states the problem which is being addressed. it also includes the research objectives, research questions, significance and limitations of study and an outline of this report.

1.1 Background to the study

The concept of Critical Success Factors (CSFs) within project management has been integral to enhancing project outcomes. Initially proposed by Slevin and Pinto (1987), CSFs are defined as pivotal elements that, when adequately addressed, significantly increase the likelihood of project success. Unlike conventional success metrics focusing solely on time, cost, and quality, Slevin and Pinto's model broadened the scope to encompass various aspects contributing to project success. Russell and Jaselskis (1992) further emphasize the importance of these factors, noting that their fulfillment ensures successful performance at departmental, business, or individual levels.

Traditionally, studies utilizing Pinto and Slevin's framework have predominantly explored success factors in the broader construction industry, with findings often applicable to road construction projects. Chetty (2020) notes the absence of a universal method for determining project success but underscores the necessity of considering specific factors for favorable project outcomes. Building upon this foundation, Belassi and Tukel (1996) introduce a contemporary perspective on project success, identifying four interconnected dimensions: project-related factors, project management and team dynamics, organizational influences, and external environmental factors. Adaptation of this model to the road construction sector allows for a nuanced understanding of CSFs in this context.

Recent research, such as that conducted by Wang et al. (2022), further enriches our comprehension of CSFs, particularly in large-scale construction endeavors. Their findings underscore the significance of stakeholder relationships, resource availability, communication efficacy, strategic clarity, and public acceptance as paramount CSFs in

mega construction projects. Moreover, factors influencing the quality of road pavement, such as resource materials and workmanship, play a pivotal role in ensuring project success (Mwelu et al., 2019).

While numerous studies have explored CSFs in road construction, disparities emerge due to variations in countries' development levels and regional contexts (Sohu et al., 2018; Ramlee et al., 2016; Erick & Were Susan, 2017). Despite these variances, Ramlee et al. (2016) note a common challenge: identifying the most influential factors affecting road project outcomes. Noteworthy research within the sub-Saharan African context, such as Damoah et al.'s (2022) investigation into public road construction projects, sheds light on critical factors specific to the region. This underscores the importance of addressing unique CSFs to enhance project management processes and outcomes within Zambia's road construction industry.

Expanding upon existing literature and contextualizing findings within the Zambian road construction sector, this study aimed to identify and assess critical project success factors. By bridging the gap between theory and practice, this research sought to inform more effective project management strategies, ultimately contributing to the advancement of the road construction industry in Zambia.

1.2 Statement of the problem

The critical success factors (CSFs) governing road construction projects exhibit significant regional and locational variations, leading to disparate findings across studies. While existing literature on CSFs predominantly focuses on the broader construction industry, there are notable studies specifically addressing road construction, such as those conducted by Mashwama et al. (2017), Damoah et al. (2022), and Barajei et al. (2023). These studies present diverse findings encompassing stakeholder involvement, project team dynamics, quality management system implementation, procurement bureaucracy, and stakeholder perceptions of project success. Notably, Belassi and Tukel (1996) corroborate these findings in their theory, which builds upon Pinto and Slevin's framework. However, despite the wealth of research, a comprehensive understanding of CSFs in road construction remains elusive, exacerbated by the limited scope of existing studies, which often focus solely on specific working environments and socioeconomic contexts. Moreover, the lack of studies specifically tailored to the Zambian road

construction context further compounds this issue

In Zambia, where substantial governmental investments, notably through initiatives like the Link Zambia 8000 project, underscore the importance of road development, the need for a nuanced understanding of CSFs becomes paramount. Despite these investments, many road projects have encountered setbacks ranging from scope reductions to significant delays and cost overruns. Notably, the absence of a localized study focusing on CSFs within Zambia's road construction industry hampers effective project management practices and contributes to financial inefficiencies. Therefore, this research aimed to fill this critical gap by conducting a comprehensive study within the Zambian context. By employing robust sampling methods to ensure generalizability, this study seeks to provide invaluable insights and tools for stakeholders involved in road construction projects, ultimately contributing to more efficient project delivery and substantial cost savings for the nation.

1.3 Objectives of the study

1.3.1 General objective

The general objective of this research is to investigate the critical project success factors which have an influence on the success of road construction projects in Zambia.

1.3.2 Specific objectives

i. To assess the influence of project planning on the success of road construction projects in Zambia.

ii. To assess the influence of stakeholders' involvement on the success of road construction projects in Zambia.

iii. To assess the influence of project funding on the success of road construction projects in Zambia.

iv. To assess the influence of a contractor's capacity on the success of road construction projects in Zambia.

v. To assess the influence of project monitoring and evaluation on the success of road construction projects in Zambia.

1.4 Research questions

i. What is the influence of project planning on the success of road construction projects in Zambia?

ii. What is the influence of stakeholders' involvement on the success of road construction projects in Zambia?

iii. What is the influence of project funding on the success of road construction projects in Zambia?

iv. What is the influence of a contractor's capacity on the success of road construction projects in Zambia?

v. What is the influence of project monitoring and evaluation on the success of road construction projects in Zambia?

1.5 Scope of the study

This research identified the critical success factors for Zambia's Road construction projects which influence the success of these projects. This study only considered road consultants, project engineers and grade 1 and 2 road contractors. The study was conducted in 2023 between July and December and considered collecting data from grade 1 and 2 road contractors, road consultants, and project engineers in all 10 provinces in Zambia involved with road construction. This study will use quantitative data collected through a questionnaire with a Likert scale which give values to views of respondents. The data was then analyzed using multiple regression and hypothesis testing. Significance of the study

This study shows results essential in assisting stakeholders who are now unable to get the greatest results from the execution of road projects. Non-governmental organizations will have a means of keeping an eye on and assessing the effectiveness of implementing agencies and road participants, as well as whether they have used resources in the most efficient manner to guarantee results that fairly and impartially benefit the public. By adopting and operationalizing the prioritized performance areas road contracts, regulating authorities such as the auditors would be better equipped to monitor the project outcomes. The project managers will have specific areas to concentrate on in the planning phase to

guarantee project success prior to project implementation starting with the highlighted critical success factors.

1.6 Definition of key terms

- **Project success:** this is delivering a project within the objectives specified at the project start.
- **Project success factors:** these are factors which lead to project success.
- **Critical success factors (Critical success factors):** these are the factors that are critical to the delivery of a project within set objectives.

1.7 Organization of the study

Chapter One: Introduction-The introductory chapter provides readers with the background of this paper adding its setting and context. It gives the reader an in-depth understanding of the subject and why it is significant and clearly states the problem. In this chapter the research objectives, questions and report outline are also provided.

Chapter Two: Literature Review –The Theoretical, Empirical, and Conceptual Framework- This section reviews studies in the field which have already been undertaken and the findings. It also reviews the existing theoretical frameworks, empirical studies, and conceptual frameworks that give insight into the meaning of project success and the variables that are important to accomplish it. The reason is to provide an in depth understanding of current and past studies and to identify the literature gaps that need to be researched.

Chapter Three: Methodology-This chapter gives understanding on the research design, methods of data collection, and analysis techniques used for this study. It also gives the method used to determine the size of the study sample. This chapter also gives and highlights the process that was used to gather and process the data to ensure that this study can be replicated.

Chapter Four: Data Presentation and Analysis- this chapter gives the reader or scholar collected and analysed data in a structured and easy to understand format. To make it easier for the reader to comprehend and analyse the results, tables, graphs, and charts are employed. Analysis of the findings is presented to answer research questions or hypothesis and the reliability of the results is presented.

Chapter Five: Discussion of Results and Findings/Interpretation of Results- This Chapter seeks to look at the results and draws interpretations and inferences from them. The findings are understood with reference to the literature that has been reviewed and the theoretical framework developed for the study. These interpretations are examined to see the extent of their implications and how important the findings are in the body of knowledge.

Chapter 6: Conclusion and recommendations- the final chapter of this research provides a summary of the finding in relation to the objectives set out at the beginning of the paper to see if the questions have been responded to. It also gives recommendations based on the findings and gaps that have been found during the research. The recommendations simply give future scholars areas that need further research; they also give project executors and agencies the tools they will need to ensure that road projects are successful. Essentially, this chapter offers a concise description of how research adds to knowledge.

1.8 Summary

This chapter has provided a background of the study of critical success factors in road construction by bringing out findings of other studies and the theories in this field. It has also highlighted the problem that this study intends to address which is to provide project teams and stakeholders with the necessary tools to ensure that road projects are a success. It also clearly states the studies objective which is to see the effect critical success factors on success of road projects in Zambia. It outlines the importance of the study's findings as well as its constraints.

The next chapter, chapter two looks at the most important literature in the study of the critical success factors in the road construction industry and important findings in these studies. It also provides the theoretical framework which includes the most important theories in the study of critical success factors, and these are the theories on which this study was conducted. The chapter also includes a conceptual framework on which this study has been conducted.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The general objective of this study was to assess the influence of critical success factors on the success of road projects in Zambia which will be used by project managers and other stakeholders to better monitor projects and ensure successful outcome of road projects in Zambia. This chapter gives a clear understanding of literature on the topic and outcomes of studies highlighting the most prominent theories used in these studies. The literature reviewed helped create a theoretical framework, it informed the methods to use in the study and clearly highlighted the gaps in literature that require to be filled.

The key words used when searching through literature were project success factors, critical success factors, project success criteria, road construction industry, project success and public roads. These key words were used to find various articles which were published between 1978 and 2023. Most of the articles on critical success factors on road construction are not more than 10 years because most studies focused on the general construction industry. The journals where articles were obtained include:

- Conference Series: Materials Science and Engineering
- Journal of Economics and Behavioral Studies
- Journal of Management and Business Studies
- Project guru
- Science direct
- In Technology & Applied Science Research
- Procedia Engineering

The articles used for literature were obtained from the following search engines:

- Google Scholar
- Google search engine
- South Africa ETD portal
- ResearchGate
- Unilus portal

The literature review chapter provides clearer definitions of key terms as per published

articles and an understanding of the critical success factors. It also outlines empirical literature reviewed for the study from around the world, region, and country which relates to critical success factors in the road construction industry. It contains empirical literature and theoretical literature which forms the basis on which the theoretical framework was derived for this study.

2.1 CRITICAL SUCCESS FACTORS IN THE ROAD CONSTRUCTION INDUSTRY

2.1.1 Critical project success factors

Lamprou & Vagiona, (2018) proposed that project success criteria and project success factors are two different concepts. Project success criteria is a dependent variable meaning it is the desired outcome while project success factors are the independent variables which lead to the desired outcome. With project success factors, there are those that are seen as the most important which will significantly affect the outcome of the project, and these are considered critical. According to Alias et al., (2014) critical success factors are the most important variables related to a project which help predict the outcome of a project. From literature the project definition, project design, senior management involvement/support, communication the external environment, project manager experience and the design team skills are some of the most prominent critical project successes (Ogwueleka, 2011).

2.1.2 Road construction industry

The road construction sector is a segment in the general construction industry. Most scholars have not looked specifically at defining the road construction industry. Therefore, the broader definition of the construction industry will be considered. Nam & Tatum, (1989) proposed that construction is related to activities carried out in relation to putting together and repairing structures which cannot be moved. All parties participating in the construction process are included in the term "construction," including those that provide industrial inputs like machinery and raw materials as well as those who plan, carry out, and oversee the project (Hillebrandt, 2000). Standard for a Construction Procurement System, (2012) describes the construction industry as a collection of many sectors and sub sectors which contribute to the formation and maintenance of structures in the built environment. The manufacturing process of the built environment, which includes a variety of activities from idea generation to design to implementation, is known as

construction (Pheng and Hou, 2019). According to Franklin Ngosong, (2014) construction can also be defined as a process whose output includes new work, renovation, repair, or modification of structures, while other construction work like roads, bridges and dams are classified heavy construction. Therefore, this thesis defines the road construction industry as the various activities involved in putting together of highways from the conception of the idea, design, and implementation. It also includes all the industries like the material extraction, heavy duty equipment manufacture, contractors, consultants, and the executing agencies.

2.1.3 Classification of critical success factors into internal and external categories

To provide an easier and clearer way to categorize and summarize the success factors which are many and need to be summarized for them to be properly understood; they are called internal and external critical success factors. A look through literature from similar studies also found that studies conducted of critical success factors categorized them into these broad subgroups for easier understanding.

Internal project success factors are those which can be controlled or run by the project managers and their team for example labor optimization during a project can be controlled by better understanding labor availability and incorporating these into the project plan (Rahman *et al.*, 2020). Below is a summary of a categorization of the critical success factors as per study conducted by Rahman et al., (2020).

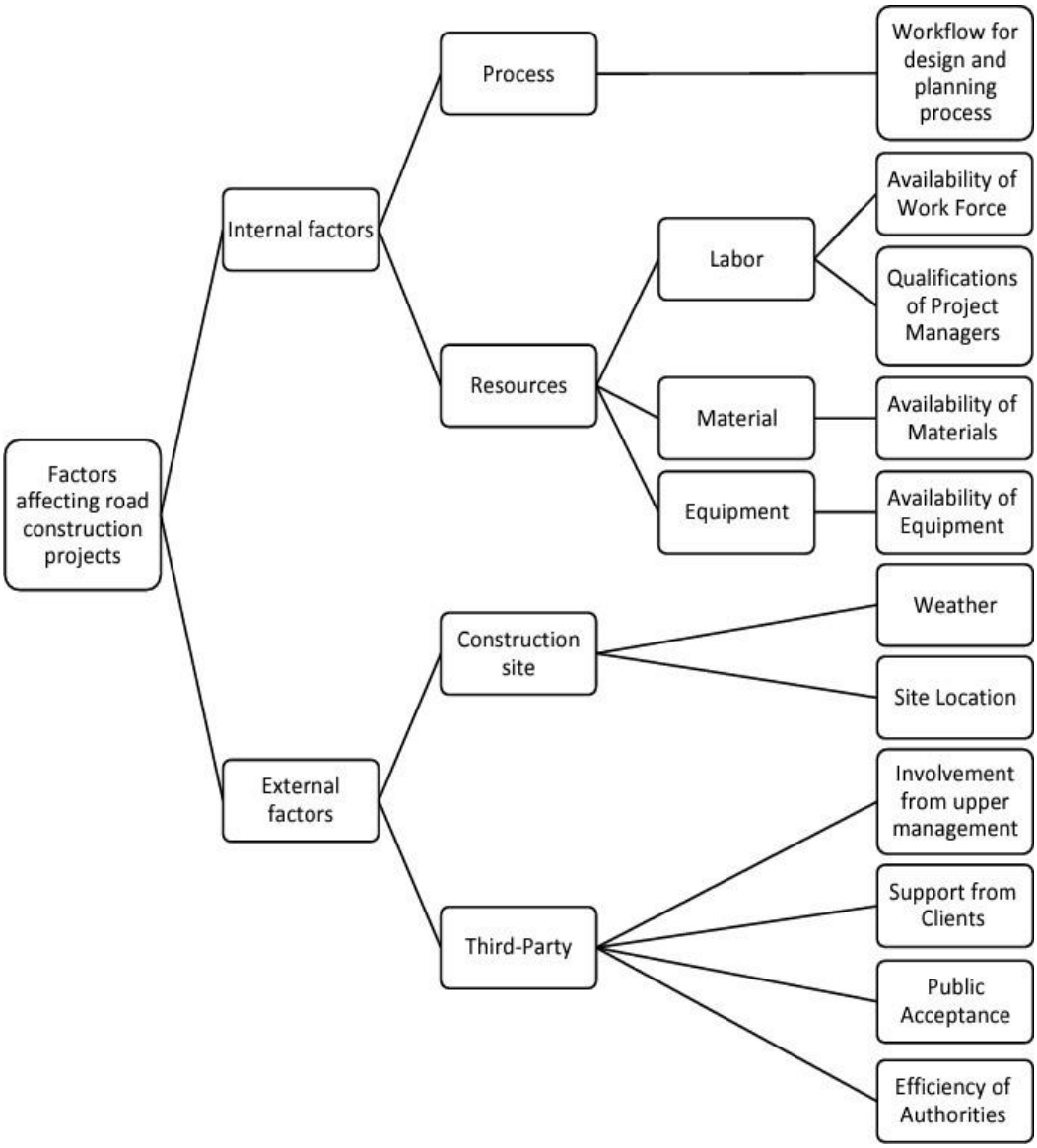


Figure 1: Summary of categorized critical success factors (Source: Rahman et. Al, 2020)

On the other hand, external project factors are those that are out of the control of the project manager or the project team, for example the weather, war, rain, payment delays by clients or unexpected site conditions (Said Al Hinai et al., 2020). Damoah et al., (2022) in the top ten important factors in Sub Saharan Africa found that factors relating to government influence and other natural forces ranked the highest and these are considered external factors since they cannot be managed by the project manager or team. In a study by Said Al Hinai Student et al., (2020) on Gulf Cooperation Countries (GCC) project success factors, the identified internal project success factors include

consultant related, contractor factors, designed factors, labor factors, material issues and equipment factors. An example of an internal factor related to the consultant could be the lack of adequate site investigations which will lead to project delays or cost overruns due to changes in design and the need to adjust the scope of work on the project.

2.2 Internal Critical Success Factors

Awaad et al., (2022) defines internal critical success factors as the factors which can be actioned or managed by the project manager or team. This section of literature takes an in-depth view of literature on the findings from scholars about the internal critical success factors. For example, a failure to plan for the availability of plants for earthworks at some point during the project can be due to project managers lacking competency in terms of resource management

2.2.1 Global literature on internal Critical Success factors

Butković, (2021) conducted a study about critical success factors in international construction projects (ICPs) in Europe, internal critical success factors were grouped as project-related, organizational, and human related factors. In the project related factors, the highest rated critical success factors were the nature of the project. Other project critical success factors include site organization/ management, project management techniques and the accuracy of the project plan. This study used a mixed method approach but only targeted participants who were mostly contractors; input from practitioners on the government agency side would have given more representative data for this study. However, the researcher ensured that the questionnaire and the tools used had both internal consistency and reliability giving confidence to the researcher to generalize these findings. According to Mathar et al., (2020) site management or organization is very key in ensuring that the project meets the prescribed limits in the iron triangle. Organizational related factors included effective organization and planning, top management support, quality, company references, and financing capacity of the firm. In the group on human related critical success factors, these were related to the abilities of the individual's competencies to carry out the work. In this research Butković, (2021) found these human related factors to be least important though Saqib et al. (2008) argues that it is humans who help determine whether a project will be a success and take corrective action if the course of the project is a failure.

A study by Said Al Hinai Student et al., (2020) on critical success factors on the causes of delay in road construction projects in the Gulf Cooperation Council (Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman) countries found consultant related, contractor related, design related, and resource related factors as internal critical factors in that region. Another recent study on critical success factors where data was collected from project management experts from around the world by Gunduz & Almuajebh, (2020) on the critical success factors for sustainable project management, the findings on the most important success factors were finance related which includes the availability of funds for the project and the mechanisms for financing of the road projects and administrative aspects which comprise aspects about how much experience and skill the project team possesses and the skills of the client's representation were the internal factors. This study used a relative importance index and Analytic Hierarchy Process methods making its findings reliable though it had the limitations of reliance on expert opinions, and it needed the validation through additional analysis.

The findings for studies in international literature can be summarized as human, contractor/consultant, resource, and finance related aspects as important success factors. This literature agrees with the objectives of the study which looks at the influence of contractor capacity, monitoring, and evaluation (Consultant capacity), project finance and project planning which are all found in literature as critical factors for project success.

2.2.2 Sub-Sahara literature on internal critical success factors

Awaad et al.'s (2022) study on the variables influencing road construction projects' productivity in Egypt found that that internal factors affecting road construction projects were process related, labor related, material related, and equipment related factors. Process related factors are those which relate to the workflow design in terms of the designs and completeness, project planning and the skills of the contractor project team. Labor related factors relate to the skills of the project manager and the availability of labor which is sufficient and with relevant skills necessary to the road project. Material related are those dealing with the availability of material for the construction process in the market. Equipment-related factors relate to the availability of machinery. The lack of these resources is likely to affect the success of the road project. This study has the strength of using a mixed method approach by use of literature review and interview to get insights

on the study. However, its limitations include a small sample size and the potential for bias in the selection of interviewees.

To ascertain impact of critical success factors on the completion of road building work in the Kenyan context of Kenya National Highways Authority highway projects, Erick & Were Susan (2017) performed a study which established that increased competency of workers had a significant relation to timely completion of projects. It also established that an increased commitment by contractors and better project planning has a positive impact in successfully completing a project. Erick and Were Susans study had high response rates and the analysis revealed significant coefficients on the importance of critical success factors. The weaknesses of this study were that there was potential bias in the respondents. Erick and Were (2022) recommend that future studies delve into looking at ways to enhance contractor capacity and engagement and looking at advanced methods to enhance project planning. Damoah et al., (2022) in a study to assess the public sector construction projects critical success factors grouped internal factors as those to do with performing organization administrative and technical capabilities which include the entities executing the project and resource factors which include financial, human, and material resources. The study used a mixed method approach and gave some critical success factors which can be used for developing countries. The weaknesses of the study were that there was an uncertainty on the exact number of clients hence the data is not easily generalizable. Studies in the sub-Sahara African region find agreements that the internal success factors are process related, labor related, material related, equipment related, contractor commitment, project planning, performing organization and human related factors.

2.2.3 Zambian literature on internal critical success factors

Eight internal critical success factors were identified during a study to develop strategies for improving the implementation of public sector construction projects in Zambia. These critical success factors are team member involvement during the project design stage, purchase planning, engagement of senior management, risk management, payment process, supply chain management, corruption levels, and the procurement system's openness (Banda, 2019).

Zulu, (2015) also conducted a study to enhance project success rate in Zambian

construction and the findings were that improvement in project financial planning by all parties, an examination of management practices by both contractors and consultants and a reduction of unethical behavior would improve successful project completion. The critical success factors that were identified in this study are all considered internal to projects. In research conducted in Lusaka, Zambia, Aigbavboa et al. (2017) found that the main reasons for project delays were the contractor's cash flow issues, delays in approving modifications to the scope of work, and delays in progress payments. One of the internal project critical success factors in this analysis is the contractor's cash flow issues. This study also discovered that significant delays in the completion of building projects in Lusaka are caused by project time extensions and cost overruns. This study gathered data from the general construction sector with a primary focus on time as a project success metric (Schwierczek and Thi, 2010).

The studies on critical success factors agree with other literature that internal critical success factors in construction include project planning and inclusion of parties, financial processes and availability, management capability and contractor/consultant capacity. These findings help have an idea on the factors which have been identified in the Zambian construction industry. In the following section, the literature on the findings about external success factors are reviewed.

2.3 External critical success factors

External critical success factors are those where the project team has no influence and cannot control. For example, when we had COVID 19 in 2021, the whole world was in isolation or lockdown, and it was discouraged to have large groups of people work together. This greatly affected road construction projects, but this could not be foreseen or controlled by project managers.

2.3.1 Global literature on external critical success factors in road construction

Rahman et al., (2020) conducted research on factors influencing success of highway construction in Malasia and identified two groups of external critical success factors which include construction site and third-party factors. Site factors affecting highway projects are weather, the site location/conditions, the difficulties in obtaining permits, traffic management, utilities relocation and distances to quarries are factors which affect the project delivery. Third party factors include upper management influence in availing

funding, management moral support, constructive feedback from clients, public engagement, length of time it takes authorities to approve submittals and public acceptance of the project. This study used a qualitative approach and used thematic analysis method by interviewing project managers. The limitations of this study are that the study cannot be generalizable due to the qualitative nature of the interviews conducted.

Sohu et al., (2018) determined the critical success factors of highway projects in Pakistan to be experienced project management, effective site organization and dedication from all parties on the project as the most important factors. Of these factors, the external critical success factor is commitment of all parties involved in the project. This study used a mixed method approach by collecting data form literature followed by a questionnaire distributed to highway experts in Pakistan. The factors were ranked using mean values. This studies' limitations include the use of questionnaires which could have received biased responses.

The findings in the studies on external critical success factors in road construction include the involvement of all parties, the nature of the construction site and the commitment of involved parties. The following section critically looks into literature at Sub Sahara Africa level and the findings on external success factors.

2.3.2 Sub-Sahara literature on external critical success factors

Ahmed Osman and Kimutai, (2019) in a study of critical success factors in the execution of highway projects in Waijr Kenya determined the participation of stakeholders and political goodwill as critical to road construction projects in Waijr Kenya. Participation of stakeholders involves project evaluation and selection of projects. Political goodwill involves the level of acceptance by the public, political interference, accountability, corruption, and transparency in project implementation. This study used a quantitative approach and only had the views of a specific country which can be considered a limitation. The strength of the study include a comprehensive research design , structured collection of data and good statistical analysis. Damoah, Ayakwah and Twum, (2022) investigated on Ghana's as an emerging economy's critical success factors for road development. The factors found as being associated to external critical success factors in the road sector are as follows: lack of political meddling; continuity by successive

administrations; lack of corruption; assistance from financial institutions and donor organizations; and government commitment. All these external factors relate to the government.

Awaad et al., (2022) in a study on t factors affecting productivity of road projects in Egypt identified construction site related and third party related external factors. Construction site related external factors include weather and site location. Whether in terms of rain can disrupt the project timelines if not properly accounted for or there is a significant change in its timing. Construction sites can affect project delivery time, quality, and the cost. For example, hilly terrains require some blasting while sites in dumbly areas require a lot of imported soils to stabilize the road base. Third party external factors relate to other parties to a project including top executives, owners, the public and authorities. Top management and clients have influence on project success by securing funding on time, providing enough resources, and providing moral support by providing constructive feedback. The public also influences project outcomes having differing political viewpoints on the project, raising disputes or legal suits over land and easements, complaints to authorities' disruptions caused by the project implementation such as dust. Authorities also have an influence on highway project performance depending on the timelines for approval of submissions. Simply put, the public and authorities greatly affect timelines, quality of the project and overall cost of construction. The next section of the literature review looks at external critical success factors in the Zambian context.

2.2.3 Zambian literature on external critical success factors in road construction

Banda, (2019) in a study conducted on strategies' for improving implementation of public sector construction projects in Zambia the major extrinsic related critical success factors were country governance, economic conditions, and efficiency of the public sector. Political status includes factors to do with the willingness of the public and elected officials to support the projects. Economic conditions include the stability of the economy in terms of interest rates and fluctuation of the exchange rates in short financial related factors. Public sector efficiency includes the time it takes for authorities to approve changes and the public procurement processes. The study by Joshua (2019) was limited to focusing on the implementation stage of projects but had the strength of using a mixed method approach which gave both qualitative and quantitative data. In the paper "Shifting the

Field: Recent Advances for the Future of Engineering and Construction," Zulu (2015) determined that weather conditions were perceived to have little influence on success of construction projects as external factors. This finding is attributed to the studies focus on the project management processes instead of success in terms of time, quality and cost. From the studies in Zambia, the external factors which are of interest are stakeholders' involvement or commitment and whether conditions. The next section looks at the findings of literature considered and gives crirtical review of information found in the studies above.

2.4 Critique of reviewed literature

From the literature, it was found that a gap in literature exists in terms of critical success factors for road construction industry in Zambia. Further, most of the studies conducted were merely by conducting surveys through questionnaires without targeting specific practitioners in the road construction industry in Zambia. It is for this reason that literature from studies conducted around the world and those in the Zambian general construction industry were considered in this review of this literature.

2.4.1 Critique of Internal critical success factors in the road construction industry

From literature reviewed on internal critical success factors in road construction industry, several articles were reviewed. The studies bused mixed and quantitative methods of for analyzing data their and their findings were similar by 7 key thematic areas which were common in all the studies were grouped. These include the following grouping:

- *Project related factors:* these factors include the complexity of the project itself including the design aspects and the ease with which the design can be implemented.
- *Organizational related factors:* these include the implementing organization capabilities in terms of the approval process and how they monitor the progress of the project.
- *Human related factors:* these include the dynamics of the teams employed on the project, their competency. Studies show that the better the competency of workers or project leadership the more likely a project is to be successful.
- *Resource related factors:* this involves the availability of resources like labor, machinery and material required for the completion of the project. It also involves how the resource aspect is managed to see to it that successful outcomes ae obtained.

- *Contractor competence* involves the commitment of the contractor to the project in terms of resources, their technical capabilities, and their ability to sustain cashflows through the life of the project. A contractor's ability to manage and arrange the site also plays a critical role in ensuring successful outcome of a project.
- *Project management processes:* This includes the methods applied by the project team in implementation. The outcomes of a waterfall project will deliver a project as first designed but will not account for changes as the project progresses. An agile method will be more flexible in taking on changes as the project progresses.

2.4.2 Critique of external critical success factors in the road construction industry

The major themes obtained from literature on the external critical success factors in the highway construction industry were 3. Zambian literature didn't have any significant studies in terms of external critical success factors for the road construction industry and those for the general construction industry are used. The group of factors highlighted are as follows:

- Site related factors: this includes the location of the site and the exiting conditions. It also includes things like the availability of land for construction and how easy or the price to obtain the land. It also includes issues like the traffic conditions and the utilities in the way of construction.
- *Third party factors/ Stakeholders:* these are parties who don't directly involve themselves in the day to day running of the project but have an impact on the outcome of the project. For example, top management is required to support the project by ensuring resource availability and must give constructive feedback to keep morale on the project. Authorities also have a role to play in ensuring that permits are issued on time and at reasonable costs. Public sentiment is also key in that if they do not accept the project, they might delay projects by obtaining injunctions or making it hard for implementation. Therefore, stakeholders must all have a level of commitment and participation for road construction projects to have successful outcomes.
- *Political environment:* this involves the legislation in the country for a contractor to participate in or the public procurement laws and process. Further, the government commitment to the project especially after a change of presidents, the corruption

rates in a country and financial support from government and donor agencies.

2.5 Theoretical framework

The ideas from the iron triangle, Belassi's theory, and Tukel's theory, which all define project success, form the foundation of this theoretical framework. It summarizes research findings and offers more understanding of these theories.

2.5.1 The iron triangle

Mohtar et al. (2013) states that for the 50 years period, time, money, and quality have grown inextricably linked when determining a project's success. As a result, the triple constraint, often known as the golden triangle, are three criteria that a successful project manager must be able to reconcile. Success in project management, according to Caccamese & Bragantini (2012), has been limited to the project manager's capacity to produce what was agreed upon, within specified timeframes, agreed-upon budgets, and scope. According to research done in 2022 by Egboga & Daniel, the golden triangle is still useful as a criterion for project success. To determine if the results of the study still considered the golden triangle to be relevant, a survey of recent peer-reviewed literature was conducted and found it relevant.

In project management, the Iron Triangle is a representation of the constraints that potentially affect the project. The scope, budget, and timeline are the three project constraints that project managers must ensure are kept within agreed upon parameters. Any modifications made to one component will affect the others. To be completed successfully, project players must balance these three constraints and handle the constantly changing trade-offs between them.

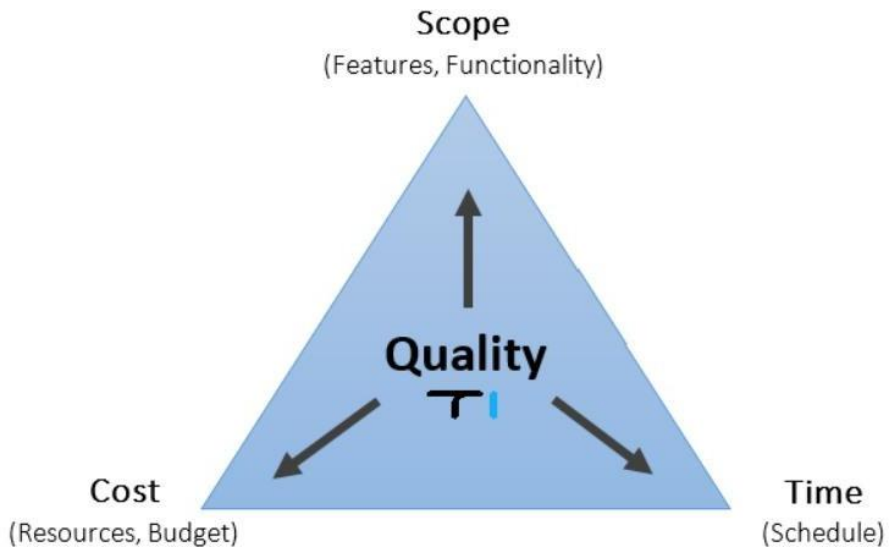


Figure 2: Triple constraint triangle (Egboga and Daniel, 2022)

Despite the classic iron triangle's dominance and acceptability, Egboga & Daniel (2022) contended in their study that these elements are not all-inclusive since performance metrics have extended to encompass new developing indicators.

This study will look at the factors beyond the traditional three which will necessitate project completion within budget, timeframe, and scope. Therefore, project success for the purpose of this study will be completing a project within the triple constraints.

2.5.2 Pinto's theory of critical success factors (1986)

Slevin & Pinto, (1986) came up with 10 critical success factors which related to the ability of the project managers and teams' ability to control. The project's goal, support from upper management, schedules, planning, staff, technical duties, client acceptance, monitoring and feedback, troubleshooting, and communication are some of these elements. Later, variables outside the project executors' control including project team leader characteristics, politics and authority, environmental occurrences, and urgency of a project. Figure 3 below is an illustration of this theory. Some of these critical factors that were considered by Pinto and Slevin were applied in this study and help in forming the theoretical framework of this study. The findings in this study have been applied across various industries and various scholars from different disciplines have applied it and it has evolved since it was first published.

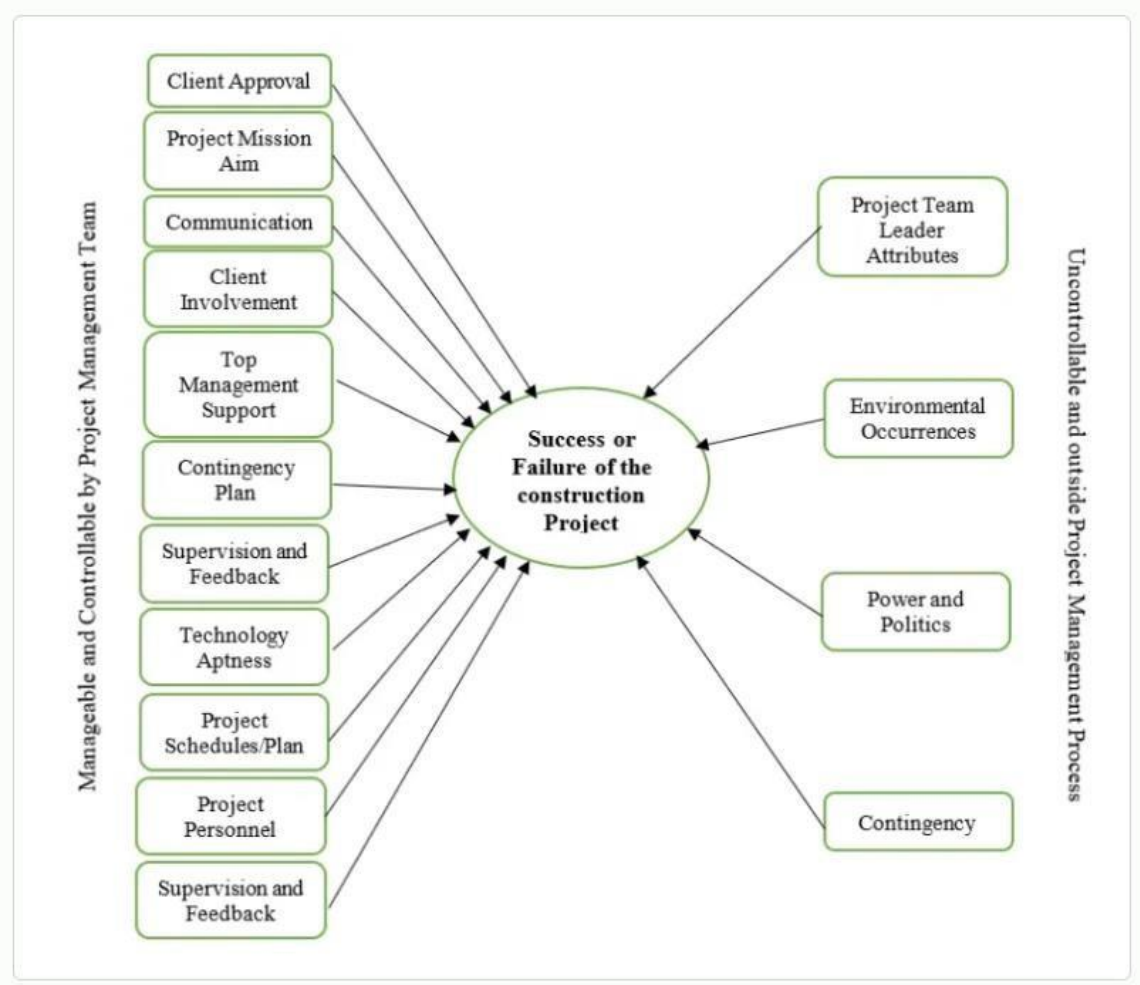


Figure 3: Slevin and Pintos theory of critical success factors (Source: Chetty, 2020)

2.5.3 Belassi & Tukel's theory of success (1996)

Belassai and Tukel (1996) considered factors outside the traditional project success criteria and built on Slevin and Pintos critical success factors theory. This theory considered other elements were added in Pinto and Slevins theory and were classed into a limited number of factors that a project team needs to look out for to ensure project success. This is a modern concept since it emphasizes importance of human resource in a project and the crucial responsibilities that teams perform. The factors highlighted in Belssai and Tukels theory assume that considering factors connected to the project manager and team members, projects, organizations, and the external environment are what lead to project success (Chetty 2020).

This looks at the factors which lead to the successful completion of a project; in this study, a project being completed successfully means according to the triple constraints.

This research highlights the need to consider other aspects in addition to those found in the iron triangle, such as the resource allotted for the project, experts involved, and degree to which they comprehend the project deliverables. The link between the variables which lead to positive project outcomes is depicted in Figure 4.

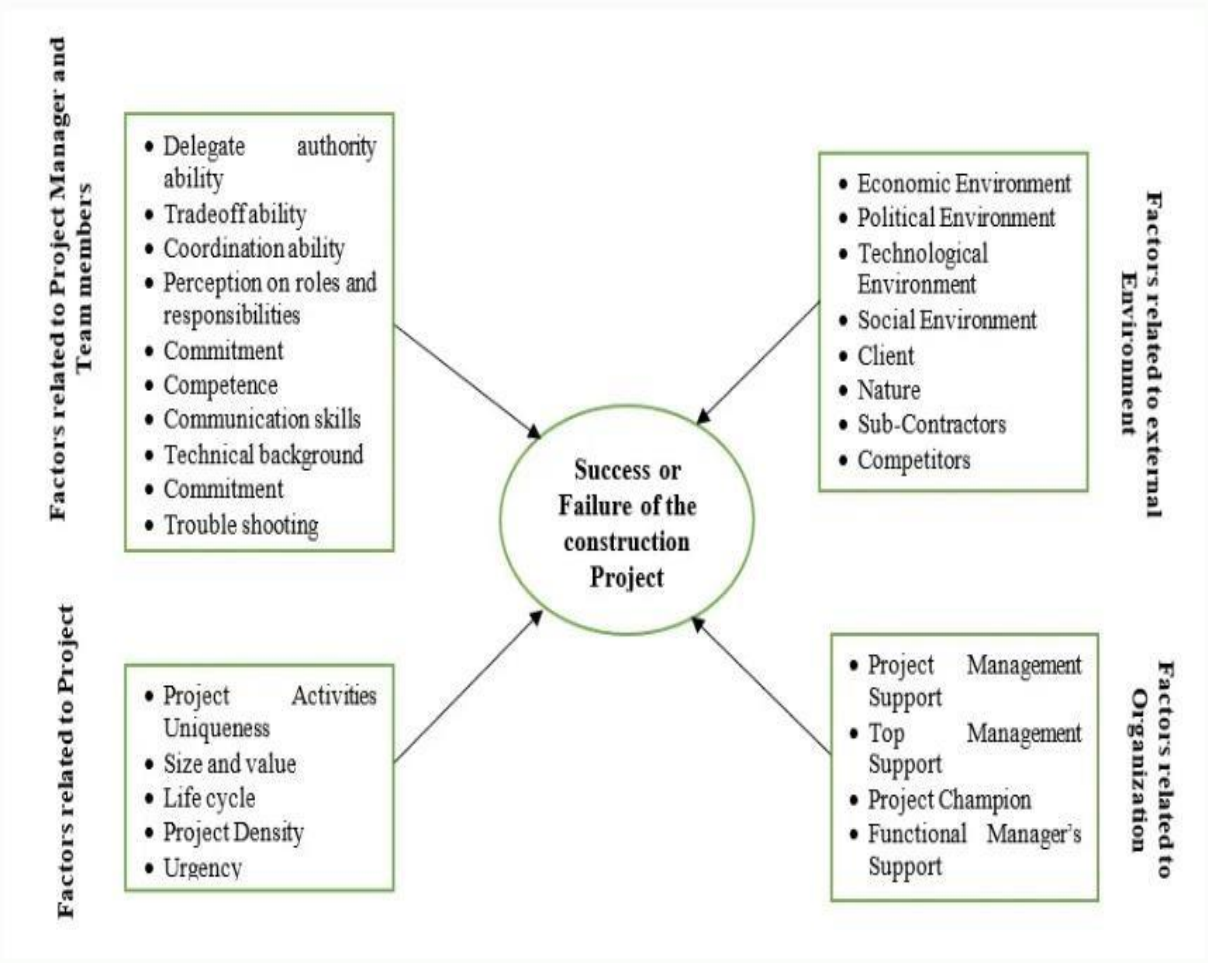


Figure 4: Belassi & Tukel's theory

This study uses some of the key areas of this theory to determine the critical success factors for the road construction industry in Zambia. The findings will give project practitioners in Zambia the ability to look out for factors which have adverse effects on their ability to deliver road projects successfully.

2.6 Conceptual Framework

This conceptual framework was developed from the key concepts from reviewed and took into consideration the concepts from the key theories that have been reviewed in the section below.

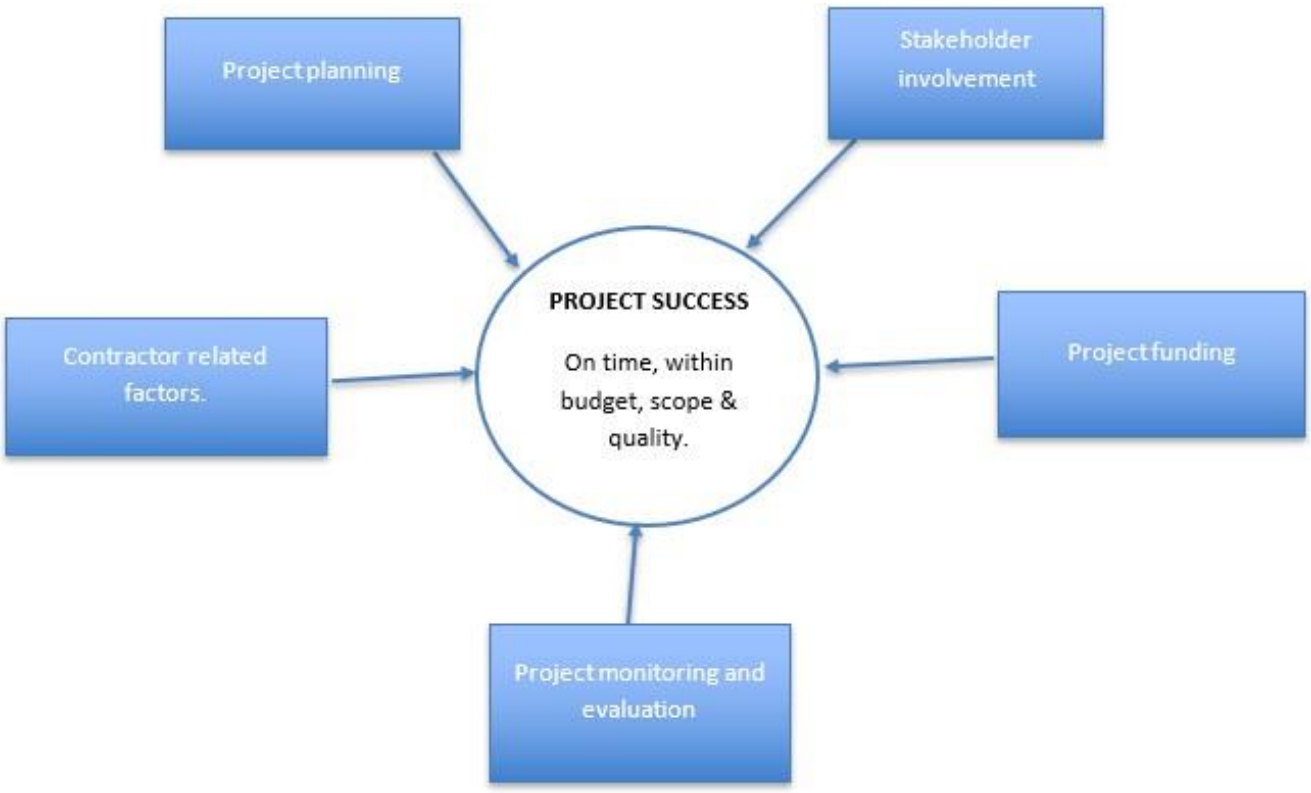


Figure 5: Theoretical framework

2.7 Summary

The literature review chapter has presented the significant studies in this chapter to give a clearer understanding of the study topic. It also outlines empirical literature reviewed for the study from around the world, region, and country which relates to critical success factors in the road construction industry. It contains empirical literature and theoretical literature which forms the basis on which the theoretical framework was derived for this study.

The next chapter informs the methods used for this study. It also provides insights into the study philosophy and the study design. Additionally, it describes the research population, the data collection sampling strategies and the methods used to analyze the information from the data.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter delineates the research approach used for this dissertation. Systematic procedures a researcher undertakes to analyze the research problem in a logical manner are collectively referred to as research methodology. This research provided an in-depth look of the methodology adopted for the survey, encompassing the considerations that influenced the selection of the research design, the target population for sampling, the data collection tool, and procedures for analyzing, interpreting, and presenting the research findings.

3.1 Research design and approach

3.1.1 Research Philosophy

Research philosophy includes methods by which one thinks information on a subject ought to be gathered, examined, and evaluated. Converting beliefs into knowledge is the aim of scientific investigation. There are two research philosophies namely positivist and interpretivist. Positivism, also called scientific philosophy, believes that things are stable and can be described objectively while interpretivists believe intervening with nature will give a clear understanding of reality.

This study used a positivist philosophy where the data was collected without intervening with reality and used a structured procedure which allows the observations to be repeatable (Levin, 2008). Positivism can also be defined as an approach which is also referred to as a scientific approach which uses observation which can be repeated to come up with a quantifiable explanation. The researcher's job in positivist studies is restricted to gathering data and providing an unbiased assessment of it (Dudovskiy, 2019). Stated differently, the researcher does the study in the role of an impartial analyst, distancing oneself from their personal ideas. This philosophy is used for this study to because the researcher wanted to come up with interpretations from data without manipulating the variables; none of the opinions or beliefs of the researcher are used in

the study except those obtained from data that was collected and analyzed. Further, positivism is usually used for quantitative research other than qualitative research (Creswell, 2009).

3.1.2 Research type

Research may be classified into two categories: deductive and inductive. Inductive approach requires the researcher to begin by collecting data about a topic then looks for patterns in the data to come up with general theories to explain this data. Deductive research types start with a general theory to come up with an assumption then collection of data to support or dispel the theory (DeCarlo, 2018).

This thesis used a deductive research type where it used general theories from literature which were then tested using data that was collected. This thesis wanted to check the validity of theories on which this thesis was based, and it gives a clear way to check whether these are valid or should be dispelled. The main assumptions of this study are that the independent variables (Project planning, project financing, stakeholder involvement, contractors' capacity and project monitoring and evaluation) have an influence on the dependent variable (Project success) as outlined in the theoretical framework in the second chapter of this study.

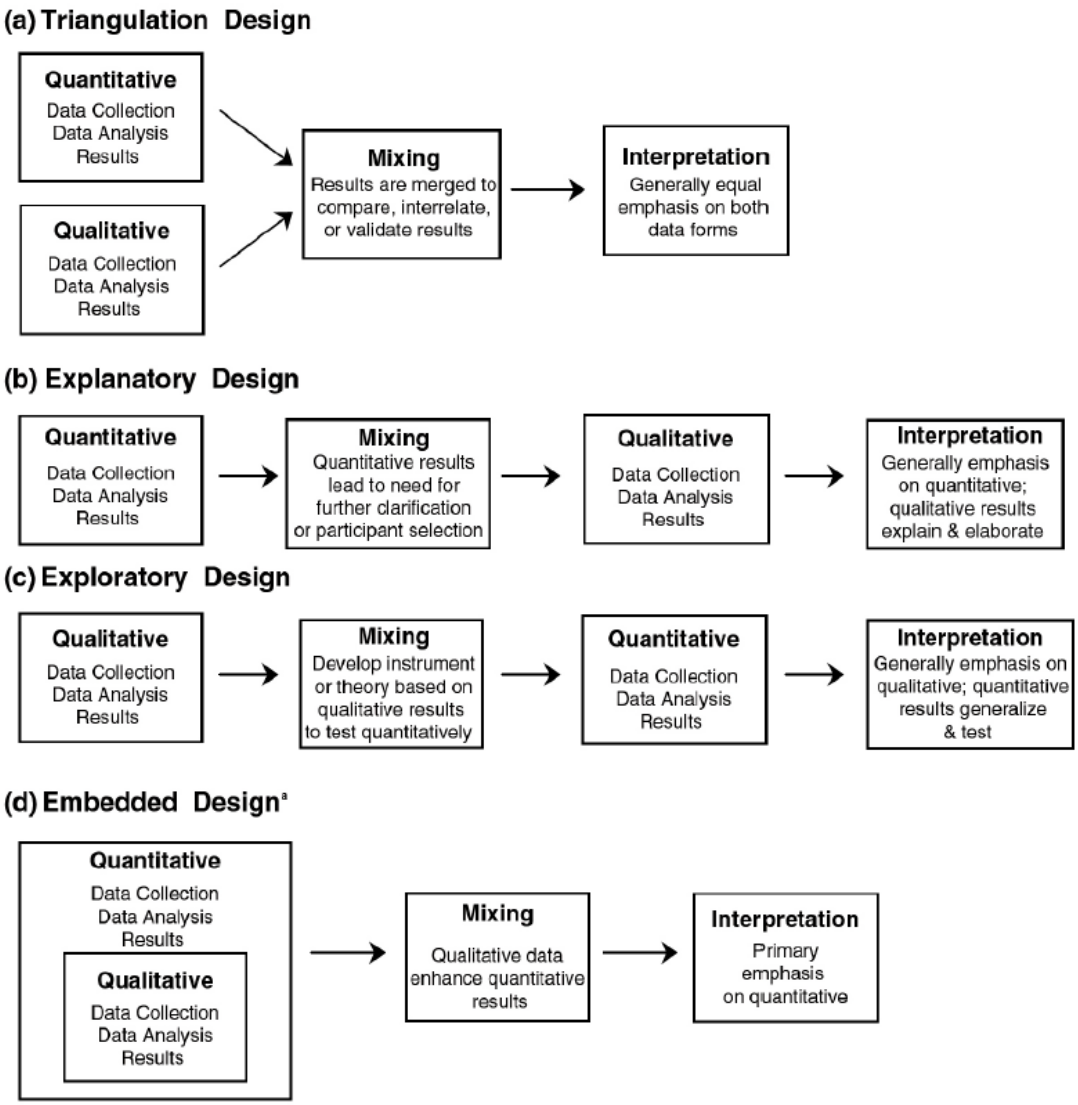
3.1.3 Research approach

There are three common research approaches which include qualitative, quantitative, and mixed method approaches. These research approaches can be referred to as strategies, plans procedure and methods used for a studies broader perspective to its research objectives(Creswell, 2009). An approach includes the framework, and technique that guide the research process from data gathering to analysis and interpretation of the results.

Qualitative research approach looks at many facets of phenomena or social realities by looking into peoples opinions, attitudes, cultural influences, beliefs and intentions (Suravi, 2023). This research approach employs techniques for gathering data which includes observations of participants, semi structured interviews and focus groups (Sands, 1990). It plays a role in the analysis and interpretation of data by providing insights into how humans see and attach importance to knowledge.

Mixed methods research is an approach that combines qualitative and quantitative methods within a single study. This method enables a researcher to have further understanding of a particular topic. Compared to using either quantitative approach alone, researchers can obtain a more thorough grasp of study problems by utilizing both of them (Igiebor and Okonmah, 2022). The figure below shows the four common research designs.

Figure Four Major Mixed Methods Designs.



Quantitative research uses surveys and experiments relating to sample and population (Creswell, 2009). Gathering and evaluating numerical data is the process of doing quantitative research. It is employed to evaluate causal links, identify patterns and averages, formulate forecasts, and extrapolate findings to larger groups (Bhandari, 2023).

Quantitative research collects data either by experiments or through surveys. This study used surveys to collect data from the identified population of the study (Sands, 1990). The results are presented in a manner consistent with the survey and experiments. Quantitative research mostly analyses numerical data by establishing relationships patterns between independent and dependent variables and variations when some variables are changed (Mehrad and Zangeneh, 2019). In the case of surveys, the questions asked are closed ended or a numerically weighted answer to questions is provided to tell significance.

Data was gathered by asking respondents questions in a questionnaire using a Likert scale then analyzed to provide a response to the research questions for this study. The method used for this study was quantitative research approach to find the effects critical success factors have on success of road construction in the country. This approach was used because the data collected needed to be quantified to come up with the relationships between project success factors for road construction projects in Zambia.

3.1.4 Research strategy

This thesis uses a correlational research design. A correlational research design looks at the relationships between variables without any changes to them or their conditions (Mitchell, 1985). This is used in studies where the strength in relations between variables is important to the study. When variables adjust in the same route a positive correlation is obtained, when variables adjust in contrasting routes it is called a negative correlation while zero correlation means that there is no connection on the variables (Creswell, 2009). Correlation is used to find causal and non-causal relations in variables. This study is interested in coming up with the influence of project success factors in the road construction industry, therefore it is looking for any relationships in these factors. Further, this study will not manipulate any of the variables to ensure that its findings represent a true reflection of the Zambian road construction professionals' views.

3.1.5 Time horizon:

This study was conducted using a cross sectional approach. This is an observational study which collects data from different participants in the same time space(Setia, 2008). The research does not track the target population over time but just collects the data at the point of the survey. Further, this method selects participants based on a criterion to

exclude or include them (Setia, 2008). This thesis used a criterion where the participants were selected whether they were a contractor, consultant, or client engineer. It is cheaper and faster to conduct this type of study hence the reason this method was selected for this study. The research was conducted in a restricted timeframe which was allocated by University of Lusaka and there are also constraints on the cost that can be incurred in carrying out this study.

3.1.6 Sampling strategy:

Because probability sampling procedures were utilized in this study, all members included in the population had the same opportunity of being chosen (Sekaran and Bougie, 2016). Sampling is crucial because, if the entire population were considered, the sample size would grow too enormous, requiring more time and resources than could be allotted. It is efficient to get a representative sample which represents the population because conclusions drawn from the sample may be applied to the total population.

In this study, the sample size was not large enough to use a sampling technique therefore, the entire population of the study was considered in terms of data collection. The term used for this method is called a census.

3.1.7 Data collection methods:

This research collected primary data by collecting responses to a survey sent out using a questionnaire. Primary data is information that is collected straight from respondents using questionnaires, interviews, experiments, observations, or surveys. This study used primary data because this study has never been done and to have clear representative information on the research objectives, the responses need to come from the primary data sources which are road construction industry experts in Zambia. This gives the data information which can be used in the context of Zambian road construction industry.

The questionnaires with their closed ended questions gave the quantitative aspect to the study thereby giving importance to each critical success factor. it enables one to give importance to each of the project success factors thus making it possible to create an index showing the most important success factors (critical success factors). The questionnaire has 22 parts with the first part mainly used to gather demographic information of participants. Included is gender, age, level of education, sector category (Contractor, consultant, or project engineer) and years of experience. The second section contains

the project success factors in the road construction industry shown as independent variables. A weighting key was given with a 5-point Likert scale (1-5, 1 being strongly disagree and 5 being strongly agree) where respondents weigh each of the project success factor statements. This helped identify the critical success factors for the road construction industry for consultants, contractors, and projects engineers.

The survey questionnaire was tested by having professionals in the road construction industry read through the questions to check for precision and clear context. The questionnaire was then tested for validity and consistency. This was done by carrying out a pilot test of the questionnaire responses.

3.1.8 Data analysis:

This study employed a comprehensive approach to data analysis, integrating both descriptive and inferential statistical methods to attain a nuanced understanding of the relationships within the research variables. In the case of quantitative data obtained through structured questionnaires, descriptive statistics played a crucial role in interpreting demographic variables of the respondents. Means and standard deviations were calculated for each study variable, providing insights into the central tendencies and variabilities within the dataset. The statistical software SPSS version 26 facilitated the application of inferential statistics for hypothesis testing, correlation analysis, and regression analysis. The outcomes of these analyses were visually presented through tables and graphs, enhancing the accessibility and clarity of the results.

The research model constructed based on identified independent variables (project planning, stakeholders' involvement, project funding, contractor's capacity, and project monitoring and evaluation) and the dependent variable (success of road construction projects), underwent multiple linear regression analysis. This advanced statistical technique aimed to unravel the complex interrelationships among these variables, providing insights into the relationships between the critical success factors in the road construction industry in Zambia and project success. To investigate the relation between the variables, a Hierarchical regression analysis model was applied.

Application of Hierarchical Regression Analysis in this thesis involved examining the relationship between variables in a systematic manner (Dependent and independent).

Specifically, this technique allowed for the investigation of the effect different sets of variables have on the dependent variable, success of road construction projects, in sequential steps. Hierarchical regression approach particularly is useful in studies like the present one, where multiple factors were hypothesized to influence project success. By systematically introducing variables in a hierarchical fashion, researchers could discern the unique contribution of each factor while considering the influence of others, providing a more robust and insightful analysis of the relationships within the research model.

Data was gathered by use of a Likert scale of agree or disagree. The qualitative data collected were quantified by assigning numerical values to the Likert scale responses. These values were then incorporated into the regression model as explanatory variables. For example, "strongly agree" was assigned a numerical value of 1, "agree" as 2, "not sure" as 3, "disagree" as 4, and "strongly disagree" as 5. This quantification enabled the integration of qualitative responses into the quantitative regression analysis. The regression model then assessed the impact of these qualitative variables (related to project planning, stakeholders' involvement, project funding, contractor's capacity, and project monitoring and evaluation) on dependent variable (success of road construction projects) by determining significance of each of the variables.

3.1.9 Study population and sample

A study population is any group of elements, entities or people who fit the criterion of the focus of a research study (Sekaran and Bougie, 2016). For example, if a person who runs a taxi business wants to know the number of taxi users in Lusaka, the commuters in Lusaka will be the study population. Samples will be drawn from this group, and it is from here that data will be collected, analyzed and conclusions will be made. It is important that the study population in any study be clearly defined so that the limits of the target group on which researcher can make conclusions and generalizations. Where the size of the population is difficult to define, the population of interest must be clearly described with characteristics and units defined.

In this study the population consists of road consultants and grade 1, 2 and 3 contractors in R category and project engineers from the Road Development Agency regional offices. The target population considers 54 contractors, 10 regional engineers and 67 consultants which gives a total of 131 respondents who are involved in road construction in Zambia.

Table 3.1 Population used for the study.

Sn	Study population	Respondents
1	R contractors in grade 1,2 and 3	54
2	Consultants in civil works	67
3	Regional office engineers	10
	Total population	**131**

Since the target population is small, a census will be carried out where all the study population will be targeted to draw conclusions for the entire population.

3.3 Methodological limitations

This research methodology had limitations as result of the resources and the time allocated for the study. The beginning constraint in this thesis is that there are not many prior scholarly studies in Zambia on critical success factors in the road construction industry. Furthermore, time allocated to collect responses from the study population was limited hence limiting the number of respondents of the study to the just above the study sample. The limit in time also made it difficult to access all would be respondents of the study because the questionnaire required 20 minutes of voluntary time which seemed taxing. Further, self-administered questionnaires have the risk of collecting information which might be biased to a certain group of the population. This study did not have a control group to which some form of intervention was applied.

3.4 Ethical considerations

This study was conducted with the full approval of the University of Lusaka post graduate school. Also, a form for ethical clearance from the University was completed and this study was approved in terms of ethical standards. Data was collected from respondents with their full consent and the information collected was in no way used for any purpose other than for this study. Furthermore, neither the organization nor the people who submitted the data were harmed or given a false impression using the information gathered.

3.5 Summary

This chapter lays out the process followed in conducting this research to enable any reader to follow the exact methods to replicate its findings. The study population was

outlined clearly, and the sampling technique and calculation process are shown in this chapter. It also includes information on the tools used to gather data and the techniques for doing so. It also outlines the methodological limitations of the study and ethical considerations made during and after the study are outlined to ensure that the research respects all individual and institutional rights. All these items in the chapter ensure that this research is repeatable by any scholar.

The next chapter is data collection and analysis which gives more insight into the results of the data collected during the study and how it was analyzed in relation to answering the research questions. It presents the findings in terms of tables and other statistical diagrams to provide the reader greater understanding of the results of the study.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.0 INTRODUCTION

This section provides a comprehensive view of analyzed collected findings presented using tables, histograms, scatter plots and graphs. The primary objective of this study was to assess critical success factors which significantly influence success of road construction. This chapter unveils the outcomes of the data collected from respondents associated with road construction in Zambia, providing a detailed examination and presentation of the gathered data. This study selected its population from road consultants and grade 1, 2 and 3 contractors in road construction, and project engineers from the Road Development Agency (RDA) regional offices. The specific objectives of the study were to investigate the influence of project planning, stakeholder involvement, project funding, contractors' capacity, and project monitoring on the success of road construction projects in Zambia.

4.1 RESPONSE RATE

Out of 131 questionnaires distributed to participants, 115 forms were filled in adequately and submitted, resulting in a response rate of 87.7 percent. This response rate is considered enough, enabling meaningful conclusions to be drawn from the obtained results. Mugenda and Mugenda's (2012) recommended that a rate of response of 50% is adequate for data analysis, conclusion, and reporting; the achieved rate of 87.7% is notably robust. The consensus that a response rate surpassing 70% is excellent further supports the appropriateness of the data collected in this study for thorough analysis and presentation. Thus, based on the established criteria for response rates, the 87.7% response rate in this research is deemed sufficient for the comprehensive examination and reporting of data findings.

4.2 DEMOGRAPHIC DATA

The demographic data analysis in this study provides essential insights into the composition of participants, such as gender distribution, age range, educational qualifications, professional roles, and experience levels in Zambia's road construction

industry. This information is crucial for understanding the diversity and expertise of the sample, ensuring that the study's findings and conclusions are representative and applicable to the broader context of road construction projects in the region. The demographic overview serves as a foundation for interpreting and contextualizing the subsequent data analysis on critical project success factors.

Frequency Tables of Demographic Data

Table 4.1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	72	62.6	62.6	62.6
	Female	43	37.4	37.4	100.0
	Total	115	100.0	100.0	

Table 4.2: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30 years old	28	24.3	24.3	24.3
	31-40 years old	43	37.4	37.4	61.7
	41-50 years old	31	27.0	27.0	88.7
	Above 50 years old	13	11.3	11.3	100.0
	Total	115	100.0	100.0	

Table 4.3: Highest academic qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	22	19.1	19.1	19.1
	Professional qualification	28	24.4	24.4	43.5
	Undergraduate degree	42	36.5	36.5	80.0
	Postgraduate degree	23	20.0	20.0	100.0
	Total	115	100.0	100.0	

Table 4.4: Experience in the road construction industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2 years	13	11.3	11.3	11.3
	3-5 years	28	24.3	24.3	35.6
	6-10 years	43	37.4	37.4	73.0
	Over 10 years	31	27.0	27.0	100.0
	Total	115	100.0	100.0	

Table 4.5: Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Consultant	41	35.7	35.7	35.7
	Contractor	46	40.0	40.0	75.7
	Government engineer	28	24.3	24.3	100.0
	Total	115	100.0	100.0	

The demographic data provided in the frequency tables gives important understanding into the composition of those who participated in the study about how critical project success factors affect the road construction industry in Zambia.

Gender (Table 4.1): Most respondents were male, constituting 62.6% of the sample, while females represented 37.4%. This indicates a significant gender imbalance, with a higher male representation in the study. This may reflect the industry's existing gender composition, where males are more prevalent in road construction-related roles.

Age (Table 4.2): The age distribution reveals that the largest proportion of respondents falls within the 31-40 age group, constituting 37.4%. This suggests that most participants are in the mid-career stage, potentially having substantial experience and expertise in the road construction industry. On the other hand, respondents above 50 years old represent the smallest group at 11.3%.

Highest Academic Qualification (Table 4.3): Highest academic achievements were diverse among participants. The largest percentage holds an undergraduate degree (36.5%), followed by diploma (19.1%). This indicates a relatively high educational attainment level among the respondents, suggesting a well-educated and potentially skilled sample.

Experience in the Road Construction Industry (Table 4.4): Most respondents (37.4%) had 6 to 10 years of experience in the road building industry, according to statistics on experience. This suggests a relatively experienced group of professionals participating in the study, potentially providing valuable insights based on their substantial industry exposure.

Profession (Table 4.5): The professional distribution shows that contractors form the largest group at 41.8%, followed by consultants at 32.7%, and government engineers at 25.5%. This indicates a balanced representation of different professional backgrounds, ensuring diverse perspectives in the study. Contractors' high percentage suggests their significant involvement and influence in road construction projects in Zambia.

In summary, the study's participants are predominantly male, with a considerable representation in the mid-career age group, possessing diverse academic qualifications, substantial experience in the road construction industry, and a balanced distribution across professional roles. These demographics suggest a well-rounded and experienced sample that can provide valuable insights into the critical success factors in Zambia's road construction industry.

4.3 DESCRIPTIVE STATISTICS OF VARIABLES ON THE LIKERT SCALES

The descriptive statistics for Likert-scale variables provide a succinct summary of participants' responses to most important factors influencing the success of road construction projects in Zambia. These statistics offer a quantitative glimpse into the distribution and variability of opinions among respondents. Examining means, standard deviations, skewness, and kurtosis values allows for an understanding of the consensus, dispersion, and normality of perceptions regarding variables project success, project planning, stakeholders' involvement, project funding, contractor's capacity, and monitoring and evaluation. This analysis is crucial for comprehending the overall trends and levels of agreement or disagreement among participants, laying the groundwork for subsequent in-depth statistical analyses and more nuanced interpretations of the critical success factors in Zambia's road construction industry.

Table 4.6 Descriptive statistics

	Descriptive Statistics									
No.	Dependent Variable	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Mean	Std. Deviation	Skewness	Kurtosis
	Success of road construction projects						Statistic	Statistic	Statistic	Statistic
1	Success1	37	25	5	26	17	2.6455	1.5240	0.3040	-1.4930
2	Success2	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
3	Success3	37	25	9	22	17	2.6091	1.5029	0.3640	-1.3940
4	Success4	33	25	5	30	17	2.7545	1.5095	0.1670	-1.5440
5	Success5	37	33	9	13	10	2.4273	1.4042	0.6170	-1.0020
	Independent Variables									
	Project planning									
1	PP1	49	29	9	18	5	2.1000	1.2631	0.8660	-0.5490
2	PP2	41	29	9	22	9	2.3545	1.3720	0.5930	-1.0540
3	PP3	45	25	9	18	13	2.3545	1.4500	0.6450	-1.0620
4	PP4	37	25	5	26	17	2.6455	1.5240	0.3040	-1.4930
5	PP5	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
	Stakeholders' involvement									
1	SI1	41	29	9	18	13	2.3909	1.4277	0.6290	-1.0350
2	SI2	37	29	9	22	13	2.5000	1.4319	0.4770	-1.2190
3	SI3	37	25	9	22	17	2.6091	1.5029	0.3640	-1.3940
4	SI4	33	25	5	30	17	2.7545	1.5095	0.1670	-1.5440
5	SI5	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
	Project funding									
1	PF1	18	21	5	31	35	3.4000	1.5035	-0.4310	-1.3560
2	PF2	41	29	9	22	9	2.3545	1.3720	0.5930	-1.0540
3	PF3	45	25	9	18	13	2.3545	1.4500	0.6450	-1.0620
4	PF4	37	25	5	26	17	2.6455	1.5240	0.3040	-1.4930
5	PF5	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
	Contractor's capacity									
1	CC1	37	25	9	22	17	2.6091	1.5029	0.3640	-1.3940
2	CC2	33	25	5	30	17	2.7545	1.5095	0.1670	-1.5440
3	CC3	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
4	CC4	18	21	5	31	35	3.4000	1.5035	-0.4310	-1.3560
5	CC5	41	29	9	22	9	2.3545	1.3720	0.5930	-1.0540
	Monitoring and evaluation									
1	ME1	33	25	5	30	17	2.7545	1.5095	0.1670	-1.5440
2	ME2	37	33	9	18	13	2.4273	1.4042	0.6170	-1.0020
3	ME3	18	21	5	31	35	3.4000	1.5035	-0.4310	-1.3560
4	ME4	41	29	9	22	9	2.3545	1.3720	0.5930	-1.0540
5	ME5	45	25	9	18	13	2.3545	1.4500	0.6450	-1.0620

Source: Research data (2023)

The descriptive statistics offer insights into the participants' perceptions regarding critical project success factors in Zambia's road construction industry, measured on Likert scales.

Success of Road Construction Projects: Participants generally show some level of agreement on successful outcomes of road projects, as reflected in mean value results ranging from 2.4273 to 2.7545. However, there is variability in responses, as indicated by standard deviations ranging from 1.4042 to 1.5240, suggesting some divergence in opinions among respondents.

Project Planning: In assessing the influence of project planning, respondents tend to agree with the statements, having mean values ranging between 2.1000 to 2.6455. The skewness and kurtosis values could mean a somewhat normal distribution, indicating a balanced range of responses without extreme tendencies.

Stakeholders' Involvement: Perceptions on the influence of stakeholders' involvement exhibit agreement, with means ranging from 2.3909 to 2.7545. The skewness and kurtosis values indicate a reasonably normal distribution, suggesting a balanced perspective among participants.

Project Funding: Responses regarding project funding show a noticeable difference, with a mean of 3.4000 for PF1, indicating a tendency towards agreement on its significant impact. The other variables in project funding show means between 2.3545 and 2.6455, suggesting a moderate level of agreement.

Contractor's Capacity: Participants generally agree on the importance of contractor's capacity, as indicated by means ranging from 2.3545 to 3.4000. Skewness and kurtosis values suggest a relatively normal distribution of responses, indicating a balanced perspective on this critical factor.

Monitoring and Evaluation: For monitoring and evaluation, means range from 2.3545 to 3.4000, suggesting varying levels of agreement. The skewness and kurtosis values indicate some deviation from a normal distribution, suggesting diverse opinions among participants.

In summary, the descriptive statistics highlight both consensus and variability in participants' perceptions of critical success factors, providing a nuanced understanding of their perspectives on project success, project planning, stakeholders' involvement, project funding, contractor's capacity, and monitoring and evaluation in Zambia's road construction industry.

4.4 PRINCIPAL COMPONENT ANALYSIS (FACTOR ANALYSIS)

To simplify the variables into easily interpreted components, principal components analysis was employed.

4.4.1 Evaluation of assumptions

To do an analysis using principal components analysis, the following presumptions were assessed:

Assumption 1: At constant level, several variables are monitored (ordinal data is also included). Thirty statements on the questionnaire assessed six components at ordinal level of assessment (strongly disagreed, disagreed, neither agree nor disagree, agreed, and strongly agreed).

Assumption 2*:* All variables must have a linear relationship between. A correlation matrix was used to test the linear relationship. Satisfactory levels of correlation which are considered viable for a variable to be included is usually $r \geq 0.3$ (Laerd Statistics, 2015). This information had all its variables with correlations greater than 0.3.

Assumption 3: The sample size must be large with at least 10 cases per variable was a rough guideline for figuring out this assumption (Tabachnick and Fidell, 2014). 14 variables met the required minimum loading factor of 0.6 which equates to the need for at least 140 cases. The data collected for analysis had 115 cases which means that the cases were enough and in line with the assumption.

4.4.2 Sampling adequacy

Sampling adequacy for the data set is tested by using the Kaiser-Meyer-Olkin (KMO) index. This data set had a KMO value of 0.626 (Table 4.7), which is adequate (Kaiser's, 1974). The variables had KMO measures which were above 0.6 or near 0.6.(see Table 4.8 below).

Table 4.7: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.626
Bartlett's Test of Sphericity	Approx. Chi-Square	1780.682
	df	153
	Sig.	.000

Table 4.8: KMO measures for individual variables

Variable	KMO measure	Variable	KMO measure
Success3	0.677	ME4	0.499
Success4	0.731	ME1	0.505
Success5	0.627	SI3	0.679
Success1	0.701	SI5	0.730
CC4	0.605	SI2	0.621
CC2	0.621	PP5	0.568
CC1	0.803	PP3	0.637
PF1	0.508	PP2	0.638
PF2	0.478		
PF3	0.479		

4.4.3 Bartlett’s test of sphericity

The correlation matrix's identity matrix null hypothesis is tested using Bartlett's test of sphericity. Bartlett’s test of sphericity is statistically significant (i.e., $p < 0.05$). Thus, the correlation matrix is not an identity matrix (see Table 4.7 above). This gives the confidence that the information can be used in doing principal component analysis.

4.4.4 The result of the PCA

The principal component analysis (PCA) was run on a 30-question survey form that had variables which quantified variables influencing project success in the road construction industry in Zambia. Before the data was analyzed, suitability of principal component analysis was evaluated before the analysis. The correlation matrix was inspected, and it was found that all the 30 variables had at least a correlation coefficient greater than 0.3. The overall Kaiser-Meyer-Olkin (KMO) measure was 0.626, with the separate variables KMO measures all not significantly above or below0.6, (Kaiser, 1974). Bartlett's test of sphericity was statistically significant ($p < .05$), indicating that the data was likely

factorizable.

Six components with eigenvalues larger than 1 were revealed by PCA to explain 25.412%, 16.801%, 10.784%, 10.212%, 9.238% and 7.206% of the summed variance, respectively (see **appendix 2** for outputs). Visual evaluation of the scree plot indicated that six components should be kept (Cattell, 1966). Furthermore, the interpretability criteria were satisfied by the six- component solution. The six components that were kept include project success, contractor capacity, project funding, monitoring and evaluation, stakeholder involvement and project planning.

79.653 % of the total variance explained the six-component solution. A Varimax orthogonal rotation was used to help interpretability. The rotated solution exhibited 'simple structure' (Thurstone, 1947). The data interpretation aligned with characteristics that the survey was intended to assess with strong loadings for project success (1), contractors' capacity (2), project funding (3), monitoring and evaluation (4), stakeholder involvement (5) and project planning (6). Component loadings and communalities of the rotated solution are presented in **Table 4.9**.

Table 4.9: Rotated Structure Matrix PCA with Varimax Rotation

Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	Communalities
Success3	**.902**	.078	.052	-.038	-.015	.228	0.876
Success4	**.902**	.163	-.044	.114	.264	.039	0.926
Success5	**.870**	-.006	-.053	-.102	.121	.153	0.808
Success1	**.819**	.196	.061	.199	.248	.004	0.814
CC4	.094	**.953**	-.011	-.021	-.002	.070	0.922
CC2	.108	**.940**	-.011	-.044	.043	.062	0.904
CC1	.159	**.621**	.302	-.156	.095	-.042	0.537
PF1	-.062	.121	**.926**	-.114	.076	.005	0.895
PF2	-.076	.106	**.924**	-.019	.162	-.007	0.897
PF3	.164	-.054	**.648**	.030	-.326	-.096	0.566
ME4	.060	-.076	-.039	**.972**	.067	.125	0.975
ME1	.027	-.102	-.067	**.964**	.075	.101	0.960
SI3	.296	.249	.082	.114	**.796**	-.093	0.811
SI5	.412	.161	.071	.025	**.791**	.041	0.829
SI2	.006	-.385	-.113	.057	**.641**	.135	0.593
PP5	.014	.017	.030	-.015	.045	**.881**	0.779
PP3	.217	-.130	-.051	.176	-.129	**.833**	0.808
PP2	.120	.149	-.063	.090	.112	**.612**	0.436

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

4.5 RELIABILITY TEST

Mugenda and Mugenda (2012) emphasized the need to have reliability of a research instrument to determine the consistency in data yield across multiple trials. The accuracy of the instrument was assessed by using Cronbach's Alpha coefficient, applied to on data collected through completed questionnaires. As suggested by Mugenda and Mugenda (2012), a high coefficient signifies strong connections among objects. For social studies, an alpha exceeding 0.7 is deemed sufficient (Serakan, 2016). SPSS was used to carry out reliability analysis. Table 4.10 highlights the Cronbach alphas values for the constructs of the variables. Appendix 3 shows the outputs from the reliability analysis obtained from SPSS.

Table 4.10 Cronbach's alpha

Construct	Item	Cronbach's Alpha
Success	Success1	0.928
	Success3	
	Success4	
	Success5	
Project planning	PP2	0.715
	PP3	
	PP5	
Stakeholder involvement	SI2	0.739
	SI3	
	SI5	
Project funding	PF1	0.805
	PF2	
	PF3	
Contractor capacity	CC1	0.846
	CC2	
	CC4	
Monitoring and evaluation	ME 1	0.977
	ME 4	

According to George and Mallery (2019), the rough rule for Cronbach alpha is given in table 4.11. Table 4.10 entails that variables considered have good Cronbach's alpha values.

Table 4.11: Cronbach alpha classes

Range of value	Status
Less than 0.5	Unacceptable
Greater than 0.5	Poor
Greater than 0.6	Questionable
Greater than 0.7	Acceptable
Greater than 0.8	Good
Greater than 0.9 but not greater than 0.95	Excellent

4.6 COMPONENT BASED SCORES

Component-based scores are obtained by the combined score which is an average value of the values on all variables loading strongly on specific components. For example, CC1, CC2 and CC4 all loaded strongly on Component 2, which relates to contractor capacity. To create a component-based score for contractor capability, the averages of all the ratings for each item are calculated. The hierarchical multiple regression below uses the component-based scores for all the 6 components that are now variables. The means, standard deviations, and correction coefficients for the five new variables, which in this case are called control variables, and the dependent variable (project success) are shown in Table 4.12.

Table 4.12: Correlation Matrix and descriptive statistics of Study Variables

Correlations

	Mean	Std. Deviation	Success	Capacity	Funding	Evaluation	Stakeholder	Planning	Gender	Age	Qualifications
Success	3.352	1.358	1								
Capacity	2.078	1.115	.256**	1							
Funding	2.032	1.028	.009	.176	1						
Evaluation	2.217	1.220	.108	-.148	-.111	1					
Stakeholder	2.246	1.096	.458**	.153	.017	.152	1				
Planning	2.072	0.981	.258**	.032	-.075	.216*	.090	1			
Gender	0.626	0.486	.012	-.005	-.251**	.198*	-.062	-.292**	1		
Age	3.252	0.954	-.196*	-.126	-.044	.050	.077	.121	-.060	1	
Qualifications	2.574	1.018	-.248**	.027	-.082	.096	.113	-.142	.207*	.103	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

From Table 4.12 At the.05 and 0.01 level of significance, there existed a significant relationship between the dependent variable, project success (PS), and the control variables, gender, age, and qualifications. At the 0.01 level of significance, there was a significant relationship between the dependent variable, project success (Success), and

the three independent variables, contractor capability (CP), stakeholder engagement (SI), and project planning (PP). Monitoring and evaluation and project financing are not significantly related to project planning. The correlation matrix in Table 4.12 gives us ability to determine if multicollinearity would be a problem if we conduct OLS multiple regression. Multicollinearity is not a problem because all of the uninterrupted independent variable correlations are less than 0.7.

4.7 HIERARCHICAL MULTIPLE REGRESSION ANALYSIS

To conduct the hierarchical multiple regression analysis, assumptions were assessed and then the procedure conducted to obtain results.

4.7.1 Evaluation of assumptions

Eight key assumptions were considered to run the hierarchical multiple regression.

Assumption #1: One continuous variable, measured at the interval or ratio level, is your dependent variable. Following the computation of the component-based scores in this study, the dependent variable, project success, was regarded as a continuous variable.

Assumption #2: One or more independent variables are measured using a nominal or continuous scale. Following the computation of the component-based scores, the independent variables in this study were continuous variables: contractor capacity (CC), project funding (PF), monitoring and evaluation (ME), stakeholder involvement (SI) and project planning (PP). Gender (nominal), Age (ordinal), and qualifications (ordinal) were used as control variables.

Assumption #3 There should be independence of errors (residuals)

The Durbin-Watson was 1.523, this is within the 1.5 to 2.5 limits, which means that there is an auto- correlation in the data. The Durbin –Watson statistic of 1.523 was used to assess the independence of residuals.

Assumption#4: There should be a linear relationship between the predictor variables and the dependent variable.

With the use of SPSS's chat builder, a scatter plot of the studentized residuals versus the unstandardized projected values was created to find out if there is a linear connection between the dependent and independent variables summed as one. Since there is a nonlinear relationship between the dependent and independent variables, data transformation was necessary to attain linearity. Check the scatter plot attached in appendix 4 to verify these findings.

Using SPSS partial regression plots, each independent variable was compared to the dependent variable to see whether a linear relationship existed. Check regression plots in appendix 4.

The partial regression plots show linear relationships between the dependent variable, project success and dependent variables being considered for this study(Contractor capacity, project funding, monitoring and evaluation, stakeholder involvement and project planning)

Assumption #5: There should be homoscedasticity of residuals (equal error variances)

The plot of the studentized residuals against the unstandardized projected values was used to verify homoscedasticity of assumption made (see appendix 4). Random distributions of the residuals may be seen both above and below the line. Based on this observation the homoscedasticity assumption has been established.

Assumption#6: There should be no multicollinearity.

Correlation coefficient and tolerance/VIF values were examined to test for multicollinearity. Table 4.12 has no independent variables with correlations higher than 0.7. Since there are no variance VIFs in the coefficient output bigger than 5, multicollinearity shouldn't be an issue with this set of data.

Assumption#7: There should be no significant outliers, high-leverage points, or highly influential points.

Standardized residuals and studentized deleted residuals were examined from the SPSS output residual statistics to look for outliers. When the value is bigger than ±3, an outlier is present. From the residual statistics table, only one of the residuals had a value of 3.02

which is close to 3 and is not an issue therefore the standardized residuals and studentised deleted residuals met the ±3 cutoff criteria for outliers. This demonstrates that the data set had no indication of outliers. See appendix 4 for the full statistics table.

One basic general guideline to regard leverage values less than 0.2 as safe, 0.2 to less than 0.5 as risky, and values of 0.5 and above as risky (Huber, 1981) to determine whether any examples demonstrate excessive leverage. There are no leverage values greater than the safe limit of 0.2 in this data set. This demonstrates that a high leverage point residual does not exist. See appendix 4 for the full results.

Each case's Cook's Distance data were examined in order to check if there were any significant values. Cook's Distance values greater than 1 should be looked at. The greatest Cook's value is.088 and the smallest value is.000, according to the residual statistics. There was no indication of a significant influential case because there were no Cook's distance values greater than 1 (Cook and Weisberg, 1982). See appendix 4 for the full results.

Assumption #8: **Errors (residuals) should be approximately normally distributed.**

Two techniques were employed to verify the residuals' normality assumptions: an SPSS-generated P-P plot and a histogram with a normal curve overlay. The normalized residuals seem to be regularly distributed based on the histogram. The P-P Plot was examined in further detail to corroborate this discovery. Appendix 4 displays the P-P plot. The P-P Plot shows that the dots are aligned along the diagonal, indicating that the residuals are sufficiently close to normal for the analysis to continue.

4.7.2 Interpretation of the Findings

To ascertain whether factors such as contractor capacity, project funding, monitoring and evaluation, stakeholder involvement, and project funding were more important to the success of road construction projects in Zambia than the control variables of gender, age, and qualifications, a hierarchical multiple regression analysis was conducted. For complete information on each regression model, see Table 4.13.

Table 4.13: Hierarchical Multiple Regression with Project Success as a dependable variable

Project Success				
	Model 1		Model 2	
Variables	B	β	B	β
Constant	4.869		2.577	
Gender	.144	.052	.427	.153
Age	-.240	-.168	-.289	-.203
Qualifications	-.321	-.241	-.379	-.284
Capacity			0.198*	.163
Funding			-.003	-.002
Evaluation			.020	.018
Stakeholder			0.578**	.466
Planning			0.326**	.235
R^2	0.093		.430	
F	3.807*		9.992**	
ΔR^2	0.093		.337	
ΔF	3.807		12.518	
(Note: n = 115; * p < .05; ** p < 01)				

Partial regression plots and a plot of the studentized residuals versus the expected values were used to evaluate linearity. One was residual independence, measured by a Durbin-Watson value of 1.523. By visually looking through a plot of studentized residuals against unstandardized expected values, it was concluded that homoscedasticity was achieved. By using correlations and VIFs to measure multicollinearity, there was no indication of it. The studentized deleted residuals fell between ±3 standard deviations, no leverage value above 0.2, and Cook's distance values were more than 1. The residuals histogram and the P-P plot both demonstrated that the assumption of normalcy was satisfied.

The complete model which has Gender, Age, Qualification, contractor capacity, project funding, monitoring & evaluation, stakeholder involvement and project planning to predict Project Success was statistically significant, $R^2 = .430$, $F(3,106) = 9.992$, $p < .05$; adjusted $R^2 = .337$.Appendix 3 shows the full results. The added control variables of gender, age

and qualifications to the prediction of Project Success (Model 1) did not lead to a statistically significant increase in R^2 of .093, F (3, 111) = 3.807, p > . 05.

4.8 HYPOTHESIS TESTING

Table 4.14: Hypothesis Testing Results

Hypothesis	t- value	p- value	Comment
H1: Project planning has significant influence on the success of road construction projects in Zambia.	**2.846**	**0.005**	**Supported**
H2: Stakeholder involvement has significant influence on the success of road construction projects in Zambia.	**6.092**	**0.000**	**Supported**
H3: Project funding has significant influence on the success of road construction projects in Zambia.	-.031	0.976	Not supported
H4: Contractor capacity has significant influence on the success of road construction projects in Zambia	**2.092**	**0.039**	**Supported**
H5: Monitoring and evaluation has a significant influence on the success of road construction projects in Zambia.	0.219	0.827	Not supported

Table 4.14 above reveals the following:

H1: There was a significant positive relationship between the variable Project planning and Project Success (t = 2.846, p < 0.05). Hence, this hypothesis was supported.

H2: There was a significant positive relationship between the variable Stakeholder Involvement and Project Success (t = 6.092, p < 0.05). Hence, this hypothesis was supported.

H3 – There was no significant positive relationship between the variable project funding and Project Success (t = -.031, p > 0.05). Hence, this hypothesis was not supported.

H4 – There was a significant positive relationship between the variable Contractor Capacity and Project Success ($t = 2.092$, $p < 0.05$). Hence, this hypothesis was supported.

H5 – There was no significant positive relationship between the variable Monitoring and Evaluation and Project Success ($t = 0.219$, $p > 0.05$). Hence, this hypothesis was not supported.

In summary, the interpretation of p-values supports the acceptance of the hypothesis for the independent variables. The tests demonstrate statistically significant influences of project planning, stakeholder involvement and contractor capacity on the success of road construction projects in Zambia. According to table 4.13, the beta values show that Stakeholder involvement ($\beta = 0.466$) had the most significant effect on road construction projects followed by project planning ($\beta = 0.235$) and contractor capacity ($\beta = 0.163$). Project funding and monitoring and evaluation had no strong influence on road construction project success.

4.9 SUMMARY

The collected data was evaluated in this chapter. To further present the facts, tables and visuals were employed. The experiments show that stakeholder participation, contractor capacity, and project planning all have statistically significant effects on the outcome of road construction projects in Zambia. The next chapter discusses the key findings of the investigation.

CHAPTER FIVE

DISCUSSIONS OF FINDINGS

5.0 Introduction

The discussion of the results is done in line with the five research questions. The study used five dependent variables and one independent variable to answer the research questions. A five-point Likert scale was used to measure the variables: 1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, 5. Strongly Agree.

The research findings are thoroughly discussed in chapter five, which also presents the findings from the data that was presented and examined in chapter four. The objectives of this study are as below.

i. What is the influence of project planning on the success of road construction projects in Zambia?

ii. What is the influence of stakeholders' involvement on the success of road construction projects in Zambia?

iii. What is the influence of project funding on the success of road construction projects in Zambia?

iv. What is the influence of a contractor's capacity on the success of road construction projects in Zambia?

v. What is the influence of project monitoring and evaluation on the success of road construction projects in Zambia?

5.1 The influence of project planning on the success of road construction projects in Zambia

The investigation into the impact of project planning on road construction project success in Zambia has yielded compelling results, as indicated by the hypothesis tests presented in Table 4.8. These tests revealed a significant association between project planning and project success, reinforcing the importance of comprehensive planning practices. This finding is consistent with global literature highlighting the pivotal role of planning in ensuring the success of construction projects (Butković, 2021). Moreover, the study

uncovered a shared recognition among respondents regarding the necessity of considering potential risks and challenges during the planning phase, aligning with existing literature that identifies risk management as a critical internal success factor for road construction projects, particularly during the planning stage (Awaad et al., 2022)

The positive correlation observed between project success and the effectiveness of project planning contributes novel insights by quantifying the strength of this relationship within the specific context of Zambia. This empirical evidence aligns with broader literature emphasizing the link between project planning and project success (Sohu et al., 2018), yet it uniquely addresses the nuances of the Zambian road construction industry. While Slevin and Pinto (1986) identified project planning as a critical success factor in their seminal work, Belassi and Tukel's (1996) theory did not explicitly single out project planning as such. Nonetheless, the findings underscore the imperative for road construction professionals and organizations in Zambia to establish robust planning systems to ensure the successful execution of road projects.

5.2 The influence of stakeholders' involvement on the success of road construction projects in Zambia

The examination of stakeholders' involvement in road construction projects has yielded compelling insights, as indicated by the statistical analysis conducted. The results demonstrate that stakeholder involvement is a crucial determinant of project success in road construction implementation. This finding resonates with existing literature emphasizing the pivotal role of stakeholders in the road construction industry (Rahman et al., 2020), highlighting the significance of stakeholders' active participation throughout project phases.

The study's findings underscore the criticality of stakeholders' involvement in determining project success and contribute novel insights by quantifying the strength of this relationship within the specific context of Zambia. This aligns with prior research emphasizing the positive impact of stakeholder engagement (Ahmed Osman and Kimutai, 2019). Moreover, the findings are consistent with Slevin and Pinto's (1986) theory, which underscores the importance of power dynamics and client involvement—key components of stakeholder engagement. Similarly, Belassi and Tukel's (1996) theory also acknowledge the significance of stakeholder involvement, incorporating factors

related to the external environment. Therefore, the study's results imply that for road construction projects to succeed in Zambia, it is imperative for all stakeholders to be actively engaged throughout the project lifecycle, ensuring that expectations are clearly defined, reviewed, and achieved from project planning to completion.

5.3 The influence of project funding on the success of road construction projects in Zambia

The assessment of how project funding influences project success in road construction projects reveals that it does not significantly impact project outcomes. This finding aligns with existing literature which suggests that project success in the road construction industry is not heavily reliant on project funding. For instance, Awaad et al. (2022), in a study conducted in Egypt, did not identify project funding as one of the most critical success factors in road construction.

The study delved into the intricacies of financial practices within the industry, uncovering varied perspectives on the influence of project funding on road construction project success in Zambia. While acknowledging the importance of project funding, the research indicates that other factors play significant roles in ensuring the efficient utilization of financial resources.

Although respondents generally agreed on the necessity of adequate budgeting, the diversity of opinions underscores the need for organizations to consider multiple factors beyond financing alone. By demonstrating that project funding is not a predominant critical success factor for road construction project success within the Zambian context, this study contributes new insights. This finding is consistent with prior research, such as that of Slevin and Pinto (1987) and Belassi and Tukel (1996), which similarly do not prioritize project financing as a top critical success factor for road construction.

Overall, this finding serves to inform road construction agencies and industry experts that while project funding remains an important consideration, it should not overshadow other critical factors in striving for project success. By broadening the perspective beyond financing, stakeholders can better strategize and allocate resources to ensure successful project outcomes.

5.4 The influence of a contractor's capacity on the success of road construction projects in Zambia

The exploration of a contractor's capacity on project success revealed that a contractor's capacity is an important factor to determine road construction success in Zambia. This finding highlights the criticality of contractor capacity in determining the road construction project success in Zambia, aligning with literature emphasizing the importance of contractor competence and efficiency (Erick & Were Susan, 2017). These findings contribute to the existing literature by quantifying the strong association between a contractor's capacity and project success, emphasizing the need for careful assessments and considerations during the selection of contractors. The study provided insights into the perceptions of respondents regarding various aspects of a contractor's capacity, contributing new knowledge to the existing literature and supporting literature emphasizing the importance of contractor capacity for project success (Aibinu & Oluwoye, 2002).

The study adds information to existing knowledge by quantifying the strength of this relationship within the local context, supporting literature emphasizing the importance of contractor capacity for project success (Aigbavboa et al., 2017). It also agrees with Belssai and Tukel (1996) and Slevin and Pintos (1987) who included aspects on project personnel, supervision, feedback, and contractor competencies which all focus on having contractors with the right personnel and capabilities. This result entails that in Zambia, particular emphasis by road construction experts must be made to ensure that contractors selected have the capacity to carry out the road construction work.

5.5 The influence of project monitoring and evaluation on the success of road construction projects in Zambia

The examination of how project monitoring & evaluation affect road construction revealed that these factors had no appreciable impact on road project success in Zambia. This demonstrates that monitoring and evaluation are not critical success factors in the context of Zambia's road construction sector.

This finding is not aligned with existing literature in the theoretical framework which have highlighted aspects of monitoring and evaluation as a critical success factor in road construction. Literature from the theoretical framework has aspects highlighting monitoring

& evaluation as a critical success factor (Slevin & Pinto, 1987; Belssai & Tukel, 1996). This result might have not been consistent with the theories because experts in the Zambian road construction industry don't see it as important because they are satisfied with the systems in place for monitoring and evaluation of road projects.

5.5 Summary

The presentation, analysis, and discussion of the study's findings were the main topics of this chapter. The focal areas were factor analysis, validity and reliability, regression analysis, study of descriptive statistics, and respondent demographics. The results of the study showed the support of three hypotheses on contractor capacity, stakeholder involvement and project planning while it rejected the hypothesis on Monitoring and Evaluation and Project funding.

The results show that Contractor capacity, Project planning and Stakeholder involvement are critical to success of road construction projects in Zambia. The results, in response to the research questions, were also discussed. In the next chapter conclusions on the study, recommendations and recommendations for further research are discussed.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The purpose of this study was to evaluate the critical project success factors in Zambia's road construction sector in Zambia. This chapter contains the study's conclusion, recommendation, policy implications, and ideas for more research. The general results are discussed considering the results presented in the previous chapter. The main objective of this study was to assess the critical success factors in the road construction industry in Zambia. This main objective was broken down into the following specific objectives.

i. What is the influence of project planning on the success of road construction projects in Zambia?

ii. What is the influence of stakeholders' involvement on the success of road construction projects in Zambia?

iii. What is the influence of project funding on the success of road construction projects in Zambia?

iv. What is the influence of a contractor's capacity on the success of road construction projects in Zambia?

v. What is the influence of project monitoring and evaluation on the success of road construction projects in Zambia?

The findings presented in Table 4.8 indicate that the validated hypotheses regarding significant critical success factors (CSFs) for road construction in Zambia include project planning, stakeholders' involvement, and contractor capacity. This underscores the importance of prioritizing these variables to ensure effective implementation of road construction projects in Zambia. The study concludes that two other factors, namely project finance and project monitoring and evaluation, did not demonstrate substantial influence on the outcomes of road construction projects within the Zambian context.

6.1 Summary of finings

This study used a quantitative approach to collect and analyze data. It used hierarchical multiple regression and did a hypothesis test to see which of the variables outlined in the theoretical framework had a significant impact on project success.

Firstly, KMO tests were used to establish whether the samples that were collected were adequate. The data set had a KMO value of 0.626 (Table 4.7), which was adequate (Kaiser's, 1974). The variables had KMO measures which were above 0.6 or near 0.6 and this gave confidence to proceed to do the principal component analysis (PCA). The PCA tests on the data had strong loadings for project success (1), contractors' capacity (2), project funding (3), monitoring and evaluation (4), stakeholder involvement (5) and project planning (6). Reliability tests were also run on the variables using the Cronbach alphas values and all the variables were above 0.7 hence, these were all reliable.
A correlation matrix was also tested and checked and there was a significant relationship between the dependent variable, project success (Success), and the three independent variables, contractor capability (CP), stakeholder engagement (SI), and project planning (PP). Monitoring and evaluation and project financing are not significantly related to project planning.

A hierarchical multiple regression model was also run which included Gender, Age, Qualification, contractor capacity, project funding, monitoring & evaluation, stakeholder involvement and project planning to predict Project Success. The findings showed strong loadings for contractor capacity, stakeholder involvement and project planning. The hypothesis tests also accepted the hypothesis that the three dependent variables contractor capacity, stakeholder involvement and project planning had a strong influence on project success in the road construction industry in Zambia.

6.2 Conclusion

In conclusion, this study provides a comprehensive examination of the critical success factors influencing road construction projects in Zambia, encompassing project planning, stakeholders' involvement, project funding, contractor capacity, and project monitoring and evaluation. Through rigorous statistical analysis, significant insights emerged, highlighting the pivotal roles of effective project planning, stakeholder engagement, and contractor capacity in shaping the success of road construction endeavors in Zambia.

The robust correlation coefficients and hypothesis testing outcomes offer empirical support for these relationships, contributing novel insights specific to the Zambian context and shedding light on factors crucial for project success.

Notably, the study reveals that while project funding is essential, its significance is overshadowed by the importance of meticulous project planning, stakeholder engagement, and contractor selection. Instances where funding alone did not guarantee project success underscore the criticality of factors such as contractor capacity and stakeholder involvement. Similarly, the relatively limited impact of project monitoring and evaluation suggests that prioritizing thorough planning, stakeholder engagement, and competent contractor selection may yield more substantial benefits in ensuring project success.

The practical implications of these findings extend to industry practitioners, policymakers, and researchers aiming to optimize road construction project outcomes in Zambia. By emphasizing the importance of thorough project planning, active stakeholder engagement, and the selection of capable contractors, stakeholders can enhance the likelihood of successful project delivery. Moreover, the study underscores the need for continual refinement of project management practices and policies to address the unique challenges within the Zambian road construction sector.

In summary, effective project planning characterized by thoroughness, risk assessment, clear communication, scheduling, and alignment with strategic vision emerges as a critical determinant of road construction project success. Stakeholder involvement, including active engagement, consideration of governmental factors, effective communication, decision-making involvement, and addressing stakeholder concerns, also emerges as highly influential.

6.3 General recommendations

Based on the study's findings, several broad suggestions are given to increase the success of road construction projects in Zambia. These recommendations span across key areas such as project planning, stakeholders' involvement, and contractor's capacity:

Enhance Project Planning Practices:

i. Invest in training and capacity building to ensure a shared understanding of

thorough project planning practices and parameters.

ii. Foster a culture of risk awareness and management, ensuring that potential challenges are comprehensively considered during the planning phase.

iii. Emphasize effective communication strategies to articulate project objectives and setting clear milestones.

iv. Encourage the integration of project planning with the overall strategic vision to reinforce organizational goals and objectives.

Optimize Stakeholders' Involvement:

i. Develop comprehensive stakeholder engagement frameworks that address the varying expectations and perceptions within the industry.

ii. Strengthen collaboration with government entities, acknowledging the importance of factors such as corruption, change management, and political interference.

iii. Implement robust communication strategies to ensure regular and effective interaction with stakeholders at all project stages.

iv. Establish mechanisms for high levels of stakeholder involvement in decision-making processes, recognizing the significance of their input to project success.

v. Address concerns and expectations of stakeholders through tailored approaches, fostering a supportive and collaborative environment.

Evaluate and Enhance Contractor's Capacity:

i. Establish rigorous evaluation processes for contractors, focusing on track records, expertise, staffing, and collaborative capabilities. Foster partnerships with contractors based on past performance and proven efficiency in delivering project milestones.

ii. Implement strategies for knowledge transfer and skills development for contracting teams to ensure the availability of expertise and capacity building.

iii. Regularly assess and adapt contracting team resources to match the project's scale and complexity.

6.4 Recommendations for further studies

Further studies in the realm of road construction projects in Zambia, could delve into the nuanced exploration of specific factors influencing project success, such as the socio-

cultural and political context, local community engagement, and the impact of technological advancements in project management. Additionally, a comparative analysis across different regions or countries could provide valuable insights into best practices and lessons learned, contributing to a better understanding of the factors which are critical to ensure successful road construction projects. Future research can consider focusing on studies to assess long-term impact of implemented recommendations and strategies, providing a deeper understanding of the sustainability and enduring success of road construction endeavors.

6.5 Summary

This chapter gave an overview of research findings and recommendations from the results discussed in the previous chapter. It also gives recommendations for future areas of future research which have an influence on road construction success from the three significant variables contractor capacity, project planning and stakeholder engagement.

REFERENCES

Ahmed Osman, M. and Kimutai, G. (2019) *'Critical success factors in the implementation of road projects in Wajir County', Kenya*. International Academic Journal of Information Sciences and Project Management, 3(3), pp. 73–104. Available at: http://www.iajournals.org/articles/iajispm_v3_i3_73_104.pdf.

Aibinu, A.A. and Jagboro, G.O. (2002). *The effects of construction delays on project delivery in Nigerian*. International Journal of Project Management, 20 (2002), 593–599.

Alias, Z., Zawawi E. M.A., Yusof K., and Aris N.M. (2014) *'Determining Critical Success Factors of Project Management Practice: A Conceptual Framework',* Procedia - Social and Behavioral Sciences, 153, pp. 61–69. Available at: https://doi.org/10.1016/J.SBSPRO.2014.10.041.

Awaad S., Mahdi I., Mahmoud D., and Abdelrashid I. (2022) *'Factors Affecting the Productivity of Road Construction Projects in Egypt.'* International Journal of Research in Engineering & Management (ISSN: 2456-1029)(SJIF: 2.228)

Banda, J. (2019) *Developing strategies for improving implementation of public sector construction projects in Zambia*. School of postgraduate studies.

Barajei, C., Kheni, N.A., Appiah Kubi, E., Danso, H. and Iddrisu, A.W. (2023*) 'Enhancing the success of Ghanaian public road construction projects'*, Cogent Engineering, 10(1), p. 2199514. Available at: https://doi.org/10.1080/23311916.2023.2199514.

Belassi, W. and Tukel, O.I. (1996a) '*A new framework for determining critical success/failure factors in projects',* International Journal of Project Management, 14, pp. 141–151. Available at: https://doi.org/10.1016/0263-7863(95)00064-x.

Bhandari, P. (2023) What Is Quantitative Research? | Definition, Uses & Methods. Available at: https://www.scribbr.com/methodology/quantitative-research/ (Accessed: 25 October 2023).

Butković, L.L. (2021) *'A new framework for ranking Critical Success Factors for International Construction Projects',* Organization, Technology and Management in Construction, 13(2), pp. 2505–2520. Available at: https://doi.org/10.2478/otmcj-2021-0030.

Cattell, R. B. (1966). *The Scree Plot Test for the Number of Factors.* Multivariate Behavioural Research, 1, 140-161.

http://dx.doi.org/10.1207/s15327906mbr0102_10

Chetty, P. (2020) *'Theories on determination of Critical Success Factors (Critical success factors) for the success of construction projects.'* [online] Project Guru.

Clinton A., Ifije O., and Thulisile Z. (2014), *Sustainable Construction Practices: "A Lazy View" of Construction Professionals in the South Africa Construction Industry,* Energy Procedia, Volume 105, 2017, Pages 3003-3010, ISSN 1876-6102, https://doi.org/10.1016/j.egypro.2017.03.743.

Cong P. and Wen C. (2019) *'The impact of infrastructure improvement on urban life quality and firm output'*. International Growth Centre, London School of Business

Cook, R. Dennis; Weisberg, Sanford. (1982). *Residuals and Influence in Regression.* New York: Chapman and Hall. Retrieved from the University of Minnesota Digital Conservancy, https://hdl.handle.net/11299/37076.

Cooper, D and Schindler, P. (2006) '*Business Research Methods (8th edn)'.* New York: Mc - GrawHill.

Crawford, P. and Bryce, P. (2003a) '*Project monitoring and evaluation: a method for enhancing the efficiency and effectiveness of aid project implementation'*, International Journal of Project Management, 21(5), pp. 363–373. Available at: https://doi.org/10.1016/S0263-7863(02)00060-1.

Creswell, J.W. (2009) *Research Design : Qualitative, quantitative, and Mixed Methods Approaches*. 3rd edn. Sage. Available at: https://www.ucg.ac.me/skladiste/blog_609332/objava_105202/fajlovi/Creswell.pdf.

Damoah, I.S., Ayakwah, A. and Twum, P. (2022) *'Assessing public sector road construction projects' critical success factors in a developing economy: Definitive stakeholders' perspective',* Journal of Project Management, 7(1), pp. 23–34. Available at: https://doi.org/10.5267/j.jpm.2021.7.003.

DeCarlo, M. (2018) *'Inductive and deductive reasoning',* pressbooks.pub [Preprint]. Available at: https://pressbooks.pub/scientificinquiryinsocialwork/chapter/6-3-inductive-and-deductive-reasoning/.

Dudovskiy, J. (2019) *'Positivism - Research Methodology'.* Available at: https://research-methodology.net/research-philosophy/positivism.

Egboga, I., and Daniel, C. O. (2022). *'How relevant is the iron triangle as a measure of construction project performance'*. In World Journal of Management and Business Studies (Vol. 2, Issue 1).

Erick, N. and Were S. D. (2017) *'Influence of the critical success factors on completion of road projects in Kenya a case of Kenya national highways authority projects',* Int Journal of Social Sciences Management and Entrepreneurship, 1(1), pp. 188–203. Available at: www.sagepublishers.com.

Franklin, N. T. (2014) *'The construction industry and its research rationale in Cameron and Africa.'* School of the Built Environment, College of Science and Technology, University of Salford Manchester.

George D. and Mallery M. (2019) '*IBM SPSS Statistics 26 Step by Step, A Simple Guide and Reference'*, 16th Edition, https://doi.org/10.4324/9780429056765.

Gunduz, M. and Almuajebh, M. (2020) *'Critical success factors for sustainable construction project management', Sustainability (Switzerland)*, 12(5). Available at: https://doi.org/10.3390/su12051990.

Hillebrandt, P.M. (2000) '*Economic Theory and the Construction Industry*.' 3rd edn. Macmillan, Basingstoke.

Huber, P. (1981) *Robust Statistics*. Wiley, New York. https://doi.org/10.1002/0471725250

Igiebor, G.O. and Okonmar, E. (2022) 'THE APPLICATION AND IMPLICATION OF COMBINING QUANTITATIVE AND QUALITATIVE DATA IN THE SOCIAL 81 SCIENCES: A THIRD METHODOLOGICAL MOVEMENT IN CONTEXT',WILBERFORCE JOURNAL OF THE SOCIAL SCIENCES, 7(2), pp. 72–91. Available at: https://doi.org/10.36108/wjss/2202.70.0250.

Jeong, Joo-Seong, & Jung, Eun-Young. (2017). *'Construction Delays in Developing Countries: A Review.'* Journal of Construction Engineering and Project Management, 7 (1), 1–12. https://doi.org/10.6106/JCEPM.2017.3.30.001

Kaiser, H. F. (1974). *An index of factorial simplicity.* Psychometrika, 39(1), 31–36. https://doi.org/10.1007/BF02291575

Kothari, C. (2006). *Research Methodology.* New york: Willey Eastern Limited

Kothari, C. (2004). *Research Design: "Qualitative, Quantitative and Mixed Methods Approaches 4th ed*". New Delhi: New Age International Publishers.

Lamprou, A. and Vagiona, D. (2018) *'Success criteria and critical success factors in project success: a literature review'*. Available at: https://doi.org/10.26262/reland.v1i0.6483.

Levin, D.M. (2008) *The Opening of Vision.* Routledge

Mashwama, N., Aigbavboa, C. and Thwala, D. (2017) '*An Assessment of the Critical Success factor for the Reduction of Cost of Poor Quality in Construction Projects in Swaziland',* in Procedia Engineering. Elsevier Ltd, pp. 447–453. Available at: https://doi.org/10.1016/j.proeng.2017.07.223.

Mathar, H., Assaf, S.A., Hassanain, M.A., Abdallah, A. and Sayed, A. (2020) *'Critical success factors for large building construction projects: Perception of consultants and contractors', Built Environment Project, and Asset Management*, 10(3), pp. 349–367. Available at: https://doi.org/10.1108/BEPAM-07-2019-0057.

Mehrad, A. and Zangeneh, M.T. (2019) Comparison between Qualitative and Quantitative Research Approaches: Social Sciences. Available at: https://orcid.org/0000-0003-4364-5709.

Mitchell, T.R. (1985) '*An Evaluation of the Validity of Correlational Research Conducted in Organizations',* The Academy of Management Review, 10(2), pp. 192–205. Available at: https://doi.org/10.2307/257962.

Mohtar, S., Sobry, C., Abdul, H., Abdulah, C.S. and Rani, H.A. (2013) '*The Iron Triangle As The Triple Constraints In Project Management Work Safety and Health System View project Time Management*;' View project JURNAL TEKNIK SIPIL Volume 2 Nomor 1 Available at: https://www.researchgate.net/publication/354733896.

Mugenda, A. G., & Mugenda, O. M. (2012). *Research Methods Dictionary.* Nairobi: Kenya Arts Press.

Mugenda, O and Mugenda, A. (2008). *Research Methods: Quantitative and Qualitative approaches. Uganda:* African centre of technology studies.

Mwelu N., Peter R. Davis, Yongjian Ke, Susan Watundu & Marcus Jefferies (2019) *'International Journal of Construction Management Success factors for implementing Uganda's public road construction projects Success factors for implementing Uganda's public road construction projects'*, International Journal of Construction Management, 21. Available at: https://doi.org/10.1080/15623599.2019.1573481.

Nam, C.H. and Tatum, C.B. (1989) *'Toward Understanding of Product Innovation Process in Construction',* Journal of Construction Engineering and Management, 115, pp. 517–534. Available at: https://doi.org/10.1061/(asce)0733-9364(1989)115:4(517).

Ogwueleka, A. (2011) '*The critical success factors influencing project performance in Nigeria',* International Journal of Management Science and Engineering Management, 6(5), pp. 343–349. Available at: https://doi.org/10.1080/17509653.2011.10671182.

Pheng, L.S. and Hou, L.S. (2019) *'The Economy and the Construction Industry', Construction Quality and the Economy,* pp. 21–54. Available at: https://doi.org/10.1007/978-981-13-5847-0_2.

Rahman, R.A., Radzi, A.R., Saad, M.S. and Doh, S.I. (2020) 'Factors affecting the success of highway construction projects: The case of Malaysia', in IOP Conference Series: Materials Science and Engineering. Institute of Physics Publishing. Available at:

https://doi.org/10.1088/1757-899X/712/1/012030.

Russell, J.S. and Jaselskis, E.J. (1992) '*Predicting Construction Contractor Failure Prior to Contract Award'*, Journal of Construction Engineering and Management, 118, pp. 791–811. Available at: https://doi.org/10.1061/(asce)0733-9364(1992)118:4(791).

Said A. H, S., Bhuiyan B. A. and Widyarto, S. (2020) *'The empirical review of critical success factors on the causes of delay in road constructions projects in the GCC countries'*, Australian Finance & Banking Review, 4(2). Available at: https://www.cribfb.com/journal/index.php/afbr.

Sands, R.G. (1990) *'Ethnographic Research',* Social Work in Health Care, 15, pp. 115–129. Available at: https://doi.org/10.1300/j010v15n01_09.

Saunders, M., Lewis, P and Thornhill, A. (2012). *Research Methods for Business Students 6th Edition.* England: Pearson Education Limited.

Saunders, M., & Thornhill, A. (2007). *"Research Methods for Business Students"*. 2nd Edition. London: Prentice Hall.

Sekaran, U. and Bougie, R. (2016) *Research Methods for Business: A Skill-building Approach.* 7th edn. John Wiley & Sons.

Setia, M. (2008) *'Observational studies: How to go about them?',* Indian Journal of Dermatology, Venereology and Leprology, 74(3), pp. 288–291. Available at: https://doi.org/10.4103/0378-6323.41397

Slevin, D.P. and Pinto, J.K. (1987) *The Project Implementation Profile:* New Tool For Project Managers.

Sohu, S., Jhatial, A.A., Ullah, K., Lakhiar, M.T. and Khan J.S. (2018) *'Determining the Critical Success Factors for Highway Construction Projects in Pakistan'*, Technology & Applied Science Research. Available at: www.etasr.com.

Suravi, L. (2023) 'A Qualitative Research Approach is an Inevitable Part of Research

Methodology: An Overview', International Journal For Multidisciplinary Research, 5(3). Available at: https://doi.org/10.36948/ijfmr.2023.v05i03.3178.

Tabachnick, B. G., & Fidell, L. S. (2014). *Using Multivariate Statistics* (6th ed.). Harlow: Pearson Education.

Thurstone, L.L. (1947) *Multiple factor analysis: A development and expansion of vectors of the mind*. University of Chicago Press, Chicago.

Ting Wang, Junyan Xu, Qinghua He, Albert P.C. Chan and Emmanuel K.O. (2022) *'Studies on the success criteria and critical success factors for mega infrastructure construction projects: a literature review'*, Engineering, Construction and Architectural Management, 30. Available at: https://doi.org/10.1108/ecam-12-2020-1042.

Thi C. and Swierczek F. (2010) *'Critical success factors in project management: Implication from Vietnam',* Asian Business review. Available at: DOI: 10.1080/13602380903322957

Wang T., Xu J., He Q., Chan A.P. and Owusu E.K (*2022) 'Studies on the success criteria and critical success factors for mega infrastructure construction projects: a literature review'*, Engineering, Construction and Architectural Management, 30. Available at: https://doi.org/10.1108/ecam-12-2020-1042.

Zulu, S. (2015) *Changing the Field: Recent Developments for the Future of Engineering and Construction.*

APPENDICES

APPENDIX 1

UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

Plot No. 37413, Off Alick Nkhata Mass Media. P. O Box 36711, Lusaka.
Phone: +260211258505, 258409 Fax +260211233409; Cell +260976075850,961917862,
E-mail:unilus@zamnet.zm,ictar@zamnet.zm

UNILUS-RESEARCH ETHICS COMMITTEE

Ref no: FWA00033228-8712/23

Date: 10th December 2023

STUDENT NAME: CHIMWA MWANGONDE MUTAMBO

ASSESSING THE CRITICAL PROJECT SUCCESS FACTORS IN THE ROAD CONSTRUCTION INDUSTRY IN ZAMBIA

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS research ethics committee.

2. Approval from the necessary authority should be sought.

Congratulations and the committee wishes you success in your work.

Professor Kasonde Bowa
MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)
Chairman- UNILUS REC
Professor of Urology and Consultant Urologist
Deputy Vice-Chancellor – Research and Innovation
Executive Dean - School of Medicine and Health Sciences

APPENDIX 2

UNIVERSITY OF LUSAKA

QUESTIONNAIRE

December 2023

Dear, respondent

RE : QUESTIONNAIRE FOR DATA COLLECTION

I am a student at the University of Lusaka, where I am studying a Master of Science in Project Management. This questionnaire is being sent with the only intent of collecting the necessary data to respond to the research entitled: ASSESSING THE CRITICAL PROJECT SUCCESS FACTORS IN THE ROAD CONSTRUCTION INDUSTRY IN ZAMBIA.

It is respectfully requested of you to answer each question. Your provided information will be handled with the highest secrecy and used exclusively for academic reasons. It will not be shared with any outside parties. Moreover, you are not required to answer this inquiry with your name or any other identity number. The data acquired will be helpful in the master's degree certificate issuance process as well.

Yours Faithfully,

CHIMWA MWANGONDE MUTAMBO

INSTRUCTIONS

Kindly tick the box provided or fill in the blank spaces provided.

PART A: General information

1. Gender?

Male ☐ Female ☐

2. Age?

20 years or less ☐ 21-30 years old ☐ 31-40 years old ☐

41-50 years old ☐ Above 50 years old ☐

3. Please indicate your highest academic qualification attained:

Professional qualification ☐ Diploma ☐

Undergraduate degree ☐ Postgraduate degree ☐

Other (please specify) .....

4. Experience in the road construction industry:

Less than 2 years ☐ 3-5 years ☐

6-10 years ☐ Over 10 years ☐

5. Profession of participant:

Consultant ☐

Contractor ☐

Government engineer ☐

PART B: What is the influence of project planning on the success of road construction projects in Zambia?

Please indicate your agreement or otherwise with the following statement using the following Likert scale. Use a scale of: 1= Strongly Agree; 2= Agree; 3= Uncertain; 4= Disagree and 5= Strongly Disagree.

PROJECT PLANNING	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
At my organization, project planning is done thoroughly					
At this organization, adequate consideration is taken of the potential risks and challenges during the planning phase					
At this organization, clear communication of project objectives and milestones is done during the planning stage					
At this organization, there is alignment of project planning with the overall strategic vision					
At this organization comprehensive and realistic scheduling is done in the project planning phase					

PART C: What is the influence of stakeholders' involvement on the success of road construction projects in Zambia?

Please indicate your agreement or otherwise with the following statement using the following Likert scale. Use a scale of: 1= Strongly Agree; 2= Agree; 3= Uncertain; 4= Disagree and 5= Strongly Disagree.

STAKEHOLDERS' INVOLVEMENT	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
At my organization stakeholder engagement and collaboration are considered					

At this organization, regular and effective communication with stakeholders is undertaken					
At this organization the level of stakeholder involvement in decision-making is high					
At this organization, there is adequate consideration of stakeholders' concerns and expectations					
At this organization, government factors such as corruption, change management process, interference from politicians, and continuity of successive governments are important					

PART D: What is the influence of project funding on success of road construction projects in Lusaka, Zambia?

Please indicate your agreement or otherwise with the following statement using the following Likert scale. Use a scale of: 1= Strongly Agree; 2= Agree; 3= Uncertain; 4= Disagree and 5= Strongly Disagree.

PROJECT FUNDING	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
At this organization, there is the establishment of positive relationships with stakeholders in the management of finances					
At this organization, there are adequate financial resources for quality and timely completion of road construction projects					
At this organization, there is availability of contingency funds to enhance the project's resilience to unexpected challenges					
At this organization, there is transparency in financial processes					

At this organization, adequate budgeting of finances is properly carried out					

PART E: What is the influence of a contractor's capacity on the success of road construction projects in Lusaka, Zambia?

Please indicate your agreement or otherwise with the following statement using the following Likert scale. Use a scale of: 1= Strongly Agree; 2= Agree; 3= Uncertain; 4= Disagree and 5= Strongly Disagree.

CONTRACTOR'S CAPACITY	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
At this organization, there is availability of expertise and experience of contractors					
At this organization, there is adequate staffing and resources within the contracting team					
At this organization, the contractor's track record in completing similar projects is considered					
At this organization, there is effective collaboration between the project owners and the contractor					
At this organization, there is timely and efficient delivery of project milestones by the contractor					

PART F: What is the influence of project monitoring and evaluation on the success of road construction projects in Lusaka, Zambia?

Please indicate your agreement or otherwise with the following statement using the following Likert scale. Use a scale of: 1= Strongly Agree; 2= Agree; 3= Uncertain; 4= Disagree and 5= Strongly Disagree.

MONITORING AND EVALUATION	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

At this organization, there is regular monitoring and evaluation of project progress					
At this organization, there is the effectiveness of project monitoring tools and techniques					
At this organization, there is timely identification and mitigation of project risks through monitoring to enhance overall project success					
At this organization, there is continuous evaluation of project performance that supports adaptive decision-making for successful outcomes					
At this organization, the external environment that affects the project site conditions are considered					

PART E: success of road construction projects

The study wants to assess the extent to which the following critical project success factors have been used in road construction projects in Lusaka, Zambia. Please indicate how you would rate the usability of the mentioned critical project success factors using the following Likert scale; 1 = Used always; 2 = Used often; 3 = Used sometimes; 4 = Used rarely; 5 = Used very rarely.

SUCCESS OF ROAD CONSTRUCTION PROJECTS	Used always	Used often	Used sometimes	Used rarely	Used very rarely
In public road construction projects in Lusaka, Zambia, the projects are consistently delivered within the specified timelines, as per the project schedules					
The financial aspects of public road construction projects in Lusaka, Zambia are effectively managed, with costs typically aligning closely with the initial project budgets					
Quality standards and specifications are consistently met or exceeded in the					

execution of public road construction projects in Lusaka, Zambia					
The scope of public road construction projects in Lusaka, Zambia is well-defined and is rarely subject to significant changes during the project lifecycle					
Considering the factors of delivery, cost, quality, and scope, public road construction projects in Lusaka, Zambia are generally successful and meet the intended project objectives					

THANK FOR YOUR COOPERATION

APPENDIX 3

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.574	25.412	25.412	4.574	25.412	25.412	3.461	19.225	19.225
2	3.024	16.801	42.213	3.024	16.801	42.213	2.569	14.273	33.498
3	1.941	10.784	52.997	1.941	10.784	52.997	2.271	12.618	46.116
4	1.838	10.212	63.209	1.838	10.212	63.209	2.034	11.300	57.417
5	1.663	9.238	72.447	1.663	9.238	72.447	2.007	11.148	68.565
6	1.297	7.206	79.653	1.297	7.206	79.653	1.996	11.089	79.653
7	.799	4.438	84.091						
8	.769	4.275	88.366						
9	.690	3.832	92.197						
10	.425	2.360	94.557						
11	.303	1.684	96.241						
12	.249	1.385	97.626						
13	.148	.825	98.451						
14	.119	.659	99.109						
15	.050	.275	99.385						
16	.044	.242	99.627						
17	.038	.214	99.841						
18	.029	.159	100.000						

Extraction Method: Principal Component Analysis.

Anti-image Matrices

		PF2	CC2	PP3	ME4	PF3	PF1	CC4	PP5	ME1	Success1	Success3	Success4	Success5	PP2	SI5	SI2	SI3	CC1
Anti-image Covariance	PF2	.077	.000	.000	-.014	-.042	-.072	-.003	.012	.010	-.008	.046	.000	-.031	-.029	-.010	-.040	.007	-.001
	CC2	.000	.086	-.027	.005	.017	-.003	-.078	.038	-.002	.004	-.008	-.004	.012	-.016	.006	-.004	-.021	.009
	PP3	.000	-.027	.372	-.016	.024	.003	.035	-.242	-.002	.016	-.058	.002	-.001	-.108	-.036	.045	.062	-.008
	ME4	-.014	.005	-.016	.069	.010	.012	-.004	.003	-.067	.007	-.024	-.010	.037	-.012	.008	.034	-.017	.020
	PF3	-.042	.017	.024	.010	.613	.011	.013	.042	-.015	.057	-.101	-.024	.056	-.078	.064	.159	-.056	-.144
	PF1	-.072	-.003	.003	.012	.011	.076	.003	-.017	-.007	-.004	-.043	.008	.026	.034	.002	.033	-.003	-.001
	CC4	-.003	-.078	.035	-.004	.013	.003	.083	-.036	-.001	.003	-.002	-.001	-.003	-.009	.000	.030	.014	-.048
	PP5	.012	.038	-.242	.003	.042	-.017	-.036	.469	.002	.012	-.012	-.002	.029	-.104	-.036	-.054	.018	-.069
	ME1	.010	-.002	-.002	-.067	-.015	-.007	-.001	.002	.073	-.013	.026	.011	-.033	.018	-.001	-.047	.008	-.008
	Success1	-.008	.004	.016	.007	.057	-.004	.003	.012	-.013	.103	-.030	-.067	.055	-.044	.003	.036	.001	-.037
	Success3	.046	-.008	-.058	-.024	-.101	-.043	-.002	-.012	.026	-.030	.155	-.003	-.100	.047	.003	-.042	.011	.018
	Success4	.000	-.004	.002	-.010	-.024	.008	-.001	-.002	.011	-.067	-.003	.065	-.053	.024	-.025	-.002	.001	.020
	Success5	-.031	.012	-.001	.037	.056	.026	-.003	.029	-.033	.055	-.100	-.053	.169	-.063	.015	-.018	-.007	-.022
	PP2	-.029	-.016	-.108	-.012	-.078	.034	-.009	-.104	.018	-.044	.047	.024	-.063	.683	.035	-.022	-.054	.139
	SI5	-.010	.006	-.036	.008	.064	.002	.000	-.036	-.001	.003	.003	-.025	.015	.035	.210	-.022	-.167	.008
	SI2	-.040	-.004	.045	.034	.159	.033	.030	-.054	-.047	.036	-.042	-.002	-.018	-.023	-.022	.647	-.057	.015
	SI3	.007	-.021	.062	-.017	-.056	-.003	.014	.018	.008	.001	.011	.001	-.007	-.054	-.167	-.057	.231	-.066
	CC1	-.001	.009	-.008	.020	-.144	-.003	-.048	-.069	-.008	-.037	.018	.020	-.028	.139	.008	.015	-.060	.547
Anti-image Correlation	PF2	.478[a]	.002	.002	-.199	-.192	-.941	-.031	.063	.133	-.071	.418	-.005	-.271	-.126	-.080	-.179	.053	-.005
	CC2	.002	.621[a]	-.151	.070	.076	-.032	-.921	.189	-.020	.042	-.069	-.051	.101	-.061	.043	-.011	-.147	.042
	PP3	.002	-.151	.637[a]	-.100	.050	.019	.200	-.576	-.011	.083	-.240	.012	-.004	-.209	-.128	.093	.213	-.011
	ME4	-.199	.070	-.100	.499[a]	.047	.167	-.047	.014	-.944	.081	-.239	-.153	.344	-.057	.070	.163	-.133	.101
	PF3	-.192	.076	.050	.047	.479[a]	.052	.056	.077	-.072	.228	-.326	-.118	.175	-.121	.178	.252	-.150	-.249
	PF1	-.941	-.032	.019	.167	.052	.508[a]	.041	-.088	-.090	-.043	-.393	.115	.233	.150	.019	.148	-.020	-.019
	CC4	-.031	-.921	.200	-.047	.056	.041	.605[a]	-.191	-.006	.031	-.017	-.018	-.024	-.039	-.002	.129	.095	-.224
	PP5	.063	.189	-.576	.014	.077	-.088	-.191	.568[a]	.012	.055	-.043	-.014	.104	-.183	-.114	-.098	.053	-.129
	ME1	.131	-.020	-.011	-.944	-.072	-.090	-.006	.012	.505[a]	-.146	.247	.159	-.299	.082	-.009	-.216	.058	-.041
	Success1	-.071	.042	.083	.081	.228	-.043	.031	.055	-.146	.701[a]	-.241	-.823	.416	-.166	.022	.140	.007	-.154
	Success3	.418	-.069	-.240	-.235	-.326	-.393	-.017	-.043	.247	-.241	.677[a]	-.025	-.616	.144	.019	-.131	.056	.062
	Success4	-.005	-.051	.012	-.153	-.118	.115	-.018	-.014	.159	-.823	-.025	.731[a]	-.506	.113	-.213	-.009	.012	.106
	Success5	-.271	.101	-.004	.344	.175	.233	-.024	.104	-.299	.416	-.616	-.506	.627[a]	-.187	.079	-.054	-.035	-.092
	PP2	-.126	-.067	-.209	-.057	-.121	.150	-.039	-.183	.082	-.166	.144	.113	-.187	.638[a]	.093	-.039	-.137	.221
	SI5	-.080	.043	-.128	.070	.178	.019	-.002	-.114	-.009	.022	.019	-.213	.079	.093	.730[a]	-.059	-.761	.022
	SI2	-.179	-.017	.093	.163	.252	.148	.129	-.098	-.216	.140	-.131	-.009	-.054	-.039	-.059	.621[a]	-.147	.025
	SI3	.053	-.147	.213	-.132	-.150	-.020	.099	.053	.058	.007	.056	.012	-.035	-.137	-.761	-.147	.679[a]	-.176
	CC1	-.005	.042	-.011	.101	-.249	-.019	-.224	-.129	-.041	-.154	.062	.106	-.092	.221	.022	.025	-.176	.803[a]

Success

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.928	.928	4

Contractor capacity

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.846	.849	3

Project funding

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.805	.796	3

Monitoring and evaluation

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.977	.977	2

Stakeholder involvement

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.739	.718	3

Project planning

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.715	.717	3

APPENDIX 4

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.603	3	6.534	3.807	.012[b]
	Residual	190.509	111	1.716		
	Total	210.112	114			
2	Regression	90.332	8	11.291	9.992	.000[c]
	Residual	119.780	106	1.130		
	Total	210.112	114			

a. Dependent Variable: Success

b. Predictors: (Constant), Qualifications, Age, Gender

c. Predictors: (Constant), Qualifications, Age, Gender, Capacity, Stakeholder,

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					Change	F Change	df1	df2	Change	
1	.305[a]	.093	.069	1.31007	.093	3.807	3	111	.012	
2	.656[b]	.430	.387	1.06302	.337	12.518	5	106	.000	1.523

a. Predictors: (Constant), Qualifications, Age, Gender

b. Predictors: (Constant), Qualifications, Age, Gender, Capacity, Stakeholder, Funding, Evaluation, Planning

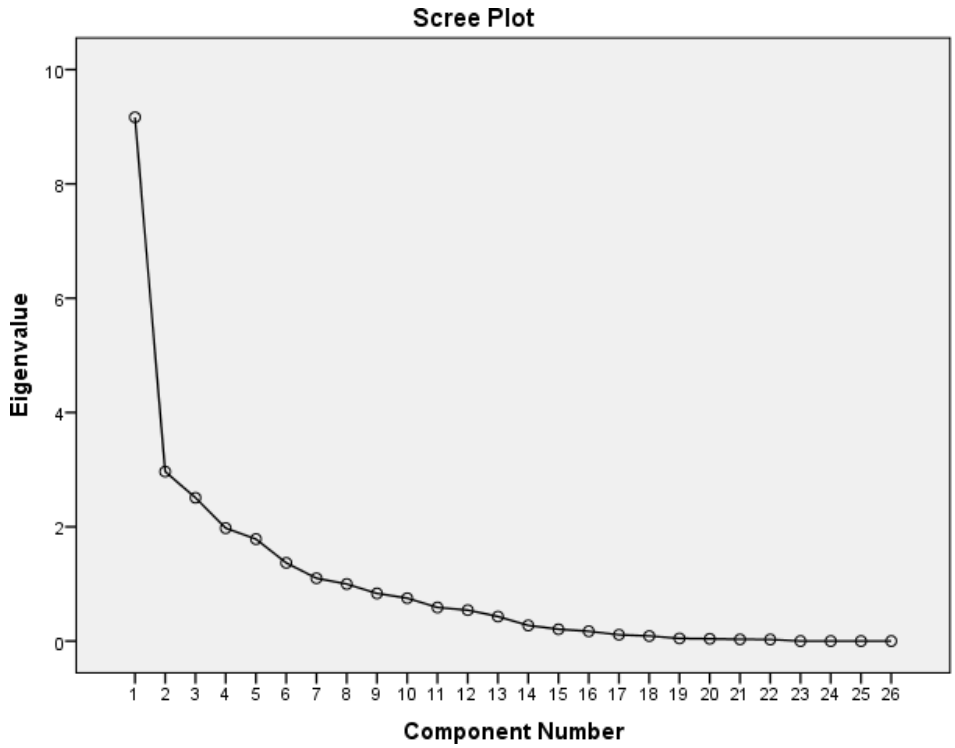
c. Dependent Variable: Success

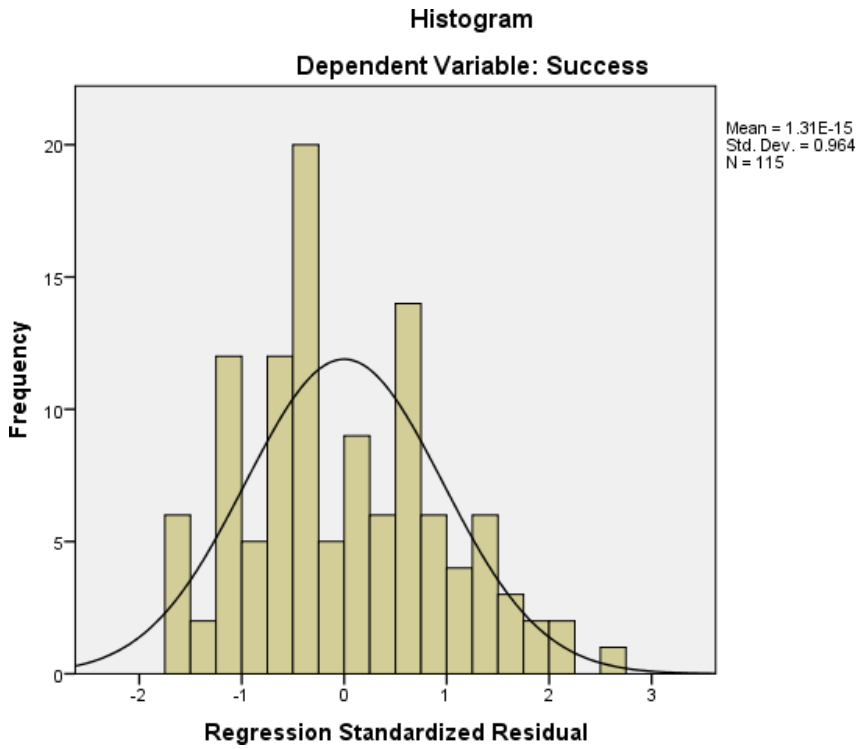
Coefficients[a]

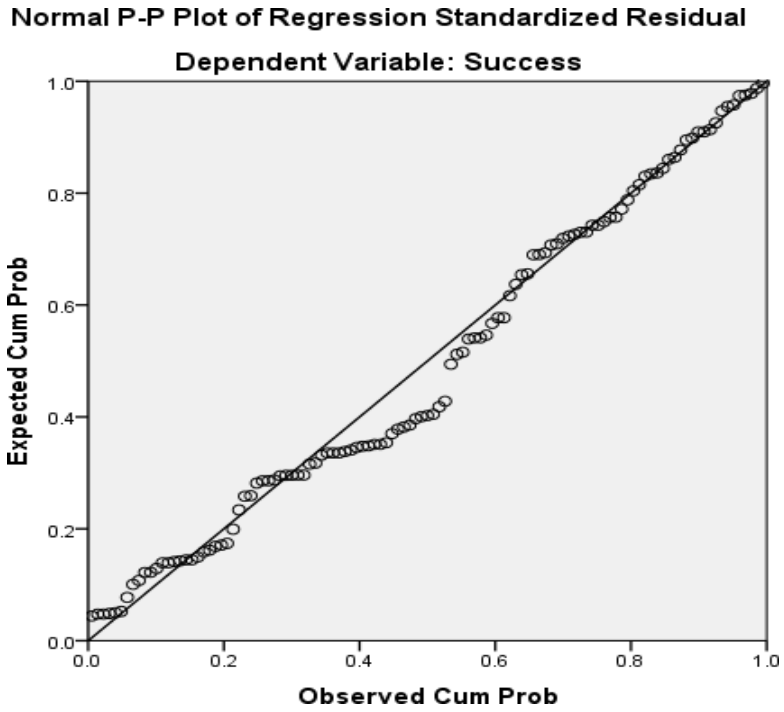
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.869	.528		9.221	.000	3.822	5.915					
	Gender	.144	.259	.052	.558	.578	-.369	.658	.012	.053	.050	.950	1.052
	Age	-.240	.130	-.168	-1.847	.067	-.497	.017	-.196	-.173	-.167	.983	1.018
	Qualifications	-.321	.124	-.241	-2.590	.011	-.567	-.075	-.248	-.239	-.234	.944	1.059
2	(Constant)	2.577	.616		4.184	.000	1.356	3.797					
	Gender	.427	.236	.153	1.807	.074	-.041	.895	.012	.173	.133	.752	1.330
	Age	-.289	.107	-.203	-2.690	.008	-.502	-.076	-.196	-.253	-.197	.945	1.058
	Qualifications	-.379	.102	-.284	-3.698	.000	-.582	-.176	-.248	-.338	-.271	.911	1.098
	Capacity	.198	.095	.163	2.092	.039	.010	.386	.256	.199	.153	.887	1.127
	Funding	-.003	.103	-.002	-.031	.976	-.208	.202	.009	-.003	-.002	.877	1.140
	Evaluation	.020	.090	.018	.219	.827	-.159	.198	.108	.021	.016	.821	1.218
	Stakeholder	.578	.095	.466	6.092	.000	.390	.766	.458	.509	.447	.917	1.090
	Planning	.326	.114	.235	2.846	.005	.099	.553	.258	.266	.209	.786	1.272

a. Dependent Variable: Success

APENDIX 5


Scree Plot
Eigenvalue
Component Number
0
2
4
6
8
10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26


Histogram
Dependent Variable: Success
Mean = 1.31E-15
Std. Dev. = 0.964
N = 115
Frequency
Regression Standardized Residual
0
5
10
15
20
-2 -1 0 1 2 3


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Success
Expected Cum Prob
Observed Cum Prob
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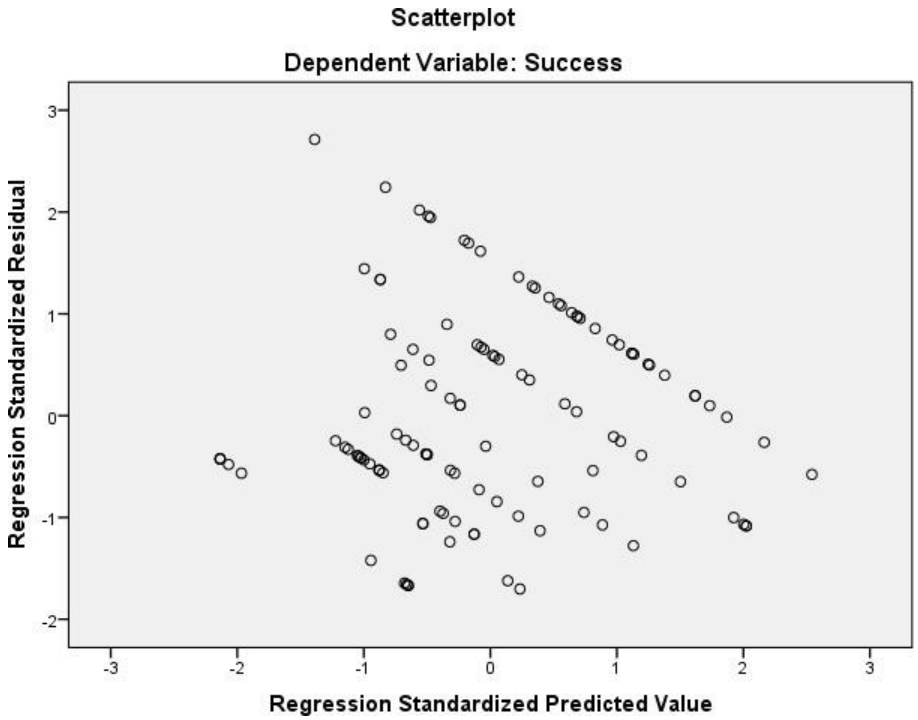
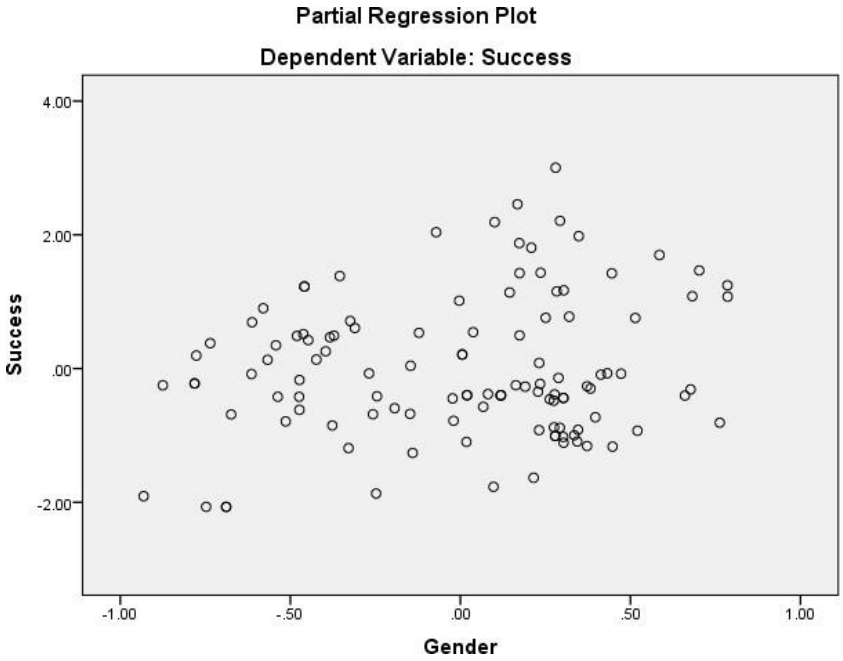
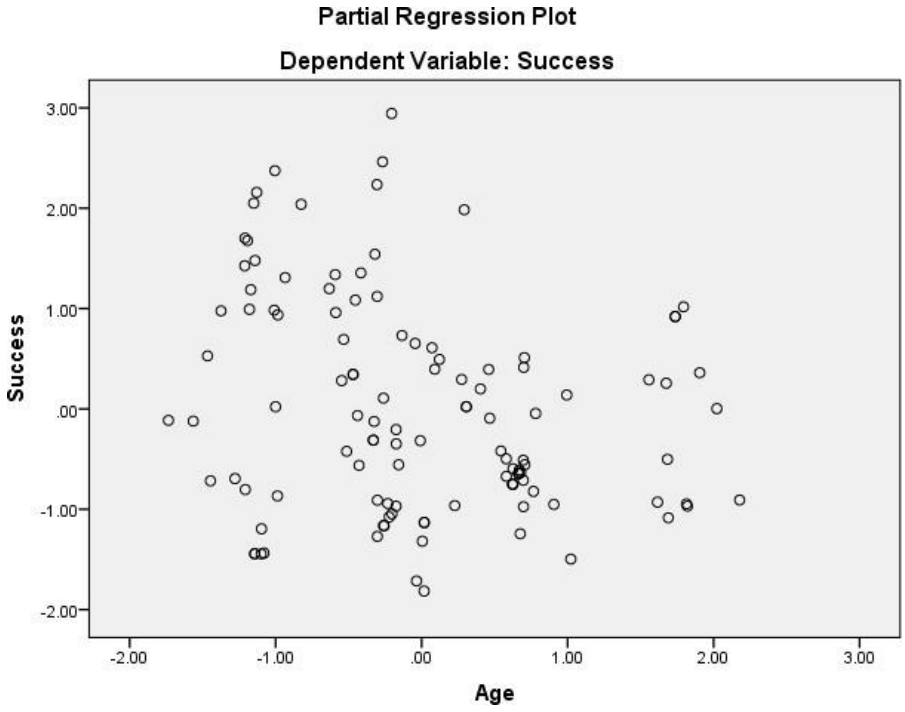
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: Success
Regression Standardized Residual
Regression Standardized Predicted Value
-3
-2
-1
0
1
2
3


Partial Regression Plot
Dependent Variable: Success
Success
Gender
4.00
2.00
.00
-2.00
-1.00
-.50
.00
.50
1.00


Partial Regression Plot
Dependent Variable: Success
Success
Age
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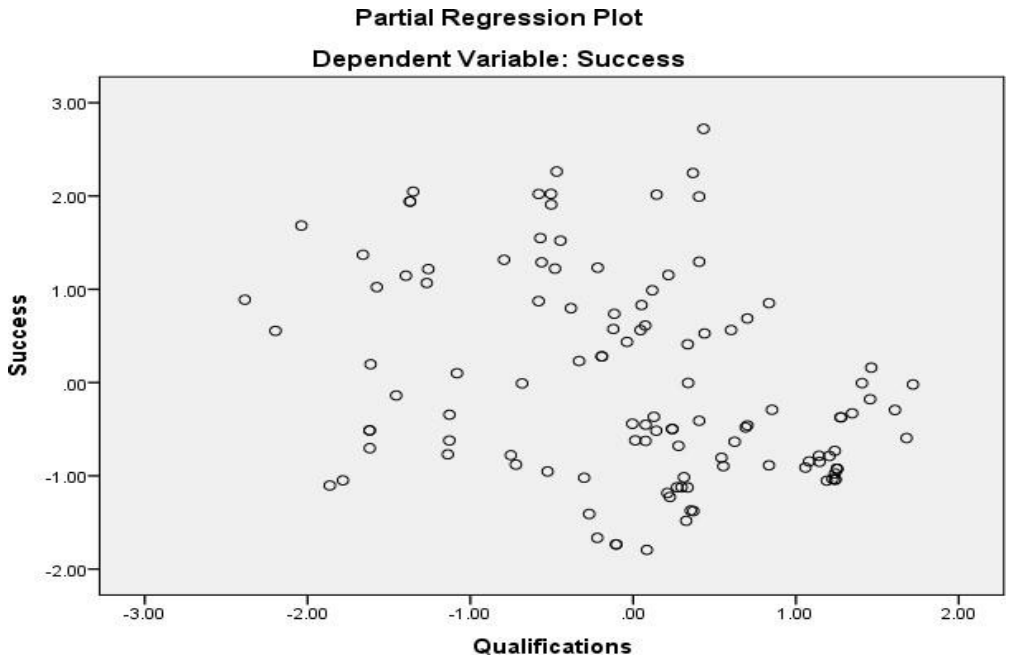
2.00
1.00
.00
-1.00
-2.00
-2.00
-1.00
.00
1.00
2.00
3.00


Partial Regression Plot
Dependent Variable: Success
Success
Qualifications
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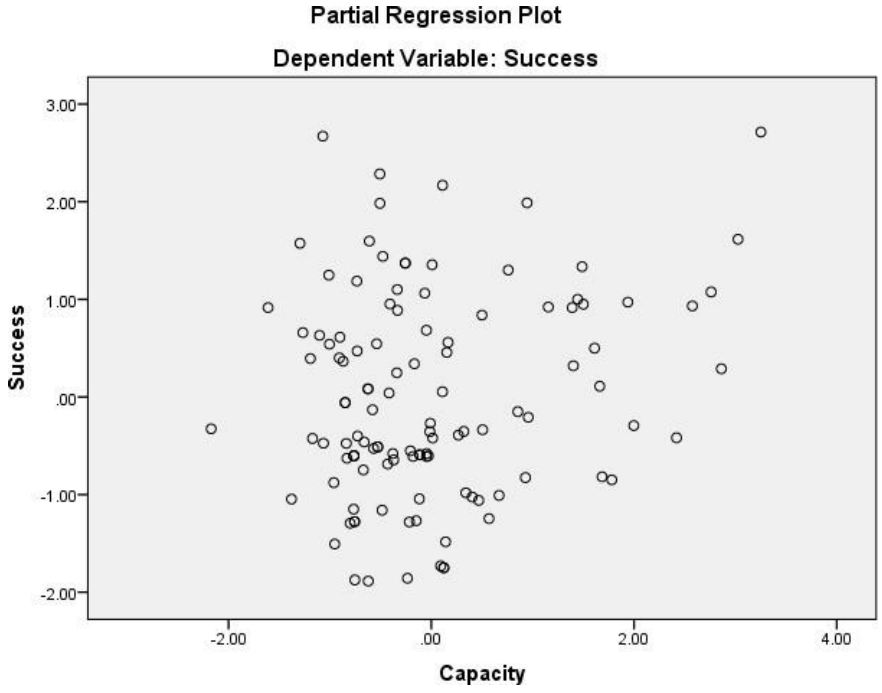
1.00
.00
-1.00
-2.00
-3.00
-2.00
-1.00
.00
1.00
2.00


Partial Regression Plot
Dependent Variable: Success
Success
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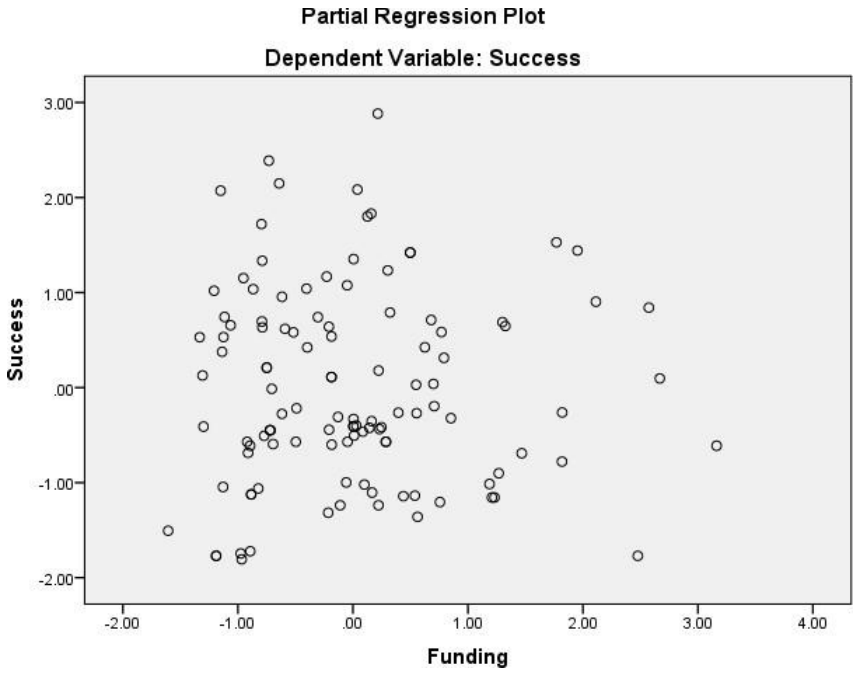
2.00
4.00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Success
Funding
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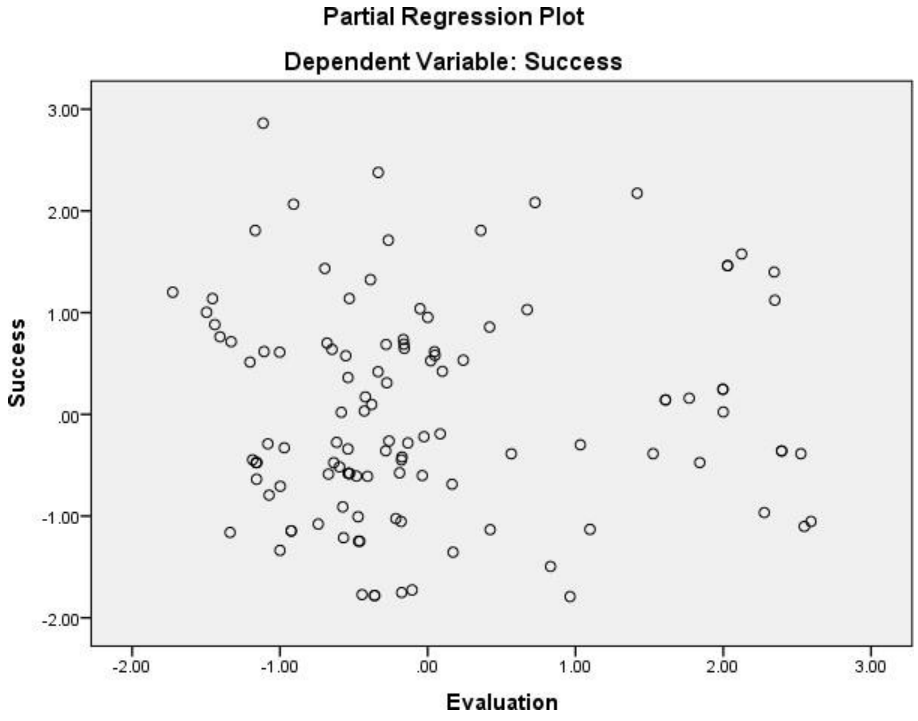
1.00
2.00
3.00
4.00


Partial Regression Plot
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Success
Evaluation
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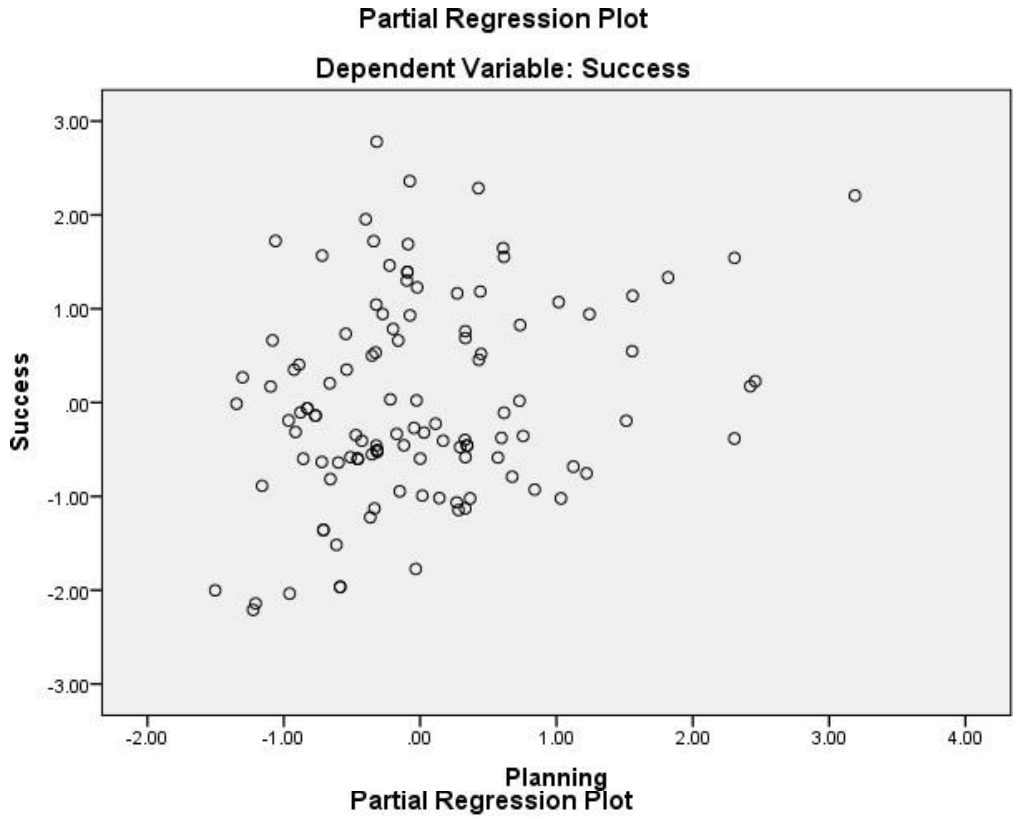
1.00
2.00
3.00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Dependent Variable: Success
Success
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.00
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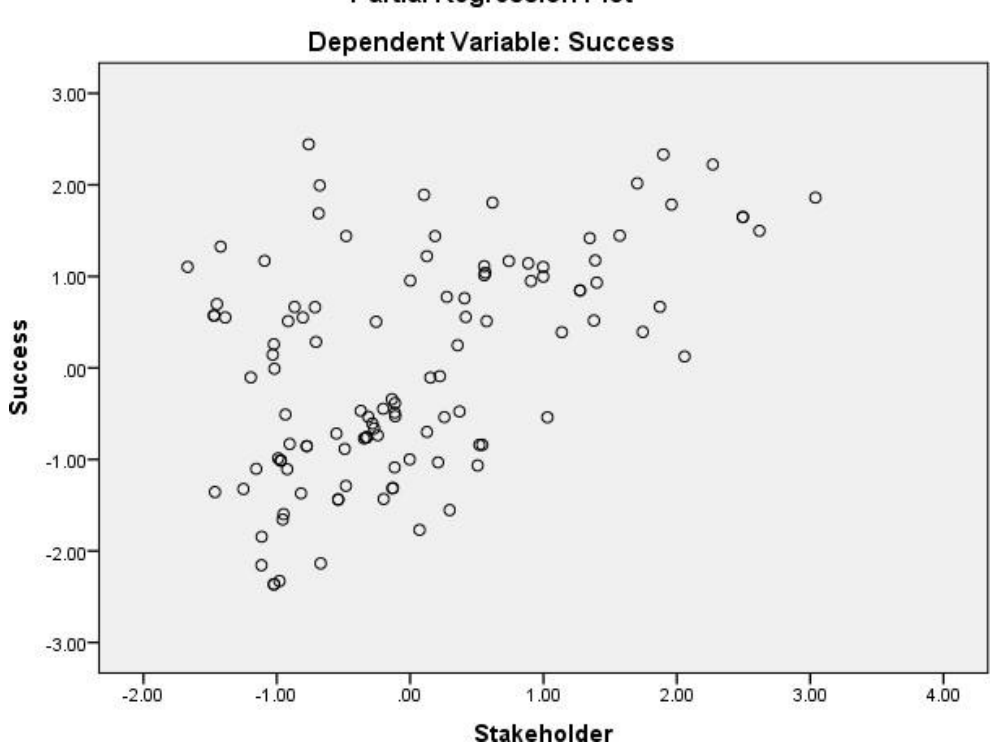
1.00
2.00
3.00
4.00
Planning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Dependent Variable: Success
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.00
-1.00
-2.00
-3.00
-2.00
-1.00
.00
1.00
2.00
3.00
4.00
Stakeholder