School of Postgraduate Studies

RESEARCH DISSERTATION

TITLE: UNDERSTANDING HOW CONSTRUCTION INDUSTRY GROWTH INFLUENCES THE QUALITY OF ENGINEERING SERVICES IN ZAMBIA.

BY

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A DISSERTATION PRESENTED

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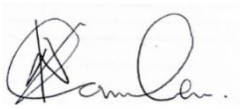
MASTER OF SCIENCE IN PROJECT MANAGEMENT

DECLARATION

I, do hereby declare that this dissertation is my original work and has not been submitted for a degree in any other university. Where other people's work or my own work has been used, this has been properly acknowledged and referenced in accordance with the University's requirements.



Signed: _____ **Date**: 27th June, 2025.

Supervised by: DR. Ethel Tembo-Mwanaumo

Signed: 

Date: 30th June, 2025

DEDICATION

Firstly, I dedicate this Research to my father, Mr Maybin Mwansa Kombe, for being the blueprint and for setting the example for those that came after him. Secondly, to all my beloved family and friends, whose unwavering support and encouragement have been my strength throughout this academic journey.

Lastly, to the passionate individuals and organisations working tirelessly to grow and improve the standard of Zambian engineering.

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ABSTRACT

Among other organizations, the National Council for Construction, NCC, is one of the main organizations governing the engineering sector in Zambia. Some of their duties include, the registration of all construction companies operating in Zambia, monitoring of projects, enforcement of regulations and training of technical personnel. The rapid growth occurring in the engineering sector has introduced a number of concerns in the quality of work being executed in Zambia; abandoned projects, increased reworks and repairs, structural flaws and other key quality issues. This study intended to understand how the construction industry growth influences the quality of engineering services in Zambia. Hence, the objectives of this study included, to explore how the registration of construction companies with NCC influences the quality of engineering services in Zambia, to understand the role of governing bodies in enforcing compliance and to explore the adequacy of Continuous Professional Development, CPD, by NCC. The study utilized the Qualitative approach to understand the reasons behind the problem. To do this, a historical design had to be used to provide quality information to the study. Data collection was done using semi-structured interview guides. Purposive sampling was used to select the participants. The study found that the current registration process has not been very efficient. New entry companies have flooded the sector and have not been thoroughly processed before confirmation. The rapid increase of companies and increased number of national projects has been overwhelming for the existing NCC systems and resources. This has hindered many compliance enforcement activities, as well as the expansion of CPD programs. The findings indicate that, construction companies are underbidding for projects, compromising on quality of labour and material being used, and simply avoiding complying with regulations. The study recommended that the NCC systems need to be upgraded, with new regulations and modern technology. It was further recommended that the NCC requires an increase of manpower, transportation modalities, finances and other resources. The study provided understanding of quality regulations and filled the knowledge gap associated with the effects of industry growth on quality.

Key Words: *Company Registration, Sector growth, Regulation Compliance, skills training, Construction*

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ACRONYMS

NCC	National council for Construction
GRZ	Government of the Republic of Zambia
EIZ	Engineering Institute of Zambia
CPD	Continuous Professional Development
USD	United States Dollar
GDP	Gross Domestic Product
ZIPAR	Zambia Institute for Policy Analysis and Research
MHID	Ministry of Housing and Infrastructure Development
ACEZ	Association of Consulting Engineers of Zambia
RDA	Road Development Agency
QSRB	Quantity Surveyors Registration Board
ZIA	Zambia Institute of Architects
ZBC	Zambia Building Code
SME	Small and Media Enterprises
MCM	Mopani Copper Mines
KCM	Konkola Copper Mines
NFCA	Non-Ferrous Company Africa
ZCCM	Zambia Consolidated Copper Mines
CIDB	Construction Industry Development Board
SON	Standard Organisation of Nigeria
COREN	Council for the Regulation of Engineering in Nigeria
CBIC	Brazilian Chamber for the Construction Industry
NBRB	National building Review Board
UNBS	Uganda National Bureau of Standards
ZNBC	Zambia National Broadcasting Corporation
IEI	Institute of Engineers India
CIDC	Construction Industry Development Council

AICTE	All India Council for Technical Education
NSDC	National Skill Development Corporation
EBK	Engineers Board of Kenya
NCA	National Council Authority
KIHBT	Kenya Institute of Highways and Building Technology
ICEO	Iranian Construction Engineering Organisation
MRUD	Ministry of Roads and Urban Development
CIF	Construction Industries Federation of Namibia
NSI	Namibia Standards Institution
ZCM	Zambia Chamber of Mines
NCCS	National Council for Construction School

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

The construction industry has been established as a critical sector at global level, within the African region and locally, in Zambia. The engineering industry plays a vital role in shaping economic development, supporting innovation, and facilitating infrastructure growth. It serves as a backbone for sectors such as energy, transport, mining, and manufacturing—creating value across both industrialized and developing economies (Grand View Research, 2024). Engineering services now contribute significantly to Gross Domestic Product (GDP) and employment in both advanced and developing economies (Fortune Business Insights, 2024).

According to Mwanaumo (2013), who referenced Murie (2007), the construction business is generating roughly three trillion USD per annum, which is 10% of the world's GDP (Murie, 2007.). According to Price Waterhouse Coopers (PwC), the construction industry would account for 13% of the global GDP by the end of this decade. These statistics provide the significance of the construction industry in the global market and its economic contribution.

Globally, the demand for engineering services is rising due to rapid technological advancements, and increased investment in smart and sustainable infrastructure (Fact.MR, 2024). At the same time, the integration of digital technologies such as artificial intelligence (AI) and green engineering practices is transforming how engineering solutions are delivered (Fortune Business Insights, 2024). These transformations not only increase efficiency but also raise expectations around quality and compliance.

Across Africa, the engineering industry is expanding rapidly in response to the continent’s infrastructure deficit, energy needs, and regional integration initiatives like Agenda 2063 (African Union, n.d.). Africa's engineering industry is shaped by the continent’s developmental agenda, particularly its push for industrialization and infrastructure development. Projects across Africa such as new highways, ports, energy plants, and urban developments are fueling demand for engineering services. Given that Africa is the new business dawn, there is an abundance of space for growth,

which has piqued the interest of investors seeking fresh prospects and space for company expansion (Oxford Business Group, 2016).

However, this expansion has been highlighted with systemic and quality issues, including inadequate regulatory frameworks, lack of supervision, skills shortages, and a growing reliance on foreign consultants for large-scale or specialized projects (AP News, 2023; Globe Newswire, 2025). This research covers how this growth that is taking place in the construction industry is influencing the quality of work being done within the sector.

In Zambia, engineering industry growth is closely tied to various construction projects, mining activities, and energy diversification. Government and private sector investments in roads, bridges, solar power stations, and housing have significantly increased demand for engineering services (Wikipedia, n.d.; Reuters, 2025). Public–private partnerships (PPPs) are helping finance key infrastructure, such as the Ndola–Mufulira road and the Mutanda–Kasempa–Kaoma highway, reinforcing Zambia's strategic goal of becoming a regional transport and trade hub (Wikipedia, n.d.).

The energy sector is also a major growth driver. Faced with climate-related power shortages, Zambia has begun transitioning from hydroelectric power toward solar projects, such as the 100 MW Chisamba Solar Power Plant and the 60 MW Itimpi Solar Power Station (Reuters, 2025). These developments require specialized engineering knowledge, regulatory oversight, and high-quality design and implementation standards.

Despite the economic and developmental benefits of this growth, concerns about the quality of engineering services in Zambia are rising. The major contributing factor is coming from the overstretching of Regulatory Bodies. Rapid growth has outpaced the capacity of governing institutions such as the Engineering Institution of Zambia (EIZ) and the National Council for Construction (NCC) to enforce quality standards, monitor compliance, and regulate a growing number of firms and practitioners (Reddit, 2025; Wikipedia, n.d.)

Chapter one of this research provides a general introduction of this study. Highlighting the global significance of the construction industry, the background of the study, the scope, the research questions and the objectives that are to be achieved through this study.

1.2 The Background of the Study

1.2.1 Construction in Zambia

As the nation of Zambia began to grow post-independence, a need arose for infrastructure development. In an article on Zambia's development post-independence by Obisie-Orlu and Mbanyele (2021), one of President Kaunda, Zambia's first republican President's, agendas were to advance national development through the revenues from the mining sector. "*Through Kaunda's ideology, the state-built Power stations, housing projects, schools, hospitals and other public infrastructure" (*Obisie-Orlu & Mbanyele, 2021). To fulfil these goals there was a demand for Registered Engineering Companies, Contractors, to carry out these works. More Engineers and technicians working in the public sector or for Zambia Consolidated Copper mines (ZCCM) in the private sector, left their respective jobs to open their own firms. Companies such as Powerflex, Meltcast Engineering and Stalwart are all purely Zambian companies that birthed out of this cause. This demand for development by the Head of State initiated the need for Contractors.

The construction industry in Zambia has seen significant growth in recent years. This is due to urbanization, population expansion, and government-led infrastructure development initiatives like the National Development Plan 2023–2026 (GRZ, 2023). This growth has resulted in a notable increase in registered construction companies, with the National Council for Construction (NCC) reporting a 45% rise in licensed firms between 2015 and 2022 (NCC, 2022). While this expansion indicates economic advancement and job opportunities, it has raised concerns regarding its impact on the quality of engineering outputs in Zambia's built environment.

The increase in construction firms has heightened market competition. This has led to cost-cutting practices, compromising material standards, technical oversight, and lack of adherence to safety regulations (Chitongo, 2021). Reports of structural defects in residential and public infrastructure in Lusaka and Copperbelt provinces, such as the reported defects in the construction of the Zambia - Congo Pedicle Road, have been linked to inadequate supervision and the use of unskilled labor (Times of Zambia, 2019; EIZ, 2020). The weak enforcement of the Zambia Building Code and fragmented regulatory oversight

exacerbate these risks, allowing substandard practices to persist (Mulenga & Tembo, 2018). This could be attributed to the rate at which construction companies are registered without thorough scrutiny of their capabilities, resulting in an increased number of unqualified contractors.

1.2.2 Socio Economic Significance

Zambia's construction industry accounts for 8–10% of its gross domestic product (GDP), and national objectives such as Vision 2030 and the National Development Plan 2023–2026 prioritize infrastructure development (GRZ, 2023; World Bank, 2020). Through the economic contribution of the construction industry large-scale initiatives have been carried out (NCC, 2024), this includes the following.

- urban housing projects
- hydroelectric facilities such as the Kafue Gorge Lower Dam
- Various road networks including the Lusaka-Ndola Dual Carriageway

In addition to these major projects, the construction sector in Zambia plays a critical role in employment creation and skills development, absorbing a significant share of both skilled and unskilled labor (ZamStats, 2022). The industry also stimulates demand for locally produced materials such as cement, steel, and aggregates, thereby linking it closely to the manufacturing and mining sectors (Chilufya & Tembo, 2021). The Construction industry is not only contributing to the national GDP but transforming the lives of members of communities through employment.

However, the rapid expansion of construction activities has also heightened competition among firms, with many new entrants equally striving to secure contracts. This has raised concerns about sustainability, quality assurance, and regulatory oversight.

1.2.3 Statutory Framework

A regulatory tool used in Zambia to guarantee compliance with quality standards, technical proficiency, and legal requirements in the construction industry is the registration of construction firms. Registration, which is governed by the NCC, by NCC Act No. 13 of 2003, acts as a gatekeeping procedure to formally

acknowledge industry involvement, reduce risks, and improve responsibility. Other bodies include Engineering institute of Zambia (EIZ).

The overarching governance authority for infrastructure development and Construction services is the responsibility of the Ministry of Housing and Infrastructure Development (MHID). It was established in September 2016 to oversee all public infrastructure design, acquisition, and construction. Architecture, aviation infrastructure, building and construction industry policy, and education infrastructure are just a few of the many tasks it oversees. Other statutory bodies that are controlling and guiding the industry include, the Association of Consulting Engineers of Zambia (ACEZ), EIZ, NCC, National Housing Authority, Road Development Agency (RDA), Quantity Surveyors Registration Board (QSRB), and Zambia Institute of Architects (ZIA) Ministry of infrastructure (2022).

The NCC Act No. 13 of 2003 mandates that all construction companies operating in Zambia must register with the NCC. In addition, registered firms must comply with the Zambia building Code (ZBC), which outlines technical standards for materials, design, and safety (Mulenga & Tembo, 2018).

In Zambian, construction firms are graded based on their capacity to deliver, which is determined by factors such as their previous contracts, access to credit, the number of professional and technical staff, financial position, and state of technology. The grading system is numeric, ranging from 1 as the highest grade attainable to 6 as the lowest. According to a 2017 survey by NCC and Zambia Institute for Policy Analysis and Research (ZIPAR), most construction firms in Zambia (87.9%) were registered in the lower grades (4–6), while the higher grades (1–3) accounted for about 12.1%. This pattern is supported by the registration data from NCC in 2018. Firms in the lower grades typically handle contracts with lower contract values, while higher-grade firms handle contracts with higher value. The lower grade companies do have the provision to progress to higher grades as their experience and services increase.

It is therefore important that an assessment be undertaken to evaluate the effects of the increase in registration of construction companies and how training and Continuous Professional Development (CPD) programs affects the quality of the workmanship by contractors, specifically in NCC, category B, grades 1 to 3. This

category was targeted since they specialize in higher contract thresholds as categorized by NCC and depicted in table 1.1 (NCC, 2025).

Table 1.1: NCC Contract Value Classification

Classification Grade	1	2	3	4	5	6
Limitation on Contract value to be Tendered – Category B	>K55m	>K25m-K55m	>K13m-K25m	>K4m-K13m	>K4m-K9m	>K0.0m-K4.0m
Limitation on Contract value to be Tendered – Category C	>K60m	>K30m-K60m	>K20m-K30m	>K13m-K20m	>K4m-K13m	>K0.0m-K4.0m

The purposes of registration to regulatory bodies are as follows.

- **Quality Assurance:** Ensures firms possess the expertise to deliver projects safely and sustainably (EIZ, 2020).
- **Market Formalisation:** Reduces the proliferation of unqualified "briefcase contractors" (Chitongo, 2021).
- **Local Empowerment:** Prioritizes Zambian-owned firms in small-to-medium projects (NCC, 2022)
- **Accountability:** Enables tracking of firms for dispute resolution and blacklisting for malpractice (GRZ, 2023).
- **Mandatory according to Public Procurement Act:** Requires registration for eligibility to bid on government-funded projects (GRZ, 2023).

1.3 Statement of the problem

Urbanization, government infrastructure initiatives, and economic liberalization have all contributed to Zambia's fast growth of registered construction companies

(NCC, 2022; GRZ, 2023). Although the sector's expansion indicates job creation and economic development, it has also been accompanied by repeated reports of structural breakdowns, poor quality materials, and a lack of adherence to safety regulations (EIZ, 2020; Times of Zambia, 2019). This has sparked concerns about how it may affect the calibre of engineering outputs in the nation. This has raised a concern on the strength and effectiveness of regulatory and governing bodies such as NCC and EIZ.

The proliferation of firms has intensified market competition, incentivizing cost-cutting measures such as the use of unskilled labour, non-compliant materials, and rushed project timelines (Chitongo, 2021). Small and medium-sized enterprises (SMEs), which constitute 65% of registered companies, often lack the technical expertise or financial capacity to meet the Zambia Building Code standards, particularly in rural areas where regulatory enforcement is weakest (Cheelo et al., 2022). Though NCC has established a training centre in Lusaka, the attendance by Contractors and new companies is very low. According to NCC: *skills bulletin (2022*), only 38 members underwent skills training, from the Copperbelt and North-western Province combined. This indicates that majority of contractors and managers do not undergo any form of continuous training for their staff to apply in projects.

Solomon and Barrack (2015) claim that the building and construction industry is unable to consistently meet the needs of its clients, due to the lack of adherence to regulations. This has created a problem to the construction industry. Therefore, new tactics and techniques must be used by governing bodies, such as NCC, to monitor the expansion of the construction industry and improve engineering services in Zambia.

This study, therefore, explored how quality of engineering in Zambia is being influenced by the expansion of the engineering sector.

1.4 Research Objectives

This study is guided by the following objectives.

1.4.1 General objective

To understand how the construction industry growth influences the quality of engineering services in Zambia.

1.4.2 Specific Research Objectives

The following specific research objectives guided this study.

i. To explore how the registration of construction companies with NCC influences the quality of Engineering services in Zambia.
ii. To understand the role of governing bodies in enforcing compliance amid sector growth.
iii. To explore the adequacy of training and continuous professional development (CPD) programs for engineers and contractors in Zambia.

1.5 Research Questions

i. How does the registration process of Construction companies with NCC influence the quality of engineering services in Zambia?
ii. What is preventing effective compliance enforcement by NCC?
iii. What is preventing effective CPD programs for engineers and contractors in Zambia?

1.6 Significance of the study

The study results offer practical solutions to designing guidelines and policies for the registration of new Companies. This will protect shareholders' interests within the construction industry. The study has identified gaps in the enforcement of regulations and provided insights on how policymakers and regulatory bodies can monitor development in the construction industry. The research results will contribute to academia by providing empirical evidence and serve as valuable future reference material.

Given the increasing demand for infrastructure within the country, this study is expected to be critical for the safety of stakeholders. The study will ensure that the safety of lives in our communities is prioritised through quality work. It is anticipated that the study will help in identifying the regulatory gaps in the implementation of the mandate of Engineering bodies within the construction industry. This study will encourage various company owners and managers to participate in engineering skill training programs and workshops essential for the management of construction firms and projects by NCC. Above all, it will improve the standard and reputation of engineering practiced in Zambia.

1.7 Scope of the study

The study was conducted and focused only on the Copperbelt province in Zambia. Due to the magnitude of mining industry on the Copperbelt, there is a high population of Contractors in the province. According to NCC 2022/2023 report, the Copperbelt has one of the highest number of Contractors in Zambia (NCC, 2023). Therefore, this provided the appropriate environment for the study.

The Copperbelt Province is the home of two of Zambia's main Mines; Mopani Copper Mines (MCM) and Konkola Copper mines (KCM). In addition to these are, Luanshya mine, Lubambe mine, Bwana Mukubwa mine, NFCA, Mimbula and most recently added is Kobold Mine. This portrays the amount of engineering projects taking place as well as Contractors available within the province.

1.8 Layout of the study

There are six chapters in the paper.

- **Chapter One:** The study's background, statement of the problem, scope, key research questions, definitions of terminology, goals and significance, are all included in the first chapter.
- **Chapter Two:** The second chapter looks at the Literature review, which displays related literature and identifies the knowledge gap. The conceptual foundation of the study field is also covered, showing the graphical image of variables.
- **Chapter Three**: The third chapter provides a detailed description and discussion of the research Methodology. The Approach and design taken, population sizes, data sources, data collection methods, data analysis techniques, data collection tools' validity and reliability, and ethical considerations are also included.
- **Chapter Four**: The Fourth chapter covers the presentation and analysis of results. It provides interpretation and in-depth analysis of the findings through themes and codes, in relation to the objectives of the research.
- **Chapter Five**: Discussion of Findings. This chapter discusses and interprets the significance of our findings considering what was already known about the research problem. In addition, it explains new insights relating to the problem.

- **Chapter Six**: Conclusion and Recommendations. These are based on themes and discussions from the earlier chapters.

1.9 Chapter Summary

Chapter one of the Research presented the introduction of the study. It provided the current global impact of the engineering industry, the background information of the study, sharing the history of construction in Zambia, the growth that has taken place and what led to the birthing of Contractors in the Engineering sector. The chapter outlined the research problem, research objectives, scope of the study and its significance to academia. The chapter concluded with defining key terms and the general outline of the dissertation.

1.10 Operational definition

- **Quality:** Quality entails "conformance to technical specifications, safety standards, and durability requirements" (Deming, 1986).
- **Construction firms:** These are defined as firms that undertake building and engineering works related to housing, roads, rail, ports and related physical infrastructure (National Construction Council, 2003)
- **Registration requirements:** Refers to actions taken by Regulatory bodies to ensure discipline, ethics, and compliance to policies and laws by contractors in the construction industry (Otido &Omwenga, 2019).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter various literature relating to the study was reviewed. The review is organized into three primary sections: the empirical literature review, theoretical review and the conceptual framework. The empirical review section looks at supporting studies on the subject, from different corners of the globe, including Zambia. The theoretical review section addresses pertinent theories that support the investigation, while the conceptual framework provides a graphic depiction of the links between the study's important variables.

2.2 Empirical Literature Review

Unlike a theoretical literature review, which focuses on ideas and theories, an Empirical Literature review summarises verifiable data. The Empirical literature review will critically evaluate the results of studies that have been done on the subjects related to this study.

This section of the study looks at the studies done globally, in Africa and Zambia.

2.2.1 The influence of sector growth on quality

2.2.1.1 Global Perspective

Globally, the economic position of the nation influences the thriving of the construction industry. For instance, as of September 2023, the Malaysian construction sector launched 9,144 projects. The Projects represent USD13.21 billion for private initiatives and USD 17.61 billion for government projects. 91% of the projects were entirely handled by local contractors (Mordor Intelligence, 2025). This demonstrates the growth of the Malaysian Construction industry. As a result of this growth in projects and companies, a need therefore arises for improved quality controls to ensure that all projects are executed without flaws.

The construction sector in Malaysia has experienced a notable expansion, marked by an influx of new firms entering the industry. According to the Construction Industry Development Board (CIDB) Malaysia (2020), the number of registered contractors has seen a significant rise. This has been driven by government initiatives aimed at supporting small and medium-sized enterprises

(SMEs) in the sector. However, studies indicate that this growth could potentially impact construction quality due to challenges such as inadequate experience, poor regulatory compliance, and insufficient quality control measures (Abdul-Rahman et al., 2017). A study conducted by Hamzah et al. (2019) revealed that a considerable percentage of newly registered construction firms lacked technical expertise and heavily relied on subcontractors, leading to a rise in structural defects in residential and commercial buildings. This therefore reveals that, while competition has heightened, it has also led to cost-cutting measures that compromise material quality and workmanship standards.

The problem of structural defects in Malaysian construction projects has been extensively documented. According to Ali and Wen (2021), an empirical analysis of defect reports filed with CIDB revealed that nearly 35% of construction projects between 2015 and 2020 experienced structural issues, including cracks, foundation failures, and improper reinforcement. The study attributed these defects to a lack of qualified professionals in newly established companies and poor supervision during construction phases. Similarly, Ismail et al. (2018) investigated defect patterns in residential projects and discovered that smaller, less experienced contractors were more likely to deliver substandard buildings. Their study concluded that firms with less than five years of operational experience were responsible for over 60% of reported construction defects, indicating a direct correlation between inexperienced contractors and the prevalence of quality issues. Industry growth has been negatively accompanied by substandard workmanship. The competition arising for the growth of the construction sector has led to more negative effects on quality than positive.

2.2.1.2 African Perspective

In Nigeria, the Standard Organization of Nigeria (SON) and Council for the Regulation of Engineering in Nigeria (COREN) are part of the regulatory organizations in the country, but they are not very effective in enforcing quality control procedures. According to Olawuyi and Fagbenle (2019), the growing number of registered contractors has overburdened regulatory bodies, making it challenging to efficiently monitor compliance. The numerous building code violations were responsible for over half of building failures in Nigeria between 2010 and 2019.

Furthermore, Oluwaseun et al. (2022) revealed that a lack of proper oversight and corruption in the licensing process caused many recently registered construction companies to violate the National Building Code (NBC). According to their research, contractors frequently put cost reductions ahead of quality, which compromises the structural integrity of the building. The quality of engineering services conducted in Nigeria, has therefore been compromised due to an inadequate registration process by COREN.

2.2.1.3 Local Perspective

In a case study done by Kawimbe (2024), highlights the rapid growth that has taken place in Zambia, between 2010 and 2019. Kawimbe states that, during the said period, the Construction industry contributed a total of 9.9 percent towards the nations GDP. But, despite this exceptional growth, small scale Zambian contractors were still prone to fail. Within this period that sector experienced a 45% Failure rate of projects.

The number of registered businesses in nation's construction industry has increased significantly, primarily because of Government initiatives that support local contractors. According to the National Council for Construction 2022 annual report, NCC has issued 14,959 certificates of registration to date (NCC, 2022). With a sizable percentage of them being small and medium-sized businesses (SMEs). Nevertheless, research indicates that many of these new businesses lack the financial resources and technical know-how required to uphold good building standards (Mwanza & Phiri, 2019).

Many recently established construction companies face resource constraints, leading to the use of substandard materials and unskilled labor, according to a study by Chileshe & Simukonda (2021). The survey indicates that over 55% of small contractors contributed to structural flaws in buildings by not adhering to standard construction quality norms.

2.2.2 The role of governing bodies in enforcing compliance amid sector growth

2.2.2.1 Global Perspective

In Brazil, the construction industry is regulated by several agencies, such as the NCC, the Ministry of Cities, and the Brazilian Chamber for the Construction Industry (CBIC). The enforcement of building standards in Brazil follows the

guidelines established in the Brazilian Building Code (NBR 15575) and the Regulatory Standard NR-18, which specifically governs construction safety.

A recent study by Souza et al. (2021) revealed that regulatory compliance has seen improvement in urban areas of Brazil but remains weak in rural regions where informal construction practices are prevalent. The study revealed that although the NCC has enhanced monitoring efforts, its ability to enforce compliance is often hindered by political interference and inadequate funding. Similarly, Martins and Oliveira (2020) conducted a study on compliance with structural safety regulations in São Paulo, which revealed that 40% of newly built residential buildings had minor non-compliance issues, and 12% had major safety violations. The study attributed these violations to ineffective inspections.

2.2.2.2 African Perspective

In Uganda, the National Building Review Board (NBRB) and the Uganda National Bureau of Standards (UNBS) collaborate with the NCC to ensure compliance with regulations in the construction sector. The construction industry in Uganda has experienced significant growth, primarily driven by infrastructure projects financed through both public and private investments. However, the rapid expansion has overwhelmed the capacity of regulatory institutions to effectively enforce compliance.

A study by Kasaija et al. (2019) assessed construction regulation enforcement in Kampala and revealed that only 55% of registered construction projects adhered to NCC guidelines, with a notable number of violations occurring in informal settlements. The study also identified significant obstacles, with some contractors bypassing inspections through bribery of regulatory officers. Furthermore, Mugisha and Tumwebaze (2020) examined the efficacy of NCC enforcement in Uganda's major cities and discovered that nearly 30% of buildings constructed between 2015 and 2020 exhibited structural defects due to inadequate regulatory oversight. Their findings indicate that staff shortages and insufficient inspection mechanisms are contributing factors to the weak enforcement of compliance.

2.2.2.3 Local Perspective

In an article by Mkandawire (2024) on monitoring of Constituency Development Fund (CDF) projects in Zambia, he highlights some of the challenges being faced by regulation enforcers. In Milenge Town Council, Zambia, a monitoring exercise of various CDF projects was carried out by the Town Council, the District Commissioner, the Director Engineering and other technical members. The report of their findings shows that one of the issues that was identified from the various projects was adherence to specifications (Mkandawire, 2024). In Zambia, the monitoring of CDF Projects is done by the respective District Councils and the NCC. But many have been struggling due to inadequate manpower and mobility, and long distances. As a result of this, the EIZ president, Eng. Wesley Kaluba, on behalf of EIZ, aided all local authorities struggling with monitoring standards for ongoing projects (ZNBC, 2024). This statement cements the challenges that various governing institutions are facing in their effort to enforce compliance in the construction industry.

2.2.3 Continuous professional development (CPD) programs for engineers and contractors

For engineers and contractors to uphold the highest professional standards, enhance their abilities, and stay abreast of industry developments, training and CPD programs should be prioritised.

2.2.3.1 Global Perspective

In India, engineering professionals and contractors are overseen by organizations like the Institution of Engineers (India) [IEI], the All-India Council for Technical Education (AICTE), and the Construction Industry Development Council (CIDC). Additionally, the National Skill Development Corporation (NSDC) and Skill India Initiative have played a significant role in enhancing the skills of engineers and construction workers.

A recent study conducted by Sharma and Kumar in 2021, revealed that the effectiveness of CPD programs in India varies widely across states and industries. The study highlighted that only 60% of engineers actively engage in CPD programs, attributing the low participation to factors such as lack of incentives and limited access to high-quality training materials. Similarly, an

analysis by Bansal and Mehta (2020) demonstrated that contractors who underwent formal training through CIDC programs exhibited a 35% improvement in project execution compared to those without training. However, the study also pointed out that numerous small and medium-scale contractors encounter challenges in accessing affordable CPD programs.

2.2.3.2 African Perspective

In Kenya, the Engineers Board of Kenya (EBK), the National Construction Authority (NCA), and the Kenya Institute of Highways and Building Technology (KIHBT) collectively oversee CPD programs for engineers and contractors. The government has put in place policies that require professionals to undergo periodic training to maintain their licenses. According to a study by Mwangi et al. (2019), 80% of registered engineers in Kenya recognize the significance of CPD, but only 45% actively engage in training programs. The study identified various barriers, including high training costs, limited training centers in rural areas, and a lack of employer support. Similarly, a study by Ochieng and Mutiso (2021) assessed the effectiveness of the NCA's training programs for contractors and found that those who received formal CPD training experienced a 30% reduction in project delays and defects. However, the study also emphasized the inadequacy of funding and inconsistent curriculum updates as major shortcomings in Kenya's CPD framework.

2.2.3.3 Local Perspective

In Zambia, the NCC runs training programs and workshops for various engineering professionals and contractors through National Council for Construction School (NCCS). According to the NCC skills bulletin, 2023, the programs typically run for a duration of 18 weeks. Some of the topics addressed include, Occupational Safety, Health and Environment, Management of Civil Engineering Construction Processes, Contracts Management etc. In addition, various Engineering training manuals are available on the NCC website (NCC, 2023). Though the Training programs are in place, the training centre location is at the NCC head office in Lusaka. This has been a challenge for contractors operating in other districts.

2.2.4 The impact of market competition on material quality and workforce competency in the construction sector.

2.2.4.1 Global Perspective

In Iran, the construction industry is regulated by organizations such as the Iranian Construction Engineering Organization (ICEO) and the Ministry of Roads and Urban Development (MRUD). Market competition has intensified due to economic fluctuations and foreign trade restrictions, leading to both positive and negative effects on material quality.

A study by Mohammadi and Taghipour (2021) found that 45% of construction firms in Tehran resorted to using lower-quality materials to remain competitive in the market. Their study identified inflation and supply chain disruptions as major factors that forced firms to reduce costs at the expense of quality. Additionally, Eslami et al. (2020) observed that some contractors avoided using standard materials to underbid rivals in government tenders, leading to a 30% increase in structural defects in low-cost housing projects. On the other hand, Rahmani and Sadeghi (2019) found that market competition encouraged some high-end construction firms to invest in premium materials and innovative construction techniques to differentiate themselves. The study revealed that firms competing in the luxury housing sector had a 25% higher compliance rate with Iran's national construction codes compared to those operating in low-cost projects.

2.2.4.2 African Perspective

In Namibia, the construction industry is regulated by two key organizations, the Construction Industries Federation of Namibia (CIF) and the Namibia Standards Institution (NSI). Market liberalization and the entry of foreign contractors have increased competition in the industry, impacting the procurement and usage of construction materials. According to a study by Shikongo et al. (2021), local contractors in Namibia have faced challenges in competing with larger, foreign-backed firms, leading some to resort to the use of cheaper, substandard materials to reduce costs. Their research, which

analyzed 100 construction projects, revealed that 35% of completed buildings exhibited premature defects linked to the use of low-grade cement and steel.

In contrast, a study by Amupadhi and Kahiurika (2020) suggested that competition has driven some Namibian firms to embrace higher-quality materials to meet international standards, especially in projects supported by foreign investors. Their findings indicated that projects funded by foreign sources were 40% more likely to adhere to Namibian building standards compared to those funded domestically, highlighting how competition can sometimes lead to the selection of better construction materials.

2.2.4.3 Local Perspective

According to the Zambia Chamber of Mines (ZCM), Konkola Copper Mines has approximately 9,000 contractors while Mopani mine has over 10,000 contractors (ZCM, 2025). This high number of contractors portray the intensity of the competition that exists to be awarded tenders or projects. In an article by Sidney Kawimbe (Kawimbe, 2024), on the causes of failure amongst small scale contractors in Zambia, he states that there is stiff competition amongst contractors, and this is leading to the failure in execution of projects by small scale contractors.

2.2.4.4 Gap Analysis

Table2.1: Gap analysis

Author	Year	Study Location	Findings	Gap Analysis
Hamzah et al	2019	Malaysia	Revealed that a considerable percentage of newly registered construction firms lacked technical expertise and heavily relied on subcontractors, leading to a rise in structural defects in residential and commercial buildings.	The study did not consider construction in developing countries.
Amupadhi & Kahiurika	2020	Namibia	Their findings indicated that projects funded by foreign sources were 40% more likely to adhere to Namibian building standards compared to those funded	The study compared adherence to regulations. However, the study

			domestically, highlighting how competition can sometimes lead to the selection of better construction materials	did not give details on the importance of thorough registration processes.
Mohammadi & Taghipour	2021	Itan	Found that 45% of construction firms in Tehran resorted to using lower-quality materials to remain competitive in the market. Their study identified inflation and supply chain disruptions as major factors that forced firms to reduce costs at the expense of quality	The study cannot be generalized because construction regulations differ in each country.
Rahmani and Sadeghi	2019	Iran	Study found that market competition encouraged some high-end construction firms to invest in premium materials and innovative construction techniques to differentiate themselves	The study did not indicate the effect of using premium materials on the overall cost of the project.
Ochieng and Mutiso	2021	Kenya	Study assessed the effectiveness of the NCA's training programs for contractors and found that those who received formal CPD training experienced a 30% reduction in project delays and defects	The study did not detail how the study can be applied in other countries.
Kawimbe	2024	Zambia	Found that contractors have a 45% failure rate and that registered contractors are finding it difficult to get jobs from public and private sector clients. He recommended that there is need to enhance training for business owners and managers.	The study did not capture the role of law enforcers in industry. And how their weaknesses are contributing to the failure rate of Zambian Contractors.

This study targeted the gap that exists from the Local perspective. There is a gap in Zambian literature on how the weaknesses and challenges that the local governing

bodies are facing are influencing the quality of projects. The challenges that governing bodies are facing at registration stage, monitoring stage and training stage.

2.3 Theoretical framework

Within the confines of fundamental foundational assumptions, the theoretical review's objectives are to elucidate, anticipate, challenge, and broaden the body of existing knowledge (Kothari, 2007). The development of the firm theory and the public interest theory served as the foundation for the investigation.

2.3.1 Growth of the Firm Theory

The theory of firm growth, developed by Penrose in 1959, focuses on how a firm can expand while considering its efficiency and profitability. According to Penrose, firms can achieve growth through effective management, production, and diversification, as well as through the possession of comparative resources, developing capabilities, and a competitive edge. This theory has been utilized in analyzing the effect of an increasing number of registered Construction companies on the quality of engineering. Firms can generate economic value through the implementation of policies and innovations that benefit their shareholders. While having substantial resources is important for improving production, not all companies with large reserves perform optimally due to various underlying factors influencing the performance of construction firms. Strategic organizational development stems from understanding how the efficient utilization of firm resources and capabilities impacts firm operations.

The number of resources a firm command does not directly correlate with its profit, but it provides opportunities for increasing productivity and expanding the business. These resources encompass financial, tangible, and intangible resources, and managers play a crucial role in accelerating the production process for economic value creation, especially in large firms. Effective management plays a pivotal role in enabling firms to grow and compete in a competitive environment by converting raw materials into value. Managers should possess a knowledge base derived from training and experience to shape the profitability direction of firms by eliminating inefficiencies that hinder competitiveness.

The Growth of the Firm theory focuses on the managerial skills and internal conditions that allow businesses to flourish, answering the question of why some businesses do not grow while others do. It highlights the need of managerial expertise, experience, and the capacity to use internal resources to generate growth prospects. The theory contends that managerial competency and the company's capacity to recognize and make novel use of its resources determine how much a company can grow instead of having a natural limit (Edith, 1995). This theory fits well in this study since the study intends to investigate what affects quality and service in the construction industry.

2.3.2 Public Interest Theory

Becker (1986) propounded and tested the Public Interest Theory through a study on administration regulation. The theory suggests that government regulation is a response to public demands for the correction of market failures caused by imperfect competition, market imbalances, missing markets due to hidden or incorrect information, high transaction costs, externalities, public goods, or socially undesirable market outcomes (Hertog, 2000). According to this hypothesis, the regulation of firms and other economic actors contributes to the advancement of the public interest, which involves the optimal allocation of limited resources for individual and collective goods and services in society (Hertog, 2000).

In developed nations, the allocation of scarce resources is largely organized through the market system, and in certain situations, it can be demonstrated that the allocation of resources using the market system is optimal (Dania, Larsen, & Yao, 2013). Project performance is evaluated based on safety, quality, cost, schedule, and shareholder satisfaction, and successful projects are expected to have minimal conflicts, disputes, and safety issues (Nguyen and Watanabe, 2017).

The housing and road construction industry holds significant public interest, leading the government to establish fully-fledged departments and specialized agencies to regulate and supervise the industry (Otido & Omwenga, 2019).

Public Interest Theory assumes that the regulatory regime aims to achieve economic efficiency based on three assumptions: the prevalence of market failure, the presence of a 'benevolent regulator' or an efficient political process, and the selection of effective regulatory agencies (Hertog, 2000). Public pressure has heightened monitoring within the construction

industry, leading to the implementation of policies ensuring adherence to waste management practices, noise reduction, and control of water and air pollution and quality of projects.

The public Interest theory posits that the goal of government regulation is to benefit the general people. It implies that regulation improves societal welfare, corrects market imperfections, and guarantees just and equal results for everybody. Essentially, it sees regulation as a tool to enhance the economy's and society's overall performance (Wen, 2024). This theory correlates well with the study as it endeavours to understand how the construction industry growth is influencing the quality of work being done in the industry.

2.4 Conceptual Framework

According to Atkinson (2006), a conceptual framework serves as a valuable tool for conducting situation analysis. To establish a framework for identifying and developing variables, it delves into the theoretical aspects of the research process. Variables, as defined by Mugenda and Mugenda (2003), are measurable characteristics that undergo changes in value based on the subject being studied. When examining the impact of one variable on another, a researcher adjusts the independent variables to observe their influence.

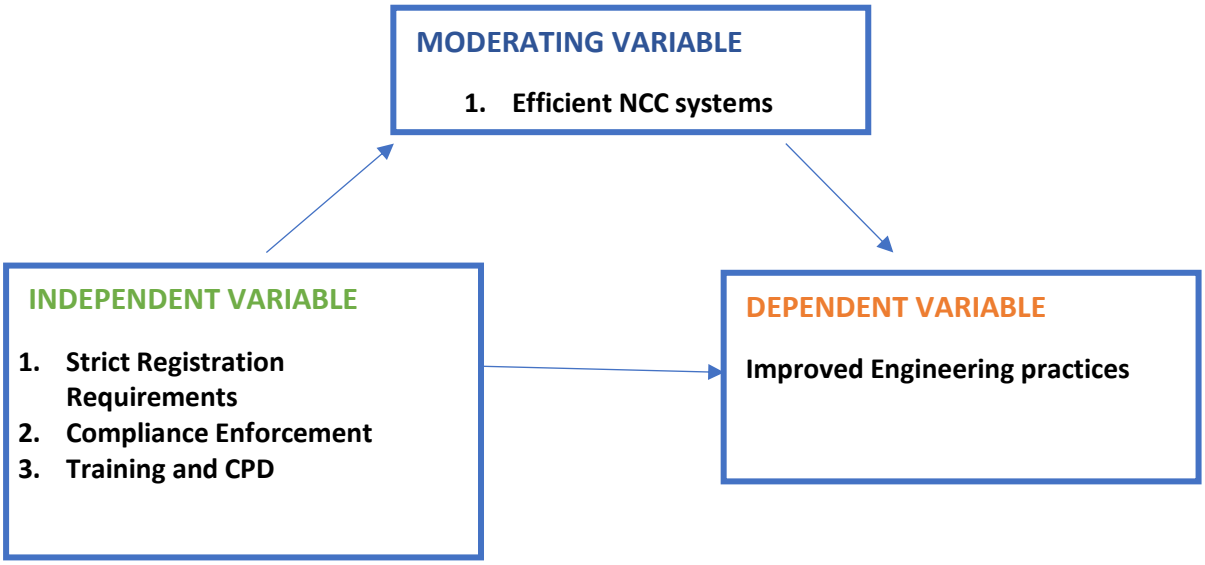

Figure 2.1: Conceptual framework

Table 2.2 outlines the operationalisation of variables as presented in the conceptual framework.

Table 2.2: Operationalization of Variables

No.	Variable	Definition	Method of Measurement
a.	Strict Registration Requirements	Any Individual that desires to register a company must meet all the necessary, stern requirements to register a Company. Source: (NCC, 2023)	Through NCC; Number of registered Companies per month.
b.	Compliance Enforcement	Regulatory and governing bodies ensure that companies are to uncompromisingly conform to standards and regulations. Source: (NCC, 2023)	• Through EIZ - Number of registered Projects per month. • Through NCC/EIZ – Number of Project Sites visited per month. • EIZ/NCC - Value of Fines and Penalties received per month.
c.	Training and Continuing Professional Development (CPD)	Regulatory bodies to conduct annual training programs per province. Source: (Bansal, Melita, 2020)	EIZ/NCC - Number of Training programs held per year. Number of Participants per training.
d.	Improved Engineering Practices	Compliance to international Engineering Quality Standards. Source: (EIZ,2024)	Percentage of flaws per project.
e.	Efficient NCC systems	Every NCC department must be working exceptionally well in their respective roles.	The number of Departmental and customer complaint reports.

2.5 Chapter summary

This chapter presented a comprehensive review of the existing literature related to the growth of the engineering sector and its relation to quality. It has specifically looked at the theoretical literature, theoretical framework, empirical literature review, research gaps, conceptual framework, and conceptualization of the variables. The chapter concludes with the conceptual framework that synthesizes the key variables, defines them and guides on how each variable can be measured during the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a comprehensive overview of the qualitative research methodology employed in this study. The process for the data gathering, analysis, and presentation is presented in this chapter. It begins by outlining the research approach, research design, population, sample size, data collection method, data analysis, ethical considerations, and chapter summary.

3.2 Research approach

A qualitative research approach was adopted for this study. According to Creswell (2014), exploring and comprehending the meaning that individuals or groups assign to a social or human situation can be done through Qualitative research. This approach allowed for the gathering of rich, detailed data to understand the participants experiences and perceptions. This type of inquiry is supported by those who value an inductive method of inquiry, an emphasis on personal meaning, and the significance of capturing the complexity of a situation (Creswell, 2014).

Though quantitative data provides numeric data that can reveal patterns and relationships, qualitative data provides the cause and reasons behind certain issues we see today in our communities. For this reason, the qualitative approach was chosen.

3.3 Research design

Research design, according to Cooper and Schindler (2008), is the plan and approach used to carry out studies to respond to research questions. According to Kerlinger (2006), it is a synopsis of the actions the researcher will conduct, starting with the formulation of hypotheses, questions and the consideration of their operational implications and ending with the final analysis.

This study employees a Historical Research design. This design allowed the researcher to gather empirical historical data regarding the Construction and engineering sector on the Copperbelt province. According to Wikipedia, Historical research design is a methodical technique to examining historical events and comprehending human experiences across time. Historical research design collects, validates, and synthesises evidence from primary and secondary sources

to establish facts and test hypotheses and questions. In addition, according to M Sandhiya in her journal *Types of Historical research,* she explains that Historical research is concerned with establishing the occurrence of unique events. Historical research not only determines past events but also interprets such events and establishes patterns of relationships (Sandhiya, 2016).

To understand the reasoning and characteristics of the construction sector today, the background information of Contractors was required. Due to constraint on time, contractors on the Copperbelt were considered for the study. The researcher required to understand the reason behind the behaviour and traits of the construction industry. The NCC required to provide historical information on the growth of the industry in the province and nation at large.

3.4 Research Philosophy

Interpretivism is the research philosophy that was used for this study. This enabled the Researcher to understand the past experiences and happenings that cause the various behaviours that can be observed today.

Interpretivism, as a research philosophy, contends that reality is socially produced and not objectively measurable, simply put, it cannot be measured using tools. It emphasizes understanding social phenomena through the subjective meanings and experiences of individuals, arguing that reality is socially constructed and not objectively measurable (Pervin, 2022).

3.5 Target Population

As stated by Singh and Kultar (2007), the "target population" is the entire group or elements or subjects of interest to the researcher that have one thing in common. Hennink et al, (2020) define the target population as a collection of each individual's possessions from which samples are taken for measurement. In this study, the population that was targeted was.

1. Governing Body- NCC
2. Construction companies - NCC grades 1-3, category B and C, registered Construction and Engineering companies on the Copperbelt province.

Table 3.1 displays the number of companies registered with NCC on the Copperbelt, according to NCC, 2025 annual List of Contractors

Table 3.1: Classification of Construction Companies on the Copperbelt

CATEGORY	GRADE			
	1	2	3	TOTAL
B	4	7	6	17
C	4	4	5	13

Table 3.2 shows the categorisation of Construction companies by NCC. Categories B and C are the targeted categories for this study. Categories B and C focus on Structures, buildings and other civil engineering products and services, and that is why it is applicable for this study.

According to a 2017 survey by NCC and ZIPAR, most construction firms in Zambia (87.9%) were registered in the lower grades (4–6), while the higher grades (1–3) accounted for about 12.1%. To obtain better responses and enrich this research, the study focused on the higher-grade Companies (1-3), which are more seasoned than the lower grades and could provide richer historical data for the Historical design that was selected by the Researcher.

Table 3.2: Categorization of Construction Companies

CODE	CONSTRUCTION ACTIVITY
B	**General Building and Housing**
	Construction of residential, commercial and Industrial buildings – single and multi-storey, together with various associated installations and external works
C	**General Civil Engineering Works**
	Bridges and other related ancillary works, Water Supply and Sanitation Works (Incl. Water, Drainage & Sewerage infrastructure), Dams, Irrigation systems and associated water works (Including ponds, swimming pools), Bore-hole Drilling and other related works and Railway Construction and Maintenance works.

R	**General Road Works**
	Road Surfacing & Paving Applications, Road drainage Structures, Off-carriageway Rehabilitation & Maintenance, On-carriageway Rehabilitation and maintenance and Road Furniture, signage & markings and other related ancillary works.
E	**General Electrical and Telecommunications**
	Power Generation, Heavy current transmission & distribution power lines, Street and Area Electrification (e.g., street lighting, electric car charging ports), Solar, Wind and other alternative Energy Installations, ICT and Communication Infrastructure, Installation of CCTV, Access Control, Alarm and Fire Detection systems, Civil works to power stations, sub-stations, communication systems, Telecommunication network installations (including towers, optic fibre installation, etc.)
ME	**Mechanical Engineering and Works**
	Mechanical Plants (including Acid Proofing, Rubber lining, etc.), Heating, Ventilation, Air Conditioning (HVAC), Piping and associated works, Rigging, Boiler Installations, Conveyors and Material Handling installations, Mechanical Lift installation, Fire Fighting Installations, Installation of Cyclones, Other installations and maintenance works of mechanical nature and installation of continuous process systems, involving chemical works metallurgical works, Oil and Gas wells, Acid Plants, Metallurgical Machinery, equipment and apparatus, and works necessary for the beneficiation of metals, minerals, rocks petroleum and Organic substances and other chemical process infrastructure.

3.6 Sample size and Techniques

This section of the study looks at the sampling techniques and sample size used in this study.

3.6.1 Sample size

Kothari (2012) defines sampling as the process of learning about a population by looking at a subset of it. A subset of individuals, objects, or occurrences from a larger population that is gathered and examined to conclude is called a sample. A sample needs to be sufficiently large and drawn at random to accurately represent the population (Saunders, 2011).

Braun and Clarke (2006) highlight that sample size for thematic analysis can vary widely. They suggest 6-10 participants for studies involving rich, in-depth data. Mwanaumo, et al (2023), conducted a study on Organisational performance in the beverage manufacturing sector, where saturation was reached using a sample of 9 participants. In qualitative research, sample size is not determined by formulas like in quantitative research. Participants within a range typically achieves thematic saturation and ensures diverse yet focused data (Hennink et al., 2017; Mason, 2010). The focus is on depth and richness of the data rather than generalizability.

3.6.1.1 Engineering Companies

Therefore, the selected sample size comprised of 8 Engineering company Directors, or management representatives, chosen purposively from Grades 1 to 3, Category B. Through the guidance obtained from NCC Secretariate, the researcher was able to obtain the data concerning registration and annual reports on regulation compliance by Contractors. Grade 1 to 3 are companies that are more seasoned and have attained reasonable experience of the Construction Industry in Zambia. In addition, category C covers various civil works, such as borehole drilling, railway maintenance, environmental management etc., that are not applicable to this study. However, category B is specific to construction of Buildings and various infrastructure as seen from *Table 3.2.*

3.6.1.2 Governing Bodies

To ensure a rounded response to the interview questions, the governing bodies were included to the samples. From the various organizations that make up the engineering governing bodies, the NCC was selected. This is because, NCC registration is one of the few mandatory documents required for any Engineering company to operate in Zambia. A sample size of 8 participants was selected, comprising of field officers, office of the Director of Registration and Regulation,

office of Director of Construction School, office of Director of Finance and Administration, as shown in table 3.3.

Table 3.3: Sample size

S/N	Selected Segment	Position of the participant	No
1	Grade 1 to 3, Category B NCC Registered Companies	Directors or Managers	8
2	NCC	Management	4
3	NCC	Inspection Officers	4
4	**TOTAL No. OF PARTICIPANTS**		**16**

3.6.2 Sampling Techniques

A sampling technique is a plan that explains how respondents are to be selected from a population (Kasonde 2013). A sampling technique mainly helps the researcher in selecting subjects to participate in the study. The study used purposive sampling methods to select respondents. Anchola and Bless (1988) stated that purposive sampling is based on the judgment of a representative sample. Mamion and Morisson (2007) also agreed that in purposive sampling, a researcher uses his or her own judgment or intelligence to handpick the cases to be included in the sample based on their typicality or possession of the characteristics being sought to meet the researcher's requirements.

Given this, the purposive sampling technique was used because the researcher needed a specific group of individuals. In this case, Copperbelt based Companies, registered with NCC and belonging to category 1 to 3. The Sampling had to be selective, to fit this requirement. Therefore, the selected Companies were able to provide rich information on the effect of increasing number of registered Construction companies on the quality of Engineering.

3.7 Research Instruments

Kasonde Ngandu (2013) defines research instruments as tools that researchers use in collecting the necessary data. Given this, an interview guide was emailed to all participants to collect data.

According to Oppenheim, A. N. (1992), interviews allow participants to freely provide information. This provides rich data for use in research. This was useful for this study that sought the honest expressions of stakeholders.

3.8 Data Collection Procedure

According to Kombo and Tromp (2006), the practice of obtaining information to confirm or dispute certain facts is known as a data-collecting procedure

3.8.1 Preparation phase

- **Ethical Approval** – Upon submission of the research proposal, ethical clearance from the University of Lusaka Director of Research and Graduate Studies for Postgraduates was provided to the researcher. This was essential for the data collection phase.
- **Participant selection** – As earlier indicated participants were selected through purposive sampling.
- **Development of Interview Guide** – A semi structures interview guide, consisting of open-ended questions aligned with the research objectives was developed. The semi structured guide allowed for the flexibility of follow up questions.

3.8.2 Phase 2

- **Pilot testing** – This was done to using the interview guide. This was critical in allowing the researcher to set the duration of the interview, which was 20 to 30min, depending on the participants' availability. It was also done to ensure usefulness of the data collection tool to the study.
- **The Interview** – The interview was conducted at a time and place convenient for the participant. While using the interview guide, the conversation was allowed to naturally flow, as the researcher took notes.

3.9 Data Analysis

The term "data analysis" refers to the process of looking over the information gathered from a survey or experiment and drawing conclusions and deductions, as stated by (Kombo and Tromp, 2006). This study used a Thematic method of data analysis. This allowed for the identification of common patterns within the responses.

Below highlights how the Thematic method was used.

a. Familiarisation with the data

The researcher had to read through all the survey responses to become familiar with the content.

b. Coding

The coding was done manually, without software aid. The manual coding process involved the categorising of data collected from the participants and identifying all the meaningful segments, themes and patterns and forming more structured data.

Some of the Codes included.

- Entrepreneurship youth movement.
- Increased Competition
- Lower quality material usage in Projects.
- Centralized systems.
- Adequate staff

c. Searching, Reviewing and Defining of Themes

Upon the completion of the Coding, the Researcher then began to look for broader themes and patterns across the data. The themes are reviewed and finally named.

Themes Used include.

- Inadequate resources.
- Shortfall of current system.
- Nationwide Infrastructure development.

d. Writing of Report

Once the data was grouped, the Researcher then proceeded with writing the report according to the findings.

3.10 Data Interpretation

According to Ghosh (1992) there is no clear- cut line between analysis and interpretation. Analysis and interpretation are said to be interdependent because each of the two cannot be complete without the other. However, interpretation is seen as the analysis of generalizations and results. Hence, it is through

interpretation that the findings of the study relate to the established theory (Ghosi, 1992).

Therefore, in this study, the interpretation of data was qualitative in nature. Qualitative data from the interviews transcribed in the case of recorded interviews and data was coded and grouped to establish the emerging and merging themes. Similarities and differences will be presented in form of a detailed description in the next chapter. Additionally, all the qualitative data from the data collection sheet was organised manually and arranged according to common themes (Bell, 1999).

3.11 Data Quality Assurance

3.11.1 Trustworthiness and Reliability

Reliability and trustworthiness relate to the researcher not misrepresenting the views of the respondents (Patton,2015). Reliability and trustworthiness are demonstrated when participants recognise the reported research findings as their own experiences (Maxwell, 2005). To ensure reliability and trustworthiness, the researcher employed the following measures: Pilot testing of the interview guide to ensure questions are clear, neutral, and encourage in-depth responses was conducted.

3.11.2 Credibility

According to Lincoln et al. (2011), credibility deals with the requirement to guarantee that the data are understood correctly. Providing a clear, verifiable explanation of the research procedure, including the methods used for data collection and analysis, is the goal of credibility (Bengtsson, 2016:13). Several things had to be done to make this study more credible. These included conducting member checks, involving peers, and routinely updating the supervisor on the status of the study.

As it fosters "confidence in the truth of the research findings," credibility is a crucial stage in the qualitative research process (Korstjens & Moser, 2018:121). It's about giving the original opinions of the participants the most open, accurate, and understandable representation and interpretation possible. Credibility, according to Dladla (2017:55), is "making the research findings believable."

3.11.3 Transferability

According to Gunawa (2015), transferability in qualitative research refers to both the capacity to apply conclusions drawn from the data to different contexts and the conviction that all social and behavioural phenomena are context-dependent or context-relevant. By using a purposive sample technique and a concise study description, the study shows transferability. Consequently, the study's findings could be applied in many contexts by employing the technique. Cope (2014) defines transferability as the ability to apply a study's findings to different contexts and subjects. In this instance, additional contexts with comparable features could benefit from applying the findings from one mining operation.

3.11.4 Dependability

The dependability of qualitative studies addresses the concern for the data to remain stable over time and in various conditions (Cresswell, 2009). The study demonstrates dependability by providing descriptive details of methods used to gather, analyse, and interpret data (Lincoln & Guba, 1985). The authenticity of the data would be clarified with participants and interpreted, examined, and discussed with the study supervisor.

3.11.5 Confirmability

In the process of data quality assurance, this refers to the “objectivity or neutrality of the data” (Gunawa, 2015). This study address confirmability by establishing an audit trail consisting of such records as notes on planned activities related to data analysis, and all drafts of reports.

3.12 Ethical considerations

Considering the nature of the subject matter, some of the targeted participants were not very comfortable to freely participate for various reasons which may include victimisation. The researcher endeavoured to protect the identities of the participants by refraining from naming any individuals in the report to protect them from any possible repercussions from any entity that may be aggrieved by any information given. The researcher also ensured that all the participants were assured of their privacy and confidentiality as they undertake to participate in the study. All necessary information about the study was given to them, they were free to accept or not to accept participation. In addition, they were also free to withdraw at any time if they felt uncomfortable to continue participating.

3.13 Chapter Summary

This chapter discussed the research design, research approach, target population, sample size, sampling technique, data collection instruments, validity and reliability, data analysis, and ethical considerations.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

4.1 Introduction

This chapter analyses the data that was collected through an interview guide from the selected participants for this Research. The interview guide was preceded by a Pilot test to ensure that the data collection tool is well structured for the participants. The study included sixteen (16) participants from various construction companies within Category B, grade 1 to 3, and from NCC, representing the governing bodies.

4.2 Demographics

The first section of the interview guide was for the collection of personal particulars from the respective participants. This included, age group, gender, engineering sector, role and lastly, years of experience. This information was vital because this study used a Historical research design, therefore, the participants needed to have vast experience of their respective sector. In addition, the participants needed to have experienced and witnessed the various shifts and changes that have taken place in the past years of the engineering sector.

Table 4.1 represents the demographic data collected from the Construction companies, while table 4.2 represents NCC.

Table 4.1: Construction Companies Demographics

Age (years)	Years of experience (Years)	Frequency	Percentage (%)	Cumulative Frequency (%)
35-44	**10 -20**	1	12	12
45-54	**21-25**	4	50	62
55 and above	**26 and above**	3	38	100

Table I: NCC Demographics

Age (years)	Years of experience (Years)	Frequency	Percentage (%)	Cumulative Frequency (%)
35-44	**10 -20**	3	38	38
45-54	**21-25**	4	50	88
55 and above	**26 and above**	1	12	100

4.2.1 Gender

The participants were asked to indicate their gender. The sample consisted of 16 samples, 8 represented Contractors and another 8 were from NCC. From the Contractors, 7 were male and 1 was female, this indicates 87% to 13% ratio. While for the governing bodies, 5 were male representing 62% and 3 were female, representing 38%.

4.2.2 Years of experience

The participants were asked to indicate their years of experience. All the participants had over 10 years' experience in the Engineering industry as shown in Figure 4.1 Out of the 16 participants, 4 had less than 20 years' experience in the industry, signifying 25%. 8 had 21 to 25 years of experience, signifying 50%. While the remaining 25% had over 25 years working experience. This was critical for the success of the Research as the participants needed to have vast experience to provide the needed information.

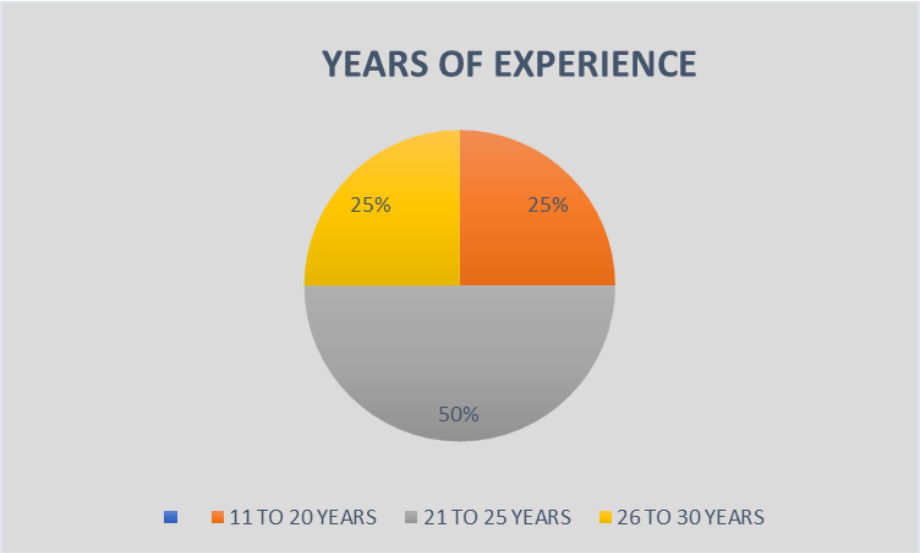

Figure 4.1: Years of experience

Source: (Author,2025)

4.2.3 Engineering Sector and Role

A key requirement of this research was for participants to be part of the engineering industry. Therefore, participants were required to indicate the engineering sector they have worked in and their respective role. The results indicated that all participants have taken part in more than one sector within the engineering industry, this includes Mining, buildings, manufacturing, electrical, roads and water. Majority indicated the construction sector. All the participants representing the Contractors were at management level in their organizations.

Each of the participants had adequate knowledge on the Engineering sector in Zambia and was able to provide the needed information through their years of experience and industry involvement. Figure 4.2 shows membership by sector.

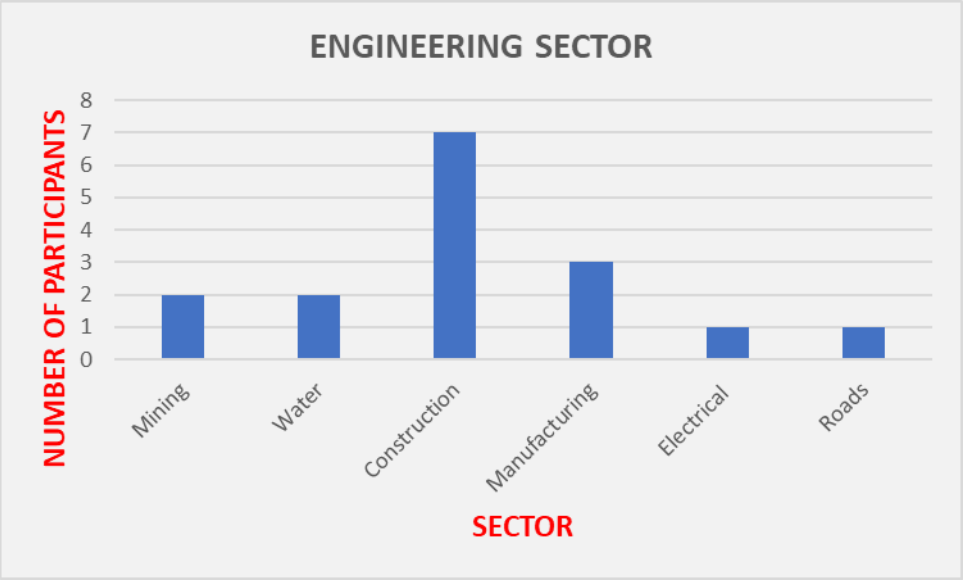

Figure 4.2: Engineering Sector

Source: (Author, 2025)

4.3 Registration of Companies and effect on the sector

One of the key objectives of this Research was on how the current company registration system by governing bodies affects the quality of the engineering sector in Zambia. Section two of the interview was structured to collect data regarding this objective. From the responses from the participants, three themes were obtained. Table 4.3 illustrates the themes and the respective codes derived from the responses.

Table 4.3: Registration of Companies and Effects on the sector themes and codes

No	Theme	Code
1	**Increased number of Entrepreneurs**	➢ **Entrepreneurship Youth Movement –** participant 2 stated that, *"there has been a youth movement in recent years, most youths prefer to start their own businesses than being employed."* ➢ **Encouragement from Government –** participant 6 highlighted that, *"the Government is encouraging citizens of the nation to open companies rather than waiting for employment."* ➢ **Infrastructure Development** – participant 9 stated that, *"There is an increased number of Projects being*

		done in the country, therefore, more construction companies are required."
2	**Inefficiencies of the current registration system**	➢ **Due diligence** – participant 7 mentioned that*, "most new companies are not checked and verified during the registration process. Key items such as personnel, company offices and company policies on quality and workmanship should be checked."* ➢ **Centralized system** – participant 12 expressed that, *"the current systems of governing bodies operate mainly from their respective headquarters and yet companies are emerging nation-wide. This centralized system is contributing negatively to works being done within the country."* ➢ **Technology and online services** – participant 1 stated that, *"online company registration has been made available by NCC and EIZ from the traditional hardcopy registration process that existed in the past. Though, it can be further improved and made more efficient for users".* ➢ **Mandatory Document** – participant 16 mentioned that, *"NCC and EIZ certificates are mandatory documents during the bidding process of every project. Therefore, the process of issuing of these documents has to be faster to prevent long queues."*
3	**Effects on the sector**	➢ **Flooded or Overcrowded sector** – participant 14 stated that, *"The industry is flooded. There has been significant increase in the number of companies in the sector."* ➢ **Increased Competition** – participant 4 expressed that, *"competition has increased due to the number of companies."* ➢ **Compromised quality of services –** participant 10 mentioned that, *"Due to the high competition, labour,*

		material and costing of projects has been compromised." ➢ **Increased number of Failed Projects** – participant 13 stated, *"There has been an increased number of stalled projects, reworks and maintenance works"* ➢ **Underbidding of Projects –** participant 16 mentioned, *"Projects are priced lower than they ought to be due to competition."*

From the above themes and codes gathered from the participants, it is evident that the nation is not only growing in numbers but also in infrastructure. And because of this growth, the systems of the governing bodies need to be upgraded to meet this demand. The systems need to be improved with more finances, increased labour, improved technology and more branches. Though growth is good for the sector, controls and measures must be put in place to kerb the flooded sector and compromise quality. This must be done to ensure that the quality of our services as a country is maintained.

4.4 Compliance Enforcement by Governing Bodies

The second objective of this research focused on was on the effectiveness of governing bodies regarding the enforcement of compliance. This was tackled in the third section of the interview. Three key themes and codes were extracted from the participants as shown in Table 4.4.

Table 4.4: Compliance Enforcement Themes and Codes

No	Theme	Code
1	**Inadequate Resources**	➢ **Low labour force** – participant 11 mentioned, *"The current labour force of the governing bodies is not adequate for the number of projects taking place nation-wide."* ➢ **Inadequate transport** – participant 6 stated that, *"Governing bodies require more vehicles to facilitate the monitoring and inspection of projects."*

		➢ **Finances** – participant 3 highlighted that, *"Government has to increase funding towards the operations of governing bodies, to ensure works are done efficiently."* ➢ **Decentralization** – participant 6 mentioned that, *"Governing bodies require more branches, country wide, to ease monitoring."*
2	**Nation-wide construction projects**	➢ **Increased CDF Projects** – participant 9 mentioned that, *"The number of projects being done has increased. Due to the increased funding in recent years, there are more projects being done and more companies being registered."* ➢ **Government has focused on infrastructure development** – participant 15 mentioned, *"In the last 15 years, infrastructure development has been a priority for the government. Therefore, more projects are being carried out."*
3	**Improvement of current system**	➢ **Improvement of Online services and stricter regulations** – participant 12 mentioned that*, "Governing bodies need to enhance regulations online as companies are registering and renewing their membership."* ➢ **Sensitization of standards** – participant 5 mentioned, *"There is need for materials to be publicized and shared with construction companies regularly."*

The themes in Table 4.4 demonstrate the challenges that governing bodies are facing, as well as the hindrances to them performing effectively. participants representing the governing bodies expressed how they do have the necessary regulations and standards of work that are required to ensure that Companies working in Zambia can comply to, but due to the challenges mentioned, enforcement has been negatively affected.

participants stressed how there is need for more resources for governing bodies to ensure that they execute their duties with ease and ensure that quality is not compromised.

On the contrary participant number 4 stated that,

"*Monitoring of works being done in Zambia, as well as ensuring standards are upheld is the duty of our governing bodies. We are mandated to pay a lot of money annually for them to function, therefore, there is no excuse.*"

4.5 Continuing Professional Development by Governing bodies

The third objective that this research addressed was on the effectiveness of the skills training programs conducted by governing bodies. This was addressed in the fourth section of the interview. In this regard, four key themes were extracted from the data collected from the participants. Table 4.5 highlights the themes and codes generated.

Table 4.5: Performance of CPD Themes and Codes

No	Theme	Code
1	**Shortfalls of the Programs**	➢ **Inadequate marketing of programs** – participant 1 mentioned, *"NCC needs to market the programs more aggressively to companies. And also improve their online presence."* ➢ **Not mandatory** – participant 7 stated that, *"Programs offered by NCC are not mandatory, neither are they a requirement for construction companies."*
2	**Other Services**	➢ **Distance education** – participant 8 highlighted that, "*Distance education needs to be enhanced to allow more students and participants nation-wide."*
3	**Performance of Alumni**	➢ **Follow ups on Alumni** - participant 14 mentioned that*, "NCC need to follow up on the performance of past students in their respective areas of work, to evaluate their performance post-training."*

4	**Adequacy of NCCS**	➢ **Good material and hands on experience**– participant 16 mentioned, *"Materials are adequate for all students to prepare them for the working environment."* ➢ **Seasoned and well-trained staff** – participant 11 mentioned, *"the institutions are equipped with quality staff members."*

Both EIZ and NCC are offering CPD through their organizations. NCC offer CPD programs through their institution National Council for Construction School (NCCS). Programs range from 6 months to 3 years in various engineering professions. This is to help professionals registered with the two organizations to be more effective as they execute their respective duties.

Though these institutions are in place, majority of participants were not aware of these services. Most participants stated that the governing bodies focus on registration of companies and renewal of subscriptions. While the services of education and training are not publicized effectively. In addition, as stated by participant 7,

"Programs offered by NCC are not mandatory, neither are they a requirement for construction companies."

Therefore, once a company has registered, continuous professional development is not a necessity. The Governing bodies did emphasize that the institutions were well equipped with learning materials and qualified staff members. Therefore, to ensure that the training offered by these institutions is effective, they must improve the marketing of these services and follow up on the performance of past students.

4.6 Chapter Summary

The findings of the study indicate that the engineering governing bodies established in Zambia, EIZ and NCC, are making strides to meet the demands of the sector. But resources must be increased for them to extend their reach to all corners of the nation and provide their services effectively. As things stand, the growth rate of the

industry has overtaken that of the governing bodies. As a result, the quality of work being executed in Zambia has been affected.

CHAPTER 5

DISCUSSION OF FINDINGS

5.1 Introduction

This chapter provides a detailed discussion of the findings presented in the previous chapter, relating them to the objectives of the research and existing literature. The purpose of this chapter is to interpret the results, explain their meaning, and show how they relate to the subject of this research. The discussion is organized according to the themes that emerged from the interviews.

5.2 Presentation of Significant results

5.2.1 The Call for Entrepreneurship

One of the key points participants highlighted that is contributing to the rise in the number of new construction companies being registered is the Entrepreneurship movement. Over 40% of the Participants stated that the rise in the number of entrepreneurs is contributing to the increase in companies being registered by NCC.

Participants further explained that due to the national challenge of employment, many individuals have opted to open and register their own companies. Government-led initiatives and policies—such as streamlining business registration via the Zambia Development Agency and launching the Public-Private Dialogue Forum—have eased the path for startups and micro-enterprises.

This aligns with Mukata, Mbewe and Haambote (2024), who stated that, initiatives like the Citizens Economic Empowerment Commission (CEEC) and the Women's Entrepreneurship Development Program have improved access to finance and training, particularly for youth and women entrepreneurs. In addition, they mentioned that Rural entrepreneurship is also growing, thanks to institutions like the Zambia Entrepreneurs Park & College and cooperative development projects that foster skills and formal markets.

5.2.2 National Infrastructure development

The study found that another key point contributing to the increasing number of companies is the nation-wide infrastructure projects taking place within the country.

The study found that, over the past years, CDF has contributed to local infrastructure, social services, and community empowerment projects across the country. This came due to the increase in the annual allocation—from K1.6 million in 2021 to over K30 million per constituency by 2024 (Sichula, 2024). More engineering companies are taking part in CDF funded construction projects. This has included, construction and rehabilitation of classroom blocks, school laboratories, maternity wards and shelters, health posts, bridges, boreholes, and sanitation facilities. Local councils have also invested in essential equipment like tipper trucks, earth-moving machinery, and low-bed transport for community projects.

In addition to CDF projects, research findings show that the nation of Zambia to is investing greatly in national capital projects. These include the S3 Mine expansion project in Kansanshi Mine, in Solwezi, Ndola-Lusaka dual carriage road and 100MW Chisamba solar plant. Results show that these large-scale infrastructure developments have created a ripple effect, stimulating growth across related industries such as mining, power generation, agriculture, logistics, and engineering consultancy services.

5.2.3 Inefficiencies within NCC system

With this surge in the number of companies in the sector, the study found that the current systems by governing bodies have been overburdened. The nationwide projects and the rise in entrepreneurship have contributed extensively to this matter. participants emphasized that this increase in national projects and number of contractors has exposed systemic inefficiencies within the organizations of governing bodies. This is a key contribution to the overstretching of NCC resources.

Participants stated that registration with NCC can be done either through online portal or through submission of hardcopy documents. The study has found that this registration system has been exposed and proven inefficient. Due to the large number of registration cases the online system is overloaded, and the registration process is affected. In addition, some hardcopy submissions coming from distant areas are lost or unattended to. This proves the inefficiency of the registration system. This is in tandem with Olawuyi and Fagbenle (2019), whose research found that most of the old systems by regulatory bodies have been overwhelmed by the increased number of registration entries.

Further, 45% of the participants stated that the quality issues being experienced in some of the projects have to do with the current weakness in the systems of governing bodies. Some of the main challenges they are facing include, centralized system, insufficient manpower, shortage of vehicles and the need to upgrade online and technology services.

5.2.4 Challenges of Continuous Professional Development by NCC

A key finding from the participants was on the challenges of CPD by NCC. It was highlighted by some participants that NCCS has well equipped engineering material on standards and regulations. In addition, NCCS has seasoned staff members to conduct quality lessons and training for all participants. Despite this, NCCS has continued to register poor participation from engineering experts and their respective companies.

It was observed from participant responses that most firms—particularly small and medium enterprises—are reluctant to engage in CPD, often citing high participation fees, limited training centers, lack of employer support, poor sensitization and the need for distance education.

5.3 Discussion and Analysis

5.3.1 Entrepreneurship Movement

The Researcher has observed that this rise in the number of entrepreneurs has contributed to the work overload being experienced by the governing bodies to register more new companies, this is one of the major contributions to the growth of the construction industry. As earlier stated in this research, over 60% of NCC registered companies are in categories 5 and 6, which is made up of recently registered companies. This confirms the rise in the number of entrepreneurs.

More companies must be registered, more must be assessed, and more certificates must be published. This has burdened and stressed the NCC resources, therefore, negatively affecting the registration system. This has been in tandem with Olawuyi and Fagbenle (2019), whose research found that Regulatory bodies have been overburdened by the rapid growth of engineering industries. It is therefore imperative that the government should implement a system upgrade across all engineering governing bodies. This will improve the registration system.

Moreover, the digital transformation sweeping across Zambia has played a significant role in encouraging new business registrations. Increased access to internet services and mobile technology has enabled aspiring entrepreneurs to reach wider markets, manage operations more efficiently, and leverage online platforms for marketing and sales (ZICTA, 2022; World Bank, 2021). This technological advancement has lowered barriers to entry for many startups, particularly in urban areas, and has also facilitated innovative business models that cater to both local and international customers. As a result, the integration of technology into business practices is becoming a crucial driver in the growth of new construction companies and other enterprises

5.3.2 National projects

The findings correspond with an article by Sinyangwe (2025), in which the Kitwe Town clerk called for more contractors to partner with the Council in the execution of CDF projects. This was after the Town Clerk signed five various contracts with successful bidders, to construct classrooms, supply solar powered streetlights and medical equipment at a Clinic. In addition, the study found that majority of projects advertised through the Zambia Public Procurement Authority portal (ZPPA) require Grade 5 and 6 registered companies. This allows new companies to take part in projects. participants also stated that in recent years, there has been a rise in Public Private Partnership (PPP) funded projects. Projects such as, the Lusaka–Ndola dual carriageway, Chingola–Kasumbalesa road, and border facility upgrades.

The Researcher through this study has observed that this rise in nation-wide projects, through CDF has placed a demand on the engineering sector, not only on the contractors, but also on the governing bodies. The numerous projects taking place across the nation by several contractors have had a negative effect on the resources of NCC. The study shows that majority of these projects are in rural areas. These remote areas require more manpower from NCC and an increase in the number of vehicles available for Inspectors to utilize. This will simplify the monitoring and inspection of projects. Though the development has been appreciated, the governing bodies have not been able to meet the demand to supervise and monitor all the projects. This aligns with Mkandawire (2024) whose findings claimed that there has been lack of adherence to specifications in CDF projects. Majority of Contractors lacked supervision and monitoring.

For all these projects to receive adequate supervision, there must be an increase in financial, labour and material resources available to NCC by the Government to enhance monitoring and compliance verification.

5.3.3 Inefficiencies in the system

Following the results obtained, it can be deduced that the current NCC systems were effective in the early years of the construction sector in Zambia. However, as the industry expanded rapidly, the sector began to outpace the institutional capacity of the NCC. This mismatch between regulatory systems and sectoral growth has created pressure on the council's existing oversight mechanisms (NCC, 2024). To strengthen regulatory effectiveness, it is vital to recruit more technical staff, including both administrative personnel and field officers, to manage the increased workload and ensure compliance across all regions.

In addition, decentralizing operations by establishing additional regional branches would enable more effective project monitoring and oversight. To achieve this, each branch would need adequate financial resources, vehicles, up-to-date digital systems, and access to academic materials on engineering standards (GRZ, 2023). Such measures would enhance efficiency, promote adherence to professional practices, and improve the overall quality of infrastructure delivery.

5.3.4 CPD Improvements

Mwangi et al. (2019) found that some of the reasons for low participation in training and continuing professional development (CPD) include high training costs, inconsistent curriculum updates, and insufficient marketing.

The researcher observed that without adequate training, firms struggle to meet the technical and regulatory standards required for higher-grade registration, which in turn limits their access to larger public contracts. In addition, this results in a stagnating professional environment where both governing bodies and construction firms face challenges in maintaining acceptable standards of work, ultimately diminishing the sector's ability to deliver high-value, technically sound projects.

Building on this, it can be argued that the lack of robust CPD participation not only affects individual firms but also weakens the overall competitiveness of the construction industry. Skilled labor shortages, inadequate exposure to modern

construction technologies, and inconsistent application of best practices reduce the capacity of local contractors to compete with international firms (ILO, 2021). Consequently, this dynamic reinforces dependence on foreign contractors for complex infrastructure projects, while limiting opportunities for knowledge transfer and long-term capacity building within Zambia's construction sector.

5.4 Inference of Findings

As a result of these findings, the quality of engineering services in Zambia has been negatively influenced. Intense competition compromises the quality of work. The following are some of the Quality concerns that have emerged from the research findings.

5.4.1 Underbidding of Projects

Due to the growth of companies in the construction sector, the underbidding of projects by companies has become a common and damaging practice in Zambia. Many firms and professionals competing for a limited pool of contracts have resorted to quoting unrealistically low prices just to secure work. This aligns with Eslami et al (2020) whose work claimed that the overcrowding of the engineering sector has led to the underbidding of projects. This problem has led to long-term problems such as poor workmanship, project delays, and financial losses. Contractors who underbid have struggled to cover material, labor, and overhead costs, forcing them to cut corners or abandon projects altogether. On the contrary, Rahmani and Sadeghi (2019), encouraged increased competition. They stated that competition encouraged firms to invest in premium materials and equipment to differentiate themselves.

5.4.2 Compromise on material and labour

Most participants emphasized the rise in the use of substandard material and the use of unskilled labour. The researcher agrees with the participants. In a bid to win contracts, some contractors cut corners, leading to substandard engineering solutions, which can endanger public safety and result in long-term infrastructure failures.

The results of the study agree with Kawimbe (2024), who claimed that competition in the engineering sector is leading to increased shoddy works and failure of projects. With many firms underbidding to secure contracts, companies are forced to operate on extremely tight budgets, which results in hiring unskilled or underpaid workers and sourcing low-quality or substandard materials. This cost-cutting approach has increased the risk of structural failures, project delays, and safety hazards on construction sites.

The researcher observed that this has also contributed to the undermining of professional standards, leaving skilled engineers underutilized or displaced by cheaper, less qualified labour. Over time, this practice has continued to devalue engineering services and is weakening public confidence in the sector's ability to deliver safe and durable infrastructure.

5.5 Authors Deduction

5.5.1 Significance of the Study

This study reveals that as long as the country is still classified as a *developing country*, infrastructure development will always be a priority. Therefore, there will always be need for more projects and more companies to execute these projects. This further means, there will always be a need and a demand for engineering governing bodies to conduct effective registration of construction companies, evaluating each application thoroughly. The systems of governing bodies should never be stagnant but adaptive, and ready for change. Constantly upgrading and reinforcing resources. The systems were fit for purposes in a particular time but the constant evolving of society necessitates the expansion of technical staffing, decentralization, improved logistical support, and strong regulatory frameworks for governing bodies.

The goal of Contractors will always be to ensure that each project is profitable at all costs, therefore, regulations will sometimes be secondary. It is therefore cardinal that governing bodies continue to enforce compliance and maintain quality in all national projects. In addition, enhance CPD programs across the country.

5.5.2 Implementation of Key Theories

It is therefore prudent that key theories be implemented to help curb these results.

i. Implementation of the Growth of the Firm Theory

The growth of the firm theory focuses on how organisations grow and develop based on the level of the internal capacity or simply, the internal resources and capabilities of the respective organisation. Thus, the growth of the firm theory is essential for this Research, in that, the internal capabilities of the governing institutions have been negatively affected and weakened. Using this theory, investment and reinforcement should be made towards the strengthening of the internal capacities of our governing institutions for them to expand and flourish in their functions. This includes, strengthening of the registration system, the IT systems and the monitoring and implementation systems of the governing institutions, for them to succeed.

ii. Public Interest Theory

The public interest theory focuses on promoting society wellbeing through the implementation of regulations. This theory supports the findings of this study because the safety of the public is at risk, through the poor-quality practices being used on some public structures. Therefore, by the implementation of this theory, key regulations will be revamped and created for the safety of public lives.

Moreover, public interest theory emphasizes that regulation is necessary when market forces alone are insufficient to protect stakeholders from harm (Jovanovic, 2019). By reinforcing the regulatory framework in line with this theory, institutions such as the National Council for Construction (NCC) can enhance accountability, improve compliance monitoring, and ultimately ensure that infrastructure development aligns with broader social and economic interests.

5.6 Chapter Summary

Chapter five has provided a discussion of the key research results extracted from the data collection. In addition, it has been able to relate the research objectives and theories to the research outcomes. It has shown how the current results fit into the existing knowledge. The limitations and the area for future study have also been well highlighted. In conclusion, the quality of the engineering services and products in Zambia is dependent on the effectiveness of governing bodies.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion of Study

This study sought to understand how the Construction industry growth influences the quality of engineering services in Zambia. Generally, the study found that increased national infrastructure projects and a rise in the number of entrepreneurs in the nation have led to the growth of the construction industry. This growth has overwhelmed the current available resources of the NCC. And as a result, the NCC has not been able to effectively perform its duties, namely, due diligence of new companies, effective monitoring of projects and general enforcement of regulations. Hence, the quality of engineering services in Zambia has been negatively affected.

Specifically, three objectives were formulated to address the topic under consideration.

Objectives one sought to explore how the registration of construction companies with NCC influences the quality of Engineering services in Zambia.

The study found that, registration, is an effective tool that manages the entry of construction companies into the engineering industry in Zambia. The NCC has not been able to conduct efficient assessments and due diligence of new companies during the registration process. Majority of which, are unable to provide adequate technical manpower, equipment and other resources to meet the standard of work required in the industry. Thus, the industry is suffering through various reports of substandard work. Therefore, it is prudent that the registration system should function efficiently, thoroughly inspecting companies and allowing only companies that will add value and improve the quality of work executed in Zambia.

Objective two meant to understand the role of governing bodies in enforcing compliance amid sector growth. It was found that as result of the growth of the sector, the resources of the governing bodies have been outstretched. The study has found that branches of governing bodies need to be expanded across the country and empowered with adequate resources for them to fulfill their duties. Infrastructure projects are simultaneously taking place nationwide; therefore, monitoring and compliance enforcement should be effective.

Objective three aimed to explore the adequacy of training and continuous professional development (CPD) programs for engineers and contractors in Zambia. The findings reveal that the NCC has implemented various CPD programs through NCCS to help improve the standard of construction work being in Zambia. Unfortunately, attendance has been poor with construction companies. The marketing has not been adequate, and the cost of the packages has not been affordable for companies. Therefore, for these programs to be effective, NCCS must make prudent marketing adjustments for Contractors.

6.2 Recommendations

To address the challenges identified through this study, the following recommendations were made.

i. **Increase of Funding and other resources to Governing bodies**– The study recommends that the government should increase the annual funding provided to engineering governing institutions. In addition, the labour force and available vehicles need to be increased. This will enable them to execute more tasks regarding the enforcement of regulations and improve their general operations.

ii. **Increase of number of branches** – The study also recommends that there is need for expanding the number of offices across the nation. Both NCC and EIZ require more branches to ease the monitoring of projects per province. This will allow remote areas to receive adequate oversight and professional support.

iii. **Upgrade of Information Technology (IT) system**– Governing institutions require assistance in the management of their respective software's and online services. The study therefore recommends that, an organization that specializes in IT services be contracted to assist in the operation,

maintenance and constant upgrading of systems, and for the functioning of NCCS services.

iv. **Increased Marketing of NCCS** – The visibility and reach of NCCS needs to be improved. Therefore, the study recommends that more effort and strides should be made to improve the social media presence, marketing per district and sensitization on the advantages of training and CPD. In addition, better rates should be provided for companies.

6.3 Limitations

The study faced the following limitations.

i. **Sample Size:** The sample size focused only on category B of NCC and yet there are several other engineering disciplines. The results were limited to what is mainly taking place in the construction sector, therefore, the experiences in other sectors are unknown.

ii. **Research Approach:** The study being Qualitative in nature did not focus on the numerical findings but more on the reasons behind the happenings. Quantitative research would have provided a wider sample size. In addition, the research was focused on the Copperbelt province only, which is one of ten provinces in the country. The results may not be the same in other provinces.

6.4 Implications to Practice

The findings of the study have made the following contributions to the engineering sector in Zambia.

i. **The role of the governing body** – This study has reemphasized the importance of the role of the NCC, EIZ and other members of the governing body. Their role as regulators and compliance enforcers is essential not only to the sector but to the nation of Zambia.

ii. **National Development** – The study has indicated that as the nation continues to develop through the execution of projects, the monitoring and compliance enforcement is just as important as the constructing. The study has shown that priority should not only be placed on building and handing over CDF projects, but that government should ensure projects are well

monitored and supervised. This will increase the lifespan of each completed project.

iii. **Importance of efficient evaluation**- Through this study, the importance of efficient evaluation of companies during registration and during tendering has been established. This study has proven that new companies in the sector ought to be well evaluated to ensure that reputable companies are registered. In addition, the study has shown the importance of efficient evaluation during the tendering process. This study will prevent awarding companies based on the lowest bidder theory, which promotes underbidding of tenders.

iv. **Importance of professional training**

The study has shown that continuous training is vital for members of the engineering sector. This must be implemented at all engineering levels, unskilled labour, artisans, technicians and engineers.

6.5 Contribution to Academia and Body of Knowledge

Key courses associated with the field of engineering and project management have been addressed in this study. This study has contributed to the body of knowledge regarding these courses and their importance to academia.

i. **Supervision and Monitoring** – Supervision and monitoring is an important aspect in the implementation of successful projects and is a mandatory course in Project management. This study reinforced the importance of overseeing the execution of works. It further proved the need for regulations, regulators and the enforcement of regulations. This study identified those responsible for the execution of this duty.

ii. **Quality management** – Another key course in engineering education is Quality Management. This course teaches the importance of quality controls, quality assurance and the cost of quality. This study amplifies these principles and provides practical examples on the importance of quality management in every project.

iii. **Evaluation** – Evaluation is another important course tackled by engineering and management students. Through the findings of this study, the importance of this course to academia has been supported.

This study has proven to academia the need for effective evaluation in management. This study has shown that effective evaluation can prevent several losses and flaws in projects and other areas.

This study contributes to the body of knowledge by providing an in-depth understanding of how the rapid expansion and overcrowding of the construction industry in Zambia affect regulatory oversight, project quality, and professional development within the sector. While previous research has primarily focused on macroeconomic contributions of construction to GDP or individual infrastructure projects, limited attention has been given to the interaction between institutional capacity, firm proliferation, and compliance with technical and safety standards. By examining these dynamics, this study fills a critical gap in understanding how regulatory bodies, such as the National Council for Construction, can effectively manage a growing and competitive sector.

Moreover, the research provides empirical evidence on the challenges associated with insufficient continuing professional development. As implemented in Kenya, the importance of CPD to engineering personnel has been amplified. By applying public interest theory, the study bridges theoretical concepts with practical realities, emphasizing the importance of robust regulatory frameworks for protecting public safety and ensuring sustainable industry growth. These insights can inform policy reforms, guide strategic planning within regulatory institutions, and help construction firms adopt better practices, ultimately contributing to the overall professionalization and quality enhancement of Zambia's construction sector.

6.6 Future Studies

This study was based on the engineering industry. Further studies would be necessary in other industries, such as Agriculture, Livestock, Forestry etc. Considering that Zambia's economy is widely spread, it would be prudent to research more on other sectors as well. Further studies can also be done on the current regulations and systems of engineering governing bodies. Their expertise would be necessary in formulating new solutions for compliance enforcement.

6.7 Chapter Summary

The findings of the study reveal that the engineering governing bodies in Zambia, specifically the National Council for Construction (NCC), needs to be supported for them to fulfil their duties in a growing economy. Governing bodies play a crucial role in setting standards, ensuring compliance, and promoting professional ethics across the industry, through CPD this can be achieved.

There is an urgent need for targeted investment and strategic support from both government and private stakeholders. Strengthening these institutions is essential not only for maintaining high standards but also for ensuring sustainable and equitable development throughout Zambia's engineering and construction landscape.

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APPENDIX

RESEARCH INTERVIEW GUIDE

UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

RESEARCH TOPIC: THE EFFECT OF THE INCREASING NUMBER OF REGISTERED CONSTRUCTION COMPANIES ON THE QUALITY OF ENGINEERING IN ZAMBIA

My name is Nathan Kombe, a University of Lusaka Postgraduate student, studying Project Management. I am carrying out a research study on the **Effects of the increasing number of registered Construction companies on the quality of engineering in Zambia.**

The purpose of this study is to assess the impact that the growth of the construction industry has on the quality of engineering being executed in construction projects in Zambia. Further, this study will assess the strength of regulatory bodies, such as NCC/EIZ in enforcing compliance of engineering standards, as well as the impact of the skills training institutions run by our governing bodies. This study will be able to contribute to the Zambian academic literature and support the engineering bodies in ensuring that Quality work is done by Zambian companies as the sector continues to grow.

This study is part of my dissertation in partial fulfilment for the award of a Master in Project Management. Your responses to the interview are of significant value to the accomplishment and completion of the dissertation and will be appreciated.

You have therefore been selected to be part of the study and the information that is provided is for academic purposes only and the information is confidential. No identifiers of any sort are needed for this study in this interview.

INSTRUCTIONS: Kindly respond to the questions to the best of your knowledge and if you are not sure about the most appropriate response, kindly indicate so. For any concerns or queries, kindly reach me on +260975067993 and on email at nathankombe12@gmil.com. Thank you for your support.

Section 1: Demographics

This section helps us understand your background. Please answer the following in your own words.

1. **Age**:
    - ☐ 18 - 24
    - ☐ 25 - 34
    - ☐ 35 – 44
    - ☐ 45 – 54
    - ☐ 55 and above

2. **Gender**:
    - ☐ Male
    - ☐ Female

- ☐ Non-binary/Other
- ☐ Prefer not to say

3. **Engineering Sector** (Where you work or have experience):
   - ☐ Mining
   - ☐ Water and Sewerage
   - ☐ Construction
   - ☐ Manufacturing
   - ☐ Electrical
   - ☐ Roads
   - ☐ Other: _____
4. **Position/Role**: _____
5. **Years of Experience in Industry**:
   - ☐ **Less than 1 year**
   - ☐ **1-3 years**
   - ☐ **4-6 years**
   - ☐ **7 – 10 years**
   - ☐ **More than 10 years**

Section 2: Registration of Companies and Quality of work in Zambia

This section explores the perceived effect that the rate at which contractors are registered has on quality of workmanship.

6. **What do you think of the current registration system of Companies by NCC?**

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   ……

7. **Have you noticed any change in the number of companies operating in your industry in recent years? If so, how would you describe this change?**

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8. **How do you think the increasing rate of contractor registration affects the quality of work in your sector?**

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9. **What would be good for the construction sector, slow and strict scrutiny of contractors before registration or quick scrutiny and registration? Why do you think so?**

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   ……
   ……
   ……

10. **What are some of the Quality issues you have noticed in Projects in Zambia?**

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    .....

11. **In your opinion, what do you think is contributing to the flaws you have observed in these Projects?**

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    .....
    .....

Section 3: Effectiveness of Governing Bodies (NCC)

This section assesses how participants perceive the effectiveness of regulators in relation to quality of work in the construction industry.

12. **In your opinion, on a scale of 1 to 10 (1 being the lowest and 10 the highest) how effective are the existing governing bodies in the maintenance of quality and enforcement of engineering standards in the sector?**

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……

13. **Do you think the growing number of companies in your sector has made it harder for quality standards to be maintained by Governing bodies (NCC)? Why or why not?**

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14. **What would be the effect of stricter regulation in the qualification of companies in respect to compliance?**

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15. **What advise would you give to governing bodies to ensure that quality is maintained across Projects in Zambia?**

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Section 4: Training and Continuous Development

This section addresses the impact of skills training and development on delivery of quality projects.

16. **Have you taken part in any skills training or continuous development conducted by NCC?**

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17. **How has the current training provided by NCC contributed to quality in the construction sector in Zambia?**

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18. **Is the training provided adequate in relation to delivery of quality projects?**

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19. **If you have participated or facilitated in training provided by NCC, what would you change from the current offering to be of greater benefit to the training participants?**

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.....

20. **In your opinion, what hinders Contractors from taking part or registering their respective employees in skills training offered by NCC?**

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.....
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Closing

Thank you for taking the time to complete this Interview. Your responses will greatly contribute to our understanding of how the growth of the engineering sector affects product and service quality in Zambian projects.