

**Exploring and Addressing Challenges Faced by Construction Management Graduates in  
Progressing Towards Professional Status:**

**A Case of DUT (2024-2017)**

**By**

**AYANDA LUSHABA**

**Submitted in partial fulfillment of the requirements of**

**MASTER'S IN CONSTRUCTION MANAGEMENT**

**In the faculty of**

**ENGINEERING AND INFORMATION TECHNOLOGY AT THE DURBAN  
UNIVERSITY OF TECHNOLOGY, KWAZULU-NATAL**

**Supervisor:** Prof AO Aiyetan

**Co-Supervisor:** Dr. C. Okorafor

**DECEMBER 2023**

## **ABSTRACT**

The construction industry contributes significantly to the South African economy, yet various challenges hinder construction management graduates from advancing to professional status. This study investigated the challenges faced by Durban University of Technology (DUT) construction management graduates from 2014 to 2017 in attaining professional registration. Using a mixed-methods approach, the research aimed to identify individual, organisational, social, and systemic factors contributing to low rates of professional registration among these graduates. Data was collected through surveys of 200 graduates. Key challenges identified included limited involvement in critical project phases, inadequate exposure to new technologies, insufficient safety knowledge, lack of skill development programmes, and employers' reluctance to hire inexperienced graduates. The study also revealed potential mitigating factors, such as addressing informal recruitment practices, promoting equitable registration processes, and implementing programmes to improve graduates' self-efficacy. Findings suggest a need for comprehensive interventions involving policy changes, improved training programmes, and enhanced industry-academia collaboration to better prepare construction management graduates for professional registration and career success. This research contributes to our understanding of professional development barriers in the construction industry and offers recommendations for improving the transition from graduate to registered professional in South Africa.

## DECLARATION

I Ayanda Lushaba declare that the research presented in this dissertation, except where otherwise indicated is my original research. The dissertation has not been submitted for any master's degree at any University, in addition, it shows what I personally think and may not be the same as the Durban University of Technology standpoint.

Ayanda Lushaba

Student number: 20904777

Date: 14/08/2024

15/08/2024

Supervisor: Prof AO Aiyeton

Date:

14/8/2024

Co-supervisor: Dr C Okorafor

Date:

Head of Department: Prof Molusiwa Ramabodu

Date: 24/03/2025

## **DEDICATION**

This research thesis is dedicated to my late grandmother; Vingi Eunice Lushaba, my late father; Bhekezakhe Ngwabe.

## ACKNOWLEDGEMENTS

It is culturally fitting to acknowledge God all might, the pillar and foundation of my studies and also my life in general. I want to dedicate this thesis to my late Grandmother Vingi Eunice Lushaba and to **THE LUSHABA** family, thank you for the prayers and support through the journey.

Furthermore Mpho Motumi for your support and words of wisdom through the journey, my deepest gratitude to you.

I am incredibly grateful for the support and guidance provided my supervisors, Prof. AO Aiyetan and Dr C Okorafor in overseeing this research and their continuous moral and intellectual support at every step of the study and highly appreciated.

I would also like to acknowledge everyone who participated and taken time to share their experiences for this research. I thank you for the support of this research. I do hope that these study gives you the voice.

I thank you all.

## TABLE OF CONTENT

<b>ABSTRACT</b> .....	<b>I</b>
<b>DECLARATION</b> .....	<b>II</b>
<b>DEDICATION</b> .....	<b>III</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>IV</b>
<b>TABLE OF CONTENT</b> .....	<b>V</b>
<b>LIST OF TABLES</b> .....	<b>XIII</b>
<b>LIST OF FIGURES</b> .....	<b>XV</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>XVI</b>
<b>CHAPTER ONE: INTRODUCTION OF THE STUDY</b> .....	<b>1</b>
<b>1.1 INTRODUCTION</b> .....	<b>1</b>
<b>1.2 BACKGROUND OF THE STUDY</b> .....	<b>1</b>
<b>1.3 PROBLEM STATEMENT</b> .....	<b>2</b>
<b>1.4 RESEARCH QUESTIONS</b> .....	<b>4</b>
<b>1.5 AIM OF THE STUDY</b> .....	<b>4</b>
<b>1.6 RESEARCH OBJECTIVE</b> .....	<b>5</b>
<b>1.7 THE SIGNIFICANCE OF THE STUDY</b> .....	<b>5</b>
<b>1.8 OUTLINE OF THE DISSERTATION CHAPTERS</b> .....	<b>5</b>

<b>1.9 CONCLUSION .....</b>	<b>7</b>
<b>CHAPTER TWO: LITERATURE REVIEW .....</b>	<b>8</b>
<b>2.1 INTRODUCTION .....</b>	<b>8</b>
2.1.1 What are construction management certifications? .....	8
2.1.2 What are the benefits of earning a construction management certification?.....	9
<b>2.2 FORMATION OF GRADUATE REGISTRATION SYSTEM BY THE SOUTH AFRICAN COUNCIL FOR PROJECT AND CONSTRUCTION MANAGEMENT PROFESSIONS (SACPCMP) .....</b>	<b>23</b>
<b>2.3 FUNCTIONS OF SACPCMP .....</b>	<b>24</b>
<b>2.4 PROFESSIONAL REGISTRATION.....</b>	<b>25</b>
2.4.1 Professional Construction Project Manager (Pr. CPM).....	27
2.4.3 Professional Construction Manager (Pr. CM) .....	27
2.4.4 Candidate Construction Project Managers (C. CPM).....	28
2.4.5 Candidate Construction Managers (C. CM) .....	29
<b>2.5 DISCUSSION OF THE STANDARD OF SERVICE DURING THE PROJECT WORK STAGES .....</b>	<b>30</b>
2.5.1 Design development phase .....	30
2.5.2 Importance of the Design Development Phase .....	31
2.5.3 Project Timeline and Budget Considerations .....	31
2.5.4 Role of Collaboration in Design Development.....	32
<b>2.6 TENDER DOCUMENTATION .....</b>	<b>32</b>

2.6.1	Tender Documentation in Construction Projects .....	33
2.6.2	Procurement Procedures and Tender Documents .....	33
2.6.3	Composition and Structure of Tender Documents .....	33
2.6.4	Challenges and Best Practices in Tender Documentation .....	34
<b>2.7</b>	<b>CONSTRUCTION DOCUMENTATION AND MANAGEMENT .....</b>	<b>34</b>
2.7.1	Importance of Proper Documentation.....	34
2.7.2	Challenges in Documentation Management .....	35
2.7.3	Best Practices in Documentation Management .....	35
<b>2.8</b>	<b>PROJECT CLOSE-OUT.....</b>	<b>36</b>
2.8.1	Project Close-Out in Construction Management.....	36
2.8.2	Importance of Proper Project Close-Out .....	37
2.8.3	Process of Project Close-Out .....	37
2.8.4	Challenges and Best Practices in Project Close-Out.....	37
<b>2.9</b>	<b>CHALLENGES FACED BY CONSTRUCTION MANAGEMENT GRADUATES TOWARDS ATTAINING PROFESSIONAL STATUS .....</b>	<b>38</b>
2.9.1	Lack of Experience .....	38
2.9.2	Unfavourable Policies.....	39
2.9.3	Stress and Unrealistic Expectations.....	39
2.9.4	Limited Access to Developmental Experiences .....	39

2.9.5	Lack of Responsibility and Accountability .....	42
2.9.6	Stereotypes and Organisational Culture .....	42
2.9.7	Recruitment Processes and Job Designations .....	46
<b>2.10 MITIGATING FACTORS TOWARDS BECOMING A PROFESSIONAL REGISTERED CONSTRUCTION MANAGER (PR CM).....</b>		<b>46</b>
2.10.1	Regulatory Framework and Professional Standards .....	46
2.10.2	Experience and Skill Development.....	48
2.10.3	Importance of Collaboration and Respect.....	48
2.10.4	Historical Context and Professional Identity .....	48
2.10.5	Addressing Challenges and Skill Gaps .....	49
2.10.6	Technological transformation .....	49
2.10.7	Simplify the registration process .....	50
<b>2.11 CONCLUSION .....</b>		<b>50</b>
<b>CHAPTER THREE: RESEARCH METHODOLOGY .....</b>		<b>52</b>
<b>3.1 INTRODUCTION .....</b>		<b>52</b>
<b>3.2 STUDY TYPE.....</b>		<b>52</b>
<b>3.2 RESEARCH METHODOLOGY .....</b>		<b>53</b>
<b>3.3 RESEARCH DESIGN .....</b>		<b>54</b>
3.3.1	Research philosophy and paradigms .....	55

3.3.2	Ontological view/assumption .....	56
3.3.3	Epistemological assumption/view .....	57
3.3.4	Research paradigms .....	58
3.3.5	The positivist paradigm .....	59
3.3.5	Phenomenological paradigm .....	61
3.5.6	Combined approaches.....	64
<b>3.6</b>	<b>TARGET POPULATION .....</b>	<b>67</b>
<b>3.7</b>	<b>SAMPLING METHOD .....</b>	<b>68</b>
3.7.1	Probability Sampling .....	69
3.7.2	Sample Frame .....	69
3.7.3	Sample Size.....	70
3.7.4	Recruitment Process.....	72
3.7.5	Inclusion and Exclusion Criteria .....	72
<b>3.8</b>	<b>DATA COLLECTION METHODS .....</b>	<b>73</b>
3.8.1	Primary Data Collection.....	73
3.8.2	Secondary Data Collection.....	74
3.8.3	Questionnaire Design.....	74
<b>3.9</b>	<b>QUESTIONNAIRE FORMAT AND SECTIONS .....</b>	<b>75</b>
<b>3.10</b>	<b>RESPONSE LIMITATION.....</b>	<b>76</b>

<b>Simple random sampling stratified method was used. ....</b>	<b>76</b>
<b>3.11. DATA ANALYSIS .....</b>	<b>76</b>
3.11.1 Data Capturing .....	77
3.11.2 Quantitative Data Analysis .....	77
3.11.3 Qualitative research designs.....	78
<b>3.13. VALIDITY OF THE STUDY .....</b>	<b>81</b>
<b>3.14. RELIABILITY OF THE STUDY.....</b>	<b>82</b>
<b>3.15. LIMITATIONS.....</b>	<b>83</b>
<b>3.16. ELIMINATIONS OF BIAS.....</b>	<b>84</b>
<b>3.17. ETHICAL CONSIDERATIONS.....</b>	<b>84</b>
<b>3.18. CONCLUSION .....</b>	<b>85</b>
<b>4.1 INTRODUCTION .....</b>	<b>87</b>
<b>4.2 RESPONSE RATE.....</b>	<b>87</b>
<b>4.3 DEMOGRAPHIC ANALYSIS .....</b>	<b>88</b>
<b>4.4 RELIABILITY TESTS .....</b>	<b>91</b>
4.4.1 Cronbach’s coefficient of a test.....	91
<b>4.5 RESULTS OF FACTOR ANALYSIS .....</b>	<b>93</b>
4.5.1 Section B: Technical Information .....	95
<b>4.6 PRESENTATION OF DATA AND ANALYSIS OF OPEN-ENDED QUESTIONNAIRE/INTERVIEW</b>	

.....	119
<b>CHAPTER FIVE: DISCUSSION OF THE RESULT.....</b>	<b>129</b>
<b>5.1 INTRODUCTION .....</b>	<b>129</b>
<b>5.2 CHALLENGES IN DESIGN, DEVELOPMENT AND TENDER DOCUMENTATION .....</b>	<b>129</b>
<b>5.3 TECHNOLOGY AND SAFETY CHALLENGES .....</b>	<b>130</b>
<b>5.4 TRAINING, SKILL DEVELOPMENT, AND RESOURCE CHALLENGES.....</b>	<b>130</b>
<b>5.5 RECRUITMENT PROCESS CHALLENGES .....</b>	<b>131</b>
<b>5.6 MITIGATING FACTORS AND POTENTIAL SOLUTIONS.....</b>	<b>131</b>
<b>5.10 CONCLUSION .....</b>	<b>140</b>
<b>CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>142</b>
<b>6.1 INTRODUCTION .....</b>	<b>142</b>
<b>6.2 CONCLUSIONS .....</b>	<b>142</b>
6.2.1 Limited Involvement in Critical Project Phases .....	142
6.2.2 Technology and Safety Knowledge Gaps.....	142
6.2.3 Inadequate Training and Skill Development Support.....	143
6.2.4 Recruitment and Career Progression Challenges .....	143
<b>6.4 RECOMMENDATIONS FOR PRACTICE .....</b>	<b>144</b>
<b>6.5 RECOMMENDATIONS FOR FUTURE RESEARCH.....</b>	<b>145</b>

<b>6.6</b>	<b>LIMITATIONS OF THE STUDY.....</b>	<b>146</b>
<b>6.7</b>	<b>CONCLUSION.....</b>	<b>146</b>
	<b>LIST OF REFERENCES.....</b>	<b>147</b>
	Appendix A:.....	161
	Appendix B:.....	166
	Appendix C.....	170
	Appendix D.....	185
	Appendix F.....	192

## LIST OF TABLES

Table 2. 1: Bandura’s theory of observation learning.....	41
Table 3. 1 Summary of implications and basic features of positivism and phenomenology.....	63
Table 3. 2: Composition of all CM graduates participants sample frame .....	70
Table 4. 1: Response rate .....	88
Table 4. 2: Cronbach’s alpha.....	92
Table 4. 3: Summary of factor analysis conducted for categories .....	93
Table 4. 4: Involvement of CM graduate in Design development .....	95
Table 4. 5: Involvement of CM graduate at tender documentation and procurement .....	98
Table 4. 6: CM graduate Involvement in Construction Documentation and Management.....	100
Table 4. 7: Involvement of CM graduate in project close-out stage .....	105
Table 4. 8: Inherent challenges faced by CM graduates in relation to getting registered as CM professional .....	108
Table 4. 9: The mitigating factors for CM graduates to get registered as professionals .....	114
Table 4. 10 Years of experience of respondents .....	119
Table 4. 11: Personal challenges faced by CM graduates in attaining a professional status.....	120
Table 4. 12: Challenges Faced by CM Graduates in Attaining Professional Status.....	121
Table 4. 13: Identification and Explanation of Measures to Mitigate Challenges Faced by CM	

Graduates ..... 123

Table 4. 14: Identifying and Explaining Options to Secure a Stable Supply of Professional Construction Managers in the Construction Industry ..... 125

Table 4. 15: Measures to Foster a Collaborative Approach Ensuring CM Graduates Attain Professional Status ..... 126

## LIST OF FIGURES

Figure 2. 1: Stage of personal certification accreditation (ISO/IEC 17024).....	14
Figure 2. 2: Bandura’s social learning theory.....	40
Figure 2. 3: Theory of vocational types (Holland) .....	43
Figure 4. 1: Gender .....	89
Figure 4. 2: Years of experience in the industry .....	90
Figure 5. 1: Guidelines for Registration .....	133
Figure 5. 2: Graphical Review of Salient Conclusions through Primary Causal Loop Analysis and Modelling, Addressing Systems Thinking.....	138

## LIST OF ABBREVIATIONS

CABE	Commission for Architecture and the Built Environment
CBE	Council for the Built Environment
CM	Construction management
DUT	Durban University of Technology
MS	Mean score
RICS	The Royal Institute of Chartered Surveyors
SACPCMP	South African Council for Project and Construction Management Professions

## **CHAPTER ONE: INTRODUCTION OF THE STUDY**

### **1.1 INTRODUCTION**

The present study explores issues of professional registration pursued by construction management graduates from the Durban University of Technology between the years 2014 and 2017. It thus seeks to identify a number of factors, which could be individual, organisational, social, and systemic, as some of the causes that contribute to these low professional registration rates among the graduates. It will also examine specific challenges faced by these graduates, assess factors contributing to the current low levels of registration, evaluate the effectiveness of existing initiatives, and make targeted interventions and policy change suggestions. Understanding these challenges is very important in order to establish effective supporting systems that will enhance professional development for graduates and assist industry in retaining a skilled workforce. This chapter highlights the problem statement, objectives, and significance of the study, together with a brief description of the methodology adopted. By specifying a delimited issue at a specific location, it identifies and fills an apparent gap in the literature. The outcome is supposed to add value to the body of knowledge contributed by academics on matters that affect the difficulties faced by construction management graduates, as well as pragmatic recommendations to address these issues in an effort to improve the registration process for new professionals. This study will therefore seek to ensure that these graduates' careers are enhanced, and the construction sector is developed within South Africa.

### **1.2 BACKGROUND OF THE STUDY**

According to Windapo and Cattell (2023), the Construction Industry remains one of the significant sectors in the economy of South Africa, providing growth in development and infrastructure. A number of studies recently, such as Mtya and Windapo (2019), show that construction management graduates add little to the normal rate at which professionals in the field register. Professional registration has been an important mechanism that boosts

confidence among graduates, with equal prospects for jobs to emerge and earning potential to increase (Khatleli, 2020). In a country like South Africa, which urgently needs skilled professionals to meet its dire housing and infrastructure development challenges, the journey from graduate to registered professional in construction is very vital (Aigbavboa, Oke and Aghimien, 2022). Professional registration helps graduate professionals take up self-generated projects in a bid to realise personal and national development imperatives (Mashwama, Aigbavboa and Thwala, 2021). Employing graduates as construction professionals would further enhance their professional development and reduce vulnerability within the job market (Osunsanmi, Aigbavboa and Oke, 2020). The present study has been conducted to identify drivers of professional registration among DUT construction management graduates, unregistered from 2014 through 2017. Based on these drivers, this research also tries to contribute to the policy discussions and practices in the industry that support job opportunities for the unregistered graduates and increase the benefits accruing to those reaching professional status (Aigbavboa, Oke and Aghimien, 2022).

The timing of the investigation is apt, in that today's construction industry is confronted by issues of emergent technologies, imperatives for sustainability, and fluctuating economic fortunes (Simpeh and Akinlolu, 2021). A focus on recent graduates means that the evidence provided about professional development in construction management is recent, adds to knowledge about career progression within the built environment sector and will be used to inform future policy decisions.

### **1.3 PROBLEM STATEMENT**

The articulation of professional status for a graduate in construction management, therefore, carries serious challenges with it in South Africa that may harm not only the personal career growth of such constructionists but also hamper the general development of the industry. The rate of successful professional registrations remains ominously low among such graduates despite initiatives like the Graduate Registration System introduced by the South African Council for Project and Construction Management Professions(SACPCMP) (Aghimien, Aigbavboa, Oke and

Musenga, 2020). In this regard, such a scenario therefore constitutes an urgent need to identify those challenges that impede graduate professionalism. Within a view to proposing policy and intervention programmes.

Thus, this demands an urgent need to explore and address the barriers that hinder the professional advancement of these graduates. There is a feeling that the career path in the construction industry is not well defined. Researchers found that the inability of graduates to see future prospects for themselves in the long term in the construction industry leads to the loss of talent. This problem is made worse by perceptions of poor remuneration since it is perceived as one that offers less attractive salary packages compared to the other sectors (Aigbavboa, Oke & Mojele, 2019).

Moreover, there are still so many issues in the industry that will further prevent graduates from getting professional registration. Health and safety issues are one such problem, which includes high numbers of accidents and injuries on building sites. While there have been certain recent improvements (Oke, Aigbavboa & Mphahlele, 2020), this is another major issue affecting the construction industry. Corruption and other unethical tendering processes are also a big issue that keeps graduates away from being related to the industry at all (Bowen, Edwards & Cattell, 2019). Further, the complication of this transition from academic training to professional practice includes the skills gap observed in instances where graduates feel unprepared for the practical demands of the construction field, thus hindering their progression toward professional status.

The present study explores the challenges faced by graduates in construction management from the Durban University of Technology who graduated between 2014 and 2017 in their attempt to acquire professional registration. Individual organizational, social, and systemic factors that underlie the low professional registration of construction management graduates are expected to be revealed by analyzing this particular cohort group. The study feels that it is important to shed light on these challenges for the development of focused methods targeting professional development for graduates, thereby enhancing the industry's capability for

retaining skilled professionals. This will, in turn, add to the broader discussion on professional development within the construction sector and will inform policy decisions. In addition, the study intends to drive systemic change and evolve practical solutions for CM graduates to register professionally in South Africa.

#### **1.4 RESEARCH QUESTIONS**

- What are the remedies that could be taken to address primary obstacles that DUT construction management graduates from 2014 to 2017 encounter in their pursuit of professional registration with SACPCMP?
- What actionable policies and interventions can be taken to reduce the individual characteristics, organizational culture, social factors, and systemic influences that impact the professional registration rates of DUT construction management graduates?
- What measurable impact have the existing initiatives, like the Graduate Registration System had in addressing the challenges faced by construction management graduates in attaining professional status?
- What actionable strategies and policies can be affected by addressing barriers to professional registration and improving outcomes for DUT construction management graduates?

#### **1.5 AIM OF THE STUDY**

- The aim is to explore the barriers faced by DUT CM graduates (2014–2017) in achieving professional registration and propose actionable strategies for improving professional progression.

## **1.6 RESEARCH OBJECTIVE**

- To identify the specific barriers that DUT construction management graduates from 2014 to 2017 face in attaining professional registration with SACPCMP,
- To analyze the individual, organizational, social, and systemic factors contributing to the low rates of professional registration among DUT construction management graduates,
- To evaluate the effectiveness of existing initiatives, such as the Graduate Registration System, in supporting the professional progression of construction management graduates, and
- To propose targeted interventions and policy recommendations to improve the transition from graduate to registered professional for construction management graduates in South Africa.
- To explore collaboration frameworks between uninvertible employers and regulatory bodies.

## **1.7 THE SIGNIFICANCE OF THE STUDY**

The research is about the challenges facing the graduates of construction management as they go through their vocational trip. The subject matter is narrow, with only a handful of books addressing the issue. The investigation will bring a significant amount of information to the academic realm by expansion of knowledge about this topic. Also, the output of this research will be good for the construction management graduates, as the suggested ideas that might help the SACPCMP to ameliorate the procedures and rules for the graduate's professional registration.

## **1.8 OUTLINE OF THE DISSERTATION CHAPTERS**

The study is divided into five chapters, which are chronologically arranged from the first to the last.

## **Chapter One: Overview of the Study**

Chapter one introduces the study. This chapter, therefore, presents the overview of the research background, problem, aim, objectives, rationale, and methodology. It discusses the overall scope of research.

## **Chapter Two: Literature Review**

The literature review in this chapter will be delved into a wide array of things: from the various concepts to the formation of SACPCMP, to professional registration inter alia. Discussion of the standard of service during the project work stages, tender documentation, construction documentation and management, project close-out and challenges faced by construction management graduates towards attaining professional status. The mitigating factors that influence the journey toward becoming a professional registered construction manager (Pr. CM), including regulatory frameworks, practical experience, collaboration, and the historical context of the profession, are discussed.

## **Chapter Three: Research Methodology Design**

This chapter describes the research design, research approach, target population, sample size, sampling method, design of the questionnaire, method of data collection, analysis of data, reliability, and its validity.

## **Chapter Four: Analysis of Data and Discussion of Findings**

This chapter presents the findings derived from the survey conducted during the research. In presenting the quantitative data that has been collected, descriptive statistics will be presented in graphs and tables, among other figures. This study will make use of inferential techniques to interpret correlations p-values.

## **Chapter Five: Conclusion and Recommendations**

This chapter will give an overview of the key findings of the study, the conclusions drawn, and the recommendations for further investigation. The conclusions are the drawn inferences from the findings of the research. Following this, the limitations of the study are noted, and further research in the area is suggested.

## **1.9 CONCLUSION**

The chapter introduced the study by highlighting its background, a statement of the problem, the research aim, the objectives, the research questions, the significance, and the structure of the study. This chapter highlighted the obstacles faced by construction graduates in their pursuit of professional advancement, identifying the construction industry's characteristics as the main constraint. The following chapter reviews the literature on several variables relevant to this study.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 INTRODUCTION**

The construction industry is a cornerstone of economic development, contributing significantly to infrastructure, job creation, and overall national growth. The SACPCMP governs the sector in South Africa, playing a critical role in regulating and enhancing the professional standards of construction management practitioners. In this study, the Graduate Registration System by SACPCMP aims to bridge the gap between academic qualifications and professional practice, facilitating the transition of construction management graduates into the workforce. However, despite these efforts, many graduates face substantial challenges in attaining professional registration, which is essential for career advancement and industry credibility.

This chapter begins with a report of international certification and their process and then presents a comprehensive examination of the characteristics of the formation of SACPCMP, professional registration, discussion of the standard of service during the project work stages, tender documentation, construction documentation and management, project close-out and challenges faced by construction management graduates towards attaining professional status. Furthermore, this literature review explores the mitigating factors that influence the journey toward becoming a professional registered construction manager (Pr. CM), including regulatory frameworks, practical experience, collaboration, and the historical context of the profession. By examining these factors, the review aims to provide insights into the barriers faced by graduates and identify pathways for enhancing their professional development.

#### **2.1.1 What are construction management certifications?**

Construction management certifications are formal verifications of a professional's expertise in various construction management specialties. Certifications often require the completion of a training programme and renewal after a certain number of years. Programs often include education on safety protocols, equipment maintenance and operation, and specific training

related to a construction manager's specialty.

### **2.1.2 Benefits of earning a construction management certification**

Construction management certifications may demonstrate your credibility, commitment and knowledge regarding the construction industry. These certifications may help employers or hiring managers assess your skills. Other certifications, such as those for safety and equipment, indicate that you can perform effective work while keeping your environment and peers safe.

### **Ten types of construction manager certifications**

Here's a list of common construction certifications and organisations that offer certification courses for this industry:

#### **1. Certified Construction Manager (CCM)**

A certified construction manager is someone with proven expertise in construction design, planning, management and safety. This certification programme requires a bachelor's degree and at least four years of construction management experience. Completion also requires passing a written test and renewal every three years.

Related: [How To Become a Construction Manager](#)

#### **2. Associate Constructor (AC)**

This certificate is the first level of the American Institution of Constructors (AIC) certification program. Associate Constructors have a high level of skill and familiarity with construction management and also abide by the AIC code of ethics. This certificate is ideal for recent graduates of a construction management graduate programme or people who wish to transfer from another industry because it can help them learn the basic requirements of construction management. This certificate is also the first step to earning higher-level certifications in this association. After passing your final exam, you renew this certification every three years.

### **3. Certified Professional Contractor (CPC)**

This certificate is the second certificate and the highest-level certificate the AIC offers. Certified Professional Contractors have experience and knowledge of managing project efficiency and performance. They also abide by the AIC code of ethics. Construction managers with several years of project management experience or a desire to advance their careers might elect to pursue this certificate. Completion of this programme requires passing a computer-based final exam and renewal every three years.

### **4. Occupational Safety and Health Administration's Outreach Training Programme for the Construction Industry**

Occupational Safety and Health Administration's training programmes include 10-hour and 30-hour classes that teach workers' rights, employer responsibilities, workplace hazards and accident avoidance techniques. Construction managers may find the 30-hour class more effective because they're responsible for their employees' safety on the worksite. These programmes are not specifically labelled as certifications, but they provide authentic safety credentials to employers and clients.

### **5. National Council of Examiners for Engineering and Surveying (NCEES)**

This organisation offers certifications for engineering and surveying. Earning one of these certificates requires passing a final exam such as Fundamentals of Engineering (FE), Professional Engineering (PE), Structural Engineering (SE), Fundamentals of Surveying (FS) and Professional Surveying (PS). Requirements for programme completion vary by state.

### **6. Certified Safety Manager Construction (CSMC).**

The National Association of Safety Professionals (NASP) offers this certification program. A CSMC certification verifies that you can supervise projects and work sites without assistance. The programme focuses on teaching leadership skills related to safety and helps you develop

plans and procedures within the construction industry. To complete this program, you pass a written final exam and re-certify every three years.

### **7. National Centre for Construction Education & Research (NCCER)**

This organisation has certifications for over 70 areas of construction that range from entry-level to senior-level accreditations. For example, some certificates available include construction technology, alternate energy, electrical fundamentals and maritime fundamentals. Completion and recertification requirements vary between programmes .

### **8. American Concrete Institute (ACI)**

The ACI offers numerous certification programmes related to testing, inspecting, using and assuring the quality of concrete. Construction workers who work often with concrete may benefit from this certification. Program completion requirements vary between certifications.

### **9. National Association of Corrosion Engineers (NACE)**

NACE offers over 23 certifications related to inspecting, managing and preventing corrosion. Construction workers who often work in areas where there are concerns regarding corrosion and structural health may benefit from these certifications. Program completion requirements usually include passing a final exam, but recertification conditions vary.

### **10. U.S. Green Building Council Leadership in Energy and Environmental Design (LEED)**

The U.S. Green Building Council offers many certification programmes related to sustainability practices in construction, such as LEED Fellow, Green Rater and Green Classroom Professional. Other LEED certifications include Green Associate and AP with Speciality (Building Design and Construction, Operations and Maintenance, Interior Design and Construction, Neighborhood Development and Homes). LEED-certified buildings use fewer

resources, produce less waste and reduce overall environmental impact. Professionals who work in sustainability or want to undertake environmentally friendly projects may benefit from these certifications. Completion requirements vary between programmes .

### **Five construction equipment certifications**

Construction equipment certifications are useful because they verify that you can safely and efficiently operate, maintain and inspect common construction machinery. Here's a list of common equipment certifications you might consider:

#### **1. Sit-down forklift operator**

People use forklifts to move heavy equipment, so it is important to understand safety, operation and maintenance procedures when using these machines. Training programmes often include the completion of a final exam and then recertification every three years. You can also operate other machinery, such as pallet trucks and rider trucks with a forklift certification licence.

#### **2. Crane operation**

The National Commission for the Certification of Crane Operators (NCCCO) is an organisation that offers many training courses for the operation and maintenance of different types of cranes. They also offer certifications for crane inspectors and lift directors. Program completion includes passing written exams, with recertification required every three years.

#### **3. Off-road dump truck**

Dump truck training courses can teach you about safety, operations and maintenance involving dump trucks and the transfer of construction materials from one place to another. You may also learn how to drive a dump truck in a variety of settings. Training programme requirements often include attaining a commercial driver's license (CDL) and completing a final exam. Recertification varies depending on the state in which you work but averages every five years.

#### **4. Grading and paving equipment**

Equipment such as rollers, graders and aggregate spreaders require you to get certified before you can use them safely. Training programmes often include instruction on hydraulic and electrical system maintenance, troubleshooting, machine set-up, special applications and asphalt mixes. Program completion often requires passing a final exam. Recertification varies between programmes but typically occurs every three years on average.

#### **5. Commercial driver's license (CDL)**

Operating commercial vehicles requires specific training, education, skills and physical abilities that differ from a regular driver's license. Commercial vehicles can include trucks with double or triple trailers, tanks or hazardous materials. Each state has different requirements to earn a CDL, so it is useful to research the requirements for the state in which you work to gain more information.

#### **Tips for pursuing a construction management certification**

Here are a few tips to help you choose and earn a construction management certification:

Evaluate your education and career goals. It's important to evaluate what construction role you want to pursue before choosing a certification. Certifications have different requirements depending on specialty and skills, so you may want to choose a specialisation and hone your skills first before enrolling in a certification course.

Consider your budget. Training or certificate programmes often vary in cost depending on who is hosting these programmes and what kind of training is included. Researching the cost of different programmes may help you choose the right course for you.

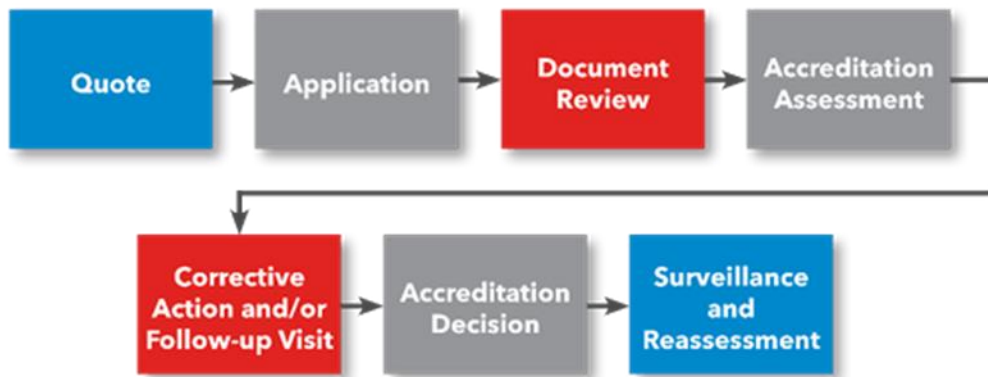
Evaluate your schedule. Certificate programmes' durations can vary between each organisation that offers the courses, so you may want to check your schedule before enrolling to ensure that you

can adequately study and prepare for course assignments or tests.

Consider pursuing higher education. Earning a four-year degree in a construction-related field may help construction employees develop valuable technical and leadership skills. It may also make earning certifications much easier because they have more experience and training prior to engaging with their certification assignments.

## **STEPS TO PERSONNEL CERTIFICATION ACCREDITATION UNDER ISO/IEC 17024**

The steps start with a preliminary application being forwarded and it is assessed for eligibility, after which a quote is given for processing application. The next stage is communication of information for eligibility, and a full application and supporting document are requested to be submitted.




*Figure 2. 1: Stage of personal certification accreditation (ISO/IEC 17024)*

The third stage is the stage of review of the applicant's supporting documents and on completion, the accreditation assessment follows. At this stage, the relevant skills requirements, both soft and technical, are assessed. The application is assessed for any shortfall, which would be communicated to the applicant and/or a visit to the applicant's workplace for assessment of

technical skills. On completion of these stages, a decision is made by the accrediting institution. After the registration of applicants, surveillance, which is the monitoring of applicants work, ensues and after a while, a reassessment is performed.

Below is a sample of supporting documents for the application form for the ANSI National Accreditation Board.

Preliminary Application for ANAB Accreditation under ISO/IEC 17024:2012		
FA 7503	Authority: Vice President	

## INSTRUCTIONS FOR PRELIMINARY APPLICANTS

Thank you for your interest in the ANSI National Accreditation Board (ANAB) Personnel Certification Accreditation Program. The purpose of this form is to determine a certification body's basic eligibility to apply for the program. Before completing this form, please carefully review ISO/IEC 17024:2012 standard and evaluate whether your organization currently complies or will eventually be able to comply with the standard.

### General Information for Submission

1. ANAB's accreditation services are governed by and subject to [AG 1008 Terms and Conditions of Accreditation](#), which are incorporated by reference here.
2. Please submit only one application form whether you are applying for one or more certifications for accreditation.
3. Application and all supporting documents shall be submitted in English.
4. Please refrain from editing, altering, or removing any clauses or language from the FA 7503 preliminary application. ANAB staff reserves the right to ask for the application to be resubmitted if the integrity of this form has been changed.
5. This form is restricted to editing and only allows text to be added. If you are encountering problems using the form, please contact ANAB staff.
6. ANAB does not accept hard copies of the preliminary application. Please submit the application and supporting materials electronically to:

Katherine Krehbiel  
ANAB Sr. Manager of Accreditation, Credentialing Programs  
[kkrehbiel@anab.org](mailto:kkrehbiel@anab.org)

### General Information on The Preliminary Application Process

Once we receive the form, ANAB staff will review it and notify you of one of the following:

- a) Your organization is eligible to proceed with the application process;
- b) Your organization will need to provide additional information; or
- c) Your organization is not eligible to apply.

If you are notified of your eligibility to proceed with the process, we will direct you to complete the full application and invoice you for the \$3,000 application fee. The fee covers processes related to the ANAB Personnel Certification Accreditation program. ANAB staff will check to see if the fee has been paid before proceeding with the full application review. For more information on fees associated with the accreditation process please refer to [PR 7522 Fees - Accreditation of Credentialing Programs](#).

## CERTIFICATION BODY INFORMATION

Legal Name of Certification Body: Click or tap here to enter text.

Address: Click or tap here to enter text.

Web Site: Click or tap here to enter text.

### Authorized Representative

Name: Click or tap here to enter text.

Title: Click or tap here to enter text.

Phone: Click or tap here to enter text.

Email: Click or tap here to enter text.

### Billing Contact

If you are deemed eligible to continue in the accreditation process, please indicate where to direct the invoice for the \$3,000 application fee.

Name: Click or tap here to enter text.

Title: Click or tap here to enter text.

Phone: Click or tap here to enter text.

Email: Click or tap here to enter text.

## CERTIFICATION PROGRAM(S)

Please list the full name of each certification you intend to submit for ANAB accreditation to ISO/IEC 17024:2012:

Name of Certification	Date of first testing (or pilot testing)	Number of active certificants (or number of pilot examinations administered)
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

\*If more than 10, please provide an attachment listing the information above for all certifications.  
 Name of attachment: [Click or tap here to enter text.](#)

## COMPLIANCE WITH ELIGIBILITY REQUIREMENTS

In the table below, reference supporting document(s) in the “Evidence” column for each eligibility requirement and attach the supporting documents when submitting this preliminary application (FA 7503).

Eligibility Requirement	Evidence
<p><b>1. Organizational chart</b></p> <p>Provide an organizational chart for the certification body. If the certification body offers both training/education and certification, the organizational chart must illustrate a separation between certification functions and training/education functions.</p>	<p><a href="#">Click or tap here to enter text.</a></p>
<p><b>2. Defined scopes of each certification being submitted for accreditation</b></p> <p>Provide evidence of a publicly available description of each certification being submitted for accreditation.</p>	<p><a href="#">Click or tap here to enter text.</a></p>
<p><b>3. Job Task Analysis</b></p> <p>Provide evidence that a job task analysis/practice analysis has been conducted for each certification being submitted for accreditation.</p>	<p><a href="#">Click or tap here to enter text.</a></p>

## DECLARATION STATEMENT

The undersigned is authorized to enter agreements on behalf of the Conformity Assessment Body (CAB). The ANSI National Accreditation Board, LLC (ANAB) provides accreditation services pursuant to the terms and conditions of ANAB’s [AG 1008 Terms and Conditions for Accreditation](#). By submitting this preliminary application for accreditation to ANAB, the CAB expressly agrees to the terms and conditions in *AG 1008 Terms and Conditions for Accreditation*.

**Please sign below.**

<a href="#">Click or tap here to enter text.</a>	<a href="#">Click or tap here to enter text.</a>	<a href="#">Click or tap here to enter text.</a>
Name	Approving Authority Title	Date

Electronic Signature:

By selecting this button, you agree to executing this document electronically. You agree that your electronic signature is equivalent to your manual signature.

A preliminary application for ANAB accreditation under ISO/IEC 17024 to find out your eligibility today has been given above.

ISO/IEC 17024:2012

### **Conformity Assessment – General Requirements For Bodies Operating Certification Of Persons**

ISO/IEC 17024:2012 contains principles and requirements for a body certifying persons against specific requirements and includes the development and maintenance of a certification scheme for persons.

### **Becoming a certified construction manager: Requirements & Certification**

Get to know the different types of certifications that construction managers can achieve. Learn more about the education requirements, the necessary skills, the median income, and projected job growth for this career path.

Construction managers are responsible for overseeing construction projects in their entirety. They schedule the coordination between different specialists and ensure that all building processes meet safety regulation guidelines. In the table below, you'll find information regarding available certifications, in addition to other details.

**Education Required:** Bachelor's degree

Education Field of Study    Architecture, construction science, engineering, construction management

### **Certifications:**

Certified Construction Manager (CCM), Associate Constructor (AC), and Certified Professional Constructor (CPC) certifications are available

**Required Skills:** Organisation, analysis, customer service, and time-management

Projected Job Growth (2020-2030) 11% (construction managers) \*

**Median Income (2020):** \$97,180 (construction managers) \*

Source: \*US Bureau of Labor Statistics

### **What does a certified construction manager do?**

Construction managers, otherwise known as general contractors, are tasked with overseeing the design and construction of buildings and other projects in their entirety. These projects include residential, commercial, public, and factory buildings, as well as memorials, tourist attractions, and bridges. They also coordinate the schedules between any other specialists required for construction completion, including architects, drafters, landscapers, electricians, and carpenters. Some construction managers also meet with clients in the early phases of design to help determine the client's needs and budget. Construction managers are responsible for allocating financial resources and budgeting throughout the entire construction process.

### **What type of education is required to become a construction manager?**

As building processes become increasingly complex, the need for a bachelor's degree from an accredited programme in a construction-related field is becoming a more refined standard in the construction management industry. Most candidates focus their studies on construction science, construction engineering, or building management. It is essential that students take courses in mathematics, construction methods and materials, design, statistics, and construction codes and regulations. Certain companies may also consider candidates with a two-year associate's degree and substantial work experience to manage small-scale projects. Companies will often hire construction managers to begin as assistants to gain work experience under a supervised manager and promote them to managerial roles after a given amount of time, which is decided by the firm.

## **How do I become certified as a construction manager?**

Certification is not mandatory for construction managers but is helpful when seeking a job to exemplify a candidate's knowledge and experience level. The Construction Management Association of America (CMAA) offers a certification to become a Certified Construction Manager (CCM). This certification requires that an individual has the minimum required years of responsible-in-charge (RIC) management experience, general construction experience or education, in addition to passing a technical exam that covers topics such as construction fundamentals and legalities.

The American Institute of Constructors also offers certifications to become an Associate Constructor (AC) and a Certified Professional Constructor (CPC). The AC certification is the first-level certification and requires that candidates have earned four years of educational or practical experience or a combination of the two and are then required to pass a written exam. For the CPC certification, candidates must first obtain eight years of experience and must also be able to pass a written exam on the application and analysis of construction practices.

## **What skills do I need to have?**

Because construction managers are responsible for overseeing the work done by several different companies or specialists, it is essential for construction managers to be well-organised. Likewise, time management skills prove essential because it is the construction manager's job to ensure that all operations and phases of construction are completed before deadlines. Technical skills are required of construction managers in order to operate the necessary software equipment and read technical blueprints from architects and builders. Construction managers must be equipped with customer service skills as well because they have to meet with clients to speak about budgeting, timeframes, and building functionality and to ensure that their needs will be met.

## **Challenges faced by CM Professionals and similar professions in professional registration**

Different countries and professional institutions have varying factors affecting professionals in

registering, Obaju, Musa and Abass (2022) list factors faced by construction management graduates in registering as professionals as:

- Overbearing cost of registration,
- Examination and interview charges,
- The complexity of examination and interviewing processes/procedures,
- Imposition of pledge/donations on incoming professionals,
- Rigorous practical work and technical report writing,
- Overbearing cost of providing maximum numbers of CPD certificates of past workshops, seminars and conference,
- The insufficient link between professional bodies and academic institutions, Lack of encouragement from Senior professionals,
- The rigidity of the professional body from allowing free movement from one profession of study to another in the built environment,
- Difficulties in accessing the institutes for registration, and
- Insufficient manuals/templates for training before induction into full practice.

## **2.2 FORMATION OF GRADUATE REGISTRATION SYSTEM BY THE SOUTH AFRICAN COUNCIL FOR PROJECT AND CONSTRUCTION MANAGEMENT PROFESSIONS (SACPCMP)**

The South African Council for Project and Construction Management Professions (SACPCMP) is instrumental in regulating, developing and promoting construction management professionals in South Africa. The SACPCMP, established under the Project and Construction Management Professions Act 48 of 2000, has evolved to address the evolving needs of the industry and its professionals (Aghimien *et al.*, 2020).

In recent years, SACPCMP focused on enhancing the professional development pathway for construction management graduates. SACPCMP acknowledged the challenges faced by new entrants to the field, introducing the Graduate Registration System. This initiative aims to bridge the gap between academic qualification and full professional registration by offering a structured pathway for graduates to gain practical experience and develop essential competencies and experience to excel and meet the industry's requirements (Musonda, Gumbo and Okoro *et al.*, 2019).

The Graduate Registration System demonstrates a broader trend in professional bodies adapting to the developing needs of the construction industry. According to Aigbavboa and Thwala (2018), such systems are essential to raise and maintain professional standards while simultaneously addressing the skills shortage and expanding the sector. Graduates are mandated to complete a period of supervised practical experience, typically lasting three to five years, during which they must prove their proficiency in various competency areas (SACPCMP, 2023). The implementation of this system was fraught with challenges. Research by Mewomo *et al.* (2022) indicates that many graduates lack the competence and confidence to navigate the requirements of the system, citing issues such as limited mentorship opportunities and experience and unclear progression pathways. This aligns with broader industry concerns about the transition from education to professional practice, as highlighted by Oke and Aigbavboa (2021).

The Graduate Registration System is a significant step towards professionalising the construction management industry in South Africa, notwithstanding the obstacles the industry faces. It aims to ensure that graduates are adequately prepared for the demands of the industry while simultaneously enhancing the overall quality of construction management practices (Windapo, 2022). The role of SACPCMP and its Graduate Registration System becomes increasingly important as the construction industry continues to develop in light of the fourth industrial revolution and sustainable practices.

### **2.3 FUNCTIONS OF SACPCMP**

The SACPCMP is vital in regulating and developing the construction management profession in South Africa. Recent studies have highlighted the evolving nature of SACPCMP's functions in response to industry demands and technological advancements (Aghimien *et al.*, 2020; Windapo, 2022).

SACPCMP outlines specific competencies required for construction project managers, emphasising both technical and managerial skills. These competencies include proficiency in construction science, processes, design methodologies, and financial management (Musonda *et al.*, 2019). The council's focus on comprehensive skill sets reflects the industry's increasing complexity and the need for well-rounded professionals. SACPCMP administers the registration process, which involves an in-depth evaluation of theoretical knowledge and practical experience. Applicants are required to demonstrate proficiency across various project management knowledge areas, aligning with global best practices (Windapo, 2022). This approach ensures that registered professionals possess the necessary skills to navigate the multifaceted challenges of modern construction projects.

SACPCMP has established a structured framework for typical construction projects, delineating distinct stages from project initiation to close-out. This framework, as noted by Aigbavboa and Thwala (2018), provides a standardised approach to project management, enhancing consistency and efficiency across the industry. The stages include:

- Project initiation and briefing
- Concept and feasibility
- Design development
- Tender documentation and procurement
- Construction documentation and management
- Project close-out.

Recent research by Mewomo *et al.* (2022) highlights the importance of involving project managers early in construction projects, a concept supported by SACPCMP's framework. This early involvement to improve risk management and stakeholder communication throughout the project lifecycle.

The rapidly-changing nature of the construction industry requires continuous adaptation to project management practices. SACPCMP's role extends beyond registering graduates to include ongoing professional development. Oke and Aigbavboa (2021) highlight the council's efforts in encouraging continuous learning and adaptation to new technologies and sustainable practices within the construction sector. SACPCMP's functions also encompass ensuring ethical practices and upholding industry standards. This aspect has gained increased attention in recent years, with studies like that of Bowen *et al.* (2019) emphasising the critical role of professional bodies in fighting corruption and unethical practices in the construction industry.

In conclusion, SACPCMP's role has adapted to address the complex demands of the modern construction industry. By setting comprehensive competency requirements, structuring project stages, and promoting continuous professional development, SACPCMP plays a vital role in shaping the future of construction management in South Africa.

## **2.4 PROFESSIONAL REGISTRATION**

Professional registration plays a crucial role in the South African construction industry, serving

as a mechanism to ensure competence, maintain standards, and promote public confidence in the sector. The SACPCMP stands as the primary statutory body responsible for regulating and registering construction management professionals (Aghimien *et al.*, 2020).

Recent research highlights the legal imperative of registration with SACPCMP. As Musonda *et al.* (2019) note, this requirement is mandated under the Safety, Health and Welfare at Work (Construction) Regulations, emphasising the critical link between professional registration and industry safety standards. This legal framework underscores the significance of registration beyond mere professional recognition, positioning it as a fundamental aspect of regulatory compliance in the construction sector. The SACPCMP's role extends beyond simple registration. According to Windapo (2022), the council is instrumental in setting and maintaining professional standards, thereby contributing to the overall quality and reliability of construction management practices in South Africa. This aligns with global trends in professional regulation, where statutory bodies play a pivotal role in industry governance and development.

However, the process of professional registration is not without challenges. Mewomo *et al.* (2022) identify several barriers faced by construction management graduates in achieving registration, including the gap between academic training and practical industry requirements. This highlights the need for a more integrated approach to professional development, bridging the transition from education to practice. The importance of professional registration in the context of industry development cannot be overstated. Oke and Aigbavboa (2021) argue that a robust registration system is crucial for addressing skills shortages and enhancing the overall competitiveness of the South African construction sector. This perspective frames professional registration as a key driver of industry growth and innovation.

Furthermore, recent studies have begun to explore the impact of professional registration on career progression and job satisfaction among construction management professionals. Aigbavboa *et al.* (2019) found a positive correlation between registration status and career advancement opportunities, suggesting that professional registration serves as a valuable

credential in the job market. Therefore, criteria for professional registration in construction management are discussed below:

#### **2.4.1 Professional Construction Project Manager (Pr. CPM)**

The role of a professional construction project manager (Pr. CPM) is pivotal in overseeing the physical construction process within the built environment, from conception to completion, while managing related professional services. The SACPCMP stipulates specific criteria for registration as a Pr. CPM, which include educational qualifications and relevant practical experience. An applicant must possess one of the following qualifications:

- An accredited Honours degree in the Built Environment with a minimum of four (4) years of relevant post-graduate practical experience.
- A B-Tech degree in the Built Environment with at least five (5) years of appropriate post- graduate practical experience.
- A National Higher Diploma in the Built Environment with a minimum of six (6) years of relevant post-graduate practical experience.
- A National Diploma in the Built Environment with at least seven (7) years of relevant post- graduate practical experience.
- For individuals lacking formal qualifications but possessing over ten (10) years of relevant practical experience, the Recognition of Prior Learning (RPL) route is recommended (SACPCMP, 2021).

#### **2.4.3 Professional Construction Manager (Pr. CM)**

Similar to the Pr. CPM, the Professional Construction Manager (Pr. CM) is responsible for co-ordinating, administering, and managing resources throughout the construction process. The registration criteria for Pr. CM are identical to those for Pr. CPM, requiring candidates to have one of the following qualifications along with the requisite years of practical experience:

- An accredited Honours degree in the Built Environment with four (4) years of relevant post- graduate practical experience.
- A B-Tech degree in the Built Environment with at least five (5) years of relevant post- graduate practical experience.
- A National Higher Diploma in the Built Environment with six (6) years of relevant post- graduate practical experience.
- A National Diploma in the Built Environment with seven (7) years of relevant post-graduate practical experience.
- As with the Pr. CPM, candidates without formal qualifications but with substantial relevant experience can pursue the RPL route (SACPCMP, 2021).

#### **2.4.4 Candidate Construction Project Managers (C. CPM)**

Candidates applying for registration as Candidate Construction Project Managers (C. CPM) typically include recent graduates with accredited Built Environment qualifications or individuals who have recently entered the construction management field. To register as a C. CPM, applicants must meet the following criteria:

- An accredited Honours Degree in the Built Environment.
- A B-Tech degree in the Built Environment with a minimum of one (1) year of relevant post- graduate practical experience.
- A National Higher Diploma in the Built Environment with at least two (2) years of relevant post-graduate practical experience.
- A National Diploma in the Built Environment with a minimum of three (3) years of relevant post-graduate practical experience.

Candidates with sufficient relevant practical experience as construction project managers or construction managers are not required to register as candidates (SACPCMP, 2021).

#### **2.4.5 Candidate Construction Managers (C. CM)**

Similar to the C. CPM, the Candidate Construction Manager (C. CM) category is designed for recent graduates or individuals with relevant qualifications who are beginning their careers in construction management. The registration criteria for C. CM include:

- An accredited Honours Degree in the Built Environment.
- A B-Tech degree in the Built Environment with a minimum of one (1) year of relevant post-graduate practical experience.
- A National Higher Diploma in the Built Environment with at least two (2) years of relevant post-graduate practical experience.
- A National Diploma in the Built Environment with a minimum of three (3) years of relevant post-graduate practical experience.

As with the C. CPM, candidates with sufficient relevant practical experience do not need to register as candidates (SACPCMP, 2021).

In conclusion, with regards to the reviewed literature, professional registration through SACPCMP represents a critical intersection of regulatory compliance, professional development, and industry standards in South African construction management. As the industry continues to evolve, the role and processes of professional registration are likely to remain central to discussions on sector development and regulation. The criteria for professional registration as a construction project manager or construction manager in South Africa are designed to ensure that individuals possess the necessary educational background and practical experience to effectively manage construction projects. By adhering to these standards, the SACPCMP aims to enhance the professionalism and competence of practitioners in the construction industry.

## **2.5 DISCUSSION OF THE STANDARD OF SERVICE DURING THE PROJECT WORK STAGES**

### **2.5.1 Design development phase**

The design development phase is a critical stage in the lifecycle of construction management projects, where the foundational elements of a project are established. During this phase, key components such as schematics are finalised, construction materials are selected, and both interior and exterior designs are refined. This collaborative process involves multiple stakeholders, including architects, engineers, owners, and project managers, who work together to produce a design that meets the owner's vision while ensuring structural integrity and sustainability (Mokhothu, Aigbavboa and Thwala, 2021).

Understanding the dynamics of the design development phase is essential for effective project management. According to Kiviniemi, Fischer and Miettinen (2020), this phase is not merely a precursor to construction but an integral part of the overall project timeline. Significant efforts are invested in design finalisation, securing necessary permits, and preparing for contractor bids, all of which are crucial for a successful project launch. The design development phase, therefore, influences the overall project timeline and budget, highlighting the importance of thorough planning and coordination among all parties involved (Hwang, Zhao and Tan, 2022).

Moreover, the financial implications of the design development phase cannot be overlooked. Stakeholders must have a clear understanding of the costs associated with the design process, which includes the services rendered by architectural and engineering teams. Different organisations may offer varying levels of service, from complete design packages to partial assistance, necessitating careful consideration by project owners regarding their needs and budget constraints (Scotty, 2023).

The role of the architect during this phase is particularly significant, as they collaborate closely

with engineers to ensure that modern engineering principles are applied effectively. This partnership is vital for developing detailed project specifications, including electrical, heating, ventilation, and plumbing systems (Mokhothu *et al.*, 2021). As such, the design development phase is not only about finalising the aesthetic aspects of a project but also about ensuring that all technical requirements are met to facilitate a smooth transition to the construction phase.

### **2.5.2 Importance of the Design Development Phase**

Understanding the design development phase's role in the overall project lifecycle is essential for effective project management. Kiviniemi *et al.* (2020) emphasise that this phase is not merely a precursor to construction but a vital part of project planning. Extensive preparatory work occurs before construction begins, including securing necessary permits, finalising contractor bids, and co-ordinating with various stakeholders to ensure that all design elements are feasible and compliant with regulatory requirements. The thoroughness of this stage directly impacts the efficiency of subsequent construction activities (Hwang *et al.*, 2022).

### **2.5.3 Project Timeline and Budget Considerations**

The design development phase significantly influences the project timeline and budget. Many stakeholders may underestimate the effort required to prepare a project for construction. Prior to breaking ground, a considerable amount of work goes into finalising the design, ensuring that it is engineered correctly, and preparing for the procurement of materials and services (Rakasyiwi *et al.*, 2022). Understanding the intricacies of the design process allows project owners to gain a comprehensive view of the services they are paying for, which is essential for effective budget management.

Moreover, the financial implications of the design development phase cannot be overlooked. Stakeholders must be aware of the costs associated with design services, which can vary significantly among architectural and engineering firms. Some firms offer comprehensive packages that cover the entire design process, while others may provide limited services,

necessitating careful evaluation by project owners to align their needs with their budget constraints (Scotty, 2023).

#### **2.5.4 Role of Collaboration in Design Development**

The interaction between architects and engineers during the design development phase is vital for integrating modern engineering principles into the design. As Mokhothu *et al.* (2021) highlight, this collaboration ensures that all technical specifications, including electrical, plumbing, and heating, ventilation, and air conditioning (HVAC) systems, are meticulously planned and executed. The design development phase serves as a foundation for ensuring that the project is not only visually appealing but also functionally sound and efficient.

In conclusion, the design development phase is a pivotal stage in the construction management process that requires careful coordination among various stakeholders. By understanding the complexities and financial implications of this phase, project managers can better navigate the challenges that arise, ultimately leading to more successful project outcomes.

### **2.6 TENDER DOCUMENTATION**

The procurement procedure is the process of selecting firms to perform the work described in the tender documents. Usually, the size and/or officialdom of the project determine which procurement path to follow. A common feature of procurement procedures is that they all require the preparation of tender documents. A tender is a submission made by a contractor in response to an invitation to the tender. It makes an offer to facilitate the supply of goods or services.

Tender documents are prepared to seek offers (Furry, 2017). Tender documents may be prepared for a range of contracts, such as equipment supply and the main construction contract. Ideally, one main contract should break down tender documents into a series of packages, each with its own design drawings and specifications suitable for issuing by the main contractor to potential sub-contractors. This makes the tender easier for the contractor to price and easier for the client

to compare with other tenderers. Ensuring the proper identification and clear allocation of interfaces between packages is crucial during this process. The following four (4) different types of tender documents are discussed.

### **2.6.1 Tender Documentation in Construction Projects**

Tender documentation plays a crucial role in the procurement process of construction projects. The tender documents enable contractors to submit bids for the specified work, ensuring that the project is delivered efficiently and cost-effectively. However, the preparation of tender documents can be a complex and time-consuming process, requiring careful consideration of various factors (Furry, 2017).

### **2.6.2 Procurement Procedures and Tender Documents**

The procurement procedure is the process of selecting firms to perform the work described in the tender documents. The size and officialdom of the project often determine which procurement path to follow. A common feature of procurement procedures is the preparation of tender documents. Tender documents are prepared to seek offers from contractors and may be prepared for a range of contracts, such as equipment supply and the main construction contract (Levy, 2021).

### **2.6.3 Composition and Structure of Tender Documents**

Tender documents should be in a form that enables the tenderer to fully understand the scope of the work. It is common to prepare bills of quantity for major projects. Ideally, one main contract should break down tender documents into a series of packages, each with its own design drawings and specifications suitable for issuing by the main contractor to potential sub-contractors. This makes the tender easier for the contractor to price and easier for the client to compare with other tenderers. Ensuring the proper identification and clear allocation of

interfaces between packages is crucial during this process (Murray, 2017).

#### **2.6.4 Challenges and Best Practices in Tender Documentation**

Having too many packages increases the number of interfaces, giving rise to potential problems. The cost plan (pre-tender estimate) should also be re-assembled package by package to allow easy appraisal of tenders received. Preparing tender documents can be a project in itself for construction companies, and reconciling and making procurement decisions can be quite an effort for asset owners and operators. The best way to prepare and handle tender documents is to break them down into packages, each for a specific area, phase of a piece of work or product, so that the parties submitting them can prepare accurate bids (Furry, 2017).

In conclusion, tender documentation is a critical aspect of construction project management, as it directly impacts the efficiency and cost-effectiveness of project delivery. By understanding the composition, structure, and best practices in tender documentation, construction professionals can ensure that projects are procured effectively and that the selected contractors are well-equipped to deliver the required work (Levy, 2021).

### **2.7 CONSTRUCTION DOCUMENTATION AND MANAGEMENT**

Construction documentation and management play a crucial role in the successful execution of construction projects. A well-designed documentation management system ensures consistent performance, regardless of time, location, or personnel involved (Sutton, 2017). Proper documentation of a construction project involves maintaining sufficient records that affect the history of the construction process, which can help reduce project costs, minimise contract modifications, and increase overall productivity (Levy, 2021).

#### **2.7.1 Importance of Proper Documentation**

Proper documentation assists in reaching agreements by defining the facts, roles, and responsibilities of the work. It can save time and money while increasing the overall

productivity of construction activities. However, current practices in construction often encounter several problems due to improper or inadequate document management, resulting in poor documentation (Alwis, 2018). Errors, omissions, and misinterpretations in contract documents are the main reasons for claims and disputes, while inadequate records are a significant cause of delays in processing construction claims (Kumaraswamy and Yogeswaran, 2017).

### **2.7.2 Challenges in Documentation Management**

A large proportion of rework and non-conformance costs are due to deficiencies in documentation. The quality and rigour of record-keeping vary widely between different organisations, with many having different procedures for keeping records. Quality procedures for record-keeping are not effectively implemented in many jobs, and records are often inconsistent in multiple forms and locations (Carmichael and Murray, 2018). Proper documentation means ensuring that events are correctly and promptly recorded when important events are about to occur, are happening, or have happened, rather than creating endless reams of paper to fill endless filing cabinets (Levy, 2021).

### **2.7.3 Best Practices in Documentation Management**

To address these challenges, construction organisations should implement standardised documentation management systems that ensure consistent record-keeping practices across projects. This includes establishing clear guidelines for document creation, storage, and retrieval, as well as regular training for personnel involved in documentation management (Sutton, 2017). Additionally, the use of digital technologies, such as Building Information Modelling (BIM) and cloud-based document management platforms, can streamline the documentation process and improve collaboration among project stakeholders (Levy, 2021).

In conclusion, to the authors above, proper construction documentation and management are essential for the successful delivery of construction projects. By addressing the challenges

associated with poor documentation practices and implementing best practices, construction organisations can improve project outcomes, reduce disputes and claims, and enhance overall productivity (Alwis, 2018). As the construction industry continues to evolve, the importance of effective documentation management will only increase, making it a critical competency for construction professionals.

## **2.8 PROJECT CLOSE-OUT**

Project close-out is the final construction phase of the project's lifecycle. This phase involves collecting the final project documents, sometimes referred to as project deliverables, assembling them into a package, and ultimately presenting this package to the client who requested the project's construction. It is also defined as the length of time between substantial completion and the general contractor receiving final payment. Just as with any of the other project management processes (initiation, planning, execution, monitoring and controlling), project closing serves an important purpose for the organisation and helps it avoid unfavourable and adverse scenarios (Furry, 2017). Thus, project close-out in construction management, the importance of proper project close-out, the process of project close-out and the challenges and best practices in project close-out are discussed below.

### **2.8.1 Project Close-Out in Construction Management**

Project close-out is the final phase of the construction project lifecycle, involving the collection and assembly of final project documents, referred to as project deliverables, into a package for presentation to the client (Furry, 2017). This phase serves a crucial purpose for the organisation, as it helps avoid unfavourable and adverse scenarios that may arise if the project is not closed properly (Hwang and Lim, 2021).

### **2.8.2 Importance of Proper Project Close-Out**

Proper project close-out is essential for maintaining the project management team's efforts, time and credibility. A poor close-out can have long-lasting implications for the business and even derail a project that has otherwise been running smoothly (Hwang and Lim, 2021). During this phase, the project or site manager confirms that all project requirements have been satisfied, all work has been completed, and all promises have been kept (Furry, 2017).

### **2.8.3 Process of Project Close-Out**

The project close-out phase enables the re-engagement of stakeholders, customers, and/or upper management executives to review the relevant work requirements, check for pending tasks, and sign off on completed deliverables (Henry, 2021). A final approval document establishes consensus and serves as legal proof that the project team has duly performed their job and that their work is complete (Furry, 2017). A successful close-out is defined by timeliness and execution, with the general contractor incentivised to close out as soon as possible to receive final payment (Henry, 2021).

### **2.8.4 Challenges and Best Practices in Project Close-Out**

While receiving payment on time is important, it is not as crucial as exceeding the client's expectations, which can lead to a better reputation, more revenue, and ultimately, more clients (Hwang and Lim, 2021). To streamline the process and shorten the time spent tracking down paper and employees on the jobsite, software that tracks every package and part of the project can be utilised (Furry, 2017). A wise general contractor understands the benefit of bridging timeliness with execution, as the sound execution of a close-out defines their personal brand and reputation (Henry, 2021).

In conclusion, project close-out is a critical phase in construction management that requires careful planning and execution to maintain the project team's credibility and avoid unfavourable scenarios. By implementing best practices and utilising technology to streamline

the process, construction professionals can ensure a successful close-out that exceeds client expectations and enhances their reputation within the industry.

## **2.9 CHALLENGES FACED BY CONSTRUCTION MANAGEMENT GRADUATES TOWARDS ATTAINING PROFESSIONAL STATUS**

The construction industry plays a vital role in the economic development of any country, including South Africa, where it significantly contributes to the gross domestic product (GDP) and job creation (Cumberlege, 2008). Despite its importance, the industry has long been associated with negative perceptions, which pose substantial challenges for construction management graduates seeking professional status. According to Rameezdeen (2017), the construction industry has become synonymous with low-quality work, high costs, poor health and safety statistics. Recently, many spectacular accidents involving loss of life, limb and property have occurred on construction sites in South Africa and have been popularised by the media. This literature review discusses the various challenges that hinder the progression of these graduates, as identified in recent studies such as Aghimien et al. (2019) and Mokhothu (2021).

### **2.9.1 Lack of Experience**

One of the primary obstacles faced by construction management graduates is the lack of practical experience. Graduates often find themselves in a paradox where they need experience to secure employment, but they cannot gain that experience without first obtaining a job (Rameezdeen, 2017). This lack of experience can lead to difficulties in meeting the requirements for professional registration, as many councils require a certain number of years of practical experience (Oke, Aigbavboa and Mphahlele, 2018).

### **2.9.2 Unfavourable Policies**

Unfavourable industry policies can also impede the progress of construction management graduates. Policies that do not support the professional development of graduates or that create barriers to entry into the profession can discourage young professionals from pursuing registration (Clarke and Boyd, 2011). These policies may include stringent registration requirements or a lack of support for mentorship programmes that could facilitate the transition from education to professional practice.

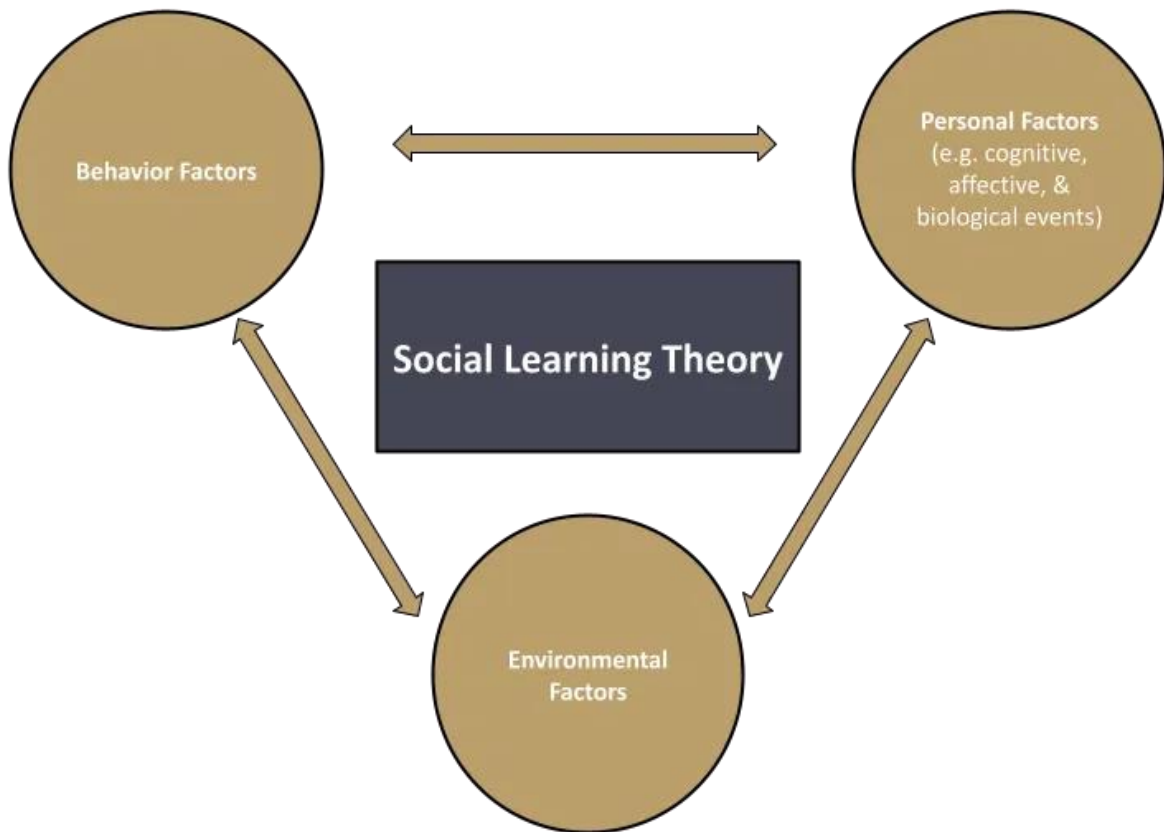
### **2.9.3 Stress and Unrealistic Expectations**

The construction industry is known for its high-stress environment, which can be overwhelming for new graduates. Stress can stem from tight deadlines, high stakes, and the pressure to perform in a competitive field (Mewomo *et al.*, 2022). Additionally, graduates often face unrealistic expectations regarding their capabilities and responsibilities, which can lead to burnout and a reluctance to pursue professional registration (Jolliffe, Ritter and Stevens, 2012).

### **2.9.4 Limited Access to Developmental Experiences**

Many construction management graduates report a lack of access to a wide range of developmental experiences that are essential for their growth and professional advancement. Opportunities for on-the-job training, mentorship, and exposure to various aspects of construction management are often limited (Mackenzie, 2012). This lack of exposure can hinder their ability to develop the necessary skills and competencies required for professional registration. Social learning theory indicates that a worker requires continuous training and learning to be abreast at work in relation to new technology and high productivity.

## Social-Learning Theory



*Figure 2. 2: Bandura's social learning theory*

## Bandura's Theory of Observation Learning.

Table 2. 1: Bandura's theory of observation learning

Attentional Processes	Retention Processes	Production Processes	Motivational Processes
Determine how closely the child will pay attention to the model.  <u>Examples:</u>  Interest value of model's behaviour.  Child's level of arousal.  Child's expectations.	Determine how well the child will remember the model's behaviour.  <u>Examples:</u>  Child's use of memory strategies, such as organisation or rehearsal.  Child's cognitive level.	Determine how well the child can reproduce the model's behaviour.  <u>Examples:</u>  Complexity of the model's behaviour.  Child's physical skills.	Determine how motivated the child is to imitate the model.  <u>Examples:</u>  Vicarious incentives to the child.  Incentives to the child for imitation.

Bandura classifies social learning into four phases, namely the attention process, retention process, production process and the motivational process. The contents of each process are indicated in Table 2.1 the stage of paying attention to a model, how well the learner will remember the details of the model, to what extent will the learner reproduce the pattern of what is learned or the process and how well the learner will imitate the model. These all-influence career development.

### **2.9.5 Lack of Responsibility and Accountability**

In some cases, graduates may find themselves in organisational cultures that do not promote responsibility and accountability. This can result in a lack of ownership over projects and a diminished sense of professional identity, making it challenging for graduates to transition into roles that require a high level of accountability (Rameezdeen, 2017).

### **2.9.6 Stereotypes and Organisational Culture**

Stereotypes associated with the construction industry can also affect graduates' career progression. Negative perceptions of the industry, such as those related to low-quality work and poor health and safety records, can deter graduates from pursuing careers in construction management (Haupt and Harinarain, 2016). Furthermore, organisational cultures that do not value diversity and inclusion can alienate graduates, making it more difficult for them to thrive in their roles (Oke, Aigbavboa and Mphahlele, 2020). Career progression or development theory, Super's developmental self-concept theory, and Super's developmental self-concept theory help to explain and how the stereotype and organisational culture are negated for individual career progression.

Career progression theories help people understand how they choose, develop, and transition in their careers. They can also help people make informed choices and reach their full potential in their careers. They consider factors that influence career choice, stages of development, and the overall career growth process. These different theories can be helpful whether you are just starting out in your career or looking to make a change.

## Holland's Theory of Vocational Types

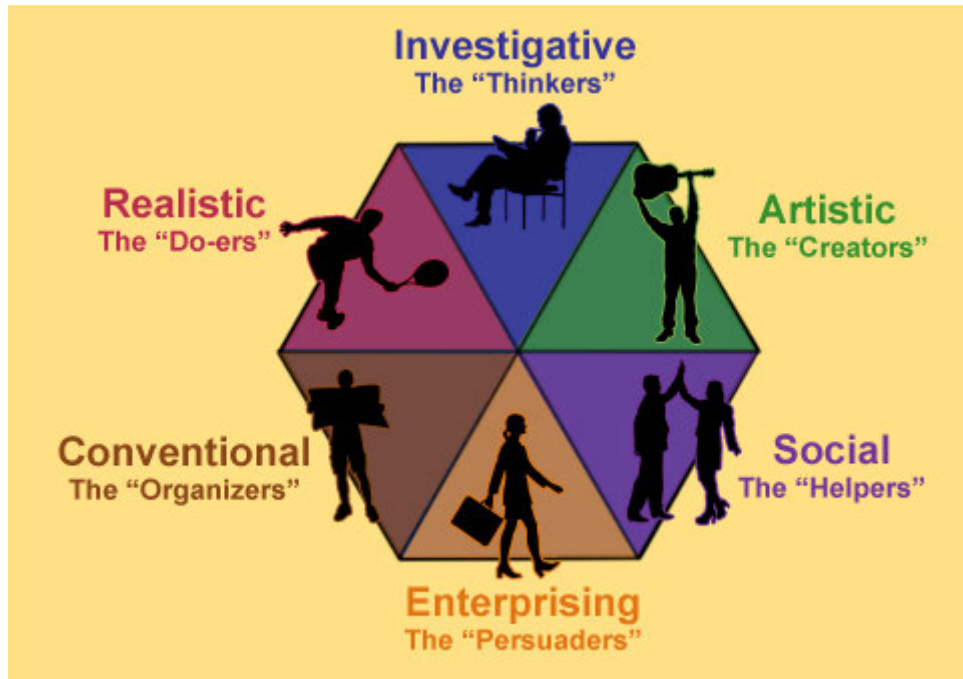


Figure 2. 3: Theory of vocational types (Holland)

Personality traits define future career choices. This idea is exactly what Holland's theory of vocational types is based on. Also known as the Holland Codes or RIASEC theory, it proposes that **people can be classified into six personality types**.

- **Realistic:** You enjoy working with your hands and solving practical problems. Think mechanics, carpenters, or engineers.
- **Investigative:** You are curious and analytical, drawn to research and figuring things out. Scientists, detectives, and data analysts fit here.
- **Artistic:** You are creative and expressive. You love self-expression and working with open-ended ideas. Artists, musicians, and writers are good examples.
- **Social:** You love helping others. You thrive on communication and building relationships, so teachers, counsellors, and social workers are good matches.

- **Enterprising:** You are a natural leader, persuasive and ambitious. [Salespeople](#), entrepreneurs, and business managers fit this type.
- **Conventional:** You value order and structure. You enjoy detailed work and following rules. [Accountants](#), administrators, and editors find satisfaction here.

According to this theory, people are a **combination of these types, with one or two usually being dominant**. The ideal career path aligns with your dominant personality type. So, a realistic person will feel drained in a social work environment, while a social person might find a data analysis job unfulfilling.

Many careers can **blend elements from different types**. For example, a [graphic designer](#) (artistic) might also need to be organised and detail-orientated (conventional) to meet client deadlines.

### **Super's Developmental Self-Concept Theory**

Donald Super developed this theory, which explains how you can form and evolve your perceptions of yourself and your career. According to Super, you go through different stages as you develop your career identities:

- **Growth Stage (Birth–14):** This is where you start developing basic ideas about yourself and the working world. You might explore different hobbies and activities, but career choices are still far off.
- **Exploration Stage (15–24):** During adolescence, you actively explore different career options through education, work experiences, and personal interests. Goals and preferences become clearer.
- **Establishment Stage (25–44):** Now, you enter the workforce and make initial career choices. Successes and challenges you face during this stage will continue to shape your self-concept and how you see yourself fitting into the working world.
- **Maintenance Stage (45–64):** You work to maintain and advance in your profession. You will [reassess your goals](#) and adjust to match changing personal and professional priorities.

- **Disengagement Stage (65+):** As you approach retirement, your focus shifts. You might explore new hobbies or volunteer work. These life experiences can help you redefine your self-concept in a fulfilling way beyond your traditional career.

Super emphasised that these stages are flexible. You can move through them at your pace and even revisit earlier stages if your interests or circumstances change.

The key takeaway? Your self-concept is a work in progress, and your career path should reflect that. As you learn and grow, your ideal career journey might change, too. This theory encourages you to continue to explore and refine your understanding of yourself.

### **Social Cognitive Career Theory (SCCT)**

According to this theory, **two main things influence your path:** you and your environment. Here's what that means:

- **Self-Efficacy:** SCCT focuses on your "self-efficacy beliefs." This is how confident you feel in your ability to do specific things. If you believe you can handle the challenges of a certain career, you will pursue it.
- **Your Interests:** They play a big role in shaping your career path. If you naturally gravitate towards activities related to a particular field, you will find that career more fulfilling.
- **Your Environment:** The world around you shapes your options. Think about things like available jobs, financial resources, and the support you have from family and friends. These environmental factors can limit or expand your career possibilities.

SCCT does not say **one factor is more important**. It focuses on how these things work together. For instance, you might be interested in becoming a doctor. However, you might need to adjust your goals if you have a strong fear of blood (low self-efficacy) or limited access to a medical school (environmental barrier).

### **2.9.7 Recruitment Processes and Job Designations**

The recruitment processes within the construction industry can also be a barrier to entry for graduates. Many organisations prioritise experience over potential, which can disadvantage recent graduates (Bowen *et al.*, 2019). Additionally, job designations may not always align with the skills and qualifications of graduates, leading to underemployment and dissatisfaction (Mewomo *et al.*, 2022).

In conclusion, the challenges faced by construction management graduates in South Africa are multifaceted and stem from various individual, organisational, and systemic factors. Addressing these challenges is crucial for enhancing the professional development of graduates and improving their chances of attaining professional registration. By understanding these barriers, stakeholders can develop targeted interventions that support graduates in their transition from education to professional practice.

## **2.10 MITIGATING FACTORS TOWARDS BECOMING A PROFESSIONAL REGISTERED CONSTRUCTION MANAGER (PR CM)**

The journey to becoming a professional registered construction manager (Pr. CM) involves navigating various mitigating factors that influence an individual's ability to achieve professional status within the construction industry. The term "professional" in this context signifies a recognised level of expertise and competence, particularly within the framework established by the SACPCMP (Brown and Phua, 2011). This literature review discusses the key factors that can facilitate the transition to professional registration for construction management graduates.

### **2.10.1 Regulatory Framework and Professional Standards**

The SACPCMP Act of 2000 outlines the requirements for professional registration, emphasising the importance of competence and adherence to established standards (Council for the Built Environment [CBE], 2001). To register as a Pr. CM, applicants must demonstrate

their competence through relevant qualifications and practical experience. This regulatory framework serves as a foundation for ensuring that construction managers possess the necessary skills and knowledge to perform effectively in their roles.

Despite significant progress in the construction sector, evidence of discrimination against construction graduates in high-paying jobs persists. In recent decades, changes in legislation and social norms have stimulated increased demand for construction management graduates, making it possible for them to seek employment in the construction sector. However, although legislative regulations prohibiting discrimination against graduates in every aspect have been adopted in all the Organisation for Economic Cooperation and Development (OECD) countries, it has been difficult to enforce some of the measures adopted (Allen, French and Poteet, 2016). Policies to achieve greater compliance with anti-discrimination rules in the construction sector include the following (OECD, 2008):

- Creating greater awareness of the legal right to equal treatment by promoting equality and actively disseminating information despite the low awareness of anti-discrimination labour laws in most OECD countries.
- Empowering national bodies promoting equality to conduct formal investigations ex officio (without filing a complaint) can create greater awareness of equality issues among employers and assist potential construction graduates in their professional development.

Offering alternative dispute resolution mechanisms, such as mediation and conciliation procedures, can reduce obstacles to enforcing legal rights by avoiding legal proceedings.

Legislation must be enacted to redress the inefficiencies brought about by discriminatory industrial practices, which tilt construction employment in favour of experienced and already registered construction managers. Implementing change was observed to be more effective through concerted efforts from both the construction firms and the industry's clients being

brought together to deliberate on effective proposals for workforce diversity in the industry.

### **2.10.2 Experience and Skill Development**

A significant mitigating factor in achieving professional registration is the accumulation of relevant experience and the development of essential skills. According to Jolliffe *et al.* (2012), individuals can achieve professional status through extensive hands-on experience, even in the absence of formal qualifications. This experiential learning is critical, as it equips aspiring construction managers with the practical skills needed to oversee complex projects effectively. Many successful construction managers initially work in specific trades before transitioning to managerial roles, allowing them to gain valuable insights into the various aspects of construction (CBE, 2001).

### **2.10.3 Importance of Collaboration and Respect**

Effective collaboration and respect among team members are vital for successful project management. Construction managers must cultivate strong relationships with workers and other stakeholders to facilitate smooth operations on-site. If managers lack hands-on experience or fail to understand the intricacies of each trade, they may struggle to gain the respect of more experienced tradespeople, which can hinder their effectiveness (Rameezdeen, 2017). Therefore, fostering a culture of mutual respect and collaboration is essential for overcoming challenges in project management.

### **2.10.4 Historical Context and Professional Identity**

The historical context of the construction profession also influences perceptions of professional identity. The evolution of construction management as a discipline has led to varying interpretations of what constitutes professionalism within the field. For instance, the role of architects and engineers has historically been viewed as more prestigious, which can affect the self-perception of construction managers (Haupt and Harinarain, 2016). Understanding this context is crucial for construction management graduates as they navigate

their professional identities and seek recognition within the industry.

### **2.10.5 Addressing Challenges and Skill Gaps**

To successfully transition into professional roles, construction management graduates must be equipped to address the challenges they encounter during the design and implementation stages of projects. This includes developing problem-solving skills and the ability to manage conflicts effectively (Mewomo *et al.*, 2022). Educational programmes should emphasise the importance of practical training and mentorship to bridge the skill gap between academic knowledge and industry requirements.

### **2.10.6 Technological transformation**

Technological transformation was not proposed in the empirical literature as a potential mitigating factor; however, by observing the effects of technological change in empirical research in advanced countries, some propositions were derived. It was observed that technology has restructured the structure of skill demands for employees and engineers in the modern construction industry, as machines can perform the heavy work that was traditionally performed manually (Moalusi and Jones, 2019). Thus, technological transformation should be encouraged in the construction industry.

The downside, however, concerns employment displacement, as the construction industry was demonstrated to be highly absorptive of less-skilled men and women who undertake menial work on construction sites (Ibanez, 2017; Craig, 2014). However, the present environment is characterised by digital transformation, with the inevitable result that the skills balance will be restructured, and more opportunities are likely to open up for construction management graduates as they progress in their professional status.

### **2.10.7 Simplify the registration process**

A concise application process that is simple to manage will avoid putting candidates off, especially younger applicants who do not want to go through a convoluted series of recruiting steps. In particular, construction industries should keep in touch with candidates, manage their expectations, and keep them up to date about progress. Even if candidates do not make it through this stage of professional registration or take a job elsewhere, they could still potentially return in the future, so constructive feedback and maintaining positive communication after the process is finished can be useful.

In conclusion, to the review above, the path to becoming a professional registered construction manager is influenced by various mitigating factors, including regulatory frameworks, practical experience, collaborative relationships, and historical context. By understanding and addressing these factors, construction management graduates can enhance their prospects for professional registration and contribute meaningfully to the construction industry. Continuous support through mentorship, practical training, and professional development initiatives will be essential in facilitating this transition.

## **2.11 CONCLUSION**

This literature review has examined the multifaceted landscape of the constraints, challenges, opportunities, and potential solutions that could facilitate the progression of unregistered graduates towards professional status within the South African construction industry. The journey to becoming a Pr. CM in South Africa is fraught with challenges that stem from a combination of regulatory, experiential, and contextual factors. The SACPCMP's Graduate Registration System represents a significant step toward professionalising the construction management field, yet many graduates struggle with the requirements and expectations associated with this transition.

The review emphasises the complexities of the registration process and the importance of

practical experience, mentorship, and collaboration within the industry; stakeholders can develop targeted strategies to support graduates in overcoming these barriers. As the construction industry continues to evolve, particularly in response to technological advancements and sustainability demands, the role of professional registration will remain central to ensuring that construction managers are equipped to meet the challenges of modern projects.

This chapter has provided a comprehensive overview of the current literature pertaining to the mitigating factors that influence the journey toward becoming a Pr. CM, including regulatory frameworks, practical experience, collaboration, and the historical context of the profession. Addressing the identified challenges will not only enhance the professional development of construction management graduates but also contribute to the overall quality and reliability of construction practices in South Africa. This sets the stage for the current study, focussing on assessing the challenges encountered by DUT's unregistered construction management graduates from 2014 to 2017 as they strive to attain professional status, with the potential to contribute valuable insights to both academic discourse and practical implementation. The following chapter discusses research methodology.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 INTRODUCTION**

This section delineates the research methodology employed to achieve the study's aim and objectives. The methodology discussion begins with an examination of the research paradigm, followed by an exposition of the research design. A justification for the selected research approach is then presented. As Creswell and Creswell (2018) assert, research methodology encompasses the overarching approach to the research process, from theoretical underpinnings to data collection and analysis.

The process of crafting a research design commences with positioning the proposed study within a specific research framework (Saunders, Lewis and Thornhill, 2019). Subsequently, data collection and analysis techniques are discussed, each aligned with the chosen paradigm. The section concludes with a discourse on data validity and reliability, pilot study interpretation, and ethical considerations. Sampling methods, research instruments, data collection procedures, and analytical approaches are thoroughly explicated. This chapter explains how the adopted mixed method informed data collection and analysis strategies.

The structure of this methodology section follows the "research onion" model proposed by Saunders *et al.* (2019), progressing from the outer layers of research philosophy and approach to the core elements of data collection and analysis. This framework ensures a comprehensive and logically structured presentation of the research methodology.

### **3.2 STUDY TYPE**

This section details the research methodology, standards, and techniques that were applied to obtain representative data from a sample of Durban University of Technology (DUT) graduates from 2014 to 2017 populations within the. The study employed a mixed method with exploratory, descriptive, and correlational elements to comprehensively investigate the challenges faced by DUT construction management graduates in attaining professional

registration.

The exploratory aspect of the research was essential in examining the real-world problems encountered by graduates in their pursuit of professional status. This approach allowed for a thorough investigation of the existence and nature of barriers to professional registration, providing insights into a relatively unexplored phenomenon within the South African construction industry context (Lune and Berg, 2017).

Descriptive elements were incorporated to accurately depict the experiences, circumstances, and perceptions of the graduates regarding their journey towards professional registration. This aspect of the study aimed to provide a detailed and precise account of the individual, organisational, and systemic factors influencing the low rates of professional registration among DUT construction management graduates (Nardi, 2018).

The correlational component of the research design facilitated the examination of relationships between various factors identified in the study. This approach enabled the study to analyse how individual characteristics, organisational culture, social factors, and systemic influences interacted to impact the professional registration rates of graduates (Apuke, 2017). By combining these research types, the study provided a comprehensive understanding of the complex issues surrounding professional registration for construction management graduates. This multi-faceted approach allowed for the development of targeted interventions and policy recommendations based on a thorough analysis of the challenges faced by graduates in their transition from academic to professional status (Creswell and Creswell, 2018).

### **3.2 RESEARCH METHODOLOGY**

Research methodology refers to the systematic approach employed to investigate a specific research problem, encompassing the rationale for the selection of methods and techniques used in data collection and analysis (Saunders *et al.*, 2019). This section delineates the methodological framework adopted for this study, ensuring alignment between the research objectives and the

chosen methods.

As Creswell and Creswell (2018) assert, the selection of an appropriate methodology is crucial in addressing research questions effectively. The study employed quantitative research methodology.

This involved the creation of data through structured questionnaires distributed to a sample of construction management graduates. The quantitative approach aimed to quantify the extent of the challenges faced by graduates, such as perceptions of career pathways and remuneration, and to analyse the data statistically to identify patterns and correlations. In this context, samples of the population were studied to derive characteristics and insights about their experiences. The quantitative method sought to generate "real answers" from "hard data," allowing for a systematic examination of the factors affecting professional registration (Schoonenboom and Johnson, 2017). By employing this methodology, the research aimed to provide clear, objective findings that could inform policy decisions and interventions aimed at improving the transition from graduate to registered professional in South Africa.

The methodological framework is guided by the pragmatic paradigm, which emphasises the importance of selecting methods that best address the research problem, regardless of philosophical underpinnings (Morgan, 2021). This approach allows for a flexible and holistic examination of the complex factors influencing CM graduates' professional progression.

### **3.3 RESEARCH DESIGN**

According to Taherdoost (2020), a research design is a framework that executes a research project and processes that must be followed in order to collect data for the study's conclusion. The research design serves as the blueprint for conducting the study, providing a structured plan for data collection, measurement, and analysis (Yin, 2018). The research design was established as a strategy for collecting and analysing appropriate data relevant to the study's objectives. It served as a guiding framework for conducting the research project, ensuring that the chosen

methods were suitable for addressing the research questions posed (Creswell and Plano Clark, 2018). The design was informed by the subject under investigation, the target audience, and the researcher's experiences. A descriptive research design was selected, which allowed for a comprehensive exploration of the factors influencing the professional registration of construction management graduates.

The explanatory sequential design was chosen for its ability to provide a comprehensive understanding of the research problem. The quantitative phase also involved a survey of DUT construction management graduates from 2014 to 2017, identifying key barriers and factors influencing professional registration. This design aligns with the study objectives by:

- Identifying specific barriers through quantitative analysis,
- Analysing contributing factors using quantitative data, and
- Informing policy recommendations based on comprehensive findings.

The integration of quantitative methods allows for a more nuanced understanding of the challenges faced by CM graduates, balancing breadth and depth in the research findings (Fetters and Molina-Azorin, 2020).

### **3.3.1 Research philosophy and paradigms**

The most basic consideration and classification of research is the philosophical level or dimension. This level relates to research assumptions based on the most general features of the world. It encompasses such aspects as the mind, matter, reality, reason, truth, the nature of knowledge and proofs of knowledge (Crossan, 2003). Simply put, research philosophy refers to the philosophical assumptions and undertakings that implicitly or explicitly guide an inquiry in a study or research. A literature scan on the various philosophical views or branches reveals that the most prevalent views or positions are ontological and epistemological. Other views, such as sociological and axiological assumptions (Neumann, 2000; Shakantu, 2004; Easterby-Smith et al., 2008), can also be found in the research methodology literature.

### 3.3.2 Ontological view/assumption

Ontology explains the nature of knowledge and assumptions about reality (Pathirage, Amaratunga and Haigh, 2008). It discusses the claims and assumptions that are made about the nature of reality. The ontological view therefore refers to the researcher's position or answer to the question about the nature of the reality under investigation. This assumption about the nature of the world complements the formulation of the research philosophy and so influences the selection of the appropriate research approach and methods. Shakantu (2004) identifies two seemingly opposing but competing ontological views in which researchers and sociologists can base their methodology. Shakantu (2004) refers to what Babbie (1995), Neumann (2000) and Chia (2002) call the "Parmenidean and Heraclitean" ontologies.

In the Parmenidean view or context, according to Chia (2002), "reality is composed of clear entities with identifiable or discrete properties and characteristics". In the Heraclitean worldview, on the other hand, reality is viewed or seen as "inclusively processual". Put differently, all things are in constant flux regardless of how they appear to the senses. These polarised ontological views only provide a shared vocabulary that can be used to describe objects and/or concepts that exist, their properties and their inter-relationships. Ontological concerns therefore deal with the nature and conception of reality. It studies being or existence, their basic categories and relationships to determine what entities and what types of entities exist (Sutrisna, 2009).

There are two types of ontological views based on whether the external world has a predetermined nature and structure or not: the realist and idealist ontologies (Johnson and Duberly, 2000; Sexton, 2004). Realists start with a stance of a commonly experienced external reality with predetermined nature and structure, whereas idealists assume that different observers may have different viewpoints and that what counts for the truth varies in space and time. This view is consistent with the proposition of Gill and Johnson (2002) that research methods can be positioned by taking nomothetic (realist) and ideographic ontologies into account. Gill and Johnson (2002) define a nomothetic approach as that which utilises quantified

methods for data analysis, while the ideographic approach deals with the analysis of subjective accounts generated through inside situations and involving oneself in the everyday flow of life.

Nomothetic approaches emphasise the importance of basing research upon systematic techniques as well as methods employed in the natural sciences that focus on the process of testing hypotheses. It also emphasises the explanation of laws and deductions using quantified operational concepts. Ideographic approaches, on the other hand, emphasise the analysis of subjective accounts that are generated by getting inside situations. The emphasis is upon theory that is grounded in empirical observations to gain explanation and understanding. In sum, while experiments and survey methods are associated with the nomothetic view, action research, case studies and ethnography are associated with the ideographic view (Pathirage et al., 2008).

However, Sutrisna (2009) provides the objective and constructive continuum, which connects all the illustrations or examples of ontological assumptions or views described by authors. In this continuum, Sutrisna (2009) explains that objectivism asserts that phenomena and their meanings have an existence that is independent from the actors, while constructivism asserts that phenomena and their meanings are continually being accomplished by their actors. Expressed differently, interactions not only produce phenomena and their meanings, but they also undergo a constant state of revision. These issues are further discussed in section 3.3.4 under research paradigms. Nevertheless, the next section deals with the epistemological research philosophy.

### **3.3.3 Epistemological assumption/view**

Epistemology refers to the claims of what is assumed to exist and can be known. It looks at the theory of knowledge with reference to its methods, validation and possible ways of gaining knowledge in the assumed reality. Simply put, epistemology describes what the researcher knows about the reality and assumptions about how knowledge should be acquired and accepted. Epistemology, therefore, is concerned with how and what the researcher knows and the questions about how and what it is possible to know (Shakantu, 2004).

In epistemological undertakings, the two most commonly used examples are positivism and interpretivism. Sometimes, these may be referred to as objectivism and subjectivism. Easterby-Smith et al. (2008), in their review of research philosophies, refer to the two ends of epistemological undertakings as positivism and constructionism. The positivists believe that the social world exists externally, and objective measures should be used to its properties through where the observer must remain independent of the phenomena being observed. Social constructivism on the other hand stems from the view that reality is not objective and exterior; it is socially constructed and given meaning by people who are conscious, purposive actors with ideas about their world and attaching meanings to what is going on around them (Robson, 2002). These two fundamentally different and competing schools of thought demonstrate the complexity of the issues embodied in epistemological and ontological view-points.

However, Sutrisna (2009) provides a hyper-simplification of these two philosophical viewpoints by stating that positivism mainly takes objectivism as the basis of understanding reality and that there is only one objective reality experienced by all. Similarly, interpretivism mainly bases its understanding of reality on constructivism which is constructed individually and interpreted differently by each individual. It must be noted that each of the two dimensions or viewpoints can be considered multi-dimensionally. This underlines the two-dimensional continuum explained by Sutrisna (2009). The intention of the continuum is to highlight the similarities among the assumptions or links between the philosophical view-points. The next section on research paradigms will provide a better understanding of these issues.

### **3.3.4 Research paradigms**

The science of research has its roots in philosophy. The philosophy of research can therefore be viewed as a way of describing how research can be conducted and how the real world, empirical data, models and theories relate to each other. A research methodology is driven by certain ontological and epistemological assumptions about the reality of the social world. These assumptions invariably affect how the research is carried out.

A research paradigm is the fundamental model or scheme that organises the researcher's view and reasoning (Babbie, 2005). Social scientists make use of a variety of paradigms to organise how they understand and enquire into social life. Thus, paradigms provide a powerful range of possibilities for structuring research. Babbie (2005) argues that each paradigm makes certain assumptions about the nature of social reality. By their nature, paradigms are neither true nor false. They merely provide different ways of viewing and seeking explanations. Paradigms may be considered useful or not depending on the context of the study.

Saunders, Lewis and Thornhill (2007) assert that although it is useful to attach research approaches to different philosophies/paradigms, such labelling has no real practical value. However, such representations or attachments provide an understanding of how theory is related to each research philosophy. The researcher must therefore find ways in which a particular paradigm can be useful and how it can guide the research. It is also important to note the consistency between the aim and objectives of the research, the problem statements/research questions, the methods and the personal philosophy of the researcher essentially underpins and drives the research process. At this point, the following sections provide an understanding of the two extremes of research paradigms: positivism and phenomenology.

### **3.3.5 The positivist paradigm**

Positivism generally denotes the belief in a logically ordered objective reality that can be understood through logical analysis (Babbie, 2005). Positivism, which originates from the thinking of Comte (1853), was for centuries the dominant method of scientific inquiry derived from the study of natural sciences. Indeed, what could be described as the traditional scientific approach to research has its underpinnings in the philosophy of positivism. The positivist approach to the social sciences assumes that things can be studied as hard facts and that the relationship between these facts can be scientifically established as laws. According to the positivists, these laws have the status of truth, and they study social objects in much the same way as studying natural objects. Babbie (2005) suggests that there are three distinct generations of the positivist philosophy. These generations follow from the period that allowed the

contemplation of social life to break away from religious interpretations and so established human beings as the main characters in the development and accumulation of scientific knowledge. The first generation of these philosophers includes Locke, Hume, and Comte. This generation established in the 18th and 19th centuries was associated with the early traditions of positivism. They were followed by the second generation of logical positivism associated with the early 20<sup>th</sup>-century philosophers. These include Carnap (1932) and Ayer (1936), collectively known as the Vienna Circle (Crossan, 2003). The third generation emerged during the post-war period associated with Hempel (1965).

The fundamental reasoning of positivism assumes that an objective reality exists that is independent of human behaviour and therefore not a creation of the human mind. It suggests that the senses should be used to accumulate data that are objective, discernible and measurable. Any other thing should be rejected. This implies that positivism assumes that the real world can only be studied through the utilisation of methods that prevent human contamination of its apprehension or comprehension (Nongiba, 2008). Logical positivists stress the importance of induction and verification and the establishment of laws. This presents a major departure from the early tradition of positivism. The aim of the logical positivists is to cleanse scientific knowledge of subjective and speculative views. They do this by the use of mathematics and formal logic to analyse statements about the observed world using the process of induction as a means of establishing generalisations and laws. Put differently, the proponents of logical positivism argue that numerical methods and mathematics are considered above the human language of description and so assumed to be the only appropriate method for obtaining facts scientifically. The standard positivists (third generation) who emerged after the Second World War focused on the need for reasoning that moves from theoretical ideas to a logical conclusion through deductive thinking.

The general features of the positivist philosophy have several implications for researchers and social scientists. These implications, according to authors, Easterby-Smith et al. (2008) and Pathirage et al. (2008), include: methodological: all research should be quantitative and only

quantitative research can form the basis for valid generalisations and laws; value-freedom: the choice of how and what to study should be determined by objective criteria rather than by human beliefs and interests; causality: the aim should be to identify causal explanations and fundamental laws that explain human behaviour; independence: the researcher is independent of the subject under investigation; and reductionism: problems are understood better if they are reduced to the simplest possible elements.

A major shortcoming of the positivist philosophy is that it does not provide the means to measure human beings and their behaviour in an in-depth manner. Human beings are not objects and are therefore subject to many influences on behaviour, feelings, perceptions and attitudes. These attributes are rejected by positivists and regarded as irrelevant, belonging to the realm of metaphysics. While the positivist approach yields useful data for analysis, its limitations provide a superficial view of the phenomenon under investigation. However, the positivist philosophy embraces a conception of truth in which verifiable statements agree with identifiable and ascertainable facts of reality (Crossan, 2003). Positivism therefore promotes a more objective interpretation of reality using concrete data from surveys and experiments.

### **3.3.5 Phenomenological paradigm**

A phenomenon is an observable occurrence, experience, circumstance, or fact that is perceptible to the senses. Phenomenology is therefore concerned with methods that examine people and their social behaviour. Phenomenology has its roots in the social sciences and so sees the social world as a world of meanings. Thus, the social world is not made up of entities that exist external of the subjective experience of its members. The phenomenological or interpretivist perspective offers researchers and social scientists a radical alternative to the positivist methodology. From the phenomenological viewpoint, there is a fundamental difference between the subject matter of the natural sciences and that of the social sciences.

Natural science deals with matter that lacks consciousness. Therefore, its behaviour can be explained as a reaction to the external stimuli. However, this explanation cannot be applied to

human beings. Human beings see, interpret and experience the world in terms of meanings and actively construct their individual social reality. Meanings do not have independent existence; they are rather constructed and reconstructed by actors in the course of social interaction. This clearly explains why the positivist and phenomenological perspectives employ different research methods. They proceed from diametrically opposite assumptions about the nature of social reality (SOCYBERTY, 2008).

Phenomenology holds that assumed notions and perceptions are often out of contact with the entities they purport to see, know or interpret; it calls for a return to the foundations of meaning and experience. Shakantu (2004) notes that phenomenological research collects data in the form of words and observations and analyses it based on the interpretation of these data rather than on numbers and statistical manipulations. Authors, Saunders et al. (2000); Crossan (2003); Veal (2006); and Easterby-Smith et al. (2008), have highlighted the main features or elements of the positivist and phenomenological paradigms of research. A summary of these features and research implications is provided in Table 3.1.

Table 3. 1 Summary of implications and basic features of positivism and phenomenology

<b>Key areas</b>	<b>Positivism</b>	<b>Phenomenology</b>
<b>Basic viewpoints and beliefs</b>	The world is external and objective; the observer is independent, and science is value-free.	The world is socially constructed and subjective; the researcher is part of what is observed, and science is driven by human interests and motives.
<b>Method of research</b>	Focus on facts; look for causality and fundamental laws; reduce phenomenon to the simplest elements and formulate hypotheses and test them.	Focus on meanings; try to understand what is happening; look at the totality of each situation and develop ideas through induction from data.
<b>Research design</b>	Structural, formal and specific detailed plans.	Evolving and flexible.
<b>Involvement of the researcher</b>	The researcher remains distanced from the material being researched; short-term contract.	The researcher gets involved with the phenomenon being researched, emphasising on trust and empathy.
<b>Preferred strategy</b>	Operationalisation of concepts so that they can be measured.	Use of multiple methods to establish different views of phenomena.
<b>Sampling</b>	Large samples and	Small samples

<b>Key areas</b>	<b>Positivism</b>	<b>Phenomenology</b>
	numbers selected randomly.	investigated in-depth or over time/small numbers of cases chosen for specific reasons.
<b>Data collection methods</b>	Experiments, surveys, structured interviews, and observation.	Observations, documentation, open-ended and semi-structured interviews.
<b>Research instruments</b>	Questionnaires, scales, test scores, and experimentation.	Researcher.
<b>Strengths</b>	Provides a wide coverage of range of situations.	The ability to look at change processes over time.

**Source: Author.**

### **3.5.6 Combined approaches**

The rationale/need for a sound understanding of philosophical issues in research has been established in section 4.4. In this section, the term “combined approach” refers to a combination of the whole or parts of different research philosophies either originating from the same or different paradigms in a particular research situation (Nongiba, 2008:97; Pathirage et al., 2008).

Many researchers discuss the various philosophical stances only from the perspective of their research. Nevertheless, philosophical stances actually portray a bigger picture because the researcher’s perception of reality influences to a great extent the conduct of the research. Researchers can approach theory building and testing from different directions. While some

researchers predominantly use experiments and surveys to test theories, others use action research and ethnography for theory building (Pathirage et al., 2008). This approach places research at polar opposites as it infers that the methods are mutually exclusive. This polarisation is obvious in the preceding sections of this chapter. After reviewing a synthesis of the discussions on philosophical assumptions and paradigms, it is evident that the positivist perspective is underpinned by nomothetic, realist, Parmenidean, and objective view-points or assumptions.

#### Key areas: Positivism versus Phenomenology

There are significant differences between the basic viewpoints and beliefs of positivism and phenomenology. The positivist perspective interprets the world as external and objective with the observer independent from the phenomena being studied. The positivist perspective maintains science is value-free. The world is socially constructed and subjective; the researcher is part of what is observed; and science is driven by human interests and motives.

With reference to methods of research, the positivist approach focuses on facts; looking for causality and fundamental laws; reducing phenomenon to their simplest elements; and formulating hypotheses to test them through controlled experiments. The constructivist approach prioritises understanding meanings; to understand what is happening; look at the totality of each situation; and develop ideas through induction from data. Research design Structural, formal and specific detailed plans Evolving and flexible Involvement of the researcher. The researcher remains distanced from the material being researched, short term contact. The researcher gets involved with the phenomenon being researched; long term contact; emphasis on trust and empathy. Preferred strategies also differ between the two approaches. Positivist research seeks to operationalise concepts so that they can be measured quantitatively. On the other hand, constructivist research uses multiple methods to establish different views of the phenomena being studied. Sampling large samples and numbers selected randomly. Small samples investigated in-depth or over time/small numbers of cases chosen for specific reasons. Data collection methods, experiments, surveys, structured interviews and

observation. Observations, documentation, open-ended and semi-structured interviews. Research instruments questionnaires, scales, test scores and experimentation. Researcher strengths provides wide coverage of the range of situations Ability to look at change processes over time philosophy (positivism). On the other hand, ideographic; idealist; Heraclitean; interpretivist/subjective or constructivist viewpoints are consistent with phenomenology. Within the positivist ideology, research moves from theory to data and within the phenomenological ideology, research moves from data to theory (Pathirage et al., 2008).

However, the richness of real-world situations implies that a particular paradigm or assumption is unlikely to present a complete picture. Simply put, different philosophical assumptions or viewpoints provide different perspectives of the real world. This can be likened to viewing the world through a telescope or an X-ray machine. Each of these can only reveal certain features while being blinded to others.

In light of the foregoing, the following arguments support the possibility of adopting more than one viewpoint in a research. Providing insight into the nature of philosophical stances/paradigms, Babbie (2005:34) argues that paradigms represent a variety of views, each of which offers insights the others lack while ignoring aspects of social life that the others reveal. In their view, Easterby-Smith et al. (2008) state that the dichotomy between the positivist and phenomenological worldviews has led to sharp differences of opinion between researchers about the desirability of methods. Easterby-Smith et al. (2008) maintain that the practice of research involves a lot of compromises between pure positions. This understanding suggests that seeing positivism and phenomenology as related concepts is useful.

Again, the understanding that empirical and theoretical research is a dialectical relationship helps in seeing research approaches as a set of tools or directions that the researcher may draw on as and when appropriate. The growing disclosure on philosophical and methodological pluralism in modern research further challenges the polarised views on philosophies and approaches (Pathirage, 2008).

Construction management as a discipline combines highly complex, technical and social systems and is therefore at the centre of natural and social sciences (Shakantu, 2004). This implies that some aspects of positivism (natural science) and phenomenology (social science) can both be relevant in construction management research and can therefore be used in a complementary manner. Having established this fact, the philosophical position of this research and the justification for the stance are discussed in the next section.

### **3.6 TARGET POPULATION**

Sekaran and Bougie (2019) describe the target population as a group of interest to the researcher, the group to which the researcher would like the results of the study to be generalised. The target population for this study consisted of construction management graduates from the Durban University of Technology (DUT) who completed their studies between 2014 and 2017. This cohort was specifically chosen because they represented individuals who possessed the relevant information and experiences necessary to address the research questions posed in the study (Croucher and Cronn-Mills, 2015). The definition of the target population was crucial, as it allowed the research to focus on a specific group that had navigated the challenges of transitioning from academic training to professional practice in the construction industry. As Bryman, et al. (2014) noted, the target population is the entire group about which information needs to be ascertained, and in this case, it was essential to gather insights from graduates who were directly affected by the barriers to professional registration.

By concentrating on the graduates from DUT, the study aimed to comprehensively examine the unique challenges they faced in attaining professional status. This focus permitted a detailed exploration of the individual, organisational, social, and systemic factors that contributed to the low rates of professional registration among this specific group. Furthermore, the targeted timeframe of 2014 to 2017 allowed for an analysis of recent graduates, providing up-to-date insights into the current landscape of professional development within the construction management field. The selection of this target population was particularly relevant given the pressing need for skilled professionals in South Africa's construction sector, as highlighted by

Aigbavboa *et al.* (2022). Engaging with this group not only aimed to inform policy discussions and industry practices but also sought to enhance the employment prospects for unregistered construction management graduates, thereby contributing to national development goals.

### **3.7 SAMPLING METHOD**

According to Majid (2018), sampling is the selection of a set of people or things that are considered representative of the group to which they belong, to study or determine the characteristics of the group. This study employed a non-probability sampling approach, specifically utilising convenience sampling. Non-probability sampling involves selecting sample units based on subjective judgement rather than random selection (Taherdoost, 2020). The research team opted for this method due to its cost-effectiveness, speed of implementation, and potential to reduce non-response error compared to probability sampling techniques (Etikan and Bala, 2022). Convenience sampling, a type of non-probability sampling, was chosen as the primary sampling strategy. This method involves selecting participants based on their accessibility and willingness to participate (Sharma, 2021). The study targeted construction management graduates from Durban University of Technology (DUT) who completed their studies between 2014 and 2017. This approach was deemed appropriate given the study's focused scope and the relative ease of accessing this specific group of graduates.

The decision to use convenience sampling was influenced by several factors. Firstly, it allowed for efficient data collection within the time and resource constraints of the study. Secondly, the method was well-suited to the exploratory nature of the research, which aimed to identify challenges faced by a specific cohort of graduates in attaining professional registration (Aspers and Corte, 2019). To mitigate potential bias inherent in convenience sampling, the study took several steps. They ensured a diverse range of participants within the target population by reaching out through various channels, including alumni networks, professional associations, and social media platforms. Additionally, the team made efforts to include graduates with varying levels of professional experience and from different sub-sectors within the construction industry.

### **3.7.1 Probability Sampling**

For the quantitative phase of the study, stratified random sampling, a probability sampling technique, was utilised. This method was chosen due to its ability to ensure representation across different subgroups within the target population (Taherdoost, 2016; Zitha and Penceliah, 2022).

The population of DUT construction management graduates from 2014 to 2017 was stratified by graduation year, ensuring that graduates from each year were proportionally represented in the sample. This approach enhanced the representativeness of the sample and allowed for comparisons across different graduation cohorts (Etikan and Bala, 2017).

### **3.7.2 Sample Frame**

According to Yin (2018), a sampling frame is a list of the actual cases or elements from which a sample is drawn or is representative of the population. The elements include individuals, households, institutions, or any other relevant elements that can be investigated. Therefore, this study sample comprises unregistered construction management graduates who from Durban University of Technology (DUT) between 2014 and 2017.

*Table 3. 2: Composition of all CM graduates participants sample frame*

	<b>DUT Construction Management Graduates</b>	<b>Number of Graduates</b>
1.	2014 to 2015	100
2.	2015 to 2016	50
3.	2016 to 2017	50
Total		200

Soon after obtaining the gatekeeper permission from DUT to access the database of construction management graduates from 2014 to 2017, the researcher moved on to the questionnaire administration stage. The questionnaire was distributed to unregistered DUT construction management graduates from 2014 to 2017 for the purpose of collecting quantitative data. Each respondent was given a maximum of 30 minutes to complete the surveys.

### **3.7.3 Sample Size**

Sharma (2017) refers to the sample size of a study as the number of units that are selected from the target population. When it is not possible to study an entire population, Slovin's formula sampling technique is used; as a result, a smaller sample is taken using a convenience sampling technique. Slovin's formula allows the researcher to sample the population with the desired accuracy. Using the cluster random sampling technique and applying Slovin's formula with a 5% margin of error. The researcher was given an idea of how large his sample size needs to be to ensure reasonable accuracy of results. Using the cluster random sampling technique and by applying Slovin's formula with a margin of error of 5%, the researcher calculated the appropriate sample size to ensure reasonable accuracy of results:

$$n = N/(1+Ne^2)$$

*n* is sample size

N is Population size

$e$  is margin of error (if there is no given margin of error, then use 5%)

1. Sample size for graduate year: 2014 - 2015

$$n = 100/[1+100 (0.05^2)]$$

$$n = 100/[1+100 (0.0025)]$$

$$n = 100/[1+ 0.135]$$

$$n = 88.$$

2. Sample size for graduate year: 2015 – 2016

$$n = 44$$

3. Sample size for graduate year: 2016 - 2017

$$n = 44$$

The total sample size =  $88 + 44 + 44 = 176$ . But actual response = 200

The sample size for the study aimed was 200. Sample size determination involves choosing the number of observations or replicates to include in a statistical sample. The sample size is an important feature of any empirical study in which the goal is to draw inferences about a population from a sample (Taherdoost, 2016). Previous research shows that there are approximately 1 000 CM graduates in South Africa; however, it is not possible to distribute questionnaires and get responses from everyone. Thus, according to Taherdoost (2017), researchers need to maximise the sample size and provide several guidelines in relation to sample size selection.

Thus, with regards to this study, the sample size was selected with the understanding that surveying the full population was not feasible due to cost and time factors. This was done by first identifying the target group, in this case, the managers in broad terms. It is also worth noting that for populations with fewer than 100 participants, there is little point in sampling; hence, researchers should survey the whole population. Also, if the population is said to be around 500, half, which is 50%, should be sampled, while 20% of a population of around 1500 should be sampled. However, a population beyond 5000 denotes it becomes almost irrelevant; therefore, a sample size of 400 should be considered. Hence, for this study, the researcher considered 200 CM graduates only since it is impossible to investigate the entire target population.

The sample size sampled for this study was 200 respondents due to time and resource factors. Respondents were also selected instead of randomisation because they were easy to access since the researcher obtained information from the university database.

#### **3.7.4 Recruitment Process**

Following ethical approval from the DUT Institutional Research Ethics Committee (IREC), the researcher obtained gatekeeper permission from the DUT Database Management Systems department to access contact information for graduates from 2014 to 2017. A letter of information and consent form was distributed to potential participants, outlining the study's objectives and the nature of their involvement.

#### **3.7.5 Inclusion and Exclusion Criteria**

The study included only unregistered DUT construction management graduates who completed their degrees between 2014 and 2017. This specific timeframe was chosen to focus on recent graduates who had sufficient time to pursue professional registration but had not yet attained it. Graduates from before 2014 or after 2017 were excluded from the study to maintain focus on the target cohort (Majid, 2018).

## **3.8 DATA COLLECTION METHODS**

### **3.8.1 Primary Data Collection**

Primary data was collected through a structured questionnaire survey, which was designed to gather specific insights from the target population of DUT construction management graduates from 2014 to 2017. The questionnaire aimed to identify the barriers to professional registration with the SACPCMP. The survey employed closed-ended questions, which facilitated easier analysis and provided fixed response options for participants. Prior to the final distribution of the questionnaire, a pilot test was conducted with ten graduates to assess the validity and clarity of the questions. Feedback from this pilot study was instrumental in refining the questionnaire design, ensuring that it effectively captured the necessary data for the research objectives (Sekaran and Bougie, 2019). This approach was deemed appropriate due to the difficulty in accessing a comprehensive list of graduates. Two hundred questionnaires were circulated among potential respondents, utilising face-to-face distribution to enhance response rates. Additional methods such as email and postal service, self-administration, and administered via MS Form and mailed link of questionnaires were also employed, with follow-up communications conducted via telephone and email to encourage participation (Englander,

2020; Bless, Higson-Smith and Sithole, 2018).

### **3.8.2 Secondary Data Collection**

Secondary data was sourced from existing literature, including academic journals, conference papers, dissertations, and reports from various South African and international organisations. This data played a crucial role in contextualising the research and identifying key issues faced by graduates in the professional registration process. The secondary data was essential for the literature review component of the study, helping to outline the existing knowledge base and identify gaps that the primary research aimed to address (Saunders, Lewis and Thornhill, 2016). The combination of primary and secondary data collection methods provided a comprehensive understanding of the challenges faced by DUT construction management graduates, allowing for a thorough analysis of both individual and systemic factors influencing professional registration rates.

### **3.8.3 Questionnaire Design**

The design of the questionnaire was guided by principles of effective survey construction, emphasising clarity and relevance to the research objectives. The final instrument comprised several sections, including demographic information, specific barriers to registration, and perceptions of current support systems such as the Graduate Registration System. The questionnaire's closed-ended format was chosen to facilitate quantitative analysis, enabling the research team to derive descriptive statistics and identify trends within the data. The design process included a rigorous review to ensure that questions were straightforward and did not lead to ambiguity. This attention to detail was crucial in achieving a high response rate and ensuring the reliability of the collected data (Hazzi and Maldaon, 2015).

The structured part of the questionnaire is answered based on the Likert scale of five and four ordinal measures of agreement to each statement from 1 to 5. Englander (2020), as shown in the following sections. The Likert scale is important to know respondents' outlooks or attitudes

about something. The reasons for adopting this simple scale are:

- To make the evaluation of the collected data easier and
- To provide simplicity for the respondent to answer

The respondents should indicate how closely their approaches match the question or statement on a ranking scale. Respondents were asked about their agreement on the variables causing cost and time overruns. For each variable, two questions were asked: the degree of impact and the frequency of occurrence. The degree of impact and the frequency of occurrence were categorised on a five- and four-point scale, respectively (Bless, Higson-Smith and Sithole, 2018). For controlling the challenges encountered by DUT's unregistered construction management graduates from 2014 to 2017, the respondents were asked to highlight their recommendations to minimise the challenges encountered in an open-ended question. After data was collected on the challenges encountered by DUT's unregistered construction management graduates from 2014 to 2017, the responsible parties were identified, and mitigation measures were recommended.

The data collection methodology employed in this study was comprehensive and well-structured, combining both primary and secondary data sources to address the research objectives effectively. This methodological rigour is expected to contribute significantly to the understanding of the challenges faced by construction management graduates in South Africa.

### **3.9 QUESTIONNAIRE FORMAT AND SECTIONS**

According to Vaus (2014: 58) and Wegner (2016: 185), a questionnaire is designed for four purposes, such as to maximise the accuracy and relevancy of the information to be obtained, to facilitate the gathering of information, to meet research objectives, and to maximise the participation of relevant elements in the sample. The questionnaire was designed to consist

of three major sections, each aimed at collecting comprehensive data relevant to the research objectives. The first section gathered demographic information about the respondents, including age, gender, and educational background. This information was crucial for understanding the context of the participants and ensuring a representative sample. The second section focused on identifying the specific barriers encountered by the graduates in their pursuit of professional registration with the SACPCMP. It included questions about personal experiences, institutional support, and external factors affecting their registration process.

The final section aimed to evaluate the effectiveness of existing initiatives, such as the Graduate Registration System, and to solicit feedback on potential strategies for improvement. This structured approach allowed for a systematic analysis of the data collected, ensuring that all relevant aspects of the graduates' experiences were addressed.

### **3.10. RESPONSE LIMITATION**

Simple random sampling stratified method was used.

### **3.11. DATA ANALYSIS**

Data analysis is the process whereby researchers take the raw data that have been entered into the data matrix and create data obtained from questionnaires that were counted and double-checked for any errors before capturing any information (Field, 2017). Data analysis was conducted using a rigorous process to ensure accuracy and reliability. Initially, the raw data from the questionnaires were entered into a data matrix, where they were meticulously checked for errors before being captured for analysis (Bless *et al.*, 2018). The results were then presented in various graphic formats, including tables, bar charts, and pie charts, accompanied by brief analyses that provided insights into the significance of the findings. The analysis utilised the latest version of the Statistical Package for the Social Sciences (SPSS), version 26, which is widely recognised for its user-friendly interface and robust analytical capabilities (Field, 2017). Frequency tables were employed to enhance the accuracy and efficiency of data processing,

allowing for a clear presentation of the results.

### **3.11.1 Data Capturing**

Data capturing was executed using SPSS version 26, ensuring that all responses were accurately recorded and represented with the necessary tables, figures and graphs produced to illustrate responses. Each questionnaire was scrutinised for legibility and completeness, particularly focussing on the coded information. The emphasis on accuracy during data input was paramount, and a detailed report of all statistical results was generated to provide a comprehensive overview of the findings.

### **3.11.2 Quantitative Data Analysis**

The quantitative component of the study involved the collection and analysis of numerical data to identify patterns and relationships among variables (Zitha, 2021). This approach was particularly useful in measuring the extent of specific barriers to professional registration and evaluating the effectiveness of existing initiatives. The quantitative analysis involved both descriptive and inferential statistics, which are essential for drawing meaningful conclusions from large datasets. Descriptive statistics were computed to summarise the data, including frequency counts and percentages for categorical variables, as well as measures of central tendency and variation (Hair *et al.*, 2018). Graphical representations, such as bar and pie charts, were created to facilitate understanding of the data. Inferential statistics were employed to generalise findings from the sample to the broader population of DUT construction management graduates. This involved random sampling techniques and the application of various statistical tests to assess central tendencies and distribution characteristics (Johnson and Christensen, 2019).

Factor analysis was also conducted to determine whether the variables being evaluated measured similar constructs, thereby allowing for a more nuanced understanding of the data (Grossoehme, 2020). The combination of descriptive and inferential statistics, along with factor analysis,

provided a robust framework for analysing the quantitative data collected through the questionnaire. This methodological approach enabled the study to uncover meaningful insights and draw reliable conclusions regarding the challenges faced by DUT construction management graduates in attaining professional registration.

### **3.11.3 Qualitative research designs**

Leedy and Ormrod (2015) describe five common qualitative research designs. These were defined briefly and the designs that talk to this research in more detail in the following section are explored:

**Case study:** A case study delves deeply into a specific individual, program, or event over a predetermined period of time. In other words, in a case study, a particular individual, program, or event is studied in depth for a defined period of time.

**Ethnography:** In ethnography, the researcher looks at an entire group and, more specifically, a group that shares a common culture.

**Phenomenological study:** This refers to a person's perception of an event, as opposed to the event as it exists external to the person. Therefore, a phenomenological study attempts to understand people's perceptions, perspectives and understandings of a particular situation.

**Content analysis:** A content analysis is a detailed, systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes and biases.

A case study may be especially suitable for learning more about a poorly understood situation. It may also be useful for investigating how an individual or programme changes over time, perhaps as a result of certain circumstances and interventions. In either circumstance, it is useful for generating or providing preliminary support for hypothesis. A case study's major weakness is that one cannot be sure that the findings are generalizable.

## Case study methods of data collection

In a case study, the researcher collects extensive data on the individual(s), program(s), or event(s) on which the investigation is focused. The data often includes observations, interviews, documents, past records and audio-visual materials. In many instances, the researcher may spend an extended period of time on site and interact regularly with the people being studied. Leedy and Ormrod (2015),

The researcher also records details about the context surrounding the case, including information about the physical environment and historical, economic and social factors that have a bearing on the situation. By identifying the context of the case, the researcher helps others who read the case study to draw conclusions about the extent to which findings might be generalisable to other situations.

## Case study data analysis

According to Leedy and Ormrod (2015), data analysis in a case study usually involves

- Organisation of details about the case: The specific facts about the case are arranged in a logical order,
- Categorisation of data: Categories are identified that can help cluster the data into meaningful groups.
- Interpretation of single instances: Specific documents, occurrences and other bits of data are examined for the specific meanings they may have in relation to the case.
- Identification of patterns: The data and their interpretations are scrutinised for underlying themes and other patterns that characterise the case more broadly than a single piece of information can reveal.
- Synthesis and generalisations: An overall portrait of the case is constructed. Conclusions are drawn that may have implications beyond the specific case that has been studied.

The case study research report

Leedy and Ormrod (2015) demonstrate that a case study report includes the following rationale for studying the case: Explanation of why the case is worthy of in-depth study.

- A description of the facts related to the case: Description of the specific individual(s), program(s), or event(s) studied, as well as the setting and any other uncontested facts about the case.
- A description of data collected: Informing the reader about observations made, persons interviewed, and documents examined.
- A discussion of the patterns found: Any trends, themes, or personality characteristics that the data may suggest. To support each pattern, sufficient evidence must be provided to convince the reader that the patterns do in fact exist.

A connection to the larger scheme of things: In some way, the connections may lead to the answer to the question, “In what way does the case study contribute to our knowledge about some aspect of the human experience?”

### **3.12. INTERVIEW PROTOCOL AND DATA COLLECTION**

An interview protocol is a list of the questions or issues that are to be explored in the course of an interview (Patton, 2015; Chenail, 2011; Janghorban et al., 2014). According to Janghorban et al. (2014), the development of the interview protocol becomes important because it enables the identification of crucial elements relevant to the subject matter. Castillo-Montoya (2016) observed that the interview protocol increases the effectiveness of an interview process by ensuring comprehensive information is obtained within the allocated time. This confirms that a reliable interview protocol is crucial to obtain accurate qualitative data.

However, in qualitative research, data is collected directly or indirectly from the participants (Jacob and Furgerson, 2012). Indirect data collection is the process of generating qualitative data

from letters, diaries, emails, minutes of meetings, codes of conduct, documents, photographs, or observation. These sources of information are referred to as indirect data. (Yeong et al., 2018; Knox and Burkard, 2009). Direct data is the written word, interactions, body language, and spoken words that are collected through observation, open-ended questionnaires, journaling, interviews, focus groups, or social media conversation (Chenail, 2011). This study employ an open ended interview question to obtain data from graduates.

### **3.13. VALIDITY OF THE STUDY**

In this study, validity was a critical concern, focussing on the suitability, distinction, and accuracy of the methods adopted to answer the research questions (Mohajan, 2020). Validity refers to the extent to which the research instruments measure what they are intended to measure (Taherdoost, 2022). While acknowledging that zero measurement errors are not practical in research, the research team implemented several pre-emptive measures to minimise errors and enhance validity. Content validity was the primary approach used to ensure the validity of the research.

instruments. This method assesses the degree to which an instrument covers the content it is supposed to measure (Prinsen, Mokkink, Bouter, Alonso, Patrick, De Vet and Terwee, 2018). To establish content validity, the study undertook the following steps:

- **Expert review**

A panel of experts in construction management and research methodology reviewed the questionnaire to ensure that it adequately covered the domain of interest and that the items were relevant to the research objectives.

- **Pilot testing**

The questionnaire was pilot tested with a small group of construction management graduates who were not part of the final sample. This process helped identify any ambiguities or

misunderstandings in the questions, allowing for refinement before the main data collection phase.

- **Clear communication**

When distributing questionnaires, respondents were thoroughly informed about the purpose of the study and provided with clear instructions on how to answer the questions. This approach aimed to minimise misinterpretation and enhance the accuracy of responses.

- **Question design**

The questionnaire featured brief, easy-to-understand questions to reduce the likelihood of respondent fatigue or misinterpretation.

While these measures were implemented to enhance validity, the researcher acknowledged that the study's validity was potentially limited by the fact that it was not checked by qualified statisticians and was conducted by students rather than experienced researchers. This limitation was clearly stated in the study's discussion of methodological constraints.

### **3.14. RELIABILITY OF THE STUDY**

Reliability in this study referred to the consistency of scores, dependability, and replicability of the results obtained from the research (Mohajan, 2020). The research team focused on ensuring that

the results would be consistent over time and across various items in the instrument. To assess reliability, Cronbach's alpha was employed as the primary measure. Cronbach's alpha is widely used to evaluate the internal consistency of a set of scale or test items (Taber, 2018). This method was chosen because it requires only a single test administration to provide a unique estimate of the reliability of a given test, making it efficient and practical for this study. The following steps were taken to enhance and assess reliability:

- **Standardised administration**

The questionnaire was administered under standardised conditions to all participants to minimise variability due to external factors.

- **Clear instructions**

Detailed instructions were provided to ensure consistent interpretation of questions across all respondents.

- **Internal consistency analysis**

Cronbach's alpha was calculated for each subscale of the questionnaire to measure how well the set of items measured a single one-dimensional latent construct.

- **Item analysis**

Individual item-total correlations were examined to identify any items that may be reducing the overall reliability of the instrument.

The study aimed for a Cronbach's alpha value of 0.7 or higher, which is generally considered acceptable in social science research (Taber, 2018). The actual Cronbach's alpha values obtained for each subscale were reported in the results section, providing transparency about the instrument's reliability. While these measures were implemented to enhance reliability, the researcher acknowledged that the study's reliability could be further improved through repeated measures or test-retest reliability assessment, which was not feasible within the time constraints of this study. This limitation was clearly stated in the discussion of the study's methodological constraints.

### **3.15. LIMITATIONS**

A research study of this nature is a mammoth task that needs funding. Inadequate financial

resources became a major constraint of this research project. Some respondents did not honour their appointments for the interviews, resulting in a challenge for the researcher to collect as much data as possible. In addition to the previously mentioned issues, the researcher decided against conducting a study across all local community areas in South Africa due to its excessively broad scope and high resource demand. Since the study was limited to DUT graduates in the construction sector in South Africa, there was no attempt to generalise the study to a greater population.

### **3.16. ELIMINATIONS OF BIAS**

According to Kudiwa (2018), bias is defined as a predisposition to error. If readers identify a researcher's bias, it may result in the reader becoming reluctant to accept the research findings. Sources of bias include the self-selecting nature of respondents, the point in time when the research is conducted, and the data collection and analysis techniques employed. Bias was eliminated by avoiding the use of gender-specific words as well as terms related to race and ethnicity. This was done to avoid alienating certain participants according to their gender, race or ethnicity unless deemed necessary in achieving the research objectives.

### **3.17. ETHICAL CONSIDERATIONS**

Ethical considerations were central to the study, necessitating strict adherence to ethical principles throughout the research process. The ethical protocol established by the DUT was fully recognised and followed. The researcher obtained ethical clearance from the institution and ensured compliance with its rules and regulations. Participants were provided with comprehensive information regarding the project, including its purpose, selection criteria, and the researcher's identity. In line with informed consent practices, respondents were made aware of their right to withdraw from the study at any time. The findings were structured to protect

the dignity, integrity, rights, and confidentiality of respondents, avoiding any reporting that could stigmatise or harm the community under investigation. Informed consent was sought after clearly outlining the study's aims and objectives, as highlighted by Munhall (2018). Consent for interviews was obtained after explaining the participants' involvement, the anticipated benefits of the study, and the confidentiality of their identities. Respondents were assured that their responses would remain confidential and would not be disclosed to anyone outside the research context, thereby ensuring their anonymity. This approach was essential in collecting sensitive data while upholding the participants' rights.

All data collected during the research was treated as confidential material and was not disclosed in any manner that could identify individuals or organisations without their consent. The researcher treated respondents with dignity and respect during interviews, adhering to the principles of voluntary participation, informed consent, and confidentiality. Importantly, the data gathered was not falsified, and information obtained from secondary sources was properly referenced. Ethical considerations significantly facilitated the free expression of respondents' viewpoints without hesitation, emphasising the importance of confidentiality and anonymity (Munhall, 2018; Zarkada- Fraser and Skitmore, 2020).

### **3.18. CONCLUSION**

In order to respond to the research goals, this chapter identified the methodology and reasoning of the research theory, research design, and data collection method. The research process revealed issues with research quality, as well as the validity and reliability of data collection and analysis techniques. The research methodology was an essential part of this study as it laid the basis of this research. This chapter has outlined the data collection methods and approaches that the researcher had taken in order to conduct the research. The chapter further articulated how data analysis and interpretation were done by the researcher. The chapter gave an in-depth discussion on research design, sampling techniques and analysis methods. The chapter highlighted the validity and reliability of adopting quantitative and qualitative research methodology in this type of study.

Therefore, the next chapter presents and analyses the study findings.

## CHAPTER FOUR: RESULTS AND INTERPRETATION

### **4.1 INTRODUCTION**

This chapter analyses and interprets data based on an assessment of the challenges faced by unregistered construction management graduates from the DUT in KwaZulu Natal, specifically those from the 2014–2017 cohorts, in their progression towards professional status. The researcher employed a case study approach to gather data. Data analysis was an integral part of the research process, involving a series of steps to convert the collected data into facts and information that could answer the research questions (Ibrahim, 2021). The analysis involved processing the data and extracting insights through established procedures.

The chapter presented the quantitative data analysis of the data collected through questionnaires, forming the basis of the investigation. It revealed the relationship between the study's objectives and the research questionnaires, illustrating the data gathered through distributed questionnaires and mailed questionnaires. The response rate was followed by a reliability test, and demographic statistics were determined. The study then performed analyses of measures of spread and central tendency, as they played a pivotal role throughout the statistical data analysis process. Furthermore, major statistical and quantitative tests, such as t-tests and correlation tests, were conducted to achieve the set objectives on the challenges faced by unregistered DUT construction management graduates from 2014 to 2017 in their progression towards professional status. Statistics were thought of as a collection of computational techniques that allowed for the identification of patterns and significance in numerical data (Leedy and Ormrod, 2019).

### **4.2 RESPONSE RATE**

A response rate is a metric that researchers and surveyors use to express the proportion of eligible or targeted participants who respond to a given questionnaire, survey, or data collection endeavour. It is a crucial indicator in determining how representative and reliable the gathered

data is. Not all those selected for participation in surveys or research studies may respond. Researchers can gauge the target population's level of interest and willingness to offer opinions or information by looking at the response rate. A higher response rate is often preferred because it shows that the sample is more substantial and representative. Table 4.1 below shows the proportion of all participants who responded to the questionnaire for the purpose of this study.

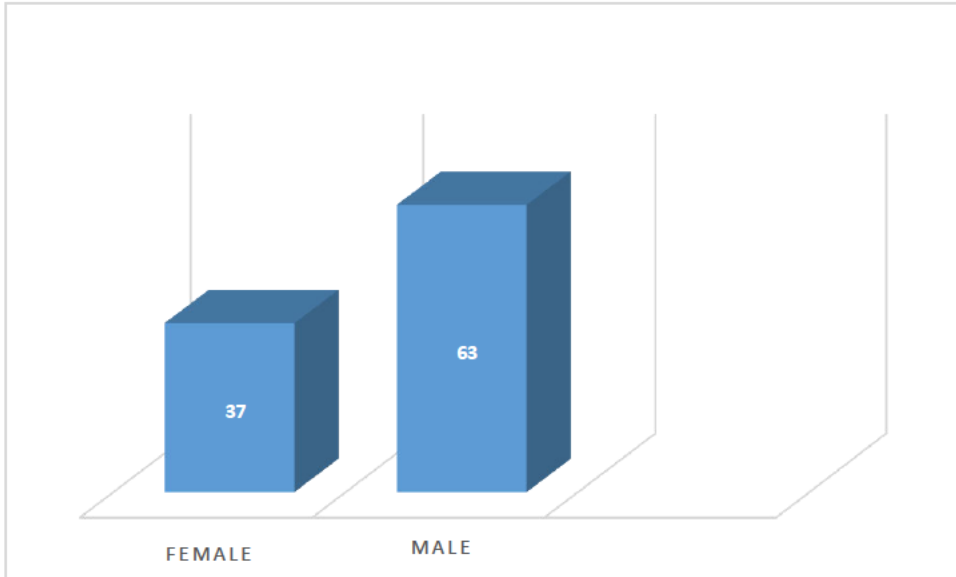
*Table 4. 1: Response rate*

<b>Total number of distributed questionnaires</b>	<b>Number of questionnaires responded</b>	<b>The response rate</b>
200	200	96%

The researcher distributed a total of 200 questionnaires to be used for quantitative analysis and a total of 196 respondents responded thereby yielding a response rate of 96%.

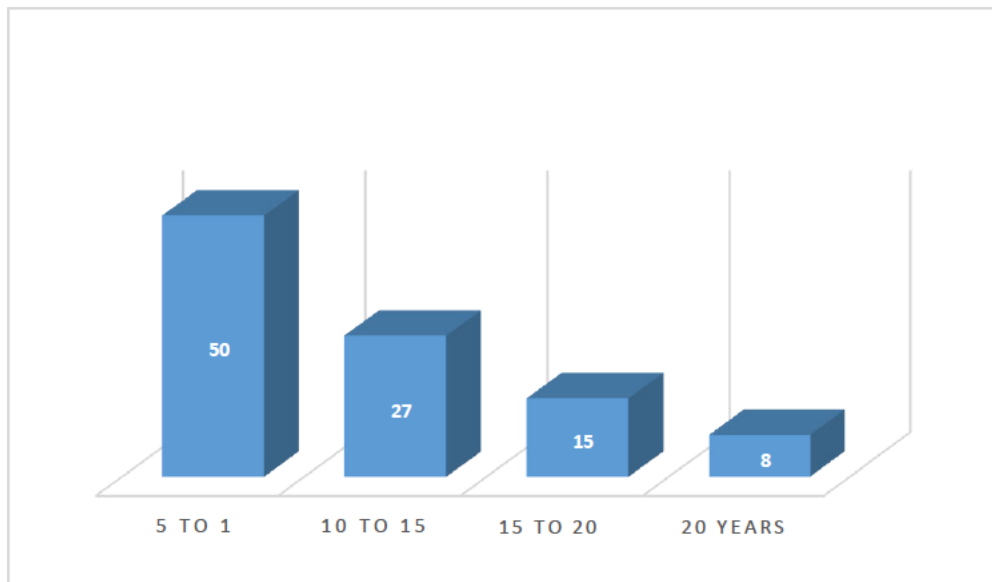
### **4.3 DEMOGRAPHIC ANALYSIS**

Demographic analysis is a research technique used to examine and analyse a population's or group's characteristics based on demographic information. Gaining knowledge about a population's makeup, distribution, and trends through demographic analysis can be helpful in a number of areas, including sociology, marketing, public health, and policymaking. Researchers can spot patterns, trends, and discrepancies within a group by examining demographic data. In order to better understand the needs, interests, and difficulties of different subgroups within a population, demographic analysis can provide useful information regarding the size and structure of these groups. It also aids in the formulation of targeted plans and interventions, as well as the ability to make educated judgements. The demographic data was gathered, and the statistical analysis was done to determine whether the sample (n = 200) represented the target population with regard to gender and working experience. The study presented the outputs of the demographic statistics in the form of histograms as shown below.



*Figure 4. 1: Gender*

Figure 4.1 above shows that the majority of the respondents are male (63%), while the minority is female (37%). This, however, denotes that male graduates predominated among construction management graduates from 2014 to 2017 were dominated by. The figure that follows is a visualisation of the gender groups.



*Figure 4. 2: Years of experience in the industry*

The histogram in Figure 4.2 presents the working experience of the respondents since graduating from the DUT with a Construction Management degree between 2014 and 2017. A normally distributed output was observed. The results show that the majority of the respondents (50%) have work experience ranging from three to seven years since graduation. Only 27% of the total respondents have seven to ten years of work experience post-graduation, while 15% have ten to thirteen years of experience, and 8% have been working in the industry for thirteen years or more since completing their studies at DUT.

These findings suggest that the majority of the respondents graduated between 2014 and 2017 and have been working in the construction industry for approximately 3 to 7 years since then. The distribution indicates that a significant portion of the graduates have been employed in the sector for a relatively short period, with fewer respondents having longer tenures. This information provides valuable insights into the career trajectories of DUT construction management graduates and the challenges they face in attaining professional registration within

the first decade of their careers.

#### **4.4 RELIABILITY TESTS**

This section reports the results of the item analysis that established the reliability of the summated scores calculated for the factor categories.

The item analysis was concluded for the 76 statements in the questionnaire that were summated into scores for the 14 factor categories. For each factor, Cronbach's coefficient was calculated, and a factor analysis specifying a one-factor model was conducted.

##### **4.4.1 Cronbach's coefficient of a test**

Table 4.2 presents the results of the reliability analysis conducted on various constructs related to the challenges faced by unregistered construction management graduates from the DUT. The reliability of each construct was assessed using Cronbach's alpha, a widely accepted measure for evaluating the internal consistency of survey items. Tests for the internal reliability of the factors in each category were conducted by determining their Cronbach's coefficient as a value, as demonstrated in Table 4.2 below.

Table 4. 2: Cronbach's alpha

Construct	No. of Items	Cronbach's alpha
1. Design Development	9	0.813
2. B2 Tender Documentation and Professional Registration	11	0.937
3. B3 Construction Documentation	10	0.910
4. B4 Project Close-out	9	0.814
5. C1 Technology	4	0.853
6. C2 Safety	4	0.844
7. C3 Training and Development	3	0.844
8. C4 Skills	3	0.844
9. C5 Resource	3	0.787
10. C6 Recruitment Processes	6	0.873
11. D1 Policy and Legislation	5	0.816
12. D2 Technological Transformation	2	0.720
13. D3 Personal Dynamics	3	0.787
14. D4 Motivation of CM Graduates	4	0.842

Cronbach's alpha values were computed to assess the internal consistency and reliability of the factors within each category. Results indicate good to excellent internal consistency among the items, with values ranging from 0.720 to 0.937. Notably, factors such as B2 Tender Documentation and Professional Registration, B3 Construction Documentation, and C1 Technology demonstrated particularly high internal consistency, with Cronbach's alphas of 0.937, 0.910, and 0.853, respectively. These findings suggest that the scales are reliable for measuring the constructs related to design development, tender documentation, construction documentation, technology, and other aspects of construction management.

#### 4.5 RESULTS OF FACTOR ANALYSIS

Table 4.3 presents the outcomes of various categories' factor analysis, including the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO measure assesses the suitability of the data for factor analysis, with values closer to one indicating better suitability. Factor analysis was conducted solely for the Likert scale items. Certain components were divided into smaller components, which are demonstrated below in the rotated component matrix.

*Table 4. 3: Summary of factor analysis conducted for categories*

		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
			Approx. Chi-Square	df	Sig.
1.	Design Development	0.770	150.720	36	0.000
2.	B2 Tender Documentation and Professional Registration	0.856	366.702	55	0.000
3.	B3 Construction Documentation	0.886	333.779	55	0.000
4.	B4 Project Close-out	0.728	176.076	36	0.000
5.	C1 Technology	0.798	86.626	6	0.000
6.	C2 Safety	0.752	57.304	6	0.000
7.	C3 Training and Development	0.709	54.750	3	0.000
8.	C4 Skills	0.723	60.195	3	0.000
9.	C5 Resource	0.662	47.364	3	0.000
10.	C6 Recruitment Processes	0.869	135.656	15	0.000
11.	D1 Policy and Legislation	0.726	98.618	10	0.000

		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
			Approx. Chi-Square	df	Sig.
12.	D2 Technological Transformation	0.500	18.660	1	0.000
13.	D3 Personal Dynamics	0.687	43.433	3	0.000
14.	D4 Motivation of CM Graduates	0.771	89.499	6	0.000

The KMO values range from 0.500 to 0.886, suggesting moderate to high adequacy for factor analysis across the categories. Additionally, Bartlett's Test of Sphericity examines whether the variables within each category are interrelated. A significant p-value ( $p < 0.05$ ) indicates that the correlations between variables are sufficiently different from zero, supporting the factorability of the data. In this case, all categories have significant chi-square values ( $p = 0.000$ ), indicating that the variables within each category are sufficiently correlated, further supporting the suitability of the data for factor analysis. Overall, these findings suggest that the data are appropriate for conducting factor analysis, allowing for the exploration of underlying factors within each category.

In the following sections, the non-parametric Chi-square test was performed to determine the relative significance of the various factors. Most of the factors having a value  $< .500$  have a significant influence on the subject being tested. Descriptive statistics, such as mean scores and standard deviations, were computed to facilitate the ranking of these factors across various constructs. In particular, the standard deviation enables the ranking of factors with the same mean score, prioritising those with a lower standard deviation. All the factors have a Cronbach's alpha value  $> .6$ , which is acceptable, indicating that the factors adequately describe the construction.

#### 4.5.1 Section B: Technical Information

Table 4. 4: Involvement of CM graduate in Design development

S/No	Statement (please answer accurately)	Mean	Standard Deviation	Test of Significance	Rank
1.	Review designs by consultants in relation to constructability requirements	4.18	0.888	<0.014	1
2.	Prepare and submit a proposed method statement for the construction of works	4.16	0.903	<.001	2
3.	Review designs by consultants in relation to health and safety requirements during construction and provide input if required on related practical and cost issues.	3.98	0.812	<0.001	3
4.	Provide detailed cost information as required by the cost consultant for estimating budgeting and cost reporting purposes	3.98	0.860	<0.001	4
5.	Attend the appropriate planning, co-ordination	3.96	0.894	<0.001	5

	and management meetings as required				
6.	Review and recommend practical and cost-effective construction alternatives to consultants	3.94	0.810	0.004	6
7.	Provide the necessary lead times required to prepare a detailed design and documentation programme	3.94	0.004	<0.001	7
8.	Prepare preliminary construction programme	3.86	0.749	<0.001	8
9.	Define and agree on preliminary scope of construction works	3.65	0.976	<0.001	9
	<b>Cronbach's alpha = 0.813</b> <b>Test of Significance = 18 995</b> <b>(Chi-square)</b>				

Table 4.4 presents respondents' level of involvement in the design development phase of the life cycle stages of a project. Most of the respondents, with a score of MS of 4.18 reviewed designs by consultants in relation to constructability requirements,. This reflects the experience of incorporating constructability into the design to ensure buildability.

Statement two includes preparing and submitting a proposed method statement for the

construction of the work with an MS of 4.16. This factor measures the level of competency of the respondents, which most of them fulfil.

Statement 5 assesses participants' involvement in attending the appropriate planning, coordination and management meetings, as required with MS = 3.96. This statement also evaluates the site's layout and the progress of work in collaboration with other members of the construction team.

The statement 7 from the bottom, rated at MS of 3.94, involves providing the necessary lead time for preparing a detailed design and documentation programme. Followed by the preparation of a preliminary construction programme, rated at MS of 3.86. Respondents do not engage in these tasks, as they are not part of their responsibilities or duties.

The factor in which respondents participate the least is defining and agreeing on the preliminary scope of the construction works. This is primarily the responsibility of the design team and the client and may be the likely reason respondents do not participate in this phase of construction.

*Table 4. 5: Involvement of CM graduate at tender documentation and procurement*

<b>S/No</b>	<b>Statement (please answer accurately)</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Test of Significance</b>	<b>Rank</b>
1.	Agree on the list of sub-contractors and suppliers with the principal agent	4.18	0.950	<.001	1
2.	Manage and procure proposals for the appropriate contract insurances and guarantees	4.18	0.953	<.001	2
3.	Manage the preparation and submission of the tender	4.08	0.997	<0.01	3
4.	Review tender documentation to establish any cost-effective alternative solutions	4.02	0.883	<0.001	4
5.	Select, recommend and agree on the procurement strategy for sub-contractors and suppliers with the principal agent and consultants	3.98	0.927	<0.001	5
6.	Manage, co-ordinate and finalise negotiations on all contractual commitments	3.96	0.947	<.001	6
7.	Manage the tender process in accordance with agreed procedures, including calling for tenders, adjudication of tenders and recommendations of	3.96	0.958	<.001	7
8.	Manage and co-ordinate the preparation and implementation of the health and safety requirements for inclusion in the tender	3.94	0.867	<.001	8

9.	Prepare and agree on the procurement programme for sub-contractors and suppliers	3.92	0.755	<.001	9
10.	Prepare the construction management organogram and obtain commitment from the appropriate staff as required	3.69	0.948	<.001	10
11.	Review and confirm the construction strategy and method for the submission of the tender	3.67	1.194	0.019	11
	<b>Cronbach's alpha = 0.937</b>				
	<b>Test of significance (Chi- square) = 46.974</b>				

Table 4.5 presents the level of involvement of respondents in the tender documentation and procurement phases. The phase that most respondents participate in is the list of sub-contractors and suppliers with the principal agent, with a mean score of 4.18. This factor is rated accordingly, as this category of construction workers deals directly with a site agent or contractor.

The third statement, 'manage and procure proposals for the appropriate contract insurance and guarantees required for the work', has an MS = 4.18. The contractor and his team are those responsible for insuring the site against all forms of risk; therefore, it is expected that the contractor's team will participate highly in this exercise regarding project delivery.

The third statement is 'manage the preparation and submission of the tender' with an MS of 4.08. The contractor and his team must possess sufficient knowledge in estimating and tendering to successfully secure jobs and sustain the company's operations.

The tender-rated factor from the bottom is to prepare and agree on the procurement programme for sub-contractors and suppliers with an MS of 3.92. This is so because it is not the responsibility of the construction manager to appoint a procurement programme or design it for sub-contractors and suppliers.

Following this factor is preparing the construction management organogram and obtaining a commitment from the appropriate staff as required with an MS of 3.69. The reason for this is that the graduates are fresh from school and do not have adequate knowledge to perform this exercise.

The leaser than CM graduate does not get involved and continues the construction strategy and MS = 3.67. The development of the work statement of the tender stage is the responsibility of the QS and can be the contributing factor to the vesting of respondents of these factors as the least CM graduates are involved with this stage of the contract.

*Table 4. 6: CM graduate Involvement in Construction Documentation and Management*

<b>S/No</b>	<b>Statement (please answer accurately)</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Test of Significance</b>	<b>Rank</b>
1.	Manage the preparation of monthly progress claims for payment	4.25	0.790	<0.001	1
2.	Continuously monitor the compliance of the quality of the works in accordance with the agreed Quality Assurance Plan	4.24	0.674	<.001	2
3.	Continuously monitoring the construction progress	4.24	0.815	<.001	4
4	Regularly prepare and submit a construction status report, including a construction financial status report	4.22	0.832	<.001	3

5.	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of practical completion	4.20	0.825	<.001	5
6.	Receive, review and substantiate any contractual claims within the prescribed period	4.18	0.793	<.001	6
7.	Review and substantiate circumstances and entitlements that may arise from any changes required to the contract programme	4.18	0.888	<.001	7
8.	Establish and communicate the formal and informal Communication structure and procedures for the construction process	4.14	0.749	<.001	8
9.	Manage the review and approval of all necessary shop details and product proprietary information by design sub-contractors	4.14	0.872	<.001	9
10.	Regularly conduct and record the necessary construction management meetings including sub-contractors, suppliers programme, progress and cost meetings	4.14	0.960	<.001	10
11.	Prepare and finalise the detailed construction programme including resources planning	4.12	0.840	<.001	11
12.	Manage and administer the distribution of construction information to all relevant parties	4.12	0.864	<.001	12

13.	Finalise and agree on the Quality Assurance Plan with the design consultants and sub-contractors	4.12	0.952	<.001	13
14.	Continuously manage the review of construction documentation and information for clarity of construction requirements	4.10	0.806	<.001	14
15.	Finalise and agree on the contract programme and revisions thereof as necessary	4.10	0.728	0.08	15
16.	Manage the implementation of the requirements of the Environmental Management Plan	4.06	0.881	0.08	16
17.	Manage, co-ordinate and monitor all necessary testing and commissioning	4.06	0.925	0.08	17
18.	Continuously monitor the compliance of the site management of the Health and Safety Plan	4.04	0.894	0.08	18
19.	Establish and monitor procedures for all shapes and cost variations	4.02	0.860	0.08	19
20.	Prepare and agree on the Information Schedule for the timeous implementation of construction	4.00	0.849	0.08	20
21.	Establish and maintain regular monitoring of all line, level and datum of the works	4.00	0.825	0.08	21
22.	Manage the preparation and agreement of the Health and Safety Plan with the	4.00	0.908	0.002	22

	client's health and safety consultants and sub-contractors				
23.	Monitor the ongoing project's insurance requirements	4.00	1.000	0.017	23
24.	Manage and co-ordinate the requirements of the direct contractors if required to do so	3.98	0.836	<0.001	24
25.	Manage, co-ordinate and supervise all work on and off site	3.98	0.905	<0.001	25
26.	Receive, co-ordinate, review and obtain approval of all contract documentation provided by the sub-contractors and suppliers for compliance with all the contract requirements	3.98	0.948	<0.001	26
27.	Provide the necessary documentation as required by the health and safety consultant for the health and safety file	3.94	0.925	<0.001	27
28.	Appoint sub-contractors and suppliers, and finalise all agreements	3.90	1.044	<0.001	28
29.	Manage the establishment including the provision of all necessary temporary services, storage facilities, security requirements and other site requirements	3.88	0.895	<0.001	29
30.	Facilitate and manage the establishment of sub-contractors.	3.84	0.903	<0.001	30
	<b>Cronbach's alpha = 0.910</b>				

	<b>Test of significance (Chi- square) = 30.192</b>				
--	--	--	--	--	--

Table 4.6 reveals the rating or involvement of respondents at the construction documentation and management stage, with an MS = 4.25. Respondents are involved the most in the ‘manage the preparation of monthly progress claims for payment’ stage, with an MS of 4.75. The likely reason for this is that without adequate cash flow, work cannot progress as planned. Furthermore, contractors are those responsible for the construction of the design and the fulfillment of the contract agreement; therefore, they need to ensure the flow of cash for construction purposes.

‘Continuously monitor the compliance of the quality of the work in accordance with the agreed quality assurance plan’ with an MS of 4.24 is next. Construction management professionals are assigned work due to their competence in relation to the quality assurance plan required for project delivery. This is one of the probable reasons for this rating.

The next step includes regularly preparing and submitting a ‘construction status report, including a construction financial status report, with an MS of 4.22. Construction management professionals need to carefully monitor budget and project progress to avoid insufficient funds during execution.

Regular oversight is essential to manage costs, track project status, and prevent delays or abandonment, which are key reasons for its third-ranking significance in construction. Significantly, the third lowest-rated factor is the appointment of sub-contractors and suppliers, including the finalisation of all agreements, with an MS of 3.90. This exercise does not pertain to construction managers, as they do not initiate the project; however, they may appoint sub-contractors and suppliers to their services. This responsibility is for the client and project manager/architects.

Managing the site establishment including the provision of all necessary temporary services, storage facilities, security requirements and other site requirements with an MS of 3.88, is next. Though respondents rated this exercise as the second least important factor/exercise, it could be argued that the responsibility and management of the site fell on the contractor and the construction manager.

The factor with the lowest rating that construction professionals are involved with during construction documentation and management is the facilitating and managing the establishment of sub-contractors on the site with an MS of 3.84. This responsibility is one of the construction manager's duties, who ensures adequate space is allocated for all sub-contractors to store their tools and equipment.

*Table 4. 7: Involvement of CM graduate in project close-out stage*

<b>S/No</b>	<b>Statement (please answer accurately)</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Test of Significance</b>	<b>Rank</b>
1.	Co-ordinate, monitor and manage the rectification of defects during the defects liability period	4.20	0.698	0.014	1
2.	Manage, co-ordinate and expedite the preparation agreement of the final Accounts with cost consultants and all sub-contractors	4.16	0.925	0.001	2
3.	Prepare and present the contract close-out report	4.16	0.925	0.001	3

4.	Manage the finalisation of the health and safety file for submission to the health and safety consultant	4.12	0.791	0.001	4
5.	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of final completion	4.10	0.755	0.001	5
6.	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of work completion	4.08	0.845	<.001	6
7.	Manage and expedite the procurement of applicable statutory compliance certificates and documentation	4.04	0.799	<.001	7
8.	Manage and expedite the procurement of all operating and maintenance manuals as well as all warranties and guarantees	4.02	0.787	<.001	8
	<b>Cronbach's alpha = 0.814</b>				
	<b>Test of significance (Chi-square) = 4.357</b>				

Table 4.7 illustrates respondents' involvement in the project close-out stage. The factor with the highest rating is 'co-ordinate, monitor and manage the rectification of defects during the defect liability period', with an MS of 4.20. The likely reason for this stage being rated the highest in construction is that at the defect liability period, the contractor ought to affect any defect at that stage; this means engaging the contractor's team to carry out the work; therefore, the involvement of the construction manager at this stage of the work.

The second highest rating is 'manage, co-ordinate and expedite the preparation and agreement of the final account with the cost consultants and all the sub-contractors', with an MS of 4.16. This task reflects the responsibilities of the construction manager and likely explains why it is rated so highly.

The third-ranked factor in the construct is 'prepare and present contract close-out report' with an MS of 4.16. The contractor needs to hand over the project that has been contracted to the company upon completion of the work. The contractor is responsible for the construction along with the hired professionals, the construction manager and others. This duty is the responsibility of the contractor, which likely accounts for its third position.

The third-lowest-rated exercise the construction managers are involved with is to manage and expedite the procurement of applicable statutory compliance certificates and documentation with an MS of 4.04. The company director is primarily responsible for carrying out this exercise, which is likely the reason for the rating. The second-lowest rated exercise is 'manage and expedite the procurement of all operating and maintenance manuals as well as all warranties and guarantees with an MS of 4.02. The contractor is not currently responsible for this rating due to the nature of the exercise. The reason for the respondents' very low involvement is unclear. The least-rated exercise that respondents are involved with is managing, co-ordinating and expediting the preparation by the relevant sub-contractors of all as-built drawings and construction documentation with an MS of 4.00. This rating is appropriate for this exercise as it pertains only to the sub-contractors.

Table 4. 8: Inherent challenges faced by CM graduates in relation to getting registered as CM professional

5.1	Technology	Mean	Standard Deviation	Test of Significance	Rank
1.	Low level of new technological development	3.90	1.044	<.001	1
2.	Low level of IT usage	3.82	1.0053	<.001	2
3.	Low level of technology transfer	3.73	1.002	<.001	3
4.	Inadequate technological knowledge	3.65	0.913	<.001	4
		<b>Cronbach's alpha = 0.853</b> <b>Chi-square = 4.583</b>			

5.2	Safety	Mean	Standard Deviation	Test of Significance	Rank
1.	Limited knowledge of safety precautions	4.29	0.832	<.001	1
2.	Inadequate safety precautions	4.04	0.937	<.006	2
3.	Improper implementation of safety rules	4.02	0.927	<.004	3
4.	Undefined specification of safety rules	3.94	0.785	<.001	4
		<b>Cronbach's alpha = 0.844</b> <b>Chi-square = 7.42</b>			

5.3	Training and Development	Mean	Standard Deviation	Test of Significance	Rank
1.	Inadequate support from institutional organisations	3.88	0.973	0.042	1
2	Limited allocation of funds for employee trainings	3.86	0.939	0.034	2
3	Inadequate carrier development programmes	3.84	0.857	0.002	3
<b>Cronbach's alpha = 0.844</b>  <b>Chi-square = 7.423</b>					

5.4	Skill	Mean	Standard Deviation	Test of Significance	4
1.	Inadequate skill development programmes	3.90	0.944	0.002	1
2	Limited allocation of funds for employee trainings	3.73	0.961	<.001	2
3	Inadequate carrier development programmes	3.59	0.942	0.017	3
<b>Cronbach's alpha = 0.844</b>  <b>Chi-square = 0.024</b>					

5.5	Resources	Mean	Standard Deviation	Test of Significance	Rank
1.	High labour turnover	3.78	1.083	0.014	1
2	Lack of highly technical construction equipment	3.67	0.887	0.007	2
3	Insufficient integration of design and built operation	3.61	1.097	0.009	3
<b>Cronbach's alpha = 0.787</b>  <b>Chi-square = 1.750</b>					

5.6	Recruitment processes	Mean	Standard Deviation	Test of Significance	Rank
1.	Antagonistic employers disinclined towards hiring inexperienced CM graduates	4.06	0.785	0.589	1
2.	Formalisation of work at lower levels limit upward mobility of CM graduates	4.06	0.835	<.001	2
3.	General employer preference for CM graduates of a certain race	4.00	0.894	0.001	3
4.	Stereotypical hiring processes	3.92	0.845	<.001	4

5.	Existence of promotion standards that are difficult for CM graduates to attain	3.86	0.825	<.001	5
6.	Informal recruitment processes among CM graduates, especially the minority	3.82	0.994	<.001	6
<b>Cronbach's alpha = 0.873</b>					
<b>Chi-square = 7.296</b>					

Section 5.1 presents the technology challenges CM graduates face in getting registered. The low level of new technological development, with an MS of 3.90, is the first-ranked challenge. The low level of adoption of new technology, and the acquisition of new technology due to the high costs limit the knowledge level of CM graduates and adversely affect the required skills for registration. The second rated factor in this construct is the low level of usage of IT; this limits the IT skills required for registration and puts them at a disadvantage.

The least-rated factor on technological challenges is inadequate technological knowledge with an MS of 3.65. This factor, though rated the least, has a very high impact based on the MS.

Section 5.2 outlines the safety challenges that CM graduates encounter when registering. Companies often fail to disclose their safety practices or requirements. The highest-rated factor is limited knowledge of safety precautions with an MS of 4.29. This suggests that the lack of adequate training and knowledge on safety practices among CM graduates hinders their ability to register as CM professionals. Next is inadequate safety precautions with an MS of 4.04. The lack of knowledge about safety precautions has led to a ripple effect on our understanding of safety requirements related to various risks, thereby placing CM graduates at a disadvantage in

the registration process

The least significant factor on safety construct that stands as CM challenges in registration is the undefined specification of construction safety, with an MS of 3.49. The lack of knowledge about safety precautions has a ripple effect on the understanding of safety requirements related to various risks, thereby placing CM graduates at a disadvantage in the registering process.

Section 5.3 reveals the training and development challenges faced by CM graduates on the job. The top-rated factor is inadequate support from institutional organisations. This training likely refers to the level of technical exposure given to graduates during their studies. Candidates may not be well exposed to practical work; most institutions do not have site training exposure in their curriculum, which therefore affects their technical knowledge and impacts the skill requirements for registration.

Section 5.4 presents challenges CM graduates face in getting professionally registered for the skill factor. The factor of inadequate skill development programmes with an MS of 3.90 presents the most challenge with respect to the acquisition of skills required for registration. Graduates lack skill programmes either at work, or outside work to capacitate them with the relevant skills they need to possess for the delivery of a project. The availability of professionals with an MS of 3.59 is the least significant factor influencing the skill requirements of CM graduates for professional registration. This implies that there are enough professionals to train CM graduates, in capacitating them with the required skills for professional registration. Furthermore, it means that the problem with skill development of CM graduates is the lack of provision and exposure to programmes that will enhance their skill acquisition.

Section 5.5 presents the resource challenges faced by CM graduates during registration. This construct rates high labour turnover, with an MS of 3.78, as the biggest challenge faced by CM graduates. The inability to retain experienced workers to impart knowledge to new graduates results in a lack of experience among CM graduates, which poses a problem during registration. The least significant obstacle to CM graduates registering as professionals in the construction

industry is the insufficient integration of design and built operations, with an MS of 3.61. The CM graduates' lack of experience may result in their failure, as they may not know what to do when design fails to provide the necessary information for construction.

Section 5.6 indicates the recruitment process challenges faced by CM graduates in relation to getting registered as professionals. The reluctance of employers to hire inexperienced CM graduates, with an MS of 4.06, is the most highly rated factor. Graduates are fresh from school and, in most cases, need to learn in the field before gaining experience, but most employers insist on hiring experienced graduates. This places the graduates at a disadvantage because they lack the relevant skills. Next is the informalisation of work at low levels, limiting the upward mobility of CM graduates with an MS of 4.06. The lack of promotion opportunities, which could lead to handling more challenging jobs and gaining experience, has posed a challenge for CM graduates seeking registration as professionals.

Informal recruitment processes are the least challenging factor in the recruitment of CM graduates, particularly among the minority with an MS of 3.61. Influence-induced job security has left the majority of minority graduates jobless and complicated their registration process.

Table 4. 9: The mitigating factors for CM graduates to get registered as professionals

6.1	Policy and legislation	Mean	Standard Deviation	Test of Significance	Rank
1.	Need to redress pervasive information recruitment which disadvantages CM graduates in professional registration	4.20	0.8	<.001	1
2.	Promotion of equitable professional registration	4.12	0.8	<.001	2
3.	Legislation defining acceptable workmanship and professional conduct and ethics disadvantages CM graduate in professional registration	4.08	0.8	<.001	3
4.	Legislation to combat difficulties in professional registration practices	3.90	1.	<.001	4
5.	Legislation that penalises normalisation of CM graduates in professional registration	3.84	0.8	<.001	5
	<b>Cronbach's alpha = 0.816</b>				
	<b>Chi-square = 10.654</b>				

6.2	Technological transformation	Mean	Standard Deviation	Test of Significance	Rank
1.	CM graduates excel in analytical decision-making skills	3.94	0.835	0.002	1
2.	Technology use restructures the balance of competencies required for successful professional registration	3.94	0.925	0.0011	2
<b>Cronbach's alpha = 0.720</b>  <b>Chi-square = 0.000</b>					

<b>6.3</b>	<b>Personal dynamics</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Test of Significance</b>	<b>Rank</b>
1.	Programmes to improve worker self-efficacy and professional registration	4.04	0.937	0.006	1
2.	Programmes to reintegrate CM graduates coming to university	3.94	0.968	<.001	2
3.	Training and workshops to improve personal dynamics at the workplace.	3.	0.872	0.001	3
<b>Cronbach's alpha = 0.787 Chi-square = 2.068</b>					

<b>6.4</b>	<b>Motivation of CM graduates</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Test of Significance</b>	<b>Rank</b>
1.	Improve the professional standards	4.02	0.761	<.0.001	1
2.	Introduction of new forms of procurement systems	3.96	0.799	<.0.001	2
3.	Offering incentives for encouragement of professional CM registration.	3.88	0.909	0.001	3
4.	Promote joint-ventures with foreign construction companies.	3.86	1.040	<.001	4
<b>Cronbach's alpha = 0.842</b>					
<b>Chi-square = 2.41</b>					

Section 6.1 in the table provides an overview of the policy and legislative interventions. The most highly-rated factor on this construct is the need to redress pervasive information recruitment, which disadvantages CM graduates in professional registration with an MS of 4.20. Employers' readiness to recruit graduates without favouritism or rejection will facilitate equitable recruitment and employment opportunities for the nation's citizens, ensuring each graduate has an equal chance to secure employment and acquire the necessary skills for professional registration.

The next step is to promote equitable professional registration with an MS of 4.12. The registration of CM graduates should be based on merit. Any graduate who qualifies should be accorded the status. This will ensure the steady development and retention of graduates in the industry.

The least significant factor rated on this construct is legislation that penalises normalisation of

CM graduates in professional registration with an MS of 3.84. Though this factor has a high to moderately high influence on factors mitigating the challenges faced by CM graduates in getting registered professionally, it is rated as the least significant factor.

Section 6.2 presents the factors that mitigate technical transformation when CM graduates register as professionals. The fact that CM graduates excel in analytical skills and decision-making skills with an MS of 3.94 is most rated as the factor that mitigates technological skill challenges required for registration. The likely reason for this may be as a result of the inclusion of technological sequences for problem-solving in the curriculum of CM graduates at tertiary institutions and their subsequent application in the industry.

Section 6.3 reviews the personal dynamics, challenges and mitigating factors to CM graduates getting registered as professionals. A programme to improve workers efficiency at work and professional registration with an MS of 4.04 is rated the most as a factor to mitigate personal dynamics of CM graduates for registration. Training workers to improve their skills and productivity, as well as their self-confidence, will capacitate CM graduates' skills and ultimately lead to a positive impact on productivity and meeting the personal dynamic skills for professional registration.

Section 6.4 delineates the mitigating factors of motivation that CM graduates encounter when pursuing professional registration. The factor improved the professional standard, achieving an MS of 4.04 as the highest possible rating. The promise of numerous benefits to attaining the status of a registered profession will encourage CM graduates to register; such benefits could bring immediate promotion and financial benefits, among others. Next, there are new forms of procurement systems with an MS of 3.96. Clauses that restrict professionals to specific project categories may motivate CM graduates to strive for registration as professionals. The least significant factor rated on the construct is promoting joint ventures with foreign companies, with an MS of 3.86. This factor, though rated as the least significant factor in mitigating challenges faced by CM graduates in getting registered as professionals, has a high to moderately high influence on CM graduates registration as professionals. Furthermore, this factor seems

challenging to realise. This may be the reason for it being rated as the least significant factor.

#### **4.6 PRESENTATION OF DATA AND ANALYSIS OF OPEN-ENDED QUESTIONNAIRE/INTERVIEW**

This section present the results obtained from an open ended questionnaire/interview conducted to reinforce the results from the main study questionnaire.

Demographic section

Sample gender

The total population of sample surveyed in this stage of the study is twenty-six (26). Apparently, the gender distribution of respondents is equitable. Fifty percent (50%) for both male and female.

*Table 4. 10 Years of experience of respondents*

S/No.	Number of years	Frequency	Percentage Frequency (%)
1	5 - 10	12	48
2	11 - 15	6	24
3	16 - 20	5	20
4	Over 21	2	8

Table 4. 10 indicates the number of years of the respondents for the interview questionnaire. Most of the respondents have between five to ten years of working experience. It is noteworthy that the entire sample have not less than five years of working experience. This implies that they are knowledgeable in the field of construction and the information provided by them can be deemed reliable. A total of twenty-six respondents were surveyed. Statements for each questions are collated and presented. Statements from respondents on question one were categorised into six groups. These are presented in Table.4. 11 The statement with the highest % frequency (38.4%), no necessary experience to obtain professional status.

*Table 4. 11: Personal challenges faced by CM graduates in attaining a professional status.*

NUMBERS	STATEMENTS	FREQUENCY	%FREQUENCY
1	Funding for registration cost	2	7.7
2	Difficulty in securing a mentor for getting experience	7	27.0
3	Delayed response time, long waiting periods on feedback from council	2	7.7
4	No necessary experience to obtain professional status	10	38.4
5	Restricted length of the report and tricky questions during interviews	1	3.80
6	Difficult documentation to compile and submit a portfolio	4	15.4

Table 4. 11 presents the personal challenges faced by CM graduates in attaining a professional status. Six main responses were received. CM graduates most frequently face the challenge of not having the necessary experience to obtain professional status during the registration process, accounting for 38.4% of the total. Experience in the field of construction is vital for registering as a professional; this experience relates to the six stages of a project life cycle. A graduate without experience cannot be trusted to handle a project from inception to close-out.

The difficulty in securing a mentor to assist in training and tutoring to gain experience with a percentage respectively 27% is the second main problem faced by graduates in getting registered as professionals. The third reason for CM graduates facing challenges in getting registered as professionals is the complexity of the documentation required to compile a portfolio of evidence for assessment (15.4%). Graduates do not have enough experience to prepare a good report, especially because of the complexity of the requirements of the portfolio required by the council for submission for assessment. Other problems are tricky questions and the restricted length of report (3.8%), lack of funding for registration lost (7.7%), and delayed response time, which is a

long waiting period for feedback on interviews (7.7%).

Table 4. 12 the highlights on various challenges faced by CM graduates at their place of work that inhibit them from attaining professional statuses.

*Table 4. 12: Challenges Faced by CM Graduates in Attaining Professional Status*

NUMBER	STATEMENTS	FREQUENCY	%FREQUEN CY
1	Not allowed to manage projects/Not exposed	13	34.19
2	Assigned for administrative work	3	7.9
3	Lack of mentorship or mentorship/supervision	2	5.26
4	Graduates struggle to balance work and personal development	2	5.26
5	No mentors	1	2.63
6	High fees	3	7.89
7	Bureaucratic hurdles and many complex documentation	4	10.52
8	Failure to pay for candidacy and CPD training courses	1	2.63
9	Limitation in access to stage 1 and 2 experience	1	2.63
10	Inadequate technology and software skills	1	2.63

Table 4. 12 reveals that respondents were asked to highlight challenges faced in various workplaces that inhibit their attainment of professional status. A total of 38 statements were collated. Of them all, 38.19% stated that they were not allowed to manage a project. This may be associated with the level of CM graduates skills in relation to the construction industry. The second important statement by the respondents was the lack of mentorship and poor supervision (23.1%) with respect to gaining experience as required to enable effective performance in handling projects from inception to close-out. The third important statement by the respondents is that the

bureaucratic hurdles and the complex documentation (10.52%) required for submission as portfolio evidence is a challenge for CM graduates to easily register as professionals. The fourth main challenge experienced by CM graduates at their place of work that inhibits them from attaining professional status is the assigning of CM graduates to administrative work (7.89%). This practice takes CM graduates out of their primary duty, leaving them without any practical experience and making it difficult for them to meet the council's requirements for professional status. Other statements are challenges to CM graduates in the workplace include the lack of mentors (2.63%), the high registration fees (7.89%), the struggle to balance work and personal development (5.26%), the failure to pay for the candidate CPD training courses, limited access to stage 1 and 2 experiences, and inadequate technological and software skills (2.63%).

*Table 4. 13: Identification and Explanation of Measures to Mitigate Challenges Faced by CM Graduates*

NUMBER	STATEMENTS	FREQUENCY	%FREQUENCY
1	Employer to encourage registration and payment of annual fees	1	3.57
2	Job description and allocation aligns with graduate qualification/ and obtain CPD points	6	21.42
3	Mentors consent required before assigning graduates to mentors	1	3.57
4	Provision of mentors by companies	4	14.28
5	Practical experience be introduced into the curriculum from the first year of study	1	3.57
6	Provision of seminars on registration requirements	1	3.57
7	Self-employment	1	3.57
8	To have a requirement that final students be registered and let them have mentors.	1	3.57
9	Employers and mentors to be given incentives to assist candidates.	1	3.57
10	Graduate must be exposed from inception to close out.	1	3.57
11	Graduate enrolment in formal graduate trainee programs and progress monitored by mentors.	4	14.28
12	Structure internship.	1	3.57

13	Pr. CM to hold management positions	2	7.14
14	Educational training CM deliverables.	1	3.57
15	A platform to register graduates for training.	1	3.57
16	3 Year program given after graduation to cover all aspect.	1	3.57

Table 4. 13 indicates the identification and explanation of the measure to be adopted in mitigating the challenges faced by CM graduates. A total of 28 remedies were suggested. The most frequently suggested statement, job description and allocation, align with graduate qualification to obtain CPD points obtained 21.4% representation. Respondents believed that graduate employees are not normally assigned jobs that match their qualifications. Graduates, in most cases, do other jobs that do not resonate with their qualifications and based on this they do not acquire the relevant job experience. Two statements have the same percentage representation: the provision of mentors by companies and graduate enrolment in formal graduate trainee programmes and intensive graduate progress monitored by mentors (14.28%). Experience needs to be taught or transferred via observation. Internships provide avenues for training and mentors impact or transfer skills and experience to fresh graduates. These factors are crucial in relation to CM graduates gaining experience. The other statement with high representation is educational training on CM deliverables (7.14%). If CM graduates are familiar with the deliverables expected of them in the form of requirements, it will assist them in preparing their documentation well for submission to be assessed.

*Table 4. 14: Identifying and Explaining Options to Secure a Stable Supply of Professional Construction Managers in the Construction Industry*

NUMBERS	STATEMENTS	FREQUENCY	%FREQUENCY
1	Create panels of professional CM according to years of experience	1	4
2	Rotation of construction manager for growth	1	4
3	Vocational training programs provided with training and mentors	7	28
4	Young professional registration for position requiring 5 years' experience	8	32
5	Making professional registration for position requiring 5 years' experience.	1	4
6	Acquire accredited service providers to train graduates	2	8
7	Utilization of CETA to provide experience to young graduates by attached them to companies.	2	8
8	CETA mentorship programs where mentors are paid	1	4
9	Creator of a new system	1	4
10	SACPCMP registration be mandated at the university curriculum like the HPCSA.	1	4

Table 4. 14 presents various options within the construction industry supply chain in securing a stable feedstock of professional construction managers. The most frequently occurring statement states that young professionals should be given training and mentorship (32%). This indicates a

compilation of yearly CM graduates in order to realise this. The next suggestion is a vocational training programme provided in curriculum and internship (28%). This will ensure that there is no shortage of CMs in the industry.

The two statements have the same percentage (8%) representation are: acquire accredited service providers to train graduates and the utilisation of SETA to provide experience to young graduates by attaching them to companies. This is in the same vein as the above-explained statement (the second point). Other suggested options are that panels of professional C according to years of experience (4%), making professional registration for positions requiring five years of experience (4%) and the creation of a new system (4%).

*Table 4. 15: Measures to Foster a Collaborative Approach Ensuring CM Graduates Attain Professional Status*

NUMBERS	STATEMENTS	FREQUENCY	%FREQUENCY
1	Ease registration and annual mentorship fees	2	7.7
2	Ease registration and annual mentorship fees	3	11.55
3	SACPCMP to review registration requirement	2	7.7
4	A graduate's program in collaboration with CETA for experience while been monitored or in collaboration with stakeholders	3	11.55
5	Hire professionally registered personal for mentorship	2	7.7

6	Workshop should be provided to CM graduates prior to sitting for SACPCMP interviews	4	15.4
7	SACPCMP to offer graduates construction specific learning and development programs/ create structured mentorship programs where experience professionals' mentors	4	15.4
8	Reduction in registration fees	1	3.85
9	SACPCPM to develop CM curriculum for their expected outcomes for accreditation	3	11.55
10	Reduce turn around time to process applications	1	3.85
11	SACPCMP to provide training for short courses for workshop to enhance skills and knowledge.	1	3.85

Table 4. 15 reveals measures that would engender a collaborative approach to ensure a win-win situation among the SACPCMPs and the CM graduates in attaining professional status. The two statements that have the highest frequency: workshops should be provided to graduates prior to the SACPCMP interviews and the SACPCMP should offer graduate construction-specific learning and development and create structured mentorship programmes with experienced professional mentors (15.4%). In this manner CM graduates will be capacitated and prepared, ready to handle projects from inception to close-out. Three statements all of which have the same percentage frequency were suggested. The encourage continual learning and professional development, a graduate programme in collaboration with SETA for experience while being mentored or in collaboration with stakeholders, and the SACPCMP to develop a CM curriculum for their expected outcomes for accreditation (11.5%). All of these suggested measures will ensure the control,

uniformity and quality of CM graduates. This indicates that any graduate of CM employed will not perform below a set standard. Other suggested measures are to ease the registration and annual membership fees (7.7%), SACPCMP to review registration requirements (7.7%), hire professionally registered personnel for mentorship (7.7%), reduce turnaround time to process application (3.85%), and to provide training courses and workshops to assist CM graduates improve their skills (3.85%).

## **CHAPTER FIVE: DISCUSSION OF THE RESULT**

### **5.1 INTRODUCTION**

This chapter discusses the key findings of the study focusing on the challenges faced by CM graduates in obtaining professional registration as reported in the main questionnaire. The discussion synthesises the results presented in Chapter four (4) with relevant recent literature to provide insights into the barriers and potential solutions for improving the professional registration process for CM graduates in South Africa.

### **5.2 CHALLENGES IN DESIGN, DEVELOPMENT AND TENDER DOCUMENTATION**

The findings revealed that CM graduates involvement in certain critical aspects of design development and tender documentation is limited. For example, defining and agreeing on the preliminary scope of construction works had the lowest mean score (3.65) in the design development phase. This aligns with recent research by Windapo *et al.* (2020), who concluded that many construction graduates lack sufficient exposure to the early stages of projects. Limited involvement in these phases can hinder the CMs' ability to develop the comprehensive project understanding required for professional registration.

CM graduates at the technical stage are not well-equipped to handle all work stages required at the comprehensive information stage. These include providing detailed cost information, attending planning meetings, reviewing and recommending cost-effective construction alternatives, providing lead times for detailed design and documentation programmes, preparing preliminary construction programmes, and defining the preliminary scope of construction works.

In the tender documentation phase, reviewing and confirming construction strategies for tender submission received a relatively low mean score (3.67). This suggests that graduates may not be acquiring adequate experience in the strategic planning aspects of tendering. Musonda *et al.*

(2019) emphasised the importance of strategic thinking skills for construction professionals, indicating this could be an area for improvement in preparing graduates for registration.

The tender documentation and procurement stage involves eleven activities that CM graduates must be proficient in. These tasks include reviewing tender documentation to find cost-effective alternatives, selecting and finalising procurement strategies for sub-contractors and suppliers, managing negotiations on contractual commitments and the tender process, co-ordinating the preparation and implementation of health and safety requirements, preparing and approving the procurement programme, preparing the construction management organogram, and reviewing and confirming the construction strategy and method for tender submission. However, CM graduates are not as involved as required by the professional council.

### **5.3 TECHNOLOGY AND SAFETY CHALLENGES**

The study identified several technology-related challenges, with low levels of new technological development (Mean Score 3.90) and IT usage (Mean Score 3.82) being prominent issues. This echoes findings by Oesterreich and Teuteberg (2016), who highlighted the construction industry's slow adoption of digital technologies as a barrier to professional development. Improving graduates' exposure to and proficiency with emerging construction technologies could enhance their readiness for professional registration.

Safety-related challenges were also significant, with limited knowledge of safety precautions receiving the highest mean score (4.29) in this category. This aligns with research by Zahoor *et al.* (2017), who found that inadequate safety knowledge among construction professionals is a persistent issue globally. Enhancing safety education and training for CM graduates could be crucial for improving their professional competence and registration prospects.

### **5.4 TRAINING, SKILL DEVELOPMENT, AND RESOURCE CHALLENGES**

Inadequate support from institutional organisations (Mean Score 3.88) and limited allocation of funds for employee training (Mean Score 3.86) emerged as key challenges in the training and

development category. This corresponds with findings by Oke *et al.* (2018), who identified insufficient investment in continuous professional development as a major barrier to construction industry advancement in developing countries.

In terms of skill development, inadequate skill development programmes received the highest mean score (3.90). This highlights a gap between academic education and industry requirements, a challenge also noted by Yogeshwaran *et al.* (2017) in their study of construction management education in South Africa.

Resource challenges, particularly high labour turnover (Mean Score 3.78), were identified as significant barriers. This aligns with research by Oke *et al.* (2017), who found that retention of skilled professionals is a persistent challenge in the construction industry, potentially impacting the mentorship and development of new graduates.

## **5.5 RECRUITMENT PROCESS CHALLENGES**

The study revealed several recruitment-related challenges, with employers' reluctance to hire inexperienced CM graduates receiving one of the highest mean scores (4.06). This "experience gap" has been noted in recent literature as a significant barrier for construction graduates (Oke and Aigbavboa, 2017). The formalisation of work at lower levels limiting upward mobility (Mean Score 4.06) was also identified as a major challenge, suggesting structural issues in career progression that may hinder professional registration.

## **5.6 MITIGATING FACTORS AND POTENTIAL SOLUTIONS**

Several potential solutions emerged from the study. The need to address pervasive informal recruitment practices received the highest mean score (4.20) among policy and legislation factors. This aligns with recommendations by Aigbavboa *et al.* (2019) for more transparent and equitable hiring practices in the construction industry.

Promoting equitable professional registration (Mean Score 4.12) and implementing legislation defining acceptable workmanship and professional conduct (Mean Score 4.08) were also highly rated. These findings support recent calls for more standardised and fair registration processes in the construction industry (Windapo, 2022).

In terms of personal dynamics, programmes to improve worker self-efficacy and professional registration received the highest mean score (4.04). This aligns with research by Oke and Aigbavboa (2017) emphasising the importance of soft skills and self-confidence in professional development for construction graduates.

### **5.7 The Flow Chart**

The SACPCMP developed guidelines for CM graduates to register as professionals. The flow chart below outlines the essential steps for CM graduates to become registered professionals. The flow chart below outlines the registration process.

## **FLOW CHART TO PROFESSIONAL REGISTRATION**

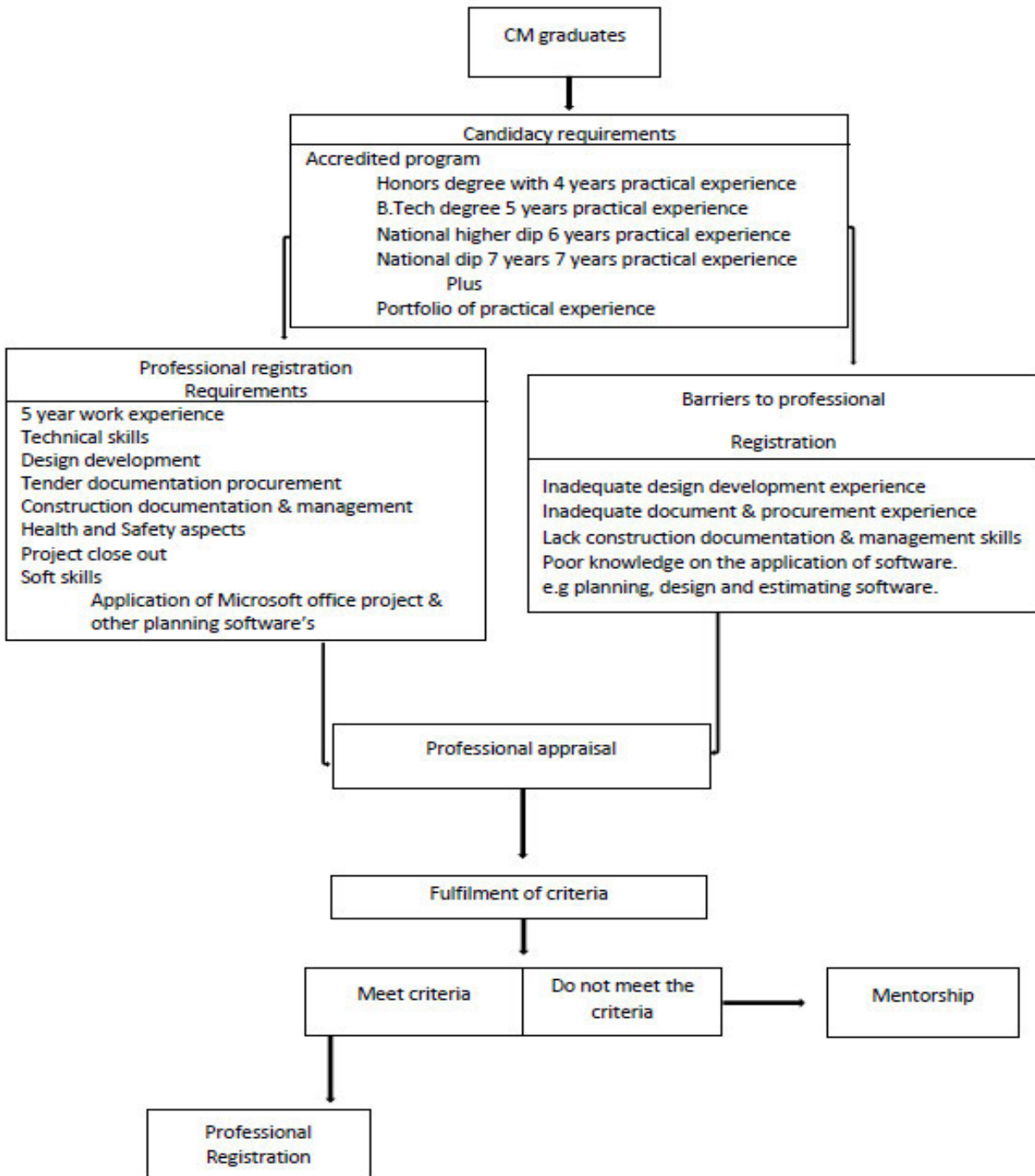


Figure 5. 1: Guidelines for Registration (Author)

Candidates are first expected to complete an accredited programme and demonstrate a minimum of four years of practical experience for an Honour's graduate. Five years of practical experience for a B.Tech graduate, six years of practical experience for a National Higher Diploma graduate, and seven years for a National Diploma graduate. To qualify for the candidacy status, a graduate is required to submit a portfolio of evidence. Upon the successful completion of this stage, the status of candidacy is confirmed.

For the professional registration, a minimum number of working years' experience is required (4-5 years). There are certain experiences and skills that CM graduates are expected to have acquired during this period. These include both soft and technical skills. A listing of the technical skills are exposure to the following: Design and development, tender documentation and procurement, construction documentation and management, Health and Safety, and Close-out. Exposure to technical skills includes the following areas: design and development, tender documentation and procurement, construction documentation and management, health and safety, and project close-out.

The soft skills include being efficient in the application of MS Office Project for scheduling, BIM, AutoCAD Rivet, and other planning and design software.

The candidate for professional registration is expected to have been exposed to or handled a few projects and should have gained the required technical and soft skills. A signed portfolio of evidence is expected to be signed by the inventor.

The application is then appraised. The outcome is then given based on whether the applicant meets the minimum specified criteria or does not meet the minimum criteria. The applicant is required to undergo further mentorship by undertaking some more projects to be exposed and acquire some experience where required.

From the onset, there are barriers to professional registration. Mostly these barriers are in the form of inadequate exposure for applicant to acquire sufficient technical and soft skill

competencies. There is a lack of evidence to prove competencies in both technical and soft skills.

## **5.8 A SYSTEMS MODEL FOR CONSTRUCTION MANAGEMENT GRADUATES PROGRESSION FOR REGISTERING AS PROFESSIONAL**

### **5.8.1 Introduction**

The application of the systems model for this study is to develop a holistic understanding of construction management graduates' progression to professional status with the council. The interrelationships of tasks and policies towards accreditation and professional registration are revealed in the study. Given that this study is investigating the relationship between actions of challenges faced by CM graduates and professional registration and that Figure 5. 2 presents a graphical review of the salient conclusions using a primary causal loop analysis and modelling, it is necessary to address systems thinking.

Senge (2006) declares that systems thinking is being able to recognise increasingly (dynamically) complex and subtle structure amid the wealth of details, pressures and crosscurrents that attend all real management settings. The art of mastering systems thinking as a management discipline involves seeking patterns where others see only events and forces to react to.

### **5.8.2 Tools**

Since they are based on feedback processes, the tools of systems thinking, inter alia, causal loop diagrams, consisting of arrows and various actions afford interrelationships to be discussed more easily.

### **5.8.3 System**

Senge (2006) describes systems as the basic interrelationships that control behaviour. In other

words, systems are the operating processes whereby we translate perceptions, goals and norms into actions. System thinking is a set of specific tools and techniques originating in two threads:

- In 'feedback' —concepts of cybernetics, and in 'servo-mechanism', and
- It is a sensibility for the subtle interconnectedness that gives living systems their unique character.

#### **5.8.4 Systemic structure**

In systemic thinking the structure is the pattern of interrelationships among key components of the system: the art of breaking problems into smaller pieces, which makes complex tasks and subjects more meaningful. Consequently, structure includes attitude and perceptions, the quality of products, the ways in which decisions are made, and hundreds of other factors.

Additionally, systems thinking involves a deep understanding of the forces that must be mastered to facilitate progress from one point to another.

- Team learning develops people's ability to see the skill of growth of people to look for the larger picture beyond individual perspectives, and
- Personal mastery fosters the personal motivation to continually learn how our actions affect our world.

System thinking makes understanding the subtlest aspect of the learning organisation —the new way individuals perceive themselves and their world. A learning organisation is a mind shift—from seeing ourselves as separate from the world to being connected to the world. It enables us to see problems not as caused by someone or something 'out there' but to see how our own actions create the problems we experience. A learning organisation is a place where people are continually discovering how they create their reality and how they can change it.

#### **5.8.5 The language of systems thinking: links and loops**

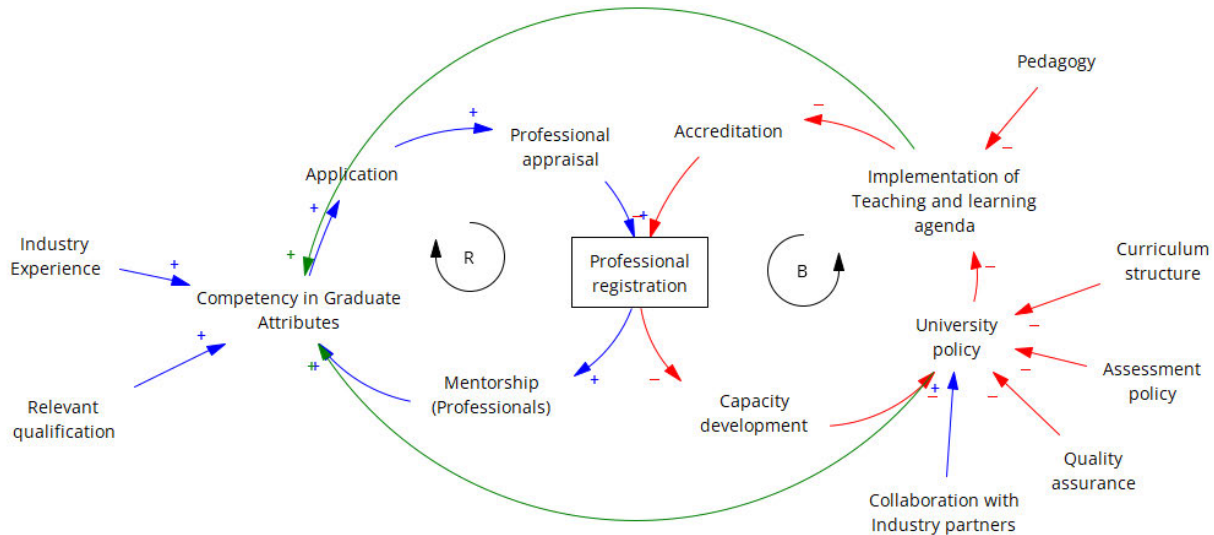
Language shapes our perceptions and thoughts. The language of systems thinking is the language of circles and documented actions, with arrows linking these actions in a loop (circle). These present certain patterns of structures that are called archetypes. System archetypes help people to see those structures and thus finding the leverage, especially amid the pressures and crosscurrents of real-life business situations. Leverage is eliminating the extreme instability that invariably occurs within a process.

### **5.8.6 Reinforcing and balancing loops**

Reinforcing systems serve as the engines of growth; and the means to implement corrective actions. These are the new ideas, changes, and actions integrated into the system that lead to experiential growth.

A vicious or virtuous cycle cannot exist by itself; it requires a balancing mechanism. Balancing processes are the mechanisms found in nature and all systems, which fix problems, maintain stability and achieve equilibrium. Balancing refers to the various actions that are taken to maintain objectives, goals and productivity.

Systems thinking by means of causal loops was employed to resolve the challenges faced by CM graduates at DUT in registering as professionals.



*Figure 5. 2: Graphical Review of Salient Conclusions through Primary Causal Loop Analysis and Modelling, Addressing Systems Thinking*

The reinforcing loop (R) represents the ideal situation. In this scenario, the mechanism enables graduates to register with minimal challenge. Students who initially possess relevant qualifications and industry experience are equipped to develop the competencies required for graduate attributes. Upon attaining these attributes, graduates can apply for professional appraisal by submitting a portfolio of evidence that meets the requirements set by professional institutions. If the portfolio satisfies the relevant criteria, graduates are approved and proceed to become registered professionals.

However, the balancing loop (B) illustrates the current situation at the institution. A lack of appropriate policies in areas such as curriculum design, assessment standards, quality assurance, and industry collaboration—combined with the inadequate implementation of teaching and learning strategies and inappropriate pedagogy—leads to unfavourable accreditation outcomes. These outcomes, in turn, negatively affect the professional registration of graduates.

For instance, ineffective university policies arise from limited collaboration with industry partners, the absence of robust quality assurance systems, an assessment policy that fails to address

competency in graduate attributes, and a curriculum structure that does not adequately prepare CM graduates. This results in poor implementation of teaching and learning strategies, which are underpinned by ineffective pedagogical practices. Consequently, CM graduates lack the technical and software skills required by accreditation bodies. This deficiency not only hinders graduates' professional registration but also limits capacity development, thereby impacting the industry.

To address these issues, two key leverage points can be identified:

1. University Policy:

- Policies must be reviewed and strengthened to promote collaboration with industry partners.
- Assessment policies should be designed to enable students to demonstrate competencies and achieve graduate attributes.
- Quality assurance systems must be implemented to ensure that the curriculum includes sufficient technical and software skills.

2. Teaching and Learning Agenda:

- A comprehensive teaching and learning agenda should be developed and implemented.
- Appropriate pedagogical practices must be adopted to ensure impactful learning and the attainment of graduate attributes.

By addressing these leverage points, CM graduates will be equipped with the necessary skills and competencies, enabling them to navigate the registration process smoothly and meet professional standards without significant challenges.

## **5.9 Discussion of Commonalities between conclusions on questionnaire study and system thinking approach**

On the challenges faced by CM graduates in getting registered as a professional, inadequate skills is a major challenge found to be the most common challenge faced by CM graduates in getting registered as professionals. These skills stem from design development, tender documentation, technical and software skills and close out. These put them at a disadvantage, from the interview questionnaire factors such as high registration fees, non-sponsoring by company or organisation of registration fees, complex documentation process, lack of training and mentors stand out as challenges in getting registered as professionals with the SCPCMP.

On mitigation of the challenges

Professional development for CM graduates is a common factor revealed from both surveys that could assist in improving the skills shortage experience of CM graduates (technical and soft skills). The provision of mentors and adequate supervision will assist in training CM graduates is a common factor indicated from both surveys as a mitigating factor to CM graduates particularly on practical experience and improve their registration rate with the council.

Support in relation to registration fees will encourage CM graduates to embark on the process of registration as professionals, this is highly recommended.

The complex documentation required for registration is being advised to be reduced and provision of training as to its compilation is hereby recommended.

## **5.10 CONCLUSION**

The findings of this study highlight multifaceted challenges facing CM graduates in their pursuit of professional registration. These challenges span technological, safety, training, skill development, resource, and recruitment domains. The identified mitigating factors suggest a need for comprehensive interventions involving policy changes, improved training programmes, and enhanced industry-academia collaboration to better prepare CM graduates for professional registration and career success.

Construction management graduates are responsible for reviewing designs, preparing and submitting method statements for construction, agreeing on sub-contractors and suppliers, managing contract insurance and guarantees, managing progress claims, and monitoring work quality. They also coordinate and manage defects during the defect liability period and prepare final accounts with cost consultants and sub-contractors. However, they face challenges in obtaining professional registration due to a low level of new technological development in the construction sector. This lack of technological advancements hinders their ability to stay updated with the latest construction practices.

## **CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 INTRODUCTION**

This chapter presents the key conclusions drawn from the study on the challenges faced by Durban University of Technology (DUT) construction management graduates from 2014 to 2017 in achieving professional registration. It also outlines the limitations of the research, suggests areas for future investigation, and provides recommendations for addressing the identified barriers to professional registration.

### **6.2 CONCLUSIONS**

Based on the findings and discussion presented in the previous chapters, the following key conclusions are drawn:

#### **6.2.1 Limited Involvement in Critical Project Phases**

The study revealed that CM graduates have insufficient involvement in crucial aspects of design development and tender documentation. This limited exposure, particularly in defining project scope and reviewing construction strategies, hinders their ability to develop the comprehensive project understanding required for professional registration. This finding aligns with recent research highlighting the importance of early-stage project involvement for construction professionals (Windapo *et al.*, 2020).

#### **6.2.2 Technology and Safety Knowledge Gaps**

Significant challenges were identified in graduates' exposure to and proficiency with emerging construction technologies. The low levels of new technological development (Mean Score 3.90) and IT usage (Mean Score 3.82) indicate a gap between academic training and industry requirements. Additionally, limited knowledge of safety precautions (Mean Score 4.29) emerged as a critical issue, echoing global concerns about inadequate safety knowledge among

construction professionals (Zahoor *et al.*, 2017).

### **6.2.3 Inadequate Training and Skill Development Support**

The study highlighted insufficient support from institutional organisations (Mean Score 3.88) and limited allocation of funds for employee training (Mean Score 3.86) as key barriers to professional development. This lack of investment in continuous professional development aligns with findings from other developing countries (Oke *et al.*, 2018) and represents a significant obstacle to graduates' progression toward professional registration.

### **6.2.4 Recruitment and Career Progression Challenges**

Employers' reluctance to hire inexperienced CM graduates (Mean Score 4.06) and the formalisation of work at lower levels limiting upward mobility (Mean Score 4.06) were identified as major challenges. These findings suggest structural issues in career progression that may hinder professional registration, consistent with recent literature on the "experience gap" faced by construction graduates (Oke and Aigbavboa, 2017).

## **6.3 Conclusions from the open-ended interview questionnaire**

The following conclusions are reached based on the analysis of the open ended interview questionnaire.

On the challenges faced by CM graduates in getting registered as professionals, no necessary practical experience required to meet criteria for registration as a professional with the council is the most occurring factor.

Difficulty in securing a mentor to train and acquire experience is the second main challenge faced by CM graduates in getting professional registration.

Organisational challenges faced by CM graduates in getting professional registration includes, not allowed to manage a project therefore, no chance of gaining exposure to acquire practical

experience is the major challenge.

This is followed by bureaucratic hurdles and many complex documentation for submission to be assessed, assigned for administrative work which supports the main challenge faced by CM graduates of no experience, high registration fees and lack of mentorship and supervision are major challenges.

#### **6.4 RECOMMENDATIONS FOR PRACTICE**

To address the challenges identified in this study, the following recommendations are proposed:

- Strengthen partnerships between universities and industry to ensure curriculum relevance and provide students with more practical exposure to all stages of construction projects.
- Integrate advanced technological training into CM programmes, focussing on emerging tools and software relevant to the industry.
- Enhance safety education and training programmes, emphasising practical application and up-to-date industry standards.
- Develop formal mentorship programmes to support graduates in their transition from academia to professional practice, addressing the "experience gap" identified in the study.
- Advocate for more transparent and standardised professional registration processes, potentially including staged registration options for recent graduates.
- Encourage and support ongoing professional development for CM graduates, with a focus on both technical and soft skills.
- Engage with relevant authorities to develop policies that promote equitable professional registration and address structural barriers in career progression.
- Establish networks and forums for CM graduates to share experiences, resources, and opportunities related to professional registration.
- University Policy:

- Policies must be reviewed and strengthened to promote collaboration with industry partners.
- Assessment policies should be designed to enable students to demonstrate competencies and achieve graduate attributes.
- Quality assurance systems must be implemented to ensure that the curriculum includes sufficient technical and software skills.
- Teaching and Learning Agenda:
  - A comprehensive teaching and learning agenda should be developed and implemented.
  - Appropriate pedagogical practices must be adopted to ensure impactful learning and the attainment of graduate attributes.

## **6.5 RECOMMENDATIONS FOR FUTURE RESEARCH**

Based on the findings and limitations of this study, the following areas are recommended for future research:

- Conduct longitudinal research to track CM graduates over an extended period, providing insights into how challenges evolve throughout their career progression.
- Expand the research to include graduates from multiple institutions and countries, allowing for comparative analysis of challenges and best practices.
- Investigate the perspectives of employers and industry leaders regarding the professional registration process and their expectations of CM graduates.
- Evaluate the effectiveness of various interventions aimed at improving professional registration rates among CM graduates.
- Explore in-depth how emerging technologies are impacting the professional development and registration process for CM graduates.
- Investigate the efficacy of current safety education programmes and their impact on graduates' professional competence and registration prospects.

## **6.6 LIMITATIONS OF THE STUDY**

Several limitations should be considered when interpreting the results of this study:

- The study focused specifically on DUT construction management graduates from 2014 to 2017, which may limit the generalisability of findings to other institutions or time periods.
- The research was confined to graduates in South Africa, potentially overlooking challenges unique to other regions or countries.
- The reliance on self-reported data through surveys and interviews may introduce potential biases or inaccuracies in the responses.
- The cross-sectional nature of the study provides a snapshot of challenges at a specific point in time, potentially missing long-term trends or changes in the industry.
- While the study focused on graduates' experiences, it may not fully capture the perspectives of employers or professional registration bodies.

## **6.7 CONCLUSION**

This study has provided valuable insights into the challenges faced by DUT construction management graduates in attaining professional registration. By addressing the identified barriers through targeted interventions and policy changes, it is possible to enhance the professional development pathway for CM graduates. Implementing the recommended strategies can contribute to producing more competent, well-rounded construction management professionals, ultimately benefiting the broader construction industry in South Africa and beyond.

## LIST OF REFERENCES

Aghimien, D., Aigbavboa, C. and Oke, A. 2019. Critical success factors for digital partnering of construction organisations – A Delphi study. *Engineering, Construction and Architectural Management*, 26(10): 2419-2436.

Aghimien, D., Aigbavboa, C., Oke, A. and Musenga, C. 2020. Barriers to the digitalization of construction projects in developing economies. *Engineering, Construction and Architectural Management*, 28(2): 334-351.

Aigbavboa, C. and Thwala, W. 2018. Structural equation modelling of critical success factors for sustainable housing in South Africa. *Journal of Construction in Developing Countries*, 23(1): 103- 120.

Aigbavboa, C., Oke, A. and Aghimien, D. 2022. Digitalisation in construction project management: The way forward for South Africa. *Journal of Engineering, Design and Technology*, 20(1): 1-14.

Aigbavboa, C., Oke, A. and Akinradewo, O. 2019. Improving quality and productivity in the construction industry through human resource management practices. In Proceedings of the International Conference on Industrial Engineering and Operations Management (pp. 236-246).

Aigbavboa, C., Oke, A. and Mojele, S. 2019. Contribution of construction mentoring to sustainable development goals in South Africa. *Journal of Engineering, Design and Technology*, 17(3): 467- 481.

Alwis, A. 2018. Improving documentation management in construction projects. *Journal of Construction Engineering and Management*, 144(6): 04018048.

Apuke, O. D. 2017. Quantitative research methods: A synopsis approach. Kuwait Chapter of

Arabian Journal of Business and Management Review, 33(5471), 1-8.

Arifin, S. R. M. 2018. Ethical considerations in qualitative study. *International Journal of Care Scholars*, 1(2); 30-33.

Aspers, P. and Corte, U. 2019. What is Qualitative in Qualitative Research. *Qualitative Sociology*, 42(2): 139-160.

Aspers, P. and Corte, U., 2019. What is qualitative in qualitative research. *Qualitative sociology*, 42(2): 139-160.

Babbie, E. (2005). *The Basics of Social Research*. 3rd edition. Belmont, CA, USA: Thomson/Wordsworth learning.

Benger, J. R., Kirby, K., Black, S., McCowan, C., Harron, K. and Elton, R. 2016. Effect of a strategy of a prepackaged secondary prevention program on medication continuation and readmission rates among patients with ACS: The UMPIRE randomised clinical trial. *JAMA*, 315(10): 1001-1010.

Blaikie, N. and Priest, J. 2019. *Designing social research: The logic of anticipation*. John Wiley & Sons.

Bless, C., Higson-Smith, C. and Sithole, S. 2018. *Research Methods: An Introduction*. Juta and Company Ltd.

Bowen, P., Edwards, P. and Cattell, K. 2019. Corruption in the South African construction industry: experiences of clients and construction professionals. *International Journal of Project Management*, 37(5): 647-658.

Brown, K. and Phua, F. 2011. The role of professionalism in construction management. *International Journal of Project Management*, 29(3): 234-245.

Bryman, A., Bell, E., Hirschsohn, P., Dos Santos, A., DuToit, J., Masenge, A., Van Aardt, I., and Wagner, C. 2014. *Research methodology: Business and management contexts*. Oxford University Press.

Busetto, L., Wick, W. and Gumbinger, C., 2020. How to use and assess qualitative research methods. *Neurological Research and practice*, 2(1): 1-10.

Carmichael, S. and Murray, M. 2018. Record keeping for contemporaneous delay analysis. *Construction Management and Economics*, 36(4): 204-217.

Chenail, R. J. 2011. Interviewing the investigator: Strategies for addressing instrumentation and researcher bias concerns in qualitative research. *Qualitative Report*. 16(1): 255-262.

Chia, R. 2002. *The Production of Management Knowledge: Strategies for Reducing Cost and Improving Service*, London: Pitman Publishing.

Clarke, L. and Boyd, D. 2011. The impact of the construction industry's image on the recruitment of new graduates. *Construction Management and Economics*, 29(4): 353-361.

Council for the Built Environment (CBE). 2001. *Guidelines for the registration of construction professionals*. Pretoria: Government Printer.

Creswell, J. W. and Creswell, J. D. 2018. *Research design: Qualitative, quantitative, and mixed methods approaches*. 5<sup>th</sup> ed. Sage publications.

Croucher, K. and Cronn-Mills, L. 2015. *Understanding research methods: An overview of the essentials*. SAGE Publications.

Crossan, F. 2003. *Research Philosophy: Towards an Understanding*. [Online]. Available from [www.slis.indiana.edu](http://www.slis.indiana.edu) 45-55. (Accessed 03 December 2024).

Cumberlege, J. 2008. The role of construction in economic development. *Journal of*

*Construction Engineering and Management*, 134(2): 50-58.

Deacon, C., 2019. Professional Construction Health and Safety Agent (CHSA) Practice Issues in the South African Construction Sector. In *Construction Industry Development Board Postgraduate Research Conference*. pp. 599–605. Springer, Cham.

Easterby-Smith, M; Thorpe, R. and Lowe, A. 2008. *Management Research: An Introduction*. 4th edition. London: Sage publications.

Englander, M. 2020. *The Interviewing Process: A Guide for Researchers*. University of Massachusetts.

Etikan, I. and Bala, K. 2022. Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, 5(6): 00149.

Etikan, I., Ahiator, L. and Steele, R. 2022. Sampling techniques and determination of sample size in applied statistics research: An overview. *International Journal of Economics and Business Research*, 6(1): 1-22.

Field, A. 2017. *Discovering statistics using IBM SPSS statistics (5th ed.)*. Sage Publications.

Furry, D. 2017. Tender documentation in construction projects: A review of best practices. *Journal of Construction Engineering and Management*, 143(5): 04017002.

Haupt, T. C. and Harinarain, N. 2016. The impact of the construction industry on the South African economy. *South African Journal of Industrial Engineering*, 27(1): 1-12.

Gill, J. and Johnson, P. 2002. *Research Methods for Managers*. London: Sage publishing

Hazzi, M. and Maldaon, I. 2015. *Questionnaire Design: A Practical Guide*. Routledge.

Heale, R. and Twycross, A. 2015. Validity and reliability in quantitative studies. *Evidence-based*

*nursing*, 18(3): 66-67.

Hempel, C. G. 1965. *Aspects of Scientific Explanation and Essays in the Philosophy of Science*. New York: Free Press.

Henry, R. 2021. Effective project close-out strategies in construction. *International Journal of Construction Management*, 21(1): 1-12.

Howitt, D. and Cramer, D. 2020. *Research methods in psychology*. 6<sup>th</sup> ed. Pearson.

Hwang, B.-G. and Lim, E.-S. J. 2021. Critical causes of delays in construction projects: A comparative analysis of Singapore and Malaysia. *International Journal of Construction Management*, 21(3): 218-228.

Hwang, B.-G., Zhao, X. and Tan, J. 2022. Managing project design development: A review of the literature. *International Journal of Project Management*, 40(1): 1-15.

Johnson, P. and Duberly, J. 2000. *Understanding Management Research*. London: Sage publications.

Jolliffe, L., Ritter, M. and Stevens, J. 2012. The challenges of the construction industry: A review of the literature. *Construction Management and Economics*, 30(1): 1-10.

Khatleli, N. 2020. The impediments to efficient supply chain management in the public sector. *Journal of Construction Project Management and Innovation*, 10(1): 2508-2518.

Kiviniemi, M., Fischer, M. and Miettinen, R. 2020. The role of design development in project management: A case study. *Construction Management and Economics*, 38(4): 349-362.

Kivunja, C. and Kuyini, A.B., 2017. Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education*, 6(5), pp.26-41.

Knox, S., and Burkard, A. W. 2009. Qualitative research interviews. *Psychotherapy research*, 19(4-5): 566-575.

Krosnick, J. A. 2018. Questionnaire design. *The Palgrave handbook of survey research*. (pp. 439-455). Palgrave Macmillan.

Kudiwa, T. 2018. Challenges of using mixed methods research in business and management studies. *International Journal of Qualitative Methods*, 17(1): 1-16.

Kumaraswamy, M. M. and Yogeswaran, K. 2017. Substantiation and assessment of claims for extensions of time. *International Journal of Project Management*, 25(4): 354-364.

Leedy, P. D. And Ormrod, J. E. 2015. *Practical Research: planning and design*. 11<sup>th</sup> Ed. New Jersey: Pearson Prentice Hall.

Janghorban, R., Latifnejad Roudsari, R. and Taghipour, A. 2014. Pilot study in qualitative research: The roles and values. *Journal of Hayat.*, 19(4): 1-5.

Levy, F. 2021. *Construction project management: A complete introduction*. McGraw-Hill Education.

Lune, H. and Berg, B. L. 2017. *Qualitative research methods for the social sciences*. 9<sup>th</sup> ed. Pearson.

Mackenzie, K. 2012. Barriers to professional development in the construction industry. *International Journal of Project Management*, 30(1): 1-12.

Majid, U., 2018. Research fundamentals: Study design, population, and sample size. *Undergraduate Research in Natural and Clinical Science and Technology Journal*, 2, p.1.

Malmqvist, J., Hellberg, K., Möllås, G., Rose, R. and Shevlin, M. 2019. Conducting the pilot study: A neglected part of the research process? Methodological findings supporting the importance of piloting in qualitative research studies. *International Journal of Qualitative Methods*, 18, 1609406919878341.

Mashwama, N., Aigbavboa, C. and Thwala, D. 2022. An assessment of the critical success factor for the reduction of cost of poor quality in construction projects in Swaziland. *Construction Economics and Building*, 21(1): 45-64.

Mewomo, M. C., Aigbavboa, C. O. and Pretorius, J. H. 2022. Assessment of the effects of coronavirus pandemic on the South African construction industry. *Journal of Engineering, Design and Technology*, 20(6)L 1508-1524.

Mohajan, H. K. 2017. Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*, 17(4): 59-82.

Mohajan, H. K. 2020. Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, 9(4): 50-79.

Mokhothu, T. T., Aigbavboa, C. O. and Thwala, W. D. 2021. Challenges in the design development phase of construction projects in South Africa. *Journal of Construction Project Management and Innovation*, 11(1): 1-17.

Mtya, A. and Windapo, A. 2019. Drivers of employee turnover in South African construction companies. *Journal of Construction Project Management and Innovation*, 9(1): 2116-2126.

Munhall, P. 2018. *Nursing Research: A Qualitative Perspective*. Jones & Bartlett Learning.

Murray, M. 2017. Procurement procedures and tender documentation. *Construction Management and Economics*, 35(4-5): 196-208.

Musonda, I., Gumbo, T. and Okoro, C. 2019. Assessment of competencies and skills for

construction management graduates. *Journal of Construction Project Management and Innovation*, 9(1): 2106-2120.

Musonda, I., Gumbo, T. and Okoro, C. 2019. Assessment of the critical success factors for sustainable housing in South Africa. *Acta Structilia*, 26(1): 142-173.

Naderifar, M., Goli, H. and Ghaljaie, F. 2017. Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in Development of Medical Education*, 14(3): 1-6.

Nardi, P. M. 2018. *Doing survey research: A guide to quantitative methods*. 4<sup>th</sup> ed. Routledge.

Neubauer, B.E., Witkop, C.T. and Varpio, L., 2019. How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*, 8(2): 90-97.

Neumann, W. 2000. *Social Research Methods: Qualitative and Quantitative Approaches*. 4th Edition. Needham Heights: Allyn and Bacon.

Nongiba, A. K. 2008. Impact of Health and Safety Management on Safety Performance of SMMEs in Ghana. Unpublished PhD thesis. Loughborough University.

Oesterreich, T. D. and Teuteberg, F. 2016. Understanding the implications of digitisation and automation in the context of Industry 4.0: A triangulation approach and elements of a research agenda for the construction industry. *Computers in Industry*, 83, 121-139.

Oke, A. and Aigbavboa, C. 2021. *Sustainable value management for construction projects*. Springer Nature.

Oke, A. E. and Aigbavboa, C. O. 2017. *Sustainable value management for construction projects*.

Springer.

Oke, A. E., Aigbavboa, C. O. and Khangale, T. 2018. Effect of skills shortage on sustainable construction. In Proceedings of the International Conference on Industrial Engineering and Operations Management (pp. 2980-2987).

Oke, A. E., Aigbavboa, C. O. and Mphahlele, N. 2020. Factors influencing construction workers' safety behaviour in South Africa. *Journal of Construction Project Management and Innovation*, 10(1): 1-11.

Oke, A., Aigbavboa, C. and Mphahlele, C. 2018. Drivers of construction organisations' performance: A South African perspective. *Journal of Engineering, Design and Technology*, 16(5), 782-797.

Okoro, C., Musonda, I. and Agumba, J. 2020. Safety performance evaluation of construction workers in Gauteng, South Africa. *International Journal of Occupational Safety and Ergonomics*, 26(4): 765-780.

Osunsanmi, T. O., Aigbavboa, C. and Oke, A. 2020. Construction 4.0: The future of the construction industry in South Africa. *World Journal of Science, Technology and Sustainable Development*, 17(4): 421-435.

Patton, M. Q. 2015. Qualitative evaluation and research methods. (3rd ed.). Thousand Oaks, CA: Sage Publications

Ponto, J. 201. Understanding and evaluating survey research. *Journal of the Advanced Practitioner in Oncology*, 6(2): 168-171.

Prinsen, C. A., Mokkink, L. B., Bouter, L. M., Alonso, J., Patrick, D. L., De Vet, H. C. and Terwee,

C. B. 2018. COSMIN guideline for systematic reviews of patient-reported outcome measures.

*Quality of Life Research*, 27(5): 1147-1157.

Rakasyiwi, G. R., Witjaksana, B. and Teki Tjendani, H. 2022. Literature review of construction project scheduling methods and effectiveness for the last 5 years in Indonesia. *International Journal on Advanced Technology, Engineering, and Information System*, 1(3): 43-48.

Rameezdeen, R. 2017. The impact of the construction industry's image on the recruitment of new graduates. *Journal of Construction Engineering and Management*, 143(5): 04017002.

SACPCMP. 2023. Graduate Route to Registration. Available (Online): <https://sacpcmp.org.za/registration/> (Accessed on 1 August 2024)

Sanjari, M., Bahramnezhad, F., Fomani, F. K., Shoghi, M. and Cheraghi, M. A. 2014. Ethical challenges of researchers in qualitative studies: the necessity to develop a specific guideline. *Journal of medical ethics and history of medicine*, 7, 14.

Saunders, B., Kitzinger, J. and Kitzinger, C. 2015. Anonymising interview data: challenges and compromise in practice. *Qualitative research*, 15(5): 616-632.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H. and Jinks, C., 2018. Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & Quantity*, 52(4): 1893-1907.

Saunders, M., Lewis, P. and Thornhill, A. 2016. *Research Methods for Business Students*. Pearson.

Sekaran, U. and Bougie, R. 2019. *Research methods for business: A skill-building approach*. 7<sup>th</sup> ed. Wiley.

Sekaran, U. and Bougie, R. 2019. *Research Methods for Business: A Skill-Building Approach*. Wiley.

Sharma, G. 2017. Pros and cons of different sampling techniques. *International Journal of Applied Research*, 3(7): 749-752.

Sharma, G. 2021. Pros and cons of different sampling techniques. *International Journal of Applied Research*, 3(7): 749-752.

Sharma, G., 2017. Pros and cons of different sampling techniques. *International Journal of Applied Research*, 3(7): 749-752.

Sim, J., Saunders, B., Waterfield, J. and Kingstone, T. 2018. Can sample size in qualitative research be determined a priori? *International Journal of Social Research Methodology*, 21(5): 619-634.

Simpeh, F. and Akinlolu, M. 2021. Challenges of remote working in the South African construction industry during the COVID-19 lockdown: The case of Western Cape Province. *Journal of Engineering, Design and Technology*, 19(6): 1435-1449.

Surmiak, A. 2018. Confidentiality in qualitative research involving vulnerable participants: Researchers' perspectives. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 19(3).

Sutton, R. 2017. Documentation management in construction projects. *Journal of Construction Engineering and Management*, 143(5): 04017001.

Taber, K. S. 2018. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6): 1273-1296.

Taherdoost, H. 2022. Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. *International Journal of Academic Research in Management (IJARM)*, 5(3), 28-36.

Taherdoost, H. 2019. What is the best response scale for survey and questionnaire design; Review

of different lengths of rating scale / attitude scale / Likert scale. *International Journal of Academic Research in Management*, 8(1): 1-10.

Taherdoost, H. 2022. *Sampling methods in research methodology: How to choose a sampling technique for research*. *International Journal of Academic Research in Management*, 9(1): 18-27.

Taherdoost, H. 2020. Sampling methods in research methodology: How to choose a sampling technique for research. *International Journal of Academic Research in Management*, 5(2): 18-27.

Taherdoost, H., 2017. Determining sample size; how to calculate survey sample size. *International Journal of Economics and Management Systems*, 2, 237-239.

Tavakol, M. and Dennick, R. 2011. Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.

Tavakol, M. and Dennick, R. 2011. Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55

Theofanidis, D. and Fountouki, A. 2018. Limitations and delimitations in the research process. *Perioperative nursing*, 7(3): 155-163.

Vasileiou, K., Barnett, J., Thorpe, S. and Young, T. 2018. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15- year period. *BMC Medical Research Methodology*, 18(1): 148.

Vaus, D. D. 2014. *Surveys in social research*. 6<sup>th</sup> ed. Oxford: Routledge.

Wegner, T. 2016. *Applied Business Statistics: Methods and Excel-based Applications*. 4<sup>th</sup> ed. Cape Town: Juta and Co.

Windapo, A. O. 2022. Challenges to the growth of construction enterprises in the South African construction industry. *Journal of Engineering, Design and Technology*, 20(1): 249-268.

Windapo, A. O. 2022. Drivers of construction industry development in South Africa. In *Research Anthology on Developing Effective Online Learning Courses* (pp. 1884-1904). IGI Global.

Windapo, A. O. and Cattell, K. 2023. Mapping the relationship between construction industry development and economic growth: A comparative analysis of South Africa and Nigeria. *Journal of Construction in Developing Countries*, 28(1): 1-22.

Windapo, A. O., Odediran, S. J. and Zwane, Z. 2020. Examining the nature of the relationships between project managers' skills, firm characteristics and project success. *Journal of Financial Management of Property and Construction*, 25(2): 245-265.

Yeong, M. L., Ismail, R., Ismail, N. H. and Hamzah, M. I. 2018. Interview protocol refinement: Fine-tuning qualitative research interview questions for multi-racial populations in Malaysia. *The Qualitative Report*. 23(11): 2700-2713.

Yin, R. K., 2018. *Case study research and applications: Design and methods*. 6<sup>th</sup> ed. Thousand Oaks, CA: Sage Publications.

Yogeshwaran, G., Perumal, V. R. and Sambasivan, M. 2017. Construction management education in South Africa: A review and analysis. *Journal of Engineering, Design and Technology*, 15(5): 669- 684.

Zahoor, H., Chan, A. P., Utama, W. P., Gao, R. and Zafar, I. 2017. Modeling the relationship between safety climate and safety performance in a developing construction industry: a cross-cultural validation study. *International Journal of Environmental Research and Public Health*, 14(4): 351.

Zarkada-Fraser, A. and Skitmore, M. 2020. Ethical Considerations in Construction Project Management. *International Journal of Project Management*, 38(1): 45-56.

Zitha, T. 2021. The use of digital payment for online shopping amongst millennials in the greater Durban area. M. Tech., Durban University of Technology. Available: <https://hdl.handle.net/10321/4259> (Accessed on 03 August 2022).

Zitha, T. and Penceliah, D. 2022. Perceptions Regarding Digital Payments in Online Shopping amongst Millennials in KwaZulu-Natal, South Africa. *African Journal of Inter/Multidisciplinary Studies*, 4(1): 338–349.

## **Appendix A:**

### **Letter of Information**



#### **Title of the Research Study:**

An assessment into the challenges faced by construction management graduates in progression towards professional status.

#### **Principal Investigator/s/researcher:**

A. Lushaba, Mtech: Construction Management

#### **Co-Investigator/s/supervisor/s:**

Dr. A.O. Aiyetan, PHD, Construction Management

#### **Brief Introduction and Purpose of the Study:**

Construction management evolved as a professional practice distinct from design and construction in the early 1960's in response to increasing complexities in the construction industry. Construction management services may be tailored to satisfy the needs of the novice or sophisticated Owner. Therefore according to SACPCMP (2021) a Professional Construction Manager must have one of the following, an approved Honours degree in the Built Environment field of study with four (4) years of appropriate post-graduate practical experience, a B-Tech

degree in the Built Environment subject of study with at least five (5) years of appropriate post-graduate practical experience, a National Higher Diploma in the Built Environment with at least six (6) years of relevant post- graduate practical experience or a National Diploma in the Built Environment with at least seven

(7) years of relevant post-graduate practical experience. However, for one to be a professional construction manager, they need to be registered with the South African Council for the Project

and Construction Management Professions. Their roles are to provide the owner with specialised knowledge, experience, and resources to navigate through the complexities of a construction programme or project (CMAA, 2007). The Professional Construction Managers in the South African construction industry play an important role however despite this several importance, researchers (Clarke & Boyd, 2011; Haupt & Harinarain, 2016; Rameezdeen, 2007; Jolliffe & Mackenzie, 2012) highlighted that the construction business has had a bad reputation for a long time, putting various barriers in the way of construction graduates towards advancing to professional status. Most common problems faced by construction management graduates include lack of experience, unfavourable policies poor information, inaccurate or inadequate planning, training and education issues, motivation issues, stress, unfavourable organisational culture, policies, and organisations promotion systems, industrial practices, job designations, unfavourable recruitment processes, and industrial dynamics. It is worth noting that lack of access to mentors and lack of responsibility and accountability play as constraints faced by CM graduates as well. CM graduates also lack onsite experience thus demonstrating the lack of suitably qualified construction graduates for senior management positions and unreliable and schedule conflicts that derail the progress towards professional status (Green; 2016, Navarro-Astor et al.; 2017, Ibanez; 2017).

It is therefore vital to give much support to CM graduates towards obtaining professional status within the construction industry. According to a study by the Korn Ferry Institute (2013), if construction graduates are placed in a positive culture where they gain deeper insight into the

skill and ability requirements of the top executives, they have been seen to obtain the information necessary to guide their professional status. Thus, this will demonstrate commitment to maintaining competence and receive professional recognition from SACPCMP that meets the minimum requirements expected professional person. As a result, in light of the aforementioned issues, this study aims to investigate the challenges, involvement, and level of development of construction management graduates toward professional status in South Africa.

### **Outline of the Procedures**

The study will include a purposive/judgemental selection of CM graduates across all 9 provinces of South Africa. The questionnaires will be sent to 54 individual respondents for the quantitative analysis while the nine provinces will be used as a focus group in the qualitative part of the study as semi- structured interviews. Hence the researcher will have 9 interview sections with the respondents in the qualitative part of the study. This study will make use of the Zoom conference to reach CM graduates focus group participants in semi-structured interviews due to Covid-19 restrictions. The responsibility of the participant is to sign the letter of information and consent form sent together with the questionnaire to each respondent to prove that they are participating voluntarily and answer the questions in the questionnaire of an interview guide.

### **Risks or Discomforts to the Participant:**

There will be no risk or discomfort to the participants. The responses provided will be treated with confidentiality and may only be made available for verification purposes. Thus, ethical considerations will significantly ensure that the point of view of respondents will be rendered freely and without hesitation.

### **Explain to the participant the reasons he/she may be withdrawn from the Study:**

You are entitled to withdraw from the study at any time should you wish to do so and will still continue to receive the appropriate standard of care. In relation to this study, when you are not complying or in case of sickness or adverse reactions, early termination will be implemented.

In either case, there will be no adverse consequences for you.

**Benefits:**

The results obtained from the participants will assist in the development of the framework which will provide solutions to the challenges encountered by construction management graduates in the progression towards professional status.

**Remuneration:**

There will be no remuneration offered for participating in the study.

**Costs of the Study:**

There will be no cost borne by the participant.

**Confidentiality:**

All data acquired in the course of this research will be considered confidential material and will not be openly divulged in any manner that would identify any individual or organisation without their consent. As such, the researcher will treat the respondents with dignity in that they were honoured and respected during the interviews. This will be done by upholding the principles of voluntary participation, informed consent, and confidentiality.

**Results:**

The data gathered will not be falsified and information gathered from secondary sources will be referenced properly.

**Research-related Injury:**

I will ensure that no research-related injury occurs to you since the questionnaires and interviews will be administered online

### **Storage of all electronic and hard copies including tape recordings**

In this study, data obtained will be coded, protected, and stored by the researcher with a password on an external hard drive and placed under a shelf with a lock key only accessible to the researcher. Thus, the stored and protected data will be discarded by deleting the files after 10 years by the researcher accordingly.

### **Persons to contact in the Event of Any Problems or Queries:**

Please contact the researcher (A. Lushaba 076 427 6996), my supervisor ( Dr. A.O. Aiyetan – 031 373 2134), or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Acting Research Director: dr Vaneshree Govender on 031 373 2577 or [vanesh@dut.ac.za](mailto:vanesh@dut.ac.za).

---

## Appendix B:

### Consent



Statement of Agreement to Participate in the Research Study:

I hereby confirm that I have been informed by the researcher, (Ayanda Lushaba) about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number: \_\_,

I have also received, read, and understood the above- written information (Participant Letter of Information) regarding the study.

I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials, and diagnosis will be anonymously processed into a study report.

In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.

I may, at any stage, without prejudice, withdraw my consent and participation in the study.

I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.



language (grade 10 level- use Flesch Reading Ease Scores on Microsoft Word), selecting of a non-threatening environment for interaction and the availability of peer counseling (Department of Health, 2004).

If the potential participant is unable to read/illiterate, then a right thumbprint is required and an impartial witness, who is literate and knows the participant e.g. parent, sibling, friend, pastor, etc. should verify in writing, duly signed that informed verbal consent was obtained (Department of Health, 2004).

If anyone makes a mistake completing this document e.g. a wrong date or spelling mistake, a new document has to be completed. The incomplete original document has to be kept in the participant's file and not thrown away, and copies thereof must be issued to the participant.

### ***References:***

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes*

<http://www.doh.gov.za/docs/factsheets/guidelines/ethnics/>

Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed. Available at:

[http://www.nhrec.org.za/?page\\_id=14](http://www.nhrec.org.za/?page_id=14)

Haupt, T. & Harinarain, N. (2016). The image of the Construction Industry and its employment attractiveness. *Acta Structilia: Peer-Reviewed Paper*, DOI: <http://dx.doi.org/10.18820/24150487/as23i2.4>, 23(2), pp. 79-108.

Jolliffe I.T., Uddin, M & Vines, S.K. (2002b). Simplified EOFs. Three alternatives to rotation. *Climate Res.*, 20, 271–279

Rameezdeen, R. (2007). Image of the construction industry. In: CIB (International Council for Research and Innovation in Building and Construction), *Revaluing construction: A W065 'Organisation and management of construction perspective*. Rotterdam, The Netherlands, 7-

10 May. Rotterdam: CIB.

**NOTE: Information in brackets in the Letter of Information is to be used as a guide in completing the Letter of Information. This information as well as the general section at the end of the Letter of Information and Consent document must be deleted before attaching the document to the PG 2a.**

## Appendix C



To Whom It May Concern,

22/08/ 2022

Dear respondent,

**Re: An assessment into the challenges faced by Construction Management graduates in progression towards professional status.**

This data collection is part of a research project aimed at eliciting information on different levels of the involvement of graduates in standard services as prescribed by the South African Council for the Project and Construction Management Professions (**SACPCMP**)

Please be assured that the confidentiality of your response is guaranteed.

Should you have queries, please do not hesitate to contact the Supervisors of the study, Dr A. Aiyetan per email; AyodeiA@dut.ac.za or Dr C. Okorafor per email Chikezirimo@dut.ac.za

Many thanks for the anticipated favourable consideration of the request.

..... Mr Ayanda

Lushaba

Cell No: 076 427 6996

Email: ayandalushaba@yahoo.com

**Section A: Instructions**

**Please answer the following questions by crossing (x) on the relevant block or writing down your answer in the space provided**

**EXAMPLE of how to complete this questionnaire:**

Gender?

If you are female:

Male	1
Female	2

**Background Information**

This section of the questionnaire refers to biographical information.

1. Gender

Female	
Male	

2. Years of experience in the industry (in absolute number)

5 years – 10 years	
10 years – 15 years	
15 years – 20 years	
20 years & Above	

**Section B: Technical Information**

On a scale of 1 (minor) to 4 (major), in the listed standard services of a CM graduate rate their influence in relation to the services required by SACPCMP for registration as professional.

Kindly indicate your level of involvement in the under-listed statements with **1=never; 2=rarely; 3=often; and 4=always.**

**Section B.1: Design development**

S/No	Statement (please answer accurately)	1	2	3	4
		Never	Rarely	Often	Always
1.	1. Define and agree preliminary scope of construction works.				
2.	2. Prepare Preliminary Construction Programme				
3.	3. Provide the necessary lead times required to prepare a detailed Design and Documentation Programme.				

4.	Review and recommend practical and cost effective construction alternatives to consultants' designs.				
5.	Attend the appropriate planning, co-ordination and management meetings as required.				
6.	Review designs by consultants in relation to constructability requirements.				
7.	Review designs by consultants in relation to Health and Safety requirements during construction and provide input if required on related practical and cost issues.				
8.	Provide detailed cost information as required by the cost consultant for estimating budgeting and cost reporting purposes.				
9.	Prepare and submit a proposed method statement for the construction of the works.				

**Source:** South African Council for the Project and Construction Management Professions (SACPCMP)

**Section B.2: Tender documentation and procurement**

Kindly indicate your level of involvement in the under-listed statements with **1=never 2=rarely 3=often and 4=always.**

S/No	Statement (please answer accurately)	1	2	3	4
		Never	Rarely	Often	Always
1.	Review and confirm the Construction Strategy and method for submission of the Tender				
2.	Prepare the Construction Management Organogram and obtain commitment from appropriate staff as required				
3.	Select, recommend and agree the procurement strategy for sub-contractors and suppliers with the Principal Agent and consultants				
4.	Manage and co-ordinate the preparation and implementation of the Health and Safety requirements for inclusion in the tender				
5.	Manage and procure proposals for the appropriate contract insurances and guarantees required for the works.				
6.	Review tender documentation to establish any cost effective alternative solutions.				
7.	Manage the preparation and submission of the tender				
8.	Prepare and agree the Procurement Programme for sub-contractors and suppliers				
9.	Agree list of sub-contractors and suppliers with the Principal Agent				
10.	Manage the tender process in accordance with agreed procedures, including calling for tenders,				

S/No	Statement (please answer accurately)	1	2	3	4
		Never	Rarely	Often	Always
	adjudication of tenders, and recommendation of appropriate domestic sub-contractors and suppliers				
<b>11.</b>	Manage, co-ordinate and finalise negotiations on all contractual commitments.				

Source: South African Council for the Project and Construction Management Professions

**(SACPCMP)**

**Section B.3: Construction Documentation and Management**

Kindly indicate your level of involvement in the under-listed statements with **1=never; 2=rarely; 3=often; and 4=always.**

S/No	Statement (please answer accurately)	1 Never	2 Rarely	3 Often	4 Always
1.	Manage the preparation and agreement of the Health and Safety Plan with the Client’s Health and Safety Consultants and sub-contractors				
2.	Manage the site establishment including the provision of all necessary temporary services, storage facilities, security requirements and other site requirements				
3.	Establish and maintain regular monitoring of all line, level and datum of the works.				
4.	Continuously monitor the compliance by the site management of the Health and Safety Plan.				
5.	Provide the necessary documentation as required by the Health and Safety Consultant for the Health and Safety File.				
6.	Manage the implementation of the requirements of the Environmental Management Plan.				
7.	Appoint sub-contractors and suppliers including the finalization of all agreements.				

<b>8.</b>	Receive, co-ordinate, review and obtain approval of all contract documentation provided by the sub-contractors and suppliers for compliance with all of the contract requirements.				
<b>9.</b>	Monitor the ongoing projects insurance requirements.				
<b>10.</b>	Facilitate and manage the establishment of sub-contractors on the site				
<b>11.</b>	Finalise and agree the Quality Assurance Plan with the design consultants and sub-contractors				
<b>12.</b>	Continuously monitor the compliance of the quality of the works in accordance with the agreed Quality Assurance Plan				
<b>13.</b>	Establish and co-ordinate the formal and informal communication structure and procedures for the construction process				
<b>14.</b>	Regularly conduct and record the necessary construction management meetings including sub-contractors, suppliers, programme, progress and cost meetings				
<b>15.</b>	Finalise and agree the contract programme and revisions thereof as necessary				
<b>16.</b>	Prepare and finalise the detailed Construction Programme including resources planning				
<b>17.</b>	Prepare and agree Information Schedule for timeous implementation of construction.				
<b>18.</b>	Continuously manage the review of construction documentation and information for clarity of				

	construction requirements.				
<b>19.</b>	Manage and administer the distribution of construction information to all relevant parties				
<b>20</b>	Continuously monitoring the construction progress				
<b>21</b>	Manage the review and approval of all necessary shop details and product proprietary information by the design sub-contractors.				
<b>22</b>	Review and substantiate circumstances and entitlements that may arise from any changes required to the Contract Programme				
<b>23</b>	Establish procedures for, and monitor all scope and cost variations				
<b>24</b>	Manage the preparation of monthly progress claims for payment				
<b>25</b>	Receive, review and substantiate any contractual claims within the prescribed period				
<b>26</b>	Regularly prepare and submit a Construction Status Report, including construction financial status report				
<b>27</b>	Manage, co-ordinate and supervise all work on and off site.				
<b>28</b>	Manage and co-ordinate the requirements of the direct contractors if required to do so.				
<b>29</b>	Manage, co-ordinate and monitor all necessary testing and commissioning.				

30	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of Practical Completion				
----	--	--	--	--	--

Source: South African Council for the Project and Construction Management Professions (SACPCMP)

**Section B.4: Project close-out**

Kindly indicate your level of involvement in the under-listed statements with **1=never; 2=rarely; 3=often; and 4=always.**

S/No	Statement (please answer accurately)	1 Never	2 Rarely	3 Often	4 Always
1.	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of Works Completion				
2.	Manage, co-ordinate and expedite the preparation by the relevant sub-contractors of all as-built drawings and construction documentation				
3.	Manage and expedite the procurement of all operating and maintenance manuals as well as all warrantees and guarantees				
4.	Manage and expedite the procurement of applicable statutory compliance certificates and documentation				

5.	Manage the finalisation of the Health and Safety File for submission to the Health and Safety Consultant.				
6.	Co-ordinate, monitor and manage the rectification of defects during the Defects Liability Period				
7.	Manage, co-ordinate and expedite the preparation and agreement of the final accounts with the cost consultants and all sub-contractors				
8.	Co-ordinate, monitor and expedite the timeous rectification of all defects for the achievement of Final Completion.				
9.	Prepare and present Contract Close-out Report				

Source: South African Council for the Project and Construction Management Professions (SACPCMP)

3. On a scale of 1 (minor) to 4 (major), indicate the inherent challenges faced by CM graduates in relation to getting registration as a CM PR.

Kindly indicate your level of involvement in the under-listed statements with 1=never; 2=rarely; 3=often; and 4=always.

3.1	Technology	1	2	3	4
1	Low level of new technological development				
2	Inadequate technological knowledge				
3	Low level of technology transfer				
4	Low level of usage of IT				

<b>3.2</b>	<b>Safety</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Inadequate safety precautions				
2	Undefined specification of construction safety				
3	Improper implementation of safety rules				
4	Limited knowledge on safety precautions				
5	Improper implementation of safety rules				

<b>3.3</b>	<b>Training and Development</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	Limited allocation of funds for employee trainings				
	Inadequate career development programmes				
	Inadequate support from Institutional organisations				

<b>3.4</b>	<b>Skill</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Inadequate skill development programmes				
2	Availability of professionals				
3	Low level of skilled CM graduates				
4	Scarcity of skills availability in the construction				

<b>3.5</b>	<b>Resource</b>	<b>Minor</b>			<b>Major</b>
1	High labour turnover				
2	Insufficient integration on design and built operation				
3	Lack of high technical construction equipment				

<b>3.6</b>	<b>Recruitment processes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Informal recruitment processes among CM graduates especially the minority				
2.	Existence of promotion standards that are difficult for CM graduates to attain				
3	Antagonistic employers disinclined towards hiring inexperienced CM graduates				
4	Stereotypical hiring processes				
5	General employer preference for CM graduates of a certain race				
6	In formalisation of work at lower levels limiting upward mobility of CM graduates				

4. On a scale of 1 (minor) to 5 (major), rate the factors according to your perception on the mitigating factors regarding requirements or attain for registration as a CM Pr.

Kindly indicate your level of involvement in the under-listed statements with 1=never; 2=rarely; 3=often; and 4=always.

<b>4.1.</b>	<b>Policy and legislation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Legislation combats difficulties in professional registration practices				
2	Legislation that penalises normalisation of CM graduates in professional registration				
3	Legislation defining acceptable workmanship and professional conduct and ethics				
4	Need to redress pervasive information recruitment which disadvantages CM graduates in professional registration				
5	Promotion of equitable professional registration				

<b>4.2</b>	<b>Technological transformation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Technology use restructures the balance of competencies required for successful professional registration				
2	CM graduates excel in analytical skills and decision-making skills				

<b>4.3</b>	<b>Personal dynamics</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Training and workshops to improve personal dynamics at the workplace				

2	Programs to reintegrate CM graduates coming university				
3	Programs to improve worker self-efficacy at work and professional registration				

<b>4.4</b>	<b>Motivation of CM graduates</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1	Promote joint ventures with foreign construction companies				
2	Offering incentives for encouragement of professional CM registration				
3	Introduction of new forms of procurement systems				
4	Improve the professional standards				

***THANK YOU FOR YOUR PARTICIPATION***

## Appendix D



**Department of Construction Management and Quantity Surveying**  
Faculty of Engineering and the Built Environment  
Durban University of Technology  
S3 Level 2, Room BS3 404 Steve Biko Campus, Durban, 4001

P O Box 1334, Durban, South Africa,

4000Tel: (031) 373 2143  
Fax: (031) 373 2610

18<sup>th</sup>. 08. 2024

To:  
Director  
Research and Post Graduate  
SupportDurban University of  
Technology Berea  
4001  
Durban, KwaZulu-Natal

Dear Sir/Madam,

### **LETTER OF REQUEST TO CONDUCT RESEARCH**

#### **An assessment into the challenges faced by Unregistered Construction Management Graduates in Progression towards Professional Status: Case of Durban University of Technology, 2014 to 2017 Graduates**

This data collection is part of a research project carried out by Mr. Ayanda Lushaba at the Department of Construction Management and Quantity Surveying in the Durban University of Technology, Durban in fulfillment for the degree Master in the Built Environment (MBE).

The aim of this phase of the project is to conduct a focus administer questionnaires that would provide credible insights into the central question of the study.

The research required that the researcher conduct a questionnaire survey with 2014 to 2017 construction management graduates that are involved in the construction and conduct interviews.

I have therefore identified the “Durban University of Technology” as a potential source of information for my study.

Durban University of Technology is selected because of their offering of construction management programme.

I would like to kindly request your permission to provide me with a gatekeeper’s approval letter for ethical purposes. The letter should indicate that I, Mr. Ayanda Lushaba is a registered student, currently studying for his master’s degree in construction management, and have been granted permission by the Durban University of

**18th. 08. 2024**

**To: Director**

**Research and Post Graduate Support Durban University of Technology Berea**

**4001**

**Durban, KwaZulu-Natal**

**Department of Construction Management and Quantity Surveying**

**Faculty of Engineering and the Built Environment Durban University of Technology S3**

**Level 2, Room BS3 404 Steve Biko Campus, Durban, 4001**

**P O Box 1334, Durban, South Africa, 4000Tel:(031) 373 2143**

**Fax: (031) 373 2610**

**Dear Sir/Madam,**

**LETTER OF REQUEST TO CONDUCT RESEARCH**

**An assessment into the challenges faced by Unregistered Construction Management Graduates in Progression towards Professional Status: Case of Durban University of Technology, 2014 to 2017 Graduates**

**This data collection is part of a research project carried out by Mr. Ayanda Lushaba at the Department of Construction Management and Quantity Surveying in the Durban University of Technology, Durban in fulfillment for the degree Master in the Built Environment (MBE).**

**The aim of this phase of the project is to conduct a focus administer questionnaires that would provide credible insights into the central question of the study.**

**The research required that the researcher conduct a questionnaire survey with 2014 to 2017 construction management graduates that are involved in the construction and conduct interviews.**

**I have therefore identified the “Durban University of Technology” as a potential source of information for my study. Durban University of Technology is selected because of their offering of construction management programme.**

**I would like to kindly request your permission to provide me with a gatekeeper’s approval letter for ethical purposes. The letter should indicate that I, Mr. Ayanda Lushaba is a registered student, currently studying for his master’s degree in construction management, and have been granted permission by the Durban University of**

**Technology to conduct research among the students in the university. Participants are anonymous. There are no known risks, current or anticipated, to any participant in this research and all information received will be treated with the utmost confidentiality.**

**Please be assured that the confidentiality of your response is guaranteed.**

**Should you have queries, please do not hesitate to contact ayandalushaba@yahoo.com and the Supervisors of the study, Prof A. Aiyetan per email; AyodeiA@dut.ac.za or Dr C. Okorafor per email Chikezirimo@dut.ac.za**

**Many thanks for the anticipated favorable consideration of the request**

**Yours sincerely, Mr. A Lushaba**

**Cell: 076 427 6996**

**INSTRUCTIONS:**

**Please answer the following questions by crossing (x) on the relevant block or writing down your answer in the space provided.**

**EXAMPLE of how to complete this questionnaire:**

**Your gender?**

**If you are female:**

**Male 1**

**Female 2**

### **Response Background Information**

**This section of the questionnaire refers to biographical information.**

#### **1. Gender**

**Male 1**

**Female 2**

#### **2. Years of experience in the industry (in absolute number)**

**5 years – 10 years 1**

**10 years – 15 years 2**

**15 years – 20 years 3**

**20 years & Above 4**

### **INTERVIEW PROTOCOL**

#### **TECHNICAL INFORMATION**

**Please furnish us with technical information related to the following questions:**

**1. What are the personal challenges faced by Construction Management (CM) graduates in attaining a professional status?**

.....

**2. Highlight various challenges faced by CM graduates at their various workplaces that inhibit them in attaining professional statuses?**

.....

**3. Kindly identify and explain measures to be adopted in mitigating the challenges faced by CM graduates**

**4. Kindly identify and explain various options within the Construction Industry supply chain in securing a stable feedstock of Professional Construction Managers**

.....

**5. What are the measures that would engender a collaborative approach which will ensure a win-win situation among the South African Council for the Project and Construction Management Professions (SACPCMP) and the CM graduates in attaining to a professional status?**

.....

**Thank you for your contribution!**

Appendix E



**Institutional Research  
Ethics Committee** Research  
and Postgraduate Support  
Directorate 2nd Floor,  
Berwyn Court

Gate 1, Steve Biko  
Campus Durban  
University of  
Technology

P O Box 1334, Durban,  
South Africa, 4001 Tel: 031  
373 2375

Email: lavishad@dut.ac.za

[http://www.dut.ac.za/research/institutional\\_research\\_ethics](http://www.dut.ac.za/research/institutional_research_ethics)

**[www.dut.ac.za](http://www.dut.ac.za)**

31 July 2023

Mr A Lushaba

P.O Box 2540

Port Shepstone  
4240

Dear Mr Lushaba

**An assessment into the challenges faced by Unregistered Construction Management Graduates in Progression towards Professional Status: Case of Durban University of Technology, Kwa Zulu Natal, 2017 Graduates**

**Ethics Clearance Number: IREC 007/23**

The DUT-Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

**It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in the withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.**

**Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.**

Yours Sincerely

Prof J K Adam  
Chairperson: DUT-  
IREC

## Appendix F

**ENVISION2030** transparency • honesty • integrity • respect • accountability  
fairness • professionalism • commitment • compassion • excellence



30 June 2023

*Directorate for Research and Postgraduate Support*

*Durban University of Technology*

*Open House*

*P.O. Box 1334, Durban 4000*

*Tel.: 031-3732576/7 Fax: 031-3732946*

Mr Ayanda Lushaba

c/o Department of Construction Management and Quantity Surveying Faculty of  
Engineering and the Build Environment

Durban University of Technology

Dear Mr Lushaba

**PERMISSION TO CONDUCT RESEARCH AT THE DUT**

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted **Gatekeeper Permission** for you to conduct your research “An assessment into the challenges faced by unregistered Construction Management graduates in progression towards professional status: case of Durban University of Technology, Kwa- Zulu Natal, 2017 Graduates” at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection.**

The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

Upon completion of your research project, you are requested to share the summary of your key research findings.

Kind  
regards.

Yours

---

---

DR V GOVENDER

ACTING DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE