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Graduating Female Students' Long-term Career Decisions and Under-Representation of Females in South Africa's Construction Industry



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Date: 18 September 2020

DECLARATION

I, Mmanoko Moraba 553544, hereby state that this research project is my original work. It is being submitted for the fulfilment of Master of Science in Building at the School of Construction, Economics and Management at the University of Witwatersrand. I declare that it has not been submitted before any university for any degree or examination.



_____

Mmanoko Moraba

September 2020

ACKNOWLEDGEMENTS

I acknowledge and appreciate the immense support I received from my supervisor, Dr Oluwayomi Babatunde. Your guidance throughout this difficult journey has shaped me as a person and made me realise my potential. I pray that God blesses you as you continue changing the lives of the students you supervise.

To Oluremi Bambgade, this degree is dedicated to you. For the significant role you played in my research career, I hope this dissertation forms part of all the excellent things that celebrate your life. May your beautiful soul continue resting in peace.

To my loving family (Mom, Dad, Kamogelo, Kgodisho and Kgethego), you are all phenomenal. Thank you for the support you have shown me throughout the years. Everything that I am, is because of you. May God bless you for all the sacrifices you make. I'm truly grateful for everything.

To Prof. Samuel Azasu, thank you for the support you have shown me throughout this journey. If you did not step in at the time that you did, I would have given up on being a researcher in 2017. Thank you for assuring me that the training I was receiving was world-class and that I should trust the process.

To my friends (Katlego Mokone, Modiegi Mokoka, Tlhangelani Baloyi, Sphiwe, Keitumetse More, Keneilwe Manda, Tamala Manda and Mmaphasha Maroga), thank you for being part of this journey, for availing yourselves for me, for all the laughter and being overall great friends.

ABSTRACT

For many years, the construction industry in South Africa has had an under-representation of females. In contrast to what the industry is experiencing, South African universities have, nonetheless, been experiencing a rise in the number of female students entering and graduating from the built environment fields. The rise, however, has not been reflected in the workplace over the years. It can then be reasoned that, during their studies, female students (particularly the graduating female students [GFS]) experience some barriers which they perceive to be a reflection of South Africa's construction industry. GFS have the perception that the construction industry's traditions, organisational cultures and sexist environment play an essential role in determining their eventual entry and the length of their career within the construction industry.

By using the career construction theory (CCT), the study was able to develop questions to identify factors that motivated GFS to pursue a construction-related degree. This study also explored how the internal barriers experienced during the GFS construction education process influenced the long-term career decision of the GFS. The CCT was further used to develop questions on how GFS perceive females who work in the industry, the external barriers faced by females and how the barriers shape their long-term career decisions. Additionally, the leaky bucket theory was adopted to understand the possible leaks in the construction education process of the GFS. The leaky bucket theory was then used to develop questions that assess why the construction industry has an under-representation of females, despite the increase in the number of female students registering for and graduating from the built environment disciplines in the universities in South Africa.

GFS registered for their BSc (Honours) in Quantity Surveying, Construction Management, and Bachelors of Architecture at two purposively sampled universities in South Africa were participants of this study. 50 GFS were targeted and in total, 39 of the 50 from the two universities completed the online questionnaire, giving a response rate of 78%. Using Qualtrics, structured online questionnaires were distributed to GFS. The data collected were analysed using descriptive and inferential data analysis. The analysis revealed, through the relative rank, that the "career opportunities available to the GFS and the promising financial stability" accompanying employment in the construction industry were major motivating factors that inspired their choice to study a built environment- or construction-related degree. It was also revealed through the study that the internal barriers that the GFS faced at the universities have

a major influence on their perceptions of the construction industry. Gender stereotypes coupled with the masculine nature of the construction industry were major external barriers that the GFS perceived to be of major concern for females in the construction industry.

The implications of the empirical findings support the fact that GFS have remained an unexploited and untapped resource in South Africa. If South Africa's construction industry continuously fails to attract and retain the current and emerging pool of GFS, the leaky pipeline that the construction industry is currently experiencing through the different internal and external factors will persist and, eventually, result in a critical labour shortage in the long run. Generally, a shortage of labour causes sluggish economic and infrastructural developments in any country; more so, in South Africa where gender transformation has been identified as important for sustainable economic development. Consequently, the main conclusion of this study is that the construction industry in South Africa needs to attract and retain the current and emerging pool of GFS to diversify, transform and tackle the problem of under-representation of females in the industry.

The limitations of this study include the small sample size, covering only two South African universities. This purposively stratified sample excludes other South African universities which may have offered a different insight into their long-term career decisions. It is recommended that a similar future study would increase population size and conduct a longitudinal study with the surveyed GFS to follow their careers.

Keywords: Barriers, Career decisions, Construction education, Construction industry, Graduating female students.

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LIST OF ABBREVIATIONS

ASC	Associated Schools of Construction
B.E.	Built Environment
BSc	Bachelor of Science
BTech	Bachelor of Technology
C.I	Construction Industry
CM	Construction Management
ConE	Construction Education
HRM	Human Resource Management
IT	Information Technology
LABORSTA	International Labour Organisation Statistics
MSD	Musculoskeletal Disorder
NAWIC	National Association of Females in Construction
PPC	Personal Protective Clothing
QS	Quantity Surveying
SA	South Africa
SAWIC	South African Women in Construction
StatsSA	Statistics South Africa

CHAPTER ONE: INTRODUCTION

1. BACKGROUND

For many years, a key area of concern within the South African (SA) construction industry (C.I) has been the untransformed nature and the persistent under-representation of females within it (Sewalk and Netfield, 2013; Walker, 2019). Many authors have undertaken studies describing this problem (Adogbo, Ibrahim and Ibrahim, 2015; Bigelow *et al.*, 2017; Opoku and Williams, 2019). Many of these scholars also discuss various solutions and recommendations on how this lingering under-representation can be resolved through multiple recruitment and retention methods (Batouuli *et al.*, 2019; Chileshe and Haupt, 2010; Del Puerto, Guggemos and Shane, 2011). For many years, this issue has remained unchanged because the under-representation of females in the C.I remains persistent in many countries (Adogbo *et al.*, 2015; Del Puerto *et al.*, 2011; Madikizela and Haupt, 2010; Oyewobi *et al.*, 2019).

General traits of the C.I is that it is built to favour males and there is a minimal presence of females (Moraba and Babatunde, 2019; Oyewobi *et al.*, 2019; Ritter, 2014), especially in the influential positions (Martin and Barnard, 2013; Maseko, 2013; Moraba and Babatunde, 2020; Stamarsk and Hong, 2015). In SA, females in the C.I make up 12.5% of the industry's overall labour force (StatsSA, 2018). This statistic includes females who occupy clerical, administrative and technical roles within the C.I. The traditions, organisational cultures and chauvinist attitudes that occur within the C.I play an important role when hiring females in the C.I. (Aboagye-Nimo *et al.*, 2019; Sewalk and Netfield, 2013; Madikizela and Haupt, 2010). "As a result, females who are currently employed in the C.I are found to occupy roles in administration because they are often deemed as unsuitable for the more technical roles" (Agherdien and Smallwood, 2013).

In universities, the number of "female students enrolling and graduating with construction-related degrees has been experiencing a steady increase over the years" (Fernando, Amaratunga, Haigh, 2014; Oo and Widjaja, 2018). This increase is not mirrored in the industry's workplace notwithstanding the increase in the number of female students graduating from the Built Environment (B.E.) disciplines (Devonport, Russel and Conway, 2019; Fernando *et al.*, 2014; Moraba and Babatunde, 2019).

The decisions of Graduating Female Students (GFS) within the C.I are influenced by the barriers that exist in the C.I (Ling and Poh, 2004). "These barriers include the perceived

dangerous nature of the C.I construction environment, challenging labour requirements that demand physical strength" and the risky surroundings (Devonport, Russel and Conway, 2019; Ling and Poh, 2004). In addition to these barriers, the general environment of the workforce of construction industries is that the bulk of the labour force is masculine (Aulin and Jigmond, 2011; George and Loosemore, 2019). Overall, these barriers create an environment full of gender-based discrimination resulting in the under-representation of females within the industry (Agherdien and Smallwood, 2013).

For the purpose of this study, the term graduating female students (GFS) has been defined as female students registered for their Honours degree at a university. They have been defined as graduating students because they were completing their studies and about to enter the C.I at the time the survey was taken.

Oo and Widjaja (2018) found that females desire to pursue careers in the C.I. This desire is evident by the increased number of female students that have been entering universities to undertake construction-related degrees (Fielden *et al.*, 2001; Oo and Widjaja, 2018). Encouraging GFS studying towards a construction-related degree to pursue long-term careers within the industry is an essential part of alleviating the problem of under-representation of females in SA's C.I. Females, therefore, remain an untapped and under-utilised resource in this industry that is experiencing a skills shortage (Alves and English, 2018; Aulin and Jigmond, 2011).

Current studies on the lack of female representation in the SA C.I have not sufficiently addressed the issues facing GFS from a SA context (Alves and English, 2018; Devonport, Russel and Conway, 2019; George and Loosemore, 2019). The long-term career choices of graduating females and the impact their choices have on the under-representation of females in SA's C.I is thus a critical area that requires thorough investigation. This study seeks to provide insight into the career choices made by GFS as a reflection of female under-representation in SA's C.I as supported by Aulin and Jigmond (2011).

1.1 Problem statement

In universities, the number of female students enrolling and graduating from construction-related degrees has steadily improved over the past ten years (Fielden et al., 2014). The increase, however, is not being reflected in the demographics of the C.I professional workplace (Moraba and Babatunde, 2019). Existing studies suggest that women are reluctant to pursue long-term careers within the C.I ((Madikizela and Haupt, 2010), which may be a result of the

perceptions that the GFS form of the industry during their Construction Education (ConE) process (Moraba and Babatunde, 2019). Consequently, the problem is that the long-term career decisions of GFS may be influenced by their negative perceptions of the C.I, resulting in the continued under-representation of women in SA's C.I. Understanding the perceptions female students have of the C.I and how those perceptions are formed and shaped in the ConE process may enable universities and other stakeholders to develop interventions to address the formation of the negative perceptions held by GFS and assist them to take decisions that would lead them into the construction industry.

1.2 AIM

This study aimed to explore the factors that influence the long-term career decisions of GFS and the implications on the under-representation of female professionals in SA's construction industry.

1.3 MAIN RESEARCH QUESTION

What influences do the long-term career decisions of GFS have on the under-representation of females in SA's construction industry?

1.4 SUB QUESTIONS

1.4.1 What are the factors that motivate GFS to enrol for a construction-related degree?

1.4.2 What are the internal barriers faced by GFS during the ConE process?

1.4.3 What are the external barriers that GFS perceive females face in the industry?

1.5 OBJECTIVES

The following objectives were set out for the study:

1.5.1 To explore the factors that motivate GFS to pursue a construction-related degree;

1.5.2 To investigate the internal barriers GFS face during the ConE process; and

1.5.3 To explore the external barriers GFS perceive female professionals in SA's construction industry to be facing.

1.6 HYPOTHESIS

The following hypothesis was set out for the study:

Primary Hypothesis: The under-representation of females in the construction industry is strongly associated with the long-term career decisions made by GFS.

The corresponding sub-hypotheses were:

H_1: GFS are motivated by the perceived image of the construction industry to study a construction-related degree;

H_2: The internal barriers GFS become aware of during ConE discourage them from pursuing long-term careers within the construction industry; and

H_3: The perceived external barriers deter GFS from pursuing long-term careers in the construction industry

1.7 ASSUMPTIONS

The construction industry has an under-representation of females because of the long-term career decisions made by female students graduating from B.E. related degrees (Powell, Dainty and Bagilhole, 2010).

1.8 SCOPE

The study focused on GFS registered for BSc (Honours) in Quantity Surveying, Construction Management and Bachelor of Architectural Studies at two SA universities as a proxy for GFS in the construction-related studies.

1.9 RATIONALE AND SIGNIFICANCE OF THE STUDY

Literature that deals with the under-representation of females in the SA C.I tends to discuss under-representation in a broad sense by including all females rather than the GFS or newly graduated females that are fresh out of university (Aboagye-Nimo *et al.*, 2019; George and Loosemore, 2019). Few research studies have explored the internal barriers GFS are exposed to in the ConE process and how these barriers shape their perceptions of the C.I and the effect those perceptions have on their under-representation in SA's C.I (Adogbo, Ibrahim and Ibrahim, 2019). This presents an opportunity to research the relationship between long-term career decisions made by GFS and the under-representation of females in SA's C.I. In identifying these barriers, it will be possible to recommend ways to challenge the low retention rates of GFS. Identifying these barriers and giving recommendations can potentially reduce the perpetuated under-representation of females in SA's C.I and ensure that the C.I retains the growing amounts of female graduates from construction-related degrees.

1.10 ETHICAL CONSIDERATIONS

Ethical considerations and procedures of the two universities involved in the study were followed. A participation information sheet (PIS) describing the details of the survey was communicated to potential participants before they participated in the online survey. GFS who wanted to participate in the study were asked to give consent to partake in the study and use their results as part of this research. The rights of all participants remained unviolated during the data collection process and no participant was put at risk during the undertaking and completion of this research. Participants were informed that the data obtained from them would be kept confidential and in compliance with ethical considerations to respect their privacy.

1.11 STRUCTURE OF THE DISSERTATION

Chapter One of this study introduces the phenomenon of GFS' long-term career decisions and the under-representation of females in SA's C.I. This chapter proceeds to present the study's problem statement, its aim, main research questions and the related sub-questions as well as the study's objectives. The central hypothesis along with the three sub-hypotheses are also presented in addition to the study's assumptions and scope. The rationale and study's significance, the content of the chapters of the dissertation and ethical considerations for this research are presented in this chapter.

Chapter Two discusses the various types of literature reviews available to researchers and the appropriate literature review selected for this research. Arguments relating to the topic of GFS' long-term career decisions and the under-representation of females in the C.I are discussed herein. The literature is based on both international and local literature dealing with the under-representation of women in the B.E. disciplines and the cause of the perpetual under-representation in spite of the growing number of female graduates from B.E. disciplines. The relevant sub-topics of this literature review chapter include a broad overview of females in SA's C.I, the gaps in literature that have been identified, factors motivating females to pursue ConE, the internal barriers faced by females during the ConE process as well as the perceived external barriers facing females that are already employed within SA's C.I. The theoretical framework is then discussed, which includes the use of the career construction theory (CCT) and the leaky bucket theory.

Chapter Three discusses research methodologies that exist and the relevant research methodology selected for the study. Discussions begin with the philosophical approach,

research approaches and research strategies and the chapter describes various research methods. The use of questionnaires and the justification of their use in this study are discussed in addition to the structure of the questionnaire used in gathering the information from the respondents. The research structure, aspects of reliability and validity, ethical considerations and time frames are also presented.

Chapter Four is the data analysis chapter, which discusses the results from the fieldwork, data analysis and statistical tests employed to prove or disprove the study's hypotheses. This chapter starts by discussing the characteristics of the respondents, such as their demographic profiles, as well as analyses the factors that motivated the research respondents to pursue ConE. The internal barriers experienced by the research respondents and the external barriers that they perceive females in SA's C.I to be facing are also discussed. Data revealing the nature of the SA C.I is presented along with the long-term choices of female construction graduates to pursue long-term careers in the C.I or causes of the leaky pipeline are discussed.

Chapter Five summarises the results of the study and concludes the research. It further gives recommendations for the handling of internal and external barriers as well as recommendations for future studies.

1.12 SUMMARY

This section has introduced the aim of this study, the main research question together with the associated sub-questions, objectives and hypothesis. The assumptions of the study, scope and the study's significance have been discussed in addition to the ethical considerations which form a vital part of the research. Regarding this research, the prevalent untransformed nature of the C.I is assumed to be due to the nature of the under-representation of females and the underlying causes of under-representation must be investigated from the foundation of the females contact with the construction-related disciplines. Various scholarly literature has attempted to explain the under-representation and its implication on the industry with very few interrogating the barriers GFS face when entering the C.I. Female students that pursue construction-related careers need to be well prepared for the barriers in the C.I. This is important because the number of GFS in construction-related degrees continues to increase and this is not reflected in the male-dominated C.I.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter explores various types of literature reviews and it discusses literature that focusses on the under-representation of females in the C.I. It describes the factors that motivated female students to pursue construction-related degrees. Internal barriers experienced by GFS during the ConE process and the external barriers GFS perceive females face in the C.I are also interrogated in addition to the CCT and the leaky bucket theory. A conceptual model for the study is presented as the final part of this chapter. The discussion begins with information on the various types of literature reviews that exist and the one that has been selected for this study in particular. A literature review's purpose is to establish main concepts and also establish the existing content research to determine topics that have been covered and issues that are yet to be investigated (Xiao and Watson, 2019).

The different forms of literature reviews that exist include the traditional literature review which aims to synthesise literature as well as the systematic literature review, which is used to appraise literature and analyse it qualitatively or quantitatively. Meta-analysis, meta-synthesis and integrative literature review are also discussed in this section. The chapter contextualises the topic of females in the SA C.I and how the industry fails to meet the requirements of equality as stipulated in Section 9(3) of the Constitution of SA. The male-dominant nature of the C.I is not only a substantial area of concern in SA alone. There exist examples of this very same male-dominant nature in the construction industries outside of SA and literature confirms the under-representation of women in the C.I.

2.2 LITERATURE REVIEW TYPES

Researchers conduct a literature review during the early stages of a study (Callahan, 2014; Xiao and Watson, 2019). The review process aids the researcher in categorising and establishing the main concepts found in the relevant literature relating to their area of study (Hart, 2018; Leshem and Trafford, 2007). The synthesis of existing research within the confines of a particular topic is an essential part of any research study because of the process of reviewing specific literature aids in identifying the gap in knowledge on a specific phenomenon (Leshem and Trafford, 2007; Rowley and Slack, 2004; Xiao and Watson, 2019). The different forms of literature reviews have been identified as "traditional, systematic, meta-analysis, meta-synthesis and

integrative literature review" as discussed subsequently (Callahan, 2014; Leary and Walker, 2018).

2.2.1 Traditional literature review

"A traditional literature review is implemented in this study because of the aims and objectives of this study require it" (Rowley and Slack, 2004). A traditional literature review is conducted where the researcher wants to synthesise and produce literature on a subject under investigation (Rowley and Slack, 2004). The primary reason researchers undertake a traditional literature review is to contextualise the current body of knowledge in the area of study, highlighting the importance of conducting new research in the area (Callahan, 2014; Li and Wang, 2018). Another use of a literature review is to identify gaps in the existing literature which prompt further study to expand the body of knowledge (Arji *et al.*, 2019).

2.2.2 Systematic literature review

"A systematic literature review is used to answer questions about clinical [or any other] practice" (Cronin *et al.*, 2000; Nahan *et al.*, 2016). It contains timeframes, including methods used to assess past findings of the literature of a research topic (Cronin *et al.*, 2000; Greenhalgh, Thorne and Malterud, 2018). Systematic literature reviews require researchers to formulate research questions beforehand and outline the following essential factors: (i) "Set inclusion or exclusion criteria (ii) Select and assess the literature; (iii) Assess the quality of the literature included in the review; (iv) Analyse, synthesise; and (v) disseminate the findings" (Cronin *et al.*, 2000; Jahan *et al.*, 2016). It further provides a list of all published and non-published work related to a study, using unambiguous and rigorous conditions to identify, evaluate and synthesise literature found in the area of study (Cronin *et al.*, 2000; Nahan *et al.*, 2016).

2.2.3 Meta-analysis

A researcher conducting a meta-analysis review takes quantitative findings and analyses them statistically to integrate the results and improve knowledge (Cronin *et al.*, 2000). Conducting a meta-analysis helps the researcher conclude and identify patterns and relationships between outcomes (Cronin *et al.*, 2000).

2.2.4 Meta-synthesis

"Meta-Synthesis is the non-statistical technique used to integrate, evaluate and interpret the findings of multiple qualitative research studies" (Cronin *et al.*, 2000; Wang, Wang and Yao, 2019). Researchers may combine studies to identify common fundamental aspects and themes found in the area of study. Meta-synthesis conceptualises information on specific literature,

synthesising essential factors in each study (Cronin *et al.*, 2000; Snyder, 2019; Wang, Wang and Yao, 2019).

2.2.5 Integrative Literature

"An integrative literature review is a broad array of scholarly literature- empirical, non-empirical, conceptual and theoretical- to address a particular phenomenon" (Callahan, 2014; Christmals and Gross, 2017). Using the integrative literature review, the researcher critiques and synthesises current knowledge on the topic to present new contexts and viewpoints on the subject (Torraco, 2005; Vitolla, Raimo and Rubino, 2019).

2.3 GENDER STEREOTYPES

The phrase 'women come from Venus and men come from Mars' is often used to describe the different ways in which men and women, think, feel and act (Ellemers, 2018). This phrase reflects the gender stereotypes that men and women have about each other (Shaked, Gross and Glanz, 2017). According to Ellemers (2018), gender stereotypes are general reflections of the expectations regarding people of certain social groups. According to Ellemers (2018), gender stereotypes are a reflection of the primary importance that humans tend to attribute task performance with men whilst attributing social relationships to women. Men tend to be assertive and are performance-oriented, while women are perceived as nurturing and caring (Ellemers, 2018; Gartner, 2018). Although some women exhibit masculine traits and are assertive and performance-oriented, there are social stigmas and harassment that exist for women that exhibit these features (George and Loosemore, 2018).

2.4 UNDER-REPRESENTATION AND CAREER MANAGEMENT

Under-representation is a phenomenon that occurs when the percentage of an ethnic group or gender, for example, experiences a lack of representation of the broader population of a particular group (Gumprtz, 2017). The group in this study is that of the female gender. According to George and Loosemore (2018), the masculinised culture that exists within the C.I continues to shape and maintain its intensely gendered practices, work structures, roles, processes, language and norms. This has caused the exclusion of women from managerial positions and other prominent positions within the workplace, apart from administrative and supports functions (Buse, 2018).

The word career is defined as "any professional occupation that is undertaken for a significant period in a person's life for exposure to more opportunities and socio-economic progress" (Mulhall, 2014). The career focus of this research is within the C.I discipline. It then follows that career management involves analysing, planning and taking effective decisions at any stage to increase the chances of doing well in a career (Mullhall, 2014).

2.5 UNDER-REPRESENTATION OF FEMALES IN THE SA C.I

The C.I forms an essential sector of any nation's economy because of the critical role that the C.I plays in the economic development at the national level (Ofori, 2015). The C.I is one of the sectors of any nation's economy that engages in the preparation of land for construction, repair or alteration of buildings, structures or any form of infrastructure (Grahan and Warren-Meyers, 2019). Gender inequality within construction is described as a significant challenge, as stated by Joshi *et al.* (2015). Although extensive research has been undertaken to determine the gender gap in construction-related professions, the dominance of men in this industry prevails (Buse, 2018). Under-representation is a real issue and is indeed an impediment to female's career progression because of the pre-conceived perceptions that have been formed by society about women's roles and their abilities (Baker and French, 2018).

The right to equality of SA citizens is embedded in the country's constitution (Madikizela and Haupt, 2010; Plagerson et al., 2019). Section 9(3) of the Constitution of SA provides that "no one may unfairly discriminate directly or indirectly against anyone based on his or her culture, race and gender". The discouragement of unfair treatment applies in the workplace to remove anticipated causes of underlying discrimination in order to give females the same opportunities that men have (Cold-Ravinkilde, 2019). Fair treatment is not only restricted to workplaces but is applicable in every sphere of life. However, the C.I in SA has not been able to achieve equality, despite its emphasis in section 9(3) of the Bill of Rights (Carolin and Frenkel, 2019).

According to Akinlolu (2019), the C.I historically exudes the characteristics of male dominance regarding employment of males and females. For many years, the under-representation of females in the C.I has not changed. It should also be noted that this problem of under-representation is experienced outside the borders of SA. Countries such as the United States, Australia, United Kingdom, Japan, China and Canada all face a similar problem of gender-based under-representation in their construction industries (Chan, 2019; Choi *et al.*, 2019; Opoku and Williams, 2019; Struthers and Strachan, 2019).

However, as Figure 2.1 below shows, the participation rate of professional women in SA's C.I has been steady over the ten years prior to 2018. However, while there has been a growing number of female graduates from universities with construction-related degrees (Fielden *et al.*, 2014), females continue to remain under-represented in the C.I in SA, as well as many other countries (Adogbo *et al.*, 2015).

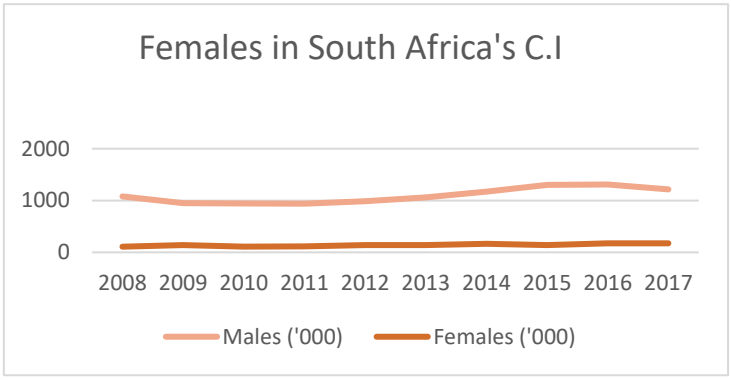


Figure 2.1: SA's labour force in the C.I.

Adapted from StatsSA (2019)

2.6 REASONS FOR FEMALE UNDER-REPRESENTATION

When entering the C.I, females are often expected to demonstrate their competence regardless of the qualifications and experience they possess. A common stereotype is that females are not physically strong enough to bear demanding tasks. Fortunately, some females have proved competent on-site regarding the handling of demanding tasks. However, studies have shown that females are more likely to stop working on-site because of complaints of pain and injury (Adogbo *et al.*, 2013; Loosemore and Malouf, 2019; Panneer, 2019). Research has shown that the development of Musculoskeletal Disorder (MSD) stems from work-related diseases (Aulin and Jigmond, 2011); it remains apparent that many females overlook limits by performing tasks that may result in MSD in the long-term (Aulin and Jigmond, 2011; Panneer, 2019). It is no secret that the C.I records the highest work-related accident rate globally across several industries and further accounts for 18% of the reported cases of fatal injuries (Bigelow *et al.*, 2016; Escamilla *et al.*, 2017; Ostadalimakhmalbaf, 2014).

Hygiene on construction sites is another factor females find challenging. Construction sites do not cater to the level of hygiene required for females to avoid diseases and infections (Aulin and Jigmond, 2011: Dakwale *et al.*, 2019). The culture of construction sites is that temporary toilets are usually unisex and are not maintained very well (Resgis *et al.*, 2019). Females are,

therefore, left susceptible to urinary tract infections and other diseases (Sultana, Ferdousi and Shahidullar, 2014). In addition to this, most construction clothing, tools and equipment are not designed to fit the physique of females (Vijayaragunathan and Rasanthi, 2019).

Further, females are discriminated against in the workplace (Aulin and Jigmond, 2011; Regis *et al.*, 2019). Gender-based harassment and bullying are said to not be reported by females as they are later victimised by their male colleagues after reporting incidences (Regis *et al.*, 2019; Vijayaragunathan and Rasanthi, 2019). These unspoken or unreported incidents make the job difficult for females and discourage them from staying in the industry (Aulin and Jigmond, 2011: Kamaruddeen, Khalid and Wahi, 2019).

2.7 GAP IN KNOWLEDGE

Specifically for SA, studies have shown that female under-representation is due to the barriers that females face in the C.I (Akinlolu, 2019; English and Le Jeune, 2012; Regis *et al.*, 2019). Studies have, also, shown that the number of female students enrolling and graduating with construction-related degrees from SA universities has been increasing (Amaratunga *et al.*, 2006; Fielden *et al.*, 2010; Gale, 1994). The gap in knowledge, as identified by Moraba and Babatunde (2019), remains that the existing studies have not been able to discuss how the long-term career decisions made by GFS contribute to the phenomenon of female under-representation. More specifically, the long-term career decisions based on the internal barriers experienced during the GFS ConE process and their perceived external barriers that females face in SA's C.I. Consequently, this study makes an important contribution to the body of knowledge by providing an understanding of how the experiences of female students during the ConE process shape their perceptions of and long-term career decisions in SA's C.I. By so doing, different institutions are able to develop interventions that challenge the formation of negative perceptions that are held by female students and GFS.

2.8 INFLUENCING FACTORS FOR CONSTRUCTION EDUCATION

It is important to understand the factors that motivated GFS to study a construction-related degree. The following section discusses factors that have been found in the literature to have motivated GFS to study a construction-related degree.

2.8.1 Early career development

People usually begin thinking about their career path around 16 years of age and towards the last years of their high school career (Madikizela and Haupt, 2010; Morrow, 2017). Despite

deciding on a career path at an early age, Elliot *et al.*, (2016) report that "the career-decision making process is often complicated for high school students" with some students reporting that they suppose that their career decision was made too early, whilst others reported that they would alter careers if given the opportunity to do so (Moraba and Babatunde, 2019; Morrow, 2017).

According to Aulin and Jigmond (2011), females need to be supported during the early stage of their career decision-making process. Additionally, Escamilla *et al.* (2017) "investigated factors that impact female high school students' career decision and how to reach them the best and teach them about careers available in the C.I". Although the focus of the study was on female students in the 11th grade, it presented recommendations that could improve recruitment of females into ConE. The poor image of the C.I is cited as the reason for the lack of interest expressed by both men and females in high school (Bigelow *et al.*, 2017). Advice from families, friends, educators and counsellors influence female student's perceptions of the C.I and serve as motivating factors in female students pursuing careers within the C.I (OstadaliMakhmalbaf, 2014).

It is believed that the stereotyping young females face makes it hard for them to want to pursue careers in the C.I. (Elliot *et al.*, 2016; Moraba and Babatunde, 2019). The feeling of segregation is present amongst young females because the opportunity to encounter other female professionals in the C.I is very minimal (Alves and English, 2019; Madikizela and Haupt, 2010; Martin and Barnard, 2013). Evidence also exists that students in SA have knowledge deficiencies when it comes to their understanding of the C.I (Ayalp and Ocal, 2016; Regis *et al.*, 2019).

2.8.2 Guidance counsellors

Francis and Prosser (2014) explored career guidance counsellors and gender-related issues and examined the career counsellor's perceptions of the C.I as a career choice for students in high school. It was discovered that career counsellors played a crucial role in providing career guidance to young people faced with making decisions of pursuing career paths for their future development (Francis and Proser, 2014). The relevance of this study confirms the findings of existing literature on the prevalent gender gap that exist in the workplace (Peila-Shuster and Hines, 2019). Whether gender was a determining factor in the type of guidance high school students receive from career counsellors was also factored into the aim of the study. The results

revealed that there was a perception that young males were encouraged to explore construction careers more than their female counterparts (Francis and Prosser, 2014).

This study emphasises the point made by Akinolu (2019) that although the C.I makes significant contributions to societal employment; the sector still possesses a low participation rate of women. Francis and Proser (2014) recommended the use of an educative model which served the purpose of educating career counsellors in gaining first-hand knowledge about careers available from people working within the industry. Akinlolu (2019) stated that the acquisition of knowledge in the C.I by women and its academic importance is still lacking. Moreover, female entrants to the C.I are often attracted to the C.I by recruitment campaigns that encourage them to join the industry.

The study also recommended that knowledge needs to be used to encourage younger females to pursue careers in the C.I (Francis & Prosser, 2014). Research by Del Puerto *et al.* (2011) discovered that the factors that have been reported to hinder the recruitment of female high school students' into a construction-related degree include the perceived harsh working environment, inadequate knowledge on the C.I, the absence of role models (Madikizela and Haupt, 2010), aspirations to have a good job and make a decent living (Elliot *et al.*, 2016), keen interest on the C.I and the perceived career rewards the industry offered (Maroga *et al.*, 2015; Bigelow *et al.*, 2017). Due to SA's cultural diversity, some females are brought up with the understanding that they cannot assume roles in non-traditional careers such as construction (Akinlolu, 2019).

2.8.3 Career opportunities

In a series of interviews conducted by Bigelow *et al.* (2017), female students reported that the career opportunities they had available upon graduation "influenced their decision to pursue a construction-related" degree. Career opportunities are a useful tool in attracting female students to the industry (Bigelow *et al.*, 2015). Female students feel that their gender would increase their employability within the sector (Bigelow *et al.*, 2017). They believed that organisations are looking to diversify their workplace and in the SA context, increase the company's Black Economic Empowerment (BEE) rating. Female students reported that they think that their gender gives them an advantage over their male counterparts (Powell, Dainty and Bagilhole, 2010). Powell *et al.* (2010) suggested that this view had a long-term consequence for females in the industry because their male counterparts tend to overlook them when it came to selection for promotions and career advancements. It is a common belief amongst men that females are

only employed for gender-balancing purposes, consequently casting doubt on their capabilities (Powel *et al.*, 2010).

2.8.4 Media

Media, community service and scholarship opportunities were reported as positive factors that influenced female students' decision to study a construction-related degree (Moraba and Babatunde, 2019; Ostadalimakhmalbaf *et al.*, 2019). However, for some, the media has had a negative impact because of the negative image the media portrays of the C.I (Bigelow *et al.*, 2017). The media often reports on accidents that occur in the C.I and the death tolls that occur as a result of construction-related accidents, although this is but one side of a multi-faceted industry (Bigelow *et al.*, 2017). Media reporting does not portray the overall image of the industry (Bigelow *et al.*, 2017).

2.8.5 The influence of family, friends & role models

People often choose a career path similar to that of a parent or someone that they look up to (Struthers and Strachan, 2019). A study undertaken by Bigelow *et al.* (2017) established that 51% of female students reported that they chose to study a construction-related degree because of a role model. This point suggests that professionals speaking to young females positively influenced female students to pursue a career in construction (Struthers and Strachan, 2019). It is also noted that the role models are primarily male professionals and this reflects the current state of the C.I (Powell *et al.*, 2010; Struthers and Strachan, 2019).

Table 2.1 presents a summary of factors that have been found in the literature to have motivated GFS to study a construction-related degree. The above literature and Table 2.1 below provide answers to objective 1 of this study.

Table 2.1: Summary of factors motivating ConE

Motivating Factors	Citation
Family, friends and teachers	Bigelow *et al.*, 2017; Escamilla *et al.*, 2017; Francis and Prosser, 2015BSc Hons (CM)
Career opportunities	Bigelow *et al.*, 2016; Bigelow *et al.*, 2017; Madikizela, 2008; Maroga *et al.*, 2015; Powell *et al.*, 2010
Financial stability	Elliot, 2016; Madikizela, 2008; Madikizela and Haupt, 2010
Image of the C.I	Escamilla *et al.*, 2017
Mentors and high school career counsellors	Francis and Prosser, 2015; Del Puerto *et al.*, 2011; Bigelow *et al.*, 2017; Powell *et al.*, 2010; Yokwana, 2015
Media	OstadaliMakhmalbaf, 2014; Bigelow *et al.*, 2017; Madikizela, 2008

2.9 INTERNAL BARRIERS DURING CONSTRUCTION EDUCATION

During their construction-related degree, GFS are faced with barriers that are defined as internal barriers for the purpose of this study. This section discusses the literature on the internal barriers found in the ConE process. These barriers are used to assess how GFS' perception of the C.I is shaped by internal barriers.

2.9.1 Introduction to higher education

According to Akinlolu (2019), training and education have a vital role to play in resolving inequality by providing women and girls with knowledge about the C.I as a whole. Although female students have increased in numbers over the years, the under-representation of females within the C.I persists (Del Puerto *et al.*, 2011; Fernando *et al.*, 2014; Oo and Widjaja, 2018). McKay (2017) defines under-representation of females or a non-traditional career for females as any industry which consists of 25% or less of females employed in an industry. The under-

representation is said to be caused by the culture that exists within the industry and barriers faced during ConE.

Section 2.9 discusses the internal barriers experienced by GFS during the ConE process. The section assesses how lived experiences have influenced the perceptions females tend to have of the C.I and how these perceptions influence their long-term careers within SA's C.I.

2.9.2 Retention in ConE

"The factors that influence students' selection of a significant subject are an ongoing concern for university administrators, as well as for university faculties" (Durdyev and Ihtyar, 2018). Factors identified as encouraging the retention of females in construction-related degree programmes include career prospects and internships that are available after graduation which provides students with practical industry experience (Bigelow *et al.*, 2016; Oo, Li and Zhang, 2018). Having a family member who is an employee of the industry is also a factor (Oo, Li and Zhang, 2018; Moraba and Babatunde, 2019). The study assessed how the perceptions of female students registered in undergraduate programmes positively influenced their retention in ConE (Oo, Li and Zhang, 2018). The study used a survey, where participants consisted of a student population studying construction-related degree programmes in five universities in the United States, namely; Arizona State University, Auburn University, Colorado State University Purdue University and Texas and M University (Bigelow *et al.*, 2016). The five-point Likert-scale was used to rate factors that were perceived as influencing factors. The findings show that the community of students in university is a useful factor in retaining female construction-related students (Bigelow *et al.*, 2016).

Another study investigate the trends of female student enrolment in construction management (CM) undergraduate degree programs in three universities in New South Wales, Australia. Findings from enrolment data revealed that "there had been a steady increase of female student enrolments in CM programs across three universities located within New South Wales" (Oo and Widjaja, 2017). From literature in constructed-related education, it can be concluded that the strong relationship between universities and the industry would help improve retention levels (Oo, Li and Zhang, 2018; Oo and Widjaja, 2018). Many other factors such as availability of internships, scholarships and fellowships, as well as mentoring and career opportunities are likely to be enhanced if the relationship between universities and industry is kept alive (Oo, Li and Zhang, 2018; Oo and Widjaja, 2017).

2.9.3 Barriers during ConE

The increasing number of female graduates have the potential to bridge the demand for female professionals in the C.I (Elliot, Perkins and Thevenin, 2017). The study conducted by Shane *et al.* (2012) provides an improved understanding of the barrier female undergraduates face and how best to retain female students. The study reports that some students found it much easier to be a woman in the ConE programme regardless of females being the 'minority' in the class (Shane *et al.,* 2012). Another survey respondent in the same study reported that because of the cohort she was a part of, she no longer felt like she was part of a minority as a female construction student (Shane *et al.,* 2012).

Within the context of different institutions of higher education, there have been considerable efforts that have been instituted to address the negative stereotypes people have of female students pursuing a construction-related degree (Durdyev and Ihtiyar, 2018). Some of the students suggested integrating activities to promote healthy relationships amongst the cohort members (Shane *et al.,* 2012). The undeclared engineering and construction students were to be informed and transferred to the ConE females' group (Shane *et al.,* 2012). Others suggested functions such as bowling or movie nights on weekday evenings, small group sessions with professional practitioners to discuss the various barriers females face in the industry and how to handle such issues within sectors were some of the strategies that were suggested to address barriers faced by females in the C.I (Oo Li and Zhang, 2018).

Recommended strategies to prepare females for the construction sector involve universities implementing a first-year learning community, hiring female staff members of faculty and creating groups explicitly tailored for female students; through this, female student enrolments would likely increase (Shane *et al.,* 2012). The reason for this is that students tend to engage in activities that reinforce and confirm that higher levels of performance motivate their identities (Huda *et al.,* 2018). It was also found that students who are content with the level of communication of a degree program were not likely to leave a degree program when compared to students that felt isolated in their degree programs (Shane *et al.,* 2012). The establishment of student communities is, therefore, vital as it provides more significant opportunities for individual identity and motivation for increasing academic performance (Oo, Li and Zhang, 2018).

Several authors have studied ways to retain more female students in ConE. Bigelow *et al.* (2016) investigated "factors that female students perceive as having the most significant

favourable influence on them remaining in a CM degree programme". Aulin and Jigmond (2011) discussed the current state of females in ConE and how best to retain them in 27-member countries of the European Union. It is reported that females shy away from the C.I because there exist barriers of "social acceptance of employment, sexual harassment, sexual discrimination, physical incapability and exposure to hazards" (Aulin and Jigmond, 2011; Vijayaragunathan and Rasanthi, 2019). The study highlighted how the EU is facing skills and labour shortages and the EU relies on outsourcing its work-force from other countries instead of looking at in-house resources (Aulin and Jigmond, 2011; Romero *et al.*, 2019). It has been reported that SA is facing the same skills and labour shortage (Aiyetan and Dillip, 2018; Fernando *et al.*, 2014).

A study conducted by Madikizela (2008) found that "80.9% of the female students studying towards a construction-related degree believed that they were capable of building successful careers" in the C.I. Out of the surveyed female students, 59% believed that high school female students should consider construction as their career choice since they have an opportunity to attain successful careers within the industry. The survey indicated that most "female students preferred careers in other sectors such as health, commerce and IT over construction, although these female students were studying towards a construction-related degree" (Madikizela, 2008). The study also revealed that the work environment found in the C.I discouraged these female students from pursuing careers in the C.I. The findings of the study suggested that the C.I was not considered popular to females (Madikizela, 2008). The C.I was also not regarded as a viable career choice in comparison to other career options (Madikizela, 2008).

The work of Aulin and Jigmond (2011) shows that "females in construction are considered the wrong gender to be around because the construction occupation requires not only dexterity but physical strength". The industry is still conservative in its recruitment of females and the reason for this is that it is a traditional industry and traditional industries emphasise physical strength (Street and Dardis, 2018).

The C.I in SA still has an under-representation of females because females are viewed as secondary to males in SA's business culture (Kaggwa, 2019; Madikizela and Haupt, 2010). However, almost two-thirds (68%) of the participants in a study suggested that construction professionals needed to educate high school girls on the careers available to them in the C.I (Madikizela, 2008; Richard, Luqman and Amina, 2018). There is lack of knowledge in SA regarding careers in construction which is emphasised by Ikiao and Wanyoni (2019) based on

the fact that some of the female students studying construction had little prior knowledge about the industry (Ikiao and Wanyoni, 2019). According to Madikizela (2008), female students have been influenced to study construction by the opportunities found within the industry. The motivating factors were listed as:

- Career expectations.
- Challenging work environment.
- Educational experience.
- Financial prospects.
- Exploration of the unknown.
- Knowledge of the C.I.
- Encouraged by females with a successful career in the industry.
- Convinced by family.
- Cultural background.

Madikizela and Haupt (2010) in Akinlolu and Haupt (2019) analysed factors that influenced females in SA to follow a career path in the C.I. Their study "examined the relationship between gender, culture, religion, masculinity and the nature of the C.I", which is considered an unattractive career choice for females in SA. The study also explored the widespread discrimination against females in the C.I and the impact that this perceived discrimination has on females that are in pursuit of attaining a construction-related degree (Madikizela and Haupt, 2010). The study adopted a purposive sampling approach to gather data. Undergraduate students registered in construction-related studies and industry practitioners from Gauteng and the Western Cape were used as participants and given questionnaires to collect the required data. The results of their research suggested that "the experience of the industry by professional females tempered with their views relative to the C.I itself when compared with the responses of students" (Madikizela and Haupt, 2010). Professional females reported that as "they gained more experience and acceptance in the industry; they were able to hold their own and develop more realistic views of the nature of the sector". The study further suggested that there exists a correlation between the perceptions GFS have about the C.I and the way they experience the industry (Akinlolu, Mariam and Haput, 2018; Madikizela and Haupt, 2010).

Gender bias still exists within SA's C.I, which is mainly caused by the predominantly masculine nature of the industry, which poses as a bottleneck to the facilitation of females' career development within the C.I (Kaggwa, 2019; Martin and Barnard, 2013). It has been

recommended that ConE should be more accessible to female students and the industry needs to address the issues of barriers, image and male-dominant culture of the industry (Akinlolu, Mariam and Haput, 2018; Kaggwa, 2019; Shikweni, Schurink and van Wyk, 2019). The authors also suggest that "females must review their roles and accept themselves as capable role players in the industry" (Haupt and Mdikizela, 2010).

Table 2.2 presents a summary of the internal barriers GFS experience during ConE. The literature discussed in Section 2.9 and summarised in Table 2.2 answers objective 2 of this study.

Table 2.2.: Summary of internal barriers in ConE

Internal Barriers	Citation
Lack of networking opportunities	Bigelow *et al.*, 2017; Shane *et al.*, 2012
Male-dominated faculty staff and lecturers	Shane at al., 2012; Adogbo *et al.*, 2015
Discrimination against female students	Ling and Poh, 2004; Madikizela and Haupt, 2010; Francis and Prosser, 2014
Male culture exists in ConE.	Ling and Poh, 2004
GFS accepted by their male counterparts.	Ling and Poh, 2004

2.10 EXTERNAL BARRIERS BASED ON CONSTRUCTION EDUCATION

The perceived barriers GFS face during their studies could be causing the gap that exists between female students studying towards the completion of their degree and the number of females found in SA's C.I (Fernando *et al.*, 2014; Kamaruddeen, Khalid and Wahi, 2019). This section discusses the literature on the barriers found in SA's C.I. These barriers are used to assess how they influence the long-term career decisions of GFS within SA's C.I.

2.10.1 Nature of the C.I

2.10.1.1 The image of the industry

The perceived image of the C.I is a significant barrier to GFS' entry into SA's C.I (Bryce, Far and Garardener, 2019; Ginige *et al.*, 2007; Ling and Poh, 2004; Madikizela and Haupt, 2009; Sewalk and Neitfeld, 2013). GFS perceive the industry as male-dominated, requiring physical strength, having severe working conditions, dangerous, tedious and dirty (Amaratunga *et al.*,

2013; Bryce, Far and Gardener, 2019; Eisenberg, 2018; Ginige *et al.*, 2007). As a result, GFS become uninterested in joining the industry after graduating (Aboagye-Nimo, Wood and Collison, 2019; Amaratunga *et al.*, 2013; Ling and Poh, 2004; Madikizela and Haupt, 2009).

The argument presented in the literature is that the C.I is becoming high-tech because of the fourth industrial revolution, which requires more mental capabilities rather than physical strength alone (Alade and Windapo, 2019). The old image of the C.I should, therefore, not discourage GFS from entering the C.I (Ginige *et al.*, 2007; Moraba and Babatunde, 2019). Studies revealed that some GFS might choose not to join the C.I after completing their studies because of the poor image the industry has, which works against GFS (Fernando *et al.*, 2014; Ling and Poh, 2004; Madikizela and Haupt 2009. It was also found that construction companies depict an "unattractive image of the industry" during recruitment, affecting the decision of GFS by deterring their desires to join the C.I (Fernando *et al.*, 2014).

2.10.2 Working Conditions

2.10.2.1 Masculinity

Masculinity is a pattern of practice, which usually involves patterns of emotional conflict and internal division mainly because of gender powers (McAllister, Callaghan and Fellin, 2019). It refers to an idea where emotional, mental and physical roles are placed on gender. Men are projected through masculinity to be confident and concentrated on material success. On the other hand, females are regarded as more shy, kind and concentrated on the overall quality of life (George and Loosemore, 2019). The concept of masculinity influences the way people think about gender, gender roles and social hierarchy (Grieve, March and Van Doorn, 2019; Lindsay and Miescher, 2005). The working conditions in the C.I are masculine, traditionally designed by men, for men and the C.I is often very demanding, requiring employees to work long hours, travelling long distances for site work and having no option to be able to work part-time, amongst other things, which GFS may find as barriers (English and Hay, 2015; Navarro-Astor *et al.*, 2017).

2.10.2.2 Long working hours

In the C.I, long working hours are glorified and rewarded by employers. Employees are expected to show dedication to their work by putting in extra hours which often requires them to neglect or postpone their responsibilities (Bryce, Far and Gardener, 2019). As a result, construction companies prefer employing men because they likely have limited domestic responsibilities (Aboagye-Nimo, Wood and Collison, 2019; Ness, 2012). In the past,

construction was a male-only industry; therefore this working model was more suitable for men as they did not have to carry out any household duties and thus, they could afford to stay at work for long hours (Navarro-Astor *et al.*, 2017). The consequence of this is that it is prejudiced against females who choose to work and have a family. These females are discriminated against by their employers (Navarro-Astor *et al.*, 2017). Discrimination is an aspect of the C.I that GFS must consider when choosing to enter the industry.

2.10.2.3 Family responsibility

Family responsibility refers to active involvement in raising children, providing for and supporting the family. Females bear this responsibility because they are regarded in most SA's homes as the primary domestic caregivers (Kolade and Kehinde, 2013;Navarro-Astor *et al.*, 2017). GFS are discouraged from entering the C.I if they wish to have families of their own in future because the industry does not readily accept leave to attend to family matters or maternity leave (Aboagye-Nimo, Wood and Collison, 2019; Sewalk and Neitfeld, 2013).

The industry is structured in such a way that work and family demands are challenging to address simultaneously (Bowen *et al.*, 2018; Fernando *et al.*, 2014). This inter-role conflict mainly affects females who aspire to have careers and at the same time, get married and have children (Fernando *et al.*, 2014; Regis, 2019). In the long run, this conflict is a determinant of whether a woman will take a job or not (Kolade and Kehinde, 2013; Opuku and Williams, 2019). Furthermore, site-based professionals are usually required to move around as it is expected of them based on the nature of the projects they undertake (Morrello, Issa and Franz, 2018). This results in them being away for months, travelling substantial distances (Kolade and Kehinde, 2013; Lingard and Lin, 2004). These demands are damaging females' relationships.

It has also been discovered that females who choose to have their own family end up developing a low expectation of their career advancement because of the glass ceiling phenomenon (Oyewobi *et al.*, 2019; Vijayaragunathan and Rasanthi, 2019). Females who wish to balance the work-family life experience substantial difficulties (Oyewobi *et al.*, 2019). Fundamentally, females who decide to have families give up hope for career advancement.

2.10.3 Sexist attitudes

2.10.3.1 Gender stereotypes

The analysis of gender stereotypes essential because of the nature of this study. Gender, which refers to the socially created characteristics of people, is different from sex, which refers to the biological characteristics of people (Corella *et al.*, 2019). These characteristics refer to the

social attributes of the prescribed differentiated issues, responsibilities, expectations, norms and modes of behaviour of females and males (Ellemers, 2018; Ifegbesan, 2010).

Femininity and masculinity are gender roles and beliefs given by society, dealing with the perceived behaviour of a man or woman on how each is expected to act and the roles they are meant to play in society (Player *et al.*, 2019). These beliefs entail psychological traits and characteristics, comprising activities that are suitable for a man or a woman (Ifegbesan, 2010). Gender stereotypes are based on "beliefs concerning the traits and behavioural characteristics attributed to people based on their gender" (Balachandra *et al.*, 2019; Ginige *et al.*, 2013). These stereotypes serve as expectations people have about the abilities and attitudes of others and are one of the direct experiences of discrimination in the workplace (Broder, 2019).

2.10.3.2 Glass ceiling

Glass ceiling is defined as the the invisible structural barrier to women's career advancement (Ansari, 2016). Glass ceiling causes frustration to many females, many of whom may potentially leave their jobs because they cannot reach top positions because of this barrier (Regis *et al.*, 2017). The industry is, however, changing and the traditional female traits such as communication and team-building are said to be significant (Aboagye-Nimo *et al.*, 2018). GFS should, therefore, consider entering the industry because men are at a disadvantage and their traditional empire crumbles around them (Kolade and Kehinde, 2013). According to Rao (2019), women around the world are trying to break this glass ceiling by creating a niche for themselves. Women are also endowed with other skills apart from physical strength which allow them to work smarter. Hussain and Hadi (2019) found a significantly positive relation between women directorship and organisation performance in researching corporate governance in the C.I.

The glass ceiling syndrome still exists in most construction companies (Aboagye-Nimo, Wood and Collison, 2019; Agherdien and Smallwood, 2013; Kolade and Kehinde, 2013). It is commonly argued that GFS are not aware of the extent of the glass ceiling they will experience once they start working (Infante-Perea *et al.*, 2019). Glass ceiling makes females entering the C.I susceptible to isolation, inadequate access to mentorship opportunities and female role models (Byrne, Fathoum and Diaz Garcia, 2019; Kolade and Kehinde, 2013). This syndrome may discourage and derail GFS from entering the C.I (Ling and Poh, 2004; Toor and Ofori, 2011; Vijayaragunathan and Rasanthi, 2019). A solution for addressing the glass ceiling syndrome is to ensure that employers conduct glass ceiling audits within their organisations to

ascertain whether their cultures and practices will potentially impede GFS' career advancement (Ling and Poh, 2004).

2.10.3.3 Organisational culture

Some studies conducted have shown that the male-dominated culture found within the C.I is a barrier "for GFS and many other" females (Agherdien and Smallwood, 2013; English and Le Jeune, 2012; Ling and Poh, 2004; Opuku and Williams, 2019). The organisational culture of the C.I is an influential and often unconscious force that affects the way people behave, perceive things, their thought patterns and values (Cameron and Quinn, 2011). One of the behaviours of men is the hostility towards females within the industry. Employees of the C.I are often exposed to what is referred to as a hostile environment where crisis, arguments and conflicts are the norms (Fernando *et al.*, 2014; Sewalk and Neitfeld 2013; Wu *et al.*, 2019). Dainty *et al.* (2000) found that GFS' career in the C.I is short because the culture of the industry has disheartened them.

The long hours at work, competition in the workplace, working independently and full-time, rewards and career achievements are norms men value (George and Loosemore, 2019; Walker, 2019). Amaratunga *et al.*, (2013) found that GFS who want to enter the C.I and have thriving careers must quickly adapt to the male norms and behave as men do. Females' failure adapt to the culture, often forces them to leave or continue holding unimportant positions within construction companies (Aboagye-Nimo, Wood and Collison, 2019; Fernando *et al.*, 2014; Mohamadi, Mohamadi and Karji, 2019)

"The male-dominated culture can be especially destructive for female's entry, career development and retention in the C.I" (Fernando *et al.*, 2014). It has been proposed that the culture of the industry is to be adjusted to accept females as equals by their male counterparts in order to change the problem of under-representation of females in the C.I (George and Loosemore, 2019; Sewalk and Neitfield, 2013).

2.10.3.4 Recruitment practices

The recruitment practices used in the C.I were found to be barriers for GFS (Bryce, Far and Gardener, 2019; Kolade and Kehinde, 2013; Ling and Poh, 2004). This is because they tend to be informal (Navarro-Astor *et al.*, 2017). The use of prejudiced recruitment practices discourages GFS from applying for specific jobs because of the requirements for the 'macho' nature which they do not possess (Fernando *et al.*, 2014; Regis *et al.*, 2019). A female's career

is often interrupted by family commitment; hence, men are found to be preferred over females (Oyewobi *et al.*, 2019). Although illegal, during job interviews, GFS are often asked whether they plan on having any children, which places them at a place of inequality with their male counterparts (Navarro-Astor *et al.*, 2017).

Table 2.3 presents a summary of the external barriers GFS are faced with when they decide to enter the C.I. The literature discussed in Section 2.10, which is summarised in Table 2.3 answers objective 3 of this study.

Table 2.3: Summary of external barriers

External Barriers	Citation
Glass ceiling	Agherdien and Smallwood, 2013; Kolade and Kehinde, 2013; Toor and Ofori, 2011; Ling and Poh, 2004
Organisational culture	Agherdien and Smallwood, 2013; Fernando *et al.*, 2014; Cameron and Quinn, 2012; English and Le Jeune, 2012; Ling and Poh, 2004
The image of the C.I	Fernando *et al.*, 2014; Ginige *et al.*, 2007; Madikizela and Haupt, 2009; Sewalk and Neitfeld, 2013; Ling and Poh, 2004
Family responsibility	Fernando *et al.*, 2014; Navarro-Astor *et al.*, 2017; Kolade and Kehinde, 2013; Lingard and Lin, 2004; Sewalk and Neitfeld, 2013
Gender stereotypes	Ginige *et al.*, 2013; Ifegbesan, 2010; Ellemers, 2018; Gartner, 2018
Masculinity	Navarro-Astor *et al.*, 2017; English and Hay, 2015; Lindsay and Miescher, 2005
Long working hours	Navarro-Astor *et al.*, 2017; Le Jeune, 2008; Lopez- Saez *et al.*, 2004; Ness, 2012

The preceding three sections have focused on the influencing factors to study for construction-related degrees, the internal barriers that the GFS face during the course of their ConE and, following from the ripple effect, the perceptions of the external barriers that females face in the C.I. In line with the aim of this study, it is relevant to explore the interplay among these three elements using a conceptual framework, which is discussed in the next section.

2.11 THEORETICAL FRAMEWORK

A theoretical framework includes a presentation of concepts, terms, definitions and models which are found in the existing literature. The theoretical framework combines existing theories, concepts that are related to the study, empirical research and assists researchers in explaining their study becoming the basis of a new theory that is being developed. "A theoretical framework involves the presentation of a specific theory, such as systems theory or self-efficacy and empirical and conceptual work about that theory" (Rocco *et al.*, 2009). It forms an essential part of the structure of a study (Rocco *et al.*, 2009). The career construction theory (CCT) and the leaky bucket theory (LBT) were used as the theoretical frameworks in this study.

2.11.1 Career Construction Theory

The CCT, which addresses the way individuals choose their career path based on personal and social constructivism, is used for this study. "CCT is a grand theory of career development that explains the interpretive and interpersonal processes through which individuals impose meaning and direction on their vocational behaviour" (Savickas, 2005, 2013; Rudolph, Zacher and Hirschi, 2018). Findings from empirical studies based on propositions of CCT identify the CCT as vital for providing a basis for the vocational choices of individuals which leads them to construct satisfying and successful careers (Rudolph, Zacher and Hirschi, 2018; Zacher *et al.*, 2019). The CCT argues that people create a reality suitable for themselves and not reality itself. It emphasises that "individuals construct their careers by imposing meaning on their vocational behaviour and professional experiences" (Savickas, 2005; 2013).

"Career adaptability is a concept that refers to the psychological construct that denotes an individual's readiness and resources for coping with current and imminent vocational development tasks, occupational transitions and personal traumas" (Neto *et al.*, 2019). Other studies have examined how young adults construct their career transition from university into the workplace, using the CCT and whether career adaptability mediated using workplace

variables such as the environment and the nature of the workplace, lead to career concerns for students (Santilli, Norta and Harlung, 2019). The CCT is, therefore, suitable for this study because the theory incorporates career planning, decision making and exploration of careers, which is what the study aims to explore. The theory offers a way of thinking regarding the way people elect their career. The theory "examines the process of psychosocial adaptation and how individuals cope with vocational development tasks, occupational transitions and work traumas" (Savickas, 2005). It proposes that the dynamics of personality and the transition to the workplace be separate variables (Maree, 2018). It is therefore essential to explore internal barriers which are distinct from the external barriers within the industry, separately, using the CCT.

2.11.1.1 Career Construction Theory and internal barriers

The CCT's model of adaptation focuses on "the role of people's experiences in that it addresses social expectations that people have, prepare for, enter and participate in the work environment and subsequently, how individuals deal with career transitions between university and the work environment" (Saviskas, 2012). In the earlier section, this study reported on the internal barriers GFS experience during ConE. Due to these barriers, it is likely that GFS will construct adaptive career approaches that do not compromise their characters in the workplace, helping them to survive (Regis *et al.*, 2019). "This adaptation is motivated and guided by the goal of bringing inner needs and outer opportunities into harmony, with the harmonies of a good fit, amplifying in present activity the individuals past pre-occupation and current aspirations" (Tokar *et al.*, 2019).

This adaptive process and transition involve mastering vocational development tasks that help female students become technically ready for the work environment, coping with the transitions and preparing to adjust from university to work, past the traumas experienced. These beneficial actions form a series of adaptive performance which are occasionally repetitive as people integrate into the work environment (Saviskas, 2012). Throughout ConE, GFS have been trained and equipped by academics to prepare for the C.I. They are therefore currently in a stage where the adaptive process comes to an end and the transition process must begin.

As each call for adaptation for the work environment approaches, Saviskas (2012) suggest that GFS can adapt more quickly to the work environment by seeking help that goes against the internal barriers they have faced during ConE. This must be followed by "informed decision making, trial behaviours which lead to a stable commitment projected forward for a certain

period, active role management and eventually forward-looking disengagement to any past barriers experienced" (Saviskas, 2012).

Being anxious about the future encourages GFS to plan ahead (Saviskas, 2018). As GFS plan their careers, how they perceive the work environment forms a big part of how they construct their careers in that environment and ultimately form a long-term career decision based on the perceptions (Saviskas, 2012). The CCT adaptation model assisted this study in discovering how GFS use their lived experiences during ConE to prepare for and to transition into the C.I.

2.11.1.2 Career Construction Theory and external barriers

Career adaptability is "a psychosocial construct that denotes an individual's resources for coping with current and expected tasks, transitions and traumas in their occupational roles that to some degree, large or small, alter their social incorporation" (Hartung and Cadaret, 2017). Career adaptability resources are "the self-regulation capacities that people draw on to resolve complex problems to developing vocational tasks, occupational transitions and evaluate work traumas" (Coetzee, Ferreira and Shunmugum, 2017; Yang *et al.*, 2019).

Saviskas (2018) reported that individuals often create career strategies based on anticipated transitions from university to the work environment and past traumas. The career strategies inventory assesses what a person plans to do with their career by thinking ahead and engaging in career path planning (Saviskas, 2018). The career strategies inventory is used to test how individuals make career decisions (Galles *et al.*, 2019). The careers strategy inventory consists of thinking about the work environment, perspective on personal strengths and behaviour, adaptive readiness, personality traits, as well as willingness and readiness to change (Saviskas, 2018). Savickas *et al.* (2018) provide a generic measure to test career adaptation of individuals planning on going to the work environment. The general survey was adapted together with the external barriers from Section 2.10 to assess GFS' long-term career decisions within the C.I.

2.11.1.3 Career Construction Theory in similar studies

The CCT in research and in practice has gone through a period of evolution in order to remain relevant for purposes of addressing complexities that are specific to 21st-century life (Hartung and Vess, 2018). The CCT for life design helps individuals to manage and ensure a smoother transition when it comes to career transitions (Santilli, Norta and Harlung, 2019). CCT recognises that individuals develop themselves and the world in which they live through the

stories that they narrate and this process begins from childhood right through to the age of adolescence (Hartung and Taber, 2015).

According to the CCT, to best attain a successful life/career adolescents need to be motivated to formulate a story about themselves and their world by the stories they tell about themselves. The stories about themselves need to articulate who they are becoming as individuals and enact that in the workplace so that they can use work to be themselves more fully (Santilli, Norta and Harlung, 2019). The usefulness of CCT is that it considers the person-environment fit in addition to the developmental and social constructive elements and it is these components that give CCT a comprehensive outlook on vocational behaviour to promote a more centralised life-career design for goals of identity, career adaptability, reflexivity and intentionality (Savickas *et al.*, 2009). Thus far, the use of the CCT has been successful in exploring the career preparation, planning and adjustment amongst young adults (Lee, 2019).

Creed *et al.* (2009) surveyed 245 undergraduate students to examine "the connection between career adaptability, person and situation variables and career concerns in young adults". The CCT was used for the theoretical framework of the study. During their studies, university students were given many career-related tasks which help them gain a better understanding of the career path they have chosen (Pambudi, Mulawarman and Japar, 2019). These CCT tasks bring a better understanding, excitement and anxiety about the career, which is different for every student (Ramoz and Lopez, 2018). The feeling of career anxiety female students experience leads them to subsequently question their career adaptability based on the tasks they are given at university (Ho, Wu and Luiz, 2019; Ramoz and Lopez, 2019). This, therefore, suggests that the internal barriers experienced by GFS have a long-term effect on their career decisions.

2.11.2 Leaky Bucket Theory

According to Afolabi *et al.* (2018) and Fielden *et al.* (2014), the number of female students enrolling in ConE has steadily increased over the past years. However, this increase has not been reflected in the demographics of the industry's workplace (Vijayaragunathan and Rasanthi, 2019.). This imbalance suggests that there is a leaky bucket phenomenon that happens between ConE and the C.I (Markowska-Przybyła and Ramsey, 2019.). The leaky bucket theory describes this occurrence as a syndrome where universities are consistently graduating an increased number of female students and releasing them into an industry that has a leak (Rodriguez, 2018). The leak describes a lack of retention. In the leaky bucket theory or

the concept of the leaky pipeline, the industry is synonymous to a bucket or a pipeline and the water is a metaphor for the pool of female talent that goes to waste. The leak in the bucket or pipeline is a consequence of the nature of the industry which has the characteristic of not being able to retain the increasing number of talented GFS from construction-related degrees.

The leaky bucket theory was initially proposed by Ehrenberg (1988) to explain the process of customer gain, loss and retention in the marketing field (Thumiki, 2019). In the science, engineering, technology and mathematics fields, the term "leaky pipeline" is a phenomenon that is often used to describe the career progression of females as they move from high school, through university and into the C.I (Aboagye-Nimo *et al.*, 2018; Blickenstoff, 2005; Block *et al.*, 2015; Morcelle, Freitas and Ludwig, 2019). Despite the increasing female graduates from universities, the number of females within the C.I remains under-represented due to the leaky bucket phenomenon that exists (Regis *et al.*, 2019; George and Loosemore, 2019).

It was found that GFS make their long-term career decisions based on internal barriers faced during ConE and the perceived external barriers found in the C.I (Ling & Poh, 2004; Struthers and Strachan, 2019; van Heerden, Burger and Zuich, 2019). The leaky bucket phenomenon, which some refer to as the leaky pipeline, is thus caused by the cumulative effect of the barriers GFS faces, resulting in the imbalance found between female students in university and in the C.I (Bares *et al.*, 2019; Morcelle, Freitas and Ludwig, 2019). The theory is applicable in the explanation of the long-term career decisions of GFS and how it affects the "under-representation of women within SA's" C.I (Santilli, Nota and Hartung, 2019).

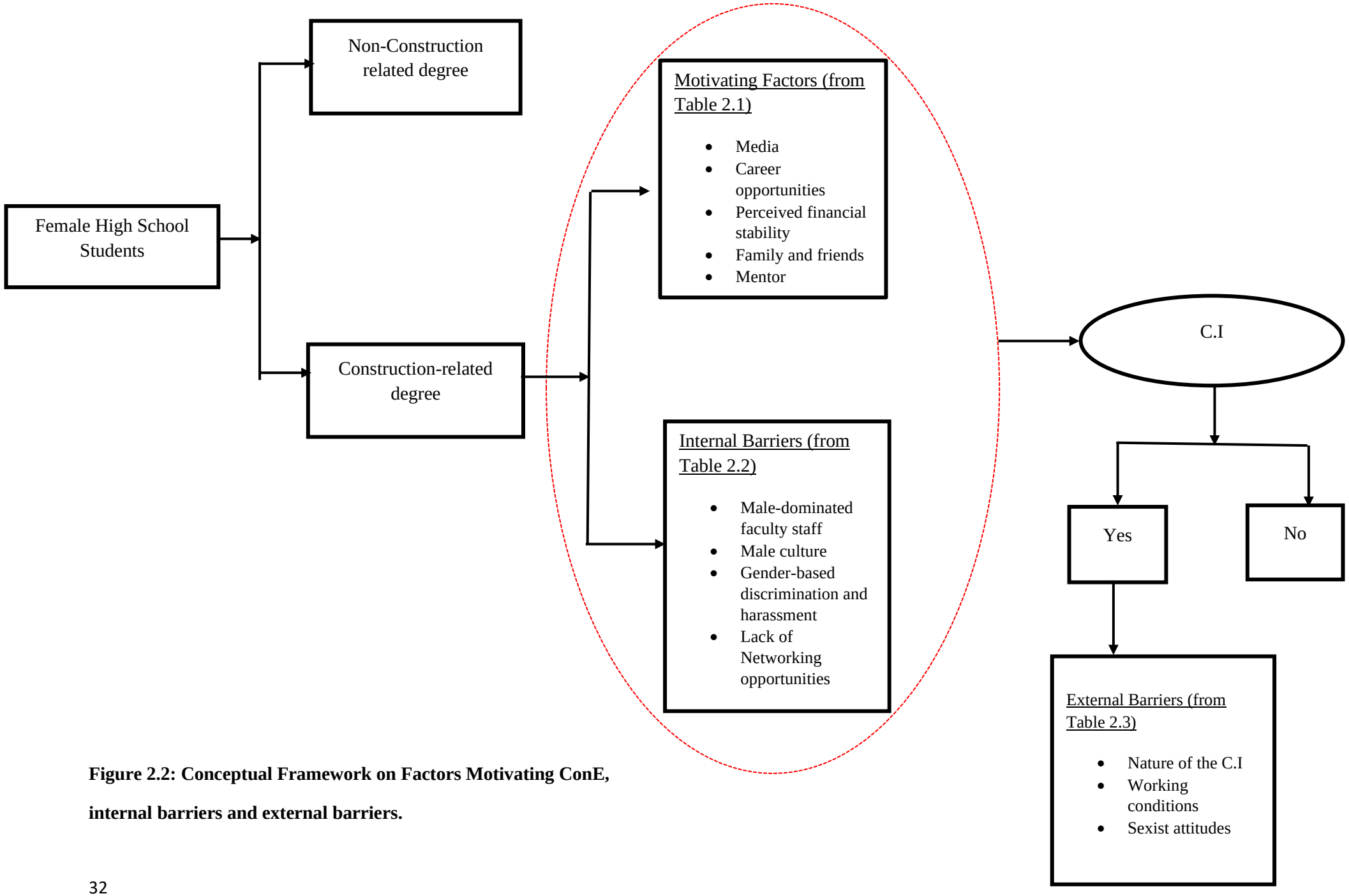


Figure 2.2: Conceptual Framework on Factors Motivating ConE, internal barriers and external barriers.

Figure 2.2 illustrates this study's conceptual model and shows a link between the beginning of female students decisions of the career path they choose until the time they enter the job market. After completing their high school studies, some female students choose to study a construction-related degree and others choose to follow a career path in other fields. The **media** (Bigelow *et al.*, 2017; Madikizela, 2008; OstadaliMakhmalbaf, 2014), **career opportunities** available within the C.I upon graduation (Bigelow *et al.*, 2016; 2017; Madikizela, 2008; Maroga *et al.*, 2015; Powell *et al.*, 2010), **perceived financial stability** that construction professionals experience (Elliot *et al.*, 2016; Madikizela, 2008; Madikizela and Haupt, 2010), **family and friends** (Bigelow *et al.*, 2017; Escamilla *et al.*, 2017; Francis and Posser, 2015) and **mentors** (Bigelow *et al.*, 2017; Del Puerto *et al.*, 2011; Francis and Prosser, 2014; Powell *et al.*, 2010; Yokwana, 2015), were all reported as factors that motivated female students to enrol and pursue construction-related degrees.

The red circle shows the female students' duration as undergraduates in their chosen university in SA. In their undergraduate studies; female students reported facing barriers that were identified broadly as internal and external barriers. These barriers included **gender-based discrimination**, the existence of a **male culture** in classrooms, male counterparts **not accepting them as equals** (Alves and English, 2018; Ling and Poh, 2004), **lack of networking** opportunities to encounter other female professionals in the C.I (Bigelow *et al.*, 2017; Shane *et al.*, 2012) and the **lack of female faculty staff members and lecturers** (Adogbo *et al.*, 2015; Shane *et al.*, 2012).

Having already encountered these barriers during their undergraduate years, some female students decide to enrol for postgraduate degrees. Previous studies indicate that GFS know the barriers that female professionals face in the C.I (Fernando *et al.*, 2014; Navarro-Astor *et al.*, 2017; English and Hay, 2015; Ginige *et al.*, 2007; Madikizela and Haupt, 2009; Lindsay and Miescher, 2005; Ling and Poh, 2004), such as the **working conditions** found (Navarro-Astor *et al.*, 2007; Le Jeune, 2008; Ness, 2012; Opoku and Williams, 2019) and **sexist attitudes** (Agherdien and Smallwood, 2013; George and Loosemore, 2019; Ginige *et al.*, 2013; Ifegbesan, 2010; Kolade and Kehinde, 2013; Lingard and Ling, 2004; Sewalk and Neitfeld, 2013).

2.12 CONCLUSION

This chapter has reviewed existing literature on factors that motivated GFS towards ConE, the internal barriers GFS face during ConE and the external barriers GFS perceive women in the C.I are facing (Kamaruddeen, Khalid and Wahi, 2019). The review found that the career choices available to GFS and the prospective occurrence of improving financial circumstance that comes with it motivated them to pursue a construction-related degree (Modestino, Suguyama and Ladge, 2019; Moraba and Babatunde, 2019). The perceived image of the C.I is shaped by families, friends, high school mentors, educators, career counsellors and the media (Modestino, Suguyama and Ladge, 2019; Richard, Luqman and Amina, 2018). Professionals interacting with high school girls regarding the C.I have had an impact on motivating them to make construction a career choice. During ConE, GFS face internal barriers within their learning environment (Bigelow *et al.*, 2017).

A male-dominant "culture exists in lecture halls where female students are not readily accepted by their male counterparts" (George and Loosemore, 2019). Furthermore, GFS remain undermined in ConE and there is a general belief that their male counterparts are more technically competent. This often results in discrimination against female students and gender-based harassment (Regis *et al.*, 2019; Suresh *et al.*, 2019). Female students report that they are not given networking opportunities with females working in the industry for mentoring and ways to deal with the barriers they are facing as female students (Kamaruddeen, Khalid and Wahi, 2019). GFS has reported that women in the C.I are faced with external barriers that stem from the reduced image "built on the traditional model of being masculine which requires employees to work long hours often at the neglect of family responsibilities" (Aboagye-Nimo, Wood and Collison, 2019; Regis *et al.*, 2019).

Moreover, the male culture found in the C.I gives rise to gender stereotyping since the primary culture of the C.I is one that demands physical strength and resilience to outdoor conditions and bad language (Elliot *et al.*, 2016; Moraba and Babatunde, 2019; Navarro-Astor *et al.*, 2017). Women who want to enter the C.I and have successful career advancement into the industry must adapt to the male culture to have successful careers (Aboagye-Nimo *et al.*, 2019). In the C.I, females are more prone to the glass ceiling if they do not adapt to this male culture (Aboagye-Nimo, Wood and Collison, 2019; Regis *et al.*, 2019; Tiwari, Mathur and Awasthi, 2019).

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

The purpose of a research study is to advance the existing body of knowledge on the subject matter by filling in a gap in knowledge in a specific field (Hoiser, 2019). This chapter follows the research onion by Saunders *et al.* (2019), to give insight into how data was obtained and analysed. The research methodologies and methods that have been employed to carry out this research study are discussed (Leedy and Ormod, 2011; Sutton and Austin, 2015). This chapter discusses the ontology, epistemology and axiology of this research. It further discusses the various research philosophies, approaches, strategies and methods used for the collection of data and its relevance to this study. In the research methods section, the sampling plans, namely convenience sampling, non-probability sampling and the populations are also discussed alongside the time horizons, the ethical considerations and aspects of validity and reliability.

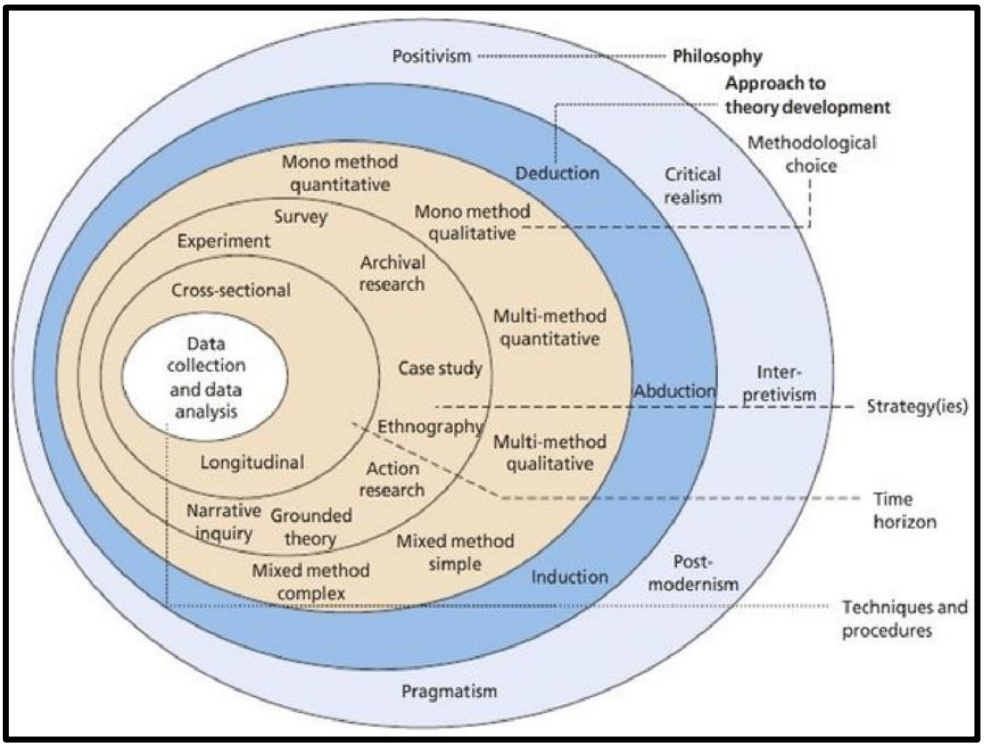


Figure 3.1: The research onion (Saunders *et al.*, 2019)

3.2 RESEARCH PHILOSOPHIES

From the first layer of the research model, the positivist philosophy is adopted. Positivism emphasises the use of a highly structured methodology to assist in the repetition of data (Saunders *et al.*, 2016). The positivist philosophy requires the researcher to observe a social

reality that will produce information that can be generalised and become law-like (Saunders *et al.*, 2016), revealing the truth about the social reality being observed (Kaboub, 2008).

The influencing factor of this study's philosophy will be the relationship between what is currently known about the career decisions of GFS and the process by which this knowledge is currently being developed. In regards to this study, positivism is used in quantitative methods and tends to study correlations and relationships between variables. As stated above, positivism holds the view that reality is subjective to each person because it is individually constructed. The study also adopts the CCT for its theoretical framework which supports the positivists' view that individuals construct different meanings and realities about their social experiences (Thanh *et al.*, 2015).

Although the philosophy has worked for several studies, some authors have opposed the philosophy of social science research. Ryan (2018) argues that the main flaw with positivism is its claim of certainty. In social science research, the researcher cannot accurately claim independence from the subject. In opposition, Vienna (2014) reports that every statement made in science must be tentative forever, yet positivism claims certainty.

3.3 RESEARCH APPROACHES

From the second layer of the research model, the deduction approach is adopted. The research approach forms an essential guide to the research strategy and design of a study (Saunders *et al.*, 2016). "The deductive approach is the dominant approach in the field of natural sciences", wherever laws are used as the foundation for explanations and allowance of the anticipated phenomena (Saunders *et al.*, 2016). The deductive approach seeks to explain causal relationships between variables and test theories and hypotheses (Saunder *et al.*, 2016). The deductive approach is employed in this study because of it seeks to explore factors that motivate GFS to join the C.I and how their long-term career decisions within the industry will influence the under-representation of females in SA's C.I. The approach will be used to test whether the under-representation of females in the C.I is a function of the decisions made by GFS.

3.4. RESEARCH METHODS

3.4.1. Quantitative research

From the third layer of the research model, the quantitative research method is adopted in this study. Quantitative research permits the researcher to collect data in a standardised manner, incorporating controls that ensure validity. "A quantitative research method involves a

numerical or statistical approach to research design and can be used to answer relational questions of variables with the research" (Sausnders *et al.*, 2016; Williams, 2007). The outcomes are analysed and the results are recorded numerically and presented using graphical techniques. The method produces statistical data, using questionnaires and structured interviews.

3.4.2 Data collection methods

Data collection processes are used primarily to collect primary and secondary data from credible sources. Data collection is a form of communication that allows the transfer of information from participants and secondary sources, to the researcher (Fellows *et al.*, 2015). A questionnaire was employed in this study for data collection purposes. The questionnaire was a sequence of questions designed to fulfil the set objectives and capture the self-reported perceptions and experiences of GFS regarding the C.I. Two universities in South Africa were approached for data collection purposes. Upon ethics approval from the respective universities, the questionnaire surveys were sent to the respective school administration officer to distribute to GFS. The purpose of the questionnaire was to obtain the knowledge, perceptions, experiences, attitudes, and career decisions of the identified GFS. The questions included reflected the fundamental concepts of the study (Rattray *et al.*, 2007). The questionnaire assisted in explaining the possible relationship between career decisions made by GFS and the occurrence of under-representation of females in the C.I.

The Likert-type scale questions were used to measure responses from the respondents. A Likert scale is a psychometric response scale that lets participants indicate how they agree or disagree with a given statement (Saunders *et al.*, 2016). The rating scale includes "strongly agree", "agree", "neutral", "disagree" or "strongly disagree" on questions relating to the internal barriers that were reported in the literature (Younas and Porr, 2019). The frequency type of scale was also used to assess the rate at which GFS faced the identified external barriers that were discussed in the literature (Saunders *et al.*, 2016).

The closed-ended questionnaire that was used is attached in Annexure 3. The questionnaire is divided into four sections. Section 1 sought primary data on the participants' demographics including the degree registered for, university enrolled at and work experience. Section 2 sought primary data on factors motivating construction education in order to fulfil objective 1 of the study. Section 2 sought primary internal barriers GFS face during construction education

to fulfil objective 2 of the study. Section 4 of the questionnaire sought primary data on external barriers GFS perceive females in the C.I to be facing.

3.4.3 Sampling technique

The purposive sampling technique, also called judgment sampling, is "the deliberate choice of a participant due to the qualities the participant possesses" (Etikan *et al.*, 2015). The technique does not require fundamental theories or an established number of participants for the technique to be valid. The researcher has the freedom to choose which variables need to be known and finds participants based on their knowledge and experience. It was, therefore, used in this study as the objectives of this study are quantitative and the study aims to generalise the career decisions of GFS in SA. The study distributed questionnaires to female students currently registered in their BSc Honours degree of CM and Quantity Surveying (QS) and Bachelor of Architectural Studies (Hons) at two universities in SA. The identified research participants consisted of female students that had been exposed to the C.I through vacation work and in-service training. This group has a better understanding of the C.I and were well equipped to make an informed decision regarding their future in the C.I (Ling and Poh, 2004).

3.5 RESEARCH STRATEGIES

From the fourth layer of the research model, the survey strategy is adopted. Surveys allow data to be collected quantitatively using instruments such as questionnaires. The data collected will be used to make recommendations on the relationships that occur between variables and test patterns between the variables (Williams, 2007). This strategy, together with secondary data from existing literature and Statistics South Africa (StatsSA), an government organization that produces data to in order to advance economic, growth, development and democracy, was used to address both the aims and objectives of the study. The survey instrument was a questionnaire.

3.6 TIME HORIZONS

From the fifth layer of the research model, the cross-sectional time horizon is adopted by this study. A researcher conducts the cross-sectional study when they want to collect data at a specific period (Saunders *et al.*, 2016). This study employed the cross-sectional time horizon using quantitative data to describe the occurrence of a phenomenon (Saunders *et al.*, 2016). The cross-sectional time horizon is more suitable for this study because the study aims to collect data about career decisions made by GFS as they are about to enter the C.I.

3.7 ETHICAL CONSIDERATION

Ethical consideration is the ethical practice of collecting and analysing data that involves humans as the research subject (Bardi and Murtagh, 2019). It relates to how questions are formulated, the clarity of the research topic, how the research is designed and the access to participants for the collection of data. How the researcher stores, analyses and reports the data is also an essential ethical consideration (Saunders *et al.*, 2016). Before data collection for this study was undertaken, the proposal was sent to the two chosen universities' human ethics committee (non-medical) for examination. This ensured that the study had considered all ethical issues and that the study would not pose any threat to participants, eventually placing the university's name and image into disrepute (Connelly, 2014). A copy of the ethics clearance certificate issued by the two universities (Wits University and the University of Cape Town), can be found under Annexure 4.

Online questionnaire surveys which included a list of structured questions for the study were distributed amongst the research participants. Participants received the link to the online questionnaire via email, through their individual university's student portals. Permission to access and send emails to the students was obtained in writing from the two respective universities under study. The request for permission to conduct research can be found in Annexure 1. The questionnaire survey were completed within 16 weeks. This time frame was given to allow enough time for the study to achieve a 50-70% response rate from the research respondents. GFS, who made up the participants of this research, were told that the study aimed to explore 'factors that motivated GFS to join the C.I'. The female participants were also briefed on 'how their long-term career decisions within the industry could influence the under-representation of females in' the C.I in SA.

Connelly (2014), Fouka and Mantzorou, (2011) and Saunders *et al.*, (2016) emphasised the importance of voluntary participation. Based on this statement, an explanation of what the study entailed was given to the participants in a participation information sheet attached in Annexure 2. The respondents were assured that they had the right to refuse to take part in the study or withdraw from it if they wished to do so, without any consequences (Connelly, 2014; Saunders *et al.*, 2016). When participants give consent, it should be on the basis that they are aware of what the study entails. Participants will then be asked to voluntarily take part in the study if they wish to do so by first filling in a consent form. The questionnaire did not instruct the participants to provide their name in the distributed online questionnaire. Their identity was

kept anonymous and the data submitted was kept confidential. The data collected for this research is now in a protected folder on the researcher's personal computer, where it will be kept for a minimum of five years after receiving the data.

3.8 ASPECTS OF VALIDITY AND RELIABILITY

The "reliability and validity you ascribe to secondary data are functions of the methods by which the data were collected and the source" (Saunders *et al.*, 2016). Reliability and validity can be assessed by analysing the source of data the researcher collects. Secondary data such as journals, books and conference papers (that have been written by credible authors and have been peer-reviewed), may be regarded as trustworthy. Primary data collected from the participants will also be regarded as trustworthy because the participants will be sharing their personal experiences and perceptions of the C.I. Furthermore, participation in the study is voluntary; thus, everyone who took part in the study is assumed to be able to give credible information.

In the data collection phase of this study, participants were not requested to provide any personal information such as names, their identity number, address or student numbers. Anonymity of participants was, therefore, protected since responses could not be attributed to any persons (Fouka and Mantzorou, 2011). Group and statistical reporting are used in order to further guarantee the anonymity of research participants (Connelly, 2014).

Table 3.1: Summary of research methodology

	Philosophies	Approaches	Strategies	Methods	Choices	Analysis	Time Horizon
Objective 1 To explore factors that motivate GFS to pursue a construction-related degree	Positivism	Deduction	Survey	Questionnaire	Quantitative	Descriptive	Cross-sectional
Objective 2 To Investigate internal barriers GFS face during the ConE process motivate	Positivism	Deduction	Survey	Questionnaire	Quantitative	Descriptive	Cross-sectional
Objective 3 To explore common barriers GFS perceive females in South Africa's C.I to be facing.	Positivism	Deduction	Survey	Questionnaire	Quantitative	Descriptive	Cross-sectional

3.9 CONCLUSION

Chapter Three discussed the various aspects of research methodology. The use of Saunders (2016) onion model aided in structuring the various sections of this chapter. The chapter started by discussing the various research philosophies and how a research philosophy regards the belief of a way data about a phenomenon is gathered, analysed and interpreted. The research philosophy used in this study is the positivist paradigm, which makes use of scientific means of gathering data to understand the phenomenon by quantifying it. The use of questionnaires which this study employed is tailor-fitted for the scientific nature of the positivist research philosophy. Questionnaires enabled the collection of quantifiable data and the quantifiable data was used to study multiple variables that existed regarding perceptions of the C.I in the experiences of GFS. In the formulation of the questionnaire, Likert-type scale questions were used to measure the responses.

A discussion of the research approaches available, namely the inductive and deductive approach, was given in addition to the relevance of the deductive approach to this study. The choice of data collection, research strategy and sampling plan were also discussed in this chapter. Additionally, the time horizons, aspects of validity and reliability and ethical considerations of the study were discussed. The chapter then concluded with the philosophies, approach, methods, analysis and time horizon of each of the three objectives of this research.

CHAPTER FOUR: DATA ANALYSIS AND RESULTS

4.1 INTRODUCTION

This chapter discusses the results from the fieldwork, descriptive and inferential data analysis and statistical tests that have been undertaken to test the hypotheses of this study. The use of descriptive and inferential data analysis provides the basis upon which the findings from the fieldwork were discussed in relation to the set aims, objectives and hypotheses. This chapter discusses the quantitative results and uses theory in the application of the analysis.

4.2 CHARACTERISTICS OF RESPONDENTS

The targeted population 50 was GFS who are registered for BSc (Hons) QS and BSc (Hons) CM and Bachelor of Architectural Studies with Honours at two SA universities. 39 viable responses were retrieved from the target population. Table 4.1 illustrates the summary of the respondent's profile. A total of 71.79% (28) of the respondents are registered female students of University A and 28.21% (11) of the respondents are registered female students of University B. The viable response retrieved comprised of 66.66% (26) female students registered for BSc (Hons) QS, 23.08% (9) registered for B.Arch. Studies (Hons) and 10.26% (4) are registered for a BSc (Hons) CM.

All the respondents have indicated that they have worked in the industry during their studies. 67.5% of the respondent's report that they have worked in the industry as part of their vocational experience, 7.5% of the respondents have worked in the industry part-time while they were registered for their full-time studies and 25% of the respondents indicated that they have worked in the C.I as full-time employees. According to Ling and Poh (2004), students who undergo industry experience have an idea of the scope and nature of professions in the C.I and the nature of the C.I. This population were, therefore identified as suitable participants for this study. Table 4.1 offers a summary of the characteristics of the respondents.

Table 4.1: Characteristics of respondents

Industry Experience			
	Vac work	**Part-time employment**	**Full-time employment**
BSc Hons (QS) University A	12	1	3
BSc Hons (CM) University A	2	0	1
BSc Hons (QS) University B	9	0	0
BSc Hons (CM) University B	2	0	0
B.Arch Studies (Hons) University A	0	0	9
Total	**25**	**1**	**13**

4.3 DESCRIPTIVE DATA ANALYSIS

Descriptive data analysis is used to describe the basic features of a quantitative research study. A two-part data analysis process was conducted on the quantitative data collected using the questionnaire. The first part of the analysis included calculating the mean scores and standard deviation of the questions posed to the GFS. The second part included using the mean scores to categorise the GFS factors, internal and external barriers into three criticality zones, including "minor (0 to 2.50), moderate (>2.50 to 3.75) and major (>3.75 to 5.00)" (Babatunde, 2019).

4.4 FACTORS MOTIVATING CONSTRUCTION EDUCATION

The factors that were found to have influenced the decisions of GFS to study a construction-related degree program are grouped into **career rewards** (career opportunities available after graduation and the prospective financial stability); and **socializers** (the media, the influence of family, friends and teachers, mentors). The results reported from the survey are discussed in the subsequent section.

Table 4.2 offers a summary of the results of the factors that motivated GFS to study a construction-related degree. These results are discussed in the subsequent section.

Table 4.2: Factors Motivating ConE

Factors motivating ConE	Mean	SD	Ranking	Criticality
F1 Career opportunities available after graduation the industry is my career of choice	3.92	1.13	1	Major
F2 Prospective financial stability	3.79	1.24	2	Major
F3 The influence of family, friends and teachers	3.67	0.96	3	Moderate
F4 Mentors and high school career counsellors	3.48	0.89	4	Moderate
F5 The image of the C.I	3.30	0.98	5	Moderate
F6 The influence of the media	3.18	0.93	6	Moderate

4.5 CAREER REWARDS

4.5.1 Career opportunities available after graduation

Figure 4.1 shows the results from the study, of how the careers available to GFS after graduation motivated GFS' decisions to pursue a construction-related degree. As per the results, 47% and 32% of the GFS reported that they were **motivated** and **highly motivated**, respectively, to pursue a construction-related degree because of the career opportunities available to them after graduation. The mean calculation indicates that the career opportunities available after graduation are a major factor that motivated GFS to pursue a construction-related degree. This is consistent with Bigelow *et al.'s* (2017) findings that the "career opportunities available to students after graduation" are a highly effective motivating factor that attracts students to the C.I.

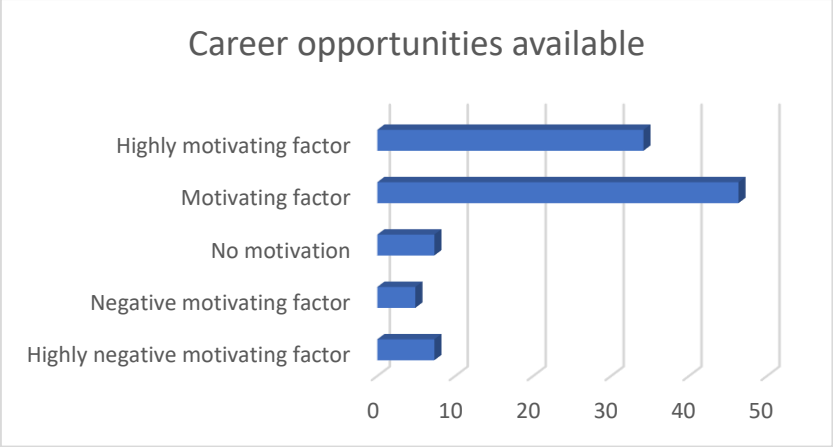


Figure 4.1: Career opportunities available

4.5.2 Prospective financial stability

Figure 4.2 shows the results from the study on how the prospective financial stability that comes with a career in the C.I motivated GFS' decision to study a construction-related degree. As can be seen, 37% and 29% of the respondents indicated that the prospective financial stability that comes with a career in the C.I **highly motivated** and **motivated** their decision to study a construction-related degree, respectively. This finding supports Powell *et al.'s* (2012) suggestion that the long-term career decisions of students are often motivated by salary and employability. In high school, these GFS believed that a career in the C.I will help them make a decent living for themselves. The mean calculation in table 4.2 indicates that the prospective financial stability that comes with a career in the C.I was a major factor that motivated their decision to study a construction-related degree.

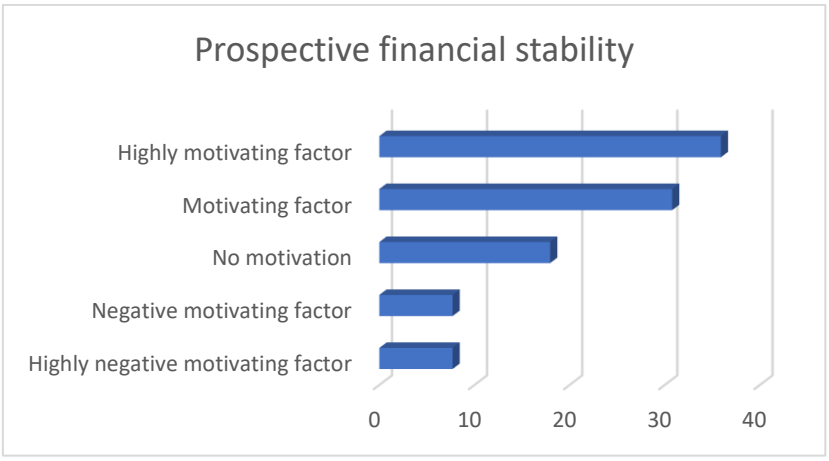


Figure 4.2: Prospective financial stability

4.6 SOCIALISERS

4.6.1 The influence of media

Figure 4.3 shows the results from the study, regarding the influence the media has had in GFS' decision to study a construction-related degree. From the figure, 8% and 28% of the GFS reported that the media has **always** and **most of the time**, respectively, motivated their decision to "study a construction-related degree" program, while 48% indicated that the media had **not influenced** their decision. Bigelow *et al.* (2017) suggest that the media is an ineffective tool in motivating GFS students to pursue a construction-related degree. This suggests that the media does not advertise the C.I as a possible career choice for students in high school often enough and only reports the adverse incidents that occur in the industry. Often, the media reports negatively about the C.I (Madikizela, 2008), which makes the industry unattractive to high school students. The media often reports on the corruption that happens in SA's C.I and more recently, about construction companies undergoing business rescue. Currently, the media reports on the shrinking career opportunities available in the C.I as the industry is seeing more retrenchments because construction companies are downscaling their organisations and resources due to severe economic climates and the liquidation of some construction companies. The media reporting can be a negative motivating factor for future high school students considering a construction-related degree. Furthermore, the long-term career decisions of GFS may be influenced by what is being reported in the media about shrinking career opportunities. This may result in the loss of confidence in the industry for those who want to join.

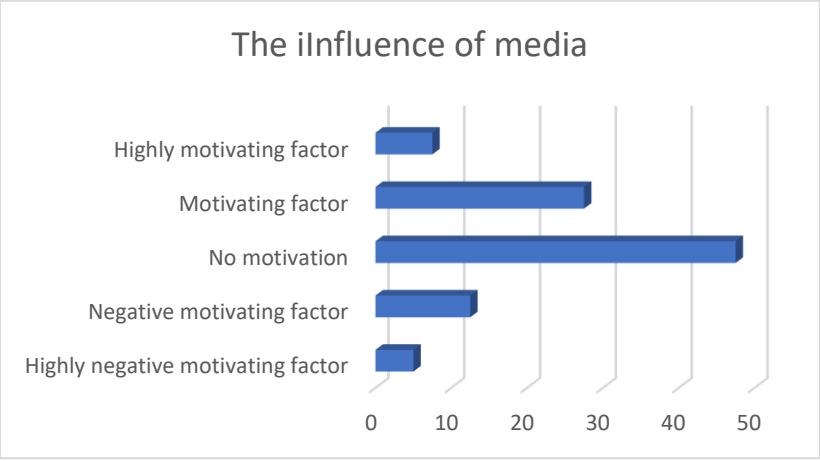


Figure 4.3: The influence of media

4.6.2 The influence of role models

"The CCT suggests that individuals choose a career path based on personal and social constructivism" (Savickas *et al.*, 2012), which assumes that individuals create meaning of vocational direction and significance based on their interactions with people. Figure 4.4 shows the results of how family, friends, teachers and mentors motivated GFS to study a construction-related degree. As per the figure, 37% and 20% of the respondents, respectively, indicated that the influence of family, friends and teachers **motivated** and **highly motivated** their decision to study a construction-related degree. These results suggest that the advice of family members, friends and mentors has a positive influence on students' career decisions as supported by the CCT. The mean calculation indicates that it is a moderate factor that motivated their decision to study a construction-related degree. These results concur with Powell *et al.* (2012), who suggest that childhood experiences and teachers have a strong influence on the career decisions of students' decision to study a construction-related degree.

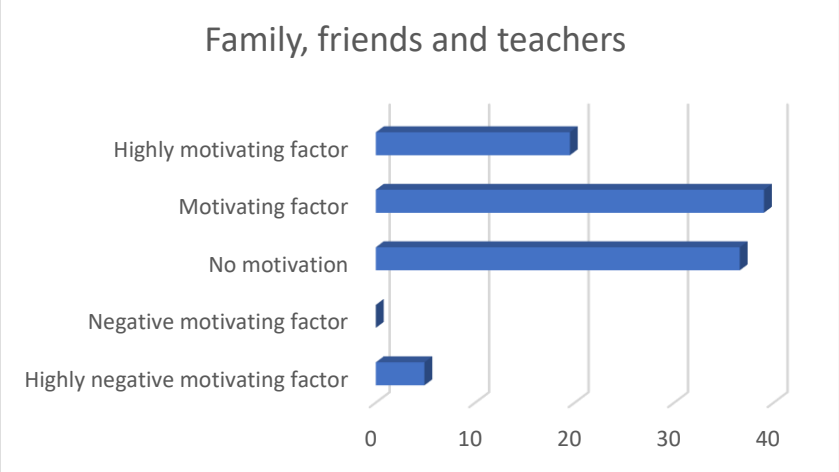


Figure 4.4: The influence of family, friends and teachers

4.7 INTERNAL BARRIERS

During the ConE process, female students are faced with several barriers that are regarded as internal barriers in this study. The CCT, which is used in the analysis, addresses how the experiences GFS have influenced the expectations they have of the C.I, as well as how they prepare to enter and participate in the industry. The theory will inform the study of how GFS will deal with the transition between university and the C.I (Savickas *et al.*, 2018). Powell *et al.*, (2005) asked whether GFS are deterred from entering the C.I because of the experiences they have had in university. These internal barriers influence the formation of GFS' perceptions

of the C.I as they make their long-term career decision within the C.I. The results of the study will be discussed in the subsequent section. Table 4.3 provides a summary of the results of the internal barriers GFS face during the ConE process. These results are discussed in the subsequent section.

Table 4.3: Internal barriers

Barriers	Mean	SD	Ranking	Criticality
Internal Barriers				
I1 The male-dominated faculty and academic staff	3.20	1.35	1	Moderate
I2 GFS face gender-based discrimination in ConE	3.17	1.07	2	Moderate
I3 GFS are not easily accepted by their male colleagues	3.14	1.12	3	Moderate
I4 Male culture exists in ConE	3.02	1.16	4	Moderate
I5 The lack of networking opportunities	2.81	1.20	5	Moderate

Figure 4.5 shows the results from the study regarding male-dominated faculties as an internal barrier. During the ConE process, 20% and 29% of GFS reported that the male-dominated faculty staff members and lecturers were internal barriers they experienced during the ConE process, **always** and **most of the time**, respectively.

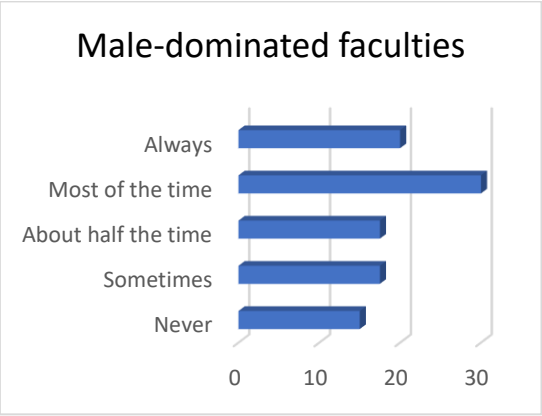


Figure 4.5: Male-dominated faculties

Figure 4.6 shows the results from the study of male culture as an internal barrier. As can be seen, 38% and 21% of the GFS reported that the male culture that exists within ConE often creates an environment where the discrimination against female students occurs and is **sometimes** and **most of the time**, respectively, an internal barrier during the ConE process.

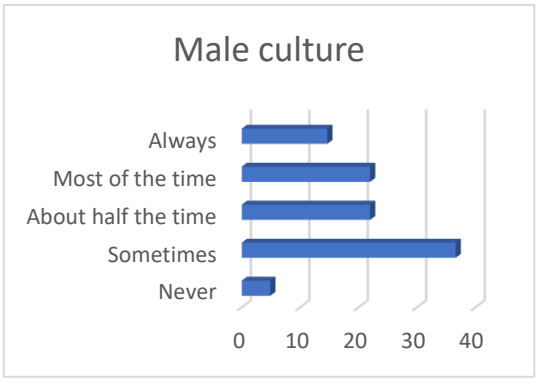


Figure 4.6: Male culture

Figure 4.7 shows the results from the study of the discrimination faced by GFS as an internal barrier. GFS reported that they are **sometimes** (33%) and **most of the time** (26%) faced with gender-based discrimination in the classrooms where they are not readily accepted by their male counterparts. According to the CCT, individuals often use their experiences to prepare for the work environment. According to the theory, GFS are likely to use the internal barriers they experience in ConE and construct their long-term career decisions within SA's C.I. Thus, the ConE environment creates a mirror image of SA's C.I based on the experienced internal barriers.

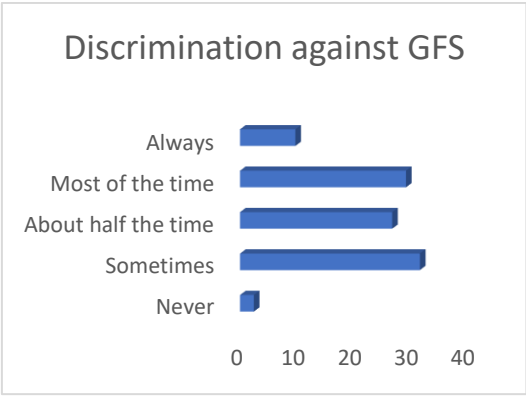


Figure 4.7: Discrimination against GFS

The male-dominated environment is argued to breed gender-based discrimination and harassment against GFS by their male counterparts (Francis & Prosser, 2014; Madikizela & Haupt, 2010). It can be added that these internal barriers experienced in university create a perception of how the SA C.I's work environment would be like. The internal barriers further

create perceptions of a mirror image of the C.I's work environment. According to the CCT, this perception forces GFS to adapt to the anticipated work environment and use the internal barriers to inform their long-term career decisions. This implies that GFS start making their long-term career decisions within SA's C.I before they enter the industry, using the perceptions they formed during ConE. This means that the experiences they have had during the ConE process play a role in determining their careers within the industry.

Figure 4.8 shows the results of the lack of networking opportunity as an internal barrier. GFS report that the lack of networking opportunities made available to them is an internal barrier for them **most** (29%) and about **half of the time** (17%). This implies that GFS have limited occasions "to meet and interact with other female professionals in the C.I" (Bigelow *et al.*, 2017; Shane *et al.*, 2012). Abalkhail and Allan (2015) argue that not affording females in the industry access to mentors and networking opportunities has an immense impact on GFS career advancement to top management within organisations.

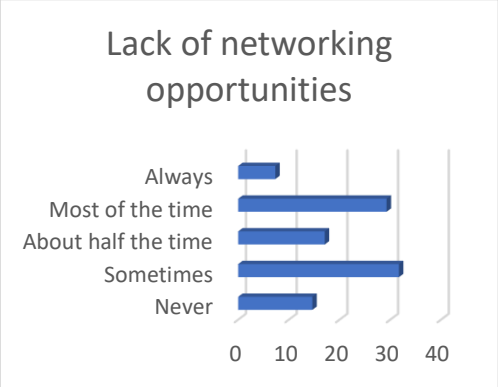


Figure 4.8: Lack of networking opportunities

According to the mean calculation, GFS perceive the lack of networking opportunities as a moderate internal barrier that affects their entry into the C.I. However, as is often said, your network is your net worth. Females are therefore disadvantaged from benefiting from industry resources and mentorship before they enter the C.I. According to the mean calculation, their perception of the industry is a significant internal barrier when planning their long-term' careers within the C.I. This suggests that GFS have already formed their long-term career decisions in the C.I based on what their experience during ConE was and how they perceive the barriers encountered by females in ConE.

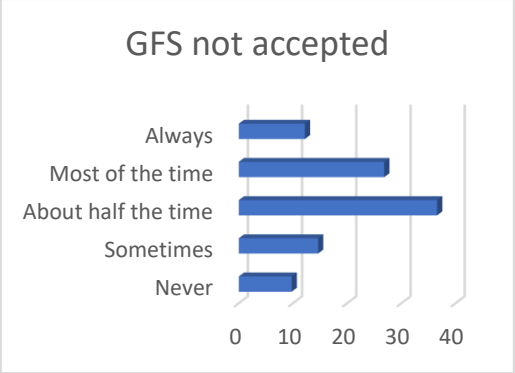


Figure 4.9: GFS not accepted

4.8 EXTERNAL BARRIERS

Fielden *et al.* (2014) reported that "there had been growth in the number of female students enrolling in and graduating from universities". This increase has not been reflected in the demographics of the C.I's workplace. The leaky bucket theory describes this occurrence as a syndrome where universities are regularly graduating an increased number of female students and releasing them into a system that is leaking (Markowska-Przybyła and Ramsey, 2019). In this section, GFS were requested to indicate the external barriers they perceive females in SA's C.I to be faced with.

Table 4.4 provides a summary of the results of these perceived external barriers. The results show that the major external barriers are the organisational culture found in the C.I and the gender stereotypes that exist within the industry. The results of the study are presented and discussed below.

Table 4.4: External barriers

Barriers	Mean	SD	Ranking	Criticality
External Barriers				
E1 Organisational culture found in the C.I	4.30	1.10	1	Major
E2 Gender stereotypes exist within the industry, and they go against women's career progression	4.02	1.15	2	Major
E3 The C.I is masculine in nature	3.93	1.05	3	Major
E4 The image of the C.I	3.56	1.06	4	Moderate
E5 GFS face biased recruitment practices	3.49	1.19	5	Moderate
E6 GFS will be faced with the glass ceiling phenomenon	3.34	1.18	6	Moderate
E7 The long working hours will deter me from performing my family responsibilities	3.12	1.29	7	Moderate

4.8.1 The image of the C.I

Figure 4.10 shows the results from the study regarding how GFS perceive the image of the C.I to be an external barrier for females, both employed and those planning on entering the C.I. According to the results, the image of the C.I is **always** (20%) and **most of the time** (39%), an external barrier to entry found in the industry that influences GFS' long-term career decisions in the C.I. GFS view the C.I as male-favoured, with severe working conditions, requiring physical strength, as well as dangerous and dirty (Amaratunga *et al.*, 2013; Ginige *et al.*, 2007). Ling and Poh (2004) suggest that the poor image of the C.I acts against GFS' entry into the C.I.

According to the mean calculation, GFS report that the image of the industry is a moderate external barrier that will deter them from pursuing a long-term career within SA's C.I. However, the nature of the C.I and the image of the industry are slowly changing. With the developments of the fourth industrial revolution, the C.I will change the way it performs its function by using more technological advancements (Moraba and Babatunde, 2019).

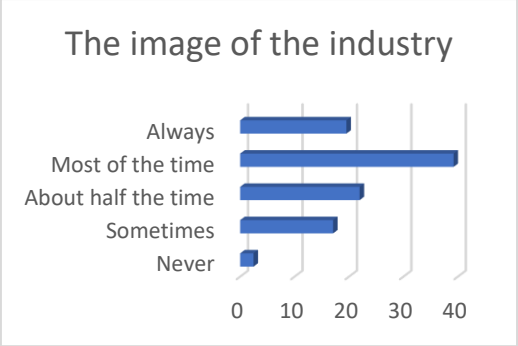


Figure 4.10: The image of the C.I

4.8.2 The C.I is masculine in nature

Figure 4.11 shows the results from the study, of how the masculine nature of the C.I is perceived by GFS to be an external barrier for women working in the industry and for those who wish to join the industry. GFS reported that the dominant male nature of the C.I is **always** (20%) and **most of the time** (39%), an external barrier that deters them from pursuing long-term careers within the C.I.

According to the mean calculation, the masculine nature of the C.I has been reported by GFS as a moderate external barrier that deters them from pursuing long-term careers in the C.I. This suggests that the masculine nature found in the industry creates career concerns for GFS for the anticipated work environment they want to enter.

The CCT suggests that the socially constructed masculine nature of the C.I may result in GFS creating a different career path suitable for themselves, by creating exit strategies beforehand. This causes the leaky bucket phenomenon, reflecting that although universities are continuously graduating an increased number of female students, external barriers such as the dominant male nature of the industry cause the pipeline to leak, perpetuating the under-representation of females in the C.I.

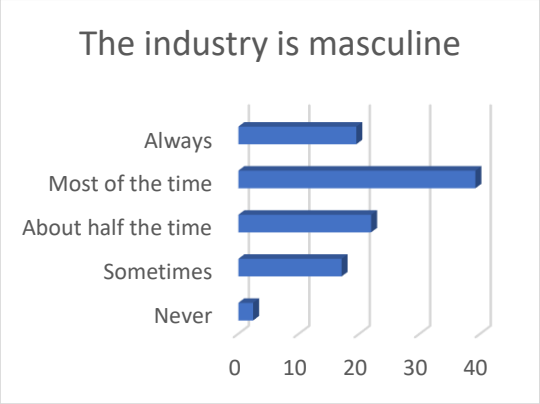


Figure 4.11: The industry is masculine

4.8.3 The long working hours and family responsibility

Figure 4.12 shows the results from the study regarding how the long working hours GFS perceive females in the C.I to have are an external barrier. From the results, these long hours will **always** (20%) and **most of the time** (22%) be an external barrier that deters GFS from pursuing long-term careers within SA's C.I. Previous studies suggest that the long working hours found in the C.I impede on the role females play as primary caregivers and any family responsibly GFS may wish to have in the future.

According to the mean calculation, the long-working hours are a moderate external barrier that will deter GFS from pursuing a long-term career in the C.I. The C.I is known for glorifying the extended hours employees put in and the significance of this is that females who choose to work and have a family encounter prejudice (Navarro-Astor *et al.*, 2017). In the long-run, the inter-role of females who work and have families develop an either-or approach to work and household commitments (Lingard and Lin, 2004). The resultant decision has the potential to create a leaky pipeline when females leave the industry and those who stay, as reported by Kolade and Kehinde (2013), remain in unimportant positions within their organisations.

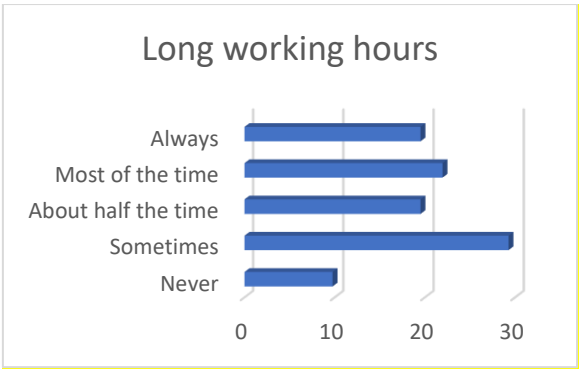


Figure 4.12: Long working hours

4.8.4 Gender stereotypes found in the C.I

Gender stereotypes refer to the social characteristics prescribed to gender and the perceived roles they ought to perform (Meyer, 2013). Figure 4.13 shows the results from the study, of how GFS perceive gender stereotypes to be an external barrier for women working in the C.I and those who wish to work in the C.I. GFS reported that the gender stereotypes found in the C.I are **always** (46%) and **most of the time** (22%), an external barrier that deters them from pursuing long-term careers within SA's C.I. In the C.I, females are regarded as being incapable and incompetent to perform specific technical and managerial tasks, such as supervising a construction site (Ling and Poh, 2004). As a result, they are often given administrative roles in projects which results in slow career progression. The under-development of technical skills results in the glass ceiling phenomenon, preventing females from progressing up the organisation's corporate ladder (Aboagye-Nimo, Wood and Collision, 2019; Kolade and Kehinde, 2013). The CCT suggests that GFS' long-term career decision-making process should consider the perceived gender stereotypes that impede women's career progression. The mean calculation indicates that gender stereotyping is a significant external barrier found in the C.I and it has a major influence on GFS' long-term career decisions. For years, gender stereotypes have been push factors for females' careers within the C.I; causing females to leave the pipeline, hence creating the leaky bucket phenomenon.

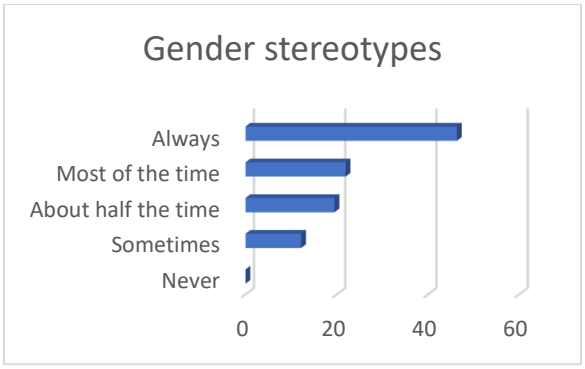


Figure 4.13: Gender stereotypes

4.8.5 Bias recruitment practices

According to Ling and Poh (2004), interviews for careers in the C.I are often informal. Figure 4.14 shows the results from the study of how GFS perceive SA's C.I as following bias recruitment practices. As reported, GFS feel that they **always** (24%) and **most of the time** (29%) face bias recruitment practices where they are not presented with the same prospects when compared to males. It should be noted, however, that SA organisations are prioritising employing more females in their organisations in order to transform the C.I.

75% of the GFS who indicated that they plan on entering the C.I after graduation will actually have better chances of employment than their male counterparts because of the transformation agenda many organisations have. Powell *et al.* (2012), however, cautions that the GFS' male counterparts often have a perception that their female colleagues have a lower competency level because they were hired for organisations' inclusion, diversity and transformation agendas. Powell *et al.* (2012) further suggest that this will have a negative impact on their careers in the long run and they may face the glass ceiling earlier.



Figure 4.14: Bias recruitment practices

4.8.6 Organisational culture

Figure 4.15 shows the results of how GFS perceive the organisational culture found in SA's C.I to be an external barrier for females. GFS **always** (63%) and **most of the time** (20%) believe that females are faced with an organisational culture that is male favoured. The mean calculation indicates that this is a major external barrier that may deter GFS from pursuing long-term careers in SA's C.I. The organisational culture found in SA's C.I is that of an 'all-boys club' with difficult working conditions for women and this has been reported as a large contributor to women leaving the industry (Agherdien & Smallwood, 2013). The male-driven culture requires long working hours, competition and isolation (Fernando *et al.*, 2014). Females are therefore expected to adapt to the male favoured culture or leave the industry; if not, they remain in 'unimportant' positions within the organisation (glass-ceiling phenomenon) (Fernando *et al.*, 2014).



Figure 4.15: Organisational culture

4.8.7 Glass ceiling

Figure 4.16 shows the perceptions GFS have on the glass ceiling phenomenon that exists within SA's C.I. GFS **always** (22%) and **most of the time** (22%) believe that females are faced with a glass ceiling in SA's C.I which impedes them from going up the organisation's corporate ladder. The mean calculation indicates that this is a moderate external barrier that may deter GFS from pursuing long-term careers in SA's C.I. During recruitment, the successful female candidates enter the industry and start on equal footing with their male counterparts. Their career advancement is however different because of the glass ceiling phenomenon that has been reported in the C.I (Agherdien & Smallwood, 2013).

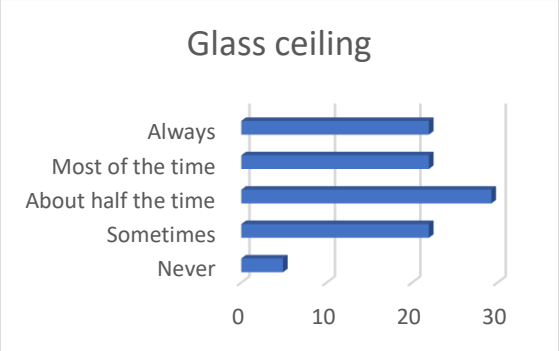


Figure 4.16: Glass ceiling

4.9 INFERENTIAL STATISTICS

Inferential statistics is performed for the purpose of generalising findings (Mukondeleli, 2019). Inferential statistics can be parametric or nonparametric. A nonparametric, Kruskal-Wallis H test, was performed on the data collected. The Kruskal-Wallis H test is a non-parametric statistical test of variance between different means. The test allows the comparison of more than two independent variables under a free distribution (Ade-Ojo and Ogunsemi, 2019).

The test assumes that the null hypothesis of the test and the k distribution functions are equal. The test is interpreted by stating the chi-squared statistic, the degree of the test and the statistical significance of the rest. H is statistically significant if it is equal to or larger than the critical value of chi-square for the given degree of freedom. H_0 is therefore rejected if H is greater than the chi-square value (Dupont, 2009; Cheng *et al.*, 2014). The Kruskal-Wallis H test formula for k samples is:

$$\mathbf{H}= \left[\frac{12}{n(n+1)}\sum_{nx}^{k} \frac{Rx^2}{nx}\right] - 3(n+1)$$

Where:

- n is the sum of sample sizes for all samples;
- x is the number of samples;
- R is the sum of ranks in a group;
- nx is the size of the x^{th} sample.

4.9.1 Kruskal- Wallis H Test: Motivating factors

Based on the results from the online questionnaire distributed to graduating students, Table 4.5 presents the statistical ranking for factors motivating construction education. The rankings were used to calculate the H test, to test the factors that motivated GFS to study a construction-

related degree among the BSc (with Honours) in QS, BSc (with Honours) in CM and Bachelor of Architectural Studies with Honours.

The hypothesis that was being tested is:

H_1: GFS were motivated by the perceived image of the C.I to study a construction-related degree.

Table 4.5: Statistical ranking for factors motivating construction education

	Sample 1 (QS)		Sample 2 (CM)		Sample 3 (BAS)	
	Variance	**Rank**	**Variance**	**Rank**	**Variance**	**Rank**
Image of the CI	0.89	9	0.75	6	0.94	10
Family, friends & teachers	1.02	14	0.49	3	0.87	8
Media	1.03	15	0.40	1	0.74	5
Mentors	0.84	7	0.40	1	1.13	16
Financial stability	1.23	18	0.98	12	0.99	13
Career opportunities	1.23	18	0.49	3	0.96	11
		R_1= 81		**R_2= 26**		**R_3= 63**

$$H_{stat}= \left[\frac{12}{n(n+1)}\sum_{nx}^{k}\ \frac{Rx^2}{nx}\right] - 3(n+1)$$

$$H_{stat}= \left[\frac{12}{18(18+1)}\right]\left[\frac{81^2}{6}+\frac{26^2}{6}+\frac{67^2}{6}\right] - 3(18+1)$$

H_{stat}=11.573

The result of the Kruskal-Wallis H test from Table 4.5 shows that there is a statistically significant difference between the factors that motivated GFS to study a construction-related degree. The test gave a H_{stat} =11.573 between the three groups of GFS. With a degree of freedom of 2 and a 95% confidence level, the chi-square value is 5.991.

H_{stat} > Chi-square, therefore the hypothesis is **rejected**.

This implies that there is variation in terms of the factors that motivated GFS to study a construction-related degree. The null hypothesis was rejected because the image of the industry was not the only factor that motivated GFS to study a construction-related degree; there are

other factors such as career opportunities available after graduation, learning about the different jobs beforehand and the perspective financial stability.

4.9.2 Kruskal- Wallis H Test: Internal barriers

Based on the results from the online questionnaire distributed to graduating students, Table 4.6 presents the statistical ranking for internal barriers faced during the construction education process. The rankings were used to calculate the H test, to test if internal barriers GFS face during ConE deters them from entering the CI.

The hypothesis that was being tested is:

H_2: The internal barriers graduating female students face during construction education deter them from entering the C.I.

Table 4.6: Statistical ranking for internal barriers

	Sample 1 (QS)		**Sample 2 (CM)**		**Sample 3 (BAS)**	
	Variance	**Rank**	**Variance**	**Rank**	**Variance**	**Rank**
Lack of networking	1.18	10	1.50	15	1.50	15
Male-dominated faculty	1.21	13	0.63	2	1.05	8
Male culture in ConE	1.18	10	0.40	1	0.87	5
GFS not accepted	1.20	12	0.75	7	1.10	9
Discrimination	1.93	6	0.98	7	0.82	4
		R_1= 51		**R_2= 28**		**R_3= 41**

$$H_{stat}= \left[\frac{12}{n(n+1)}\sum_{nx}^{k} \frac{Rx^2}{nx}\right] - 3(n+1)$$

$$H_{stat}= \left[\frac{12}{15(15+1)}\right]\left[\frac{51^2}{5}+\frac{28^2}{5}+\frac{41^2}{5}\right] - 3(15+1)$$

H_{stat}=2.660

The result of the Kruskal-Wallis H test from Table 4.6 show that there is a statistical difference in the internal barriers GFS face during the ConE process. The test gave a H_{stat} =2.660 between the three groups of GFS. With a degree of freedom of 2 and a 95% confidence level, the Chi-square value is 5.991.

H_{stat} < Chi-square, therefore the hypothesis is **accepted.**

This implies that the internal barriers GFS face during the construction education process deter them from pursuing long-term careers within SA's C.I. This further indicates that although there has been an increase in female students registering and graduating with a construction-related degree, the industry is not benefiting from that increase because of the internal barriers found in universities. This shows that GFS make the decision not to pursue long-term careers within SA's C.I due to the internal barriers they face during the ConE.

4.9.3 Kruskal- Wallis H Test: External barriers

Based on the results from the online questionnaire distributed to graduating students, Table 4.7 presents the statistical ranking for external barriers. The rankings were used to calculate the H test to test if the perceived external barriers deter GFS from having long-term careers in the CI.

The hypothesis that was being tested is:

H3: The perceived external barriers deter graduating female student from having long-term careers in the C.I.

Table 4.7: Statistical ranking for external barriers

Sample 1 (QS)			**Sample 2 (CM)**		**Sample 3 (BAS)**	
	Variance	**Rank**	**Variance**	**Rank**	**Variance**	**Rank**
Image of C.I	0.85	8	1.20	19	1.14	17
Masculinity	1.09	16	0.40	3	0.32	1
Stereotypes	0.95	9	0.40	3	1.05	14
Glass ceiling	0.95	9	0.40	3	1.05	14
Organisational culture	0.96	11	0.75	6	0.63	5
Long hours	1.20	19	0.98	13	0.82	7
Bias recruitment	1.24	21	1.17	18	0.96	11
	R_1= 93		**R_2= 65**		**R_3= 69**	

$$H_{stat}= \left[\frac{12}{n(n+1)}\sum_{nx}^{k}\ \frac{Rx^2}{nx}\right] - 3(n+1)$$

$$H_{stat}= \left[\frac{12}{21(21+1)}\right]\left[\frac{93^2}{7}+\frac{65^2}{7}+\frac{69^2}{7}\right] - 3(21+1)$$

H_{stat}= -0.564

The result of the Kruskal-Wallis H test from Table 4.7 shows that there is a statistical difference in the external barriers GFS perceive females working in the C.I to be facing. The test gave a H_{stat} = -0.564 between the three groups of GFS. With a degree of freedom of 2 and a 95% confidence level, the chi-square value is 5.991.

H_{stat} < Chi-square, therefore the hypothesis is **accepted**.

This implies that the barriers that have long been formed by the C.I discourage GFS to enter the C.I and pursue long-term careers. This suggests that the under-representation of females in SA's C.I will continue if the barriers are not mitigated.

4.10 THE LEAKY BUCKET PHENOMENON

The internal barriers GFS face during the ConE shape the perceived external barriers. As such, it is important for this study to establish the correlation between the internal and external barriers. After going through the reported internal and external barriers, GFS were asked about their long-term career decisions with SA's C.I. A total of 76% of the GFS indicated that they would be entering SA's C.I after completing their postgraduate degree. From this group, 50% indicated that they will be entering the industry and be active participants in the industry for a period of 0-5 years, 11% will participate for 5-10 years, 22% plan on actively participating for 10-20 years and 17% plan on actively participating until retirement. This indicates that GFS make their long-term career decisions based on the internal barriers experienced and the perceived external barriers faced by females in SA's C.I. The 50% GFS who reported that they will only participate in the C.I for a period of 0-5 years further reveal that the leaky bucket phenomenon occurs soon after GFS leave university and the decision to not have long-term careers within the industry is made before entering the C.I.

Only 24% of the GFS indicated that they will not be entering SA's C.I after graduating. Of this group, 89% are BSc (Hons) QS and 11% are BSc (Hons) CM students. Similarly, 88% of the GFS who will not be entering the C.I after graduating indicated that the nature of SA's C.I, sexist attitudes and the working conditions found in SA's C.I are barriers which have deterred them from pursuing careers within SA's C.I. Only 12% of this group indicated that the barriers they have faced during the ConE process made them realise that the C.I was not a suitable career for them. When asked what their long-term career plans were, 50% of this group indicated that they would be joining the property industry, 25% plan on joining the finance industry, 13% planned to join the banking industry and 12% indicated that they plan on joining

livestock farming. The choice not to enter the C.I by this group of GFS is part of the contribution to the occurrence of the leaky bucket phenomenon as the C.I will not benefit from the training obtained by this group of students. Ling and Poh (2004) suggest that scarce resources have been invested on training this group of GFS because they will not be entering the C.I after graduation.

The GFS who will not join SA's C.I were asked why they enrolled for a postgraduate degree when they could have followed a different career path after their undergraduate studies. A total of 67% of the GFS reported that they believe that having a postgraduate degree will allow them to move into different industries easily. Another 22% of the GFS reported that they registered for a postgraduate degree to delay potential entry into the C.I. Only 11% reported that they registered for a postgraduate degree because they want to pursue careers in academia. The results also revealed that in the next 0-5-year period after this group had graduated, SA's C.I would have lost 64% of its potential female professionals. This reveals that although universities are graduating large number of female graduates, the leaky bucket phenomenon hinders the attraction and retention of females for sustainable long-term careers within SA's C.I.

4.11 CONCLUSION

The results revealed the need to analyse the internal and external barriers that influenced this group's long-term career choices of not entering SA's C.I. GFS mentioned that during the construction process, the perceived barriers women in the C.I face are the most significant barrier that persuaded them not to enter the C.I. This group reported that the perceived barriers raised career concerns about going into a male-dominated industry. Another significant internal barrier was the gender discrimination they faced in the ConE process. When asked what informed their decision not to join the C.I after graduating with a postgraduate degree, all the respondents reported that the nature of the C.I, sexist attitudes and the working conditions in SA's C.I were barriers.

An analysis of the external barriers the GFS perceive women in the C.I to encounter are mainly centred on the gender stereotypes that exist within the industry. Additionally, the bias recruitment practices, the image and masculine nature of the C.I, as well as the perceived extended working hours found in the C.I, as external barriers were found to dissuade GFS.

CHAPTER FIVE: SUMMARY

5.1 SUMMARY

The under-representation of females in SA's C.I has been an area of concern for many years. With the number of female students entering and graduating with construction-related degrees, one would expect a similar trend for female professionals in SA's C.I. However, this is not the case. The C.I in SA seems to be experiencing the leaky bucket phenomenon because the increase in female graduates is not translated into the demographics of female professionals. The aim of this study was to explore factors that influenced the long-term career decisions of female students and the implications on the under-representation of female professionals in SA's C.I. This aim and the set objective of the study were fulfilled through both primary and secondary data collection.

When coming out of high school, female students reported that the influence of family, friends, teachers and the media motivated their decision to study a construction-related degree. This follows the CCT's suggestion that people choose their career paths based on social and personal constructivism, which suggests that individuals impose meaning on their career paths based on the people around them and their personal experiences. Career rewards such as career opportunities available after graduation and the financial stability were found to be factors that motivated GFS' decision to study a construction-related degree.

During the ConE process, female students were faced with internal barriers that are related to gender-based discrimination and harassment, male-dominated faculty and academic staff and the male culture that exist in classrooms. The CCT suggests that people's experiences influence the way they prepare for the transition between university and the work environment. This suggests that the internal barriers GFS face during the ConE process become a mirror image of SA's C.I and those experiences are used to prepare them to enter the industry. The lack of networking opportunities experienced during the ConE process was an internal barrier experienced by GFS. For GFS looking to pursue long-term careers, this suggests that they will be exposed to limited networking and mentoring opportunities.

Lastly, GFS perceive female professionals working in SA's C.I to be facing external barriers that are related to the nature of the C.I (the perceived dangerous, dirty and poor image of the

industry), sexist attitudes found in the C.I (gender stereotypes and glass ceiling faced by female professionals, bias recruitment practices and male-favoured organisational cultures) and the working conditions (barriers to performing family responsibility, long working hours construction professionals perform). GFS are aware of these barriers and the CCT suggests that this forces them to create career strategies based on the anticipated work environment.

5.2 SUMMARY OF FINDINGS

A comprehensive study on the long-term career decisions of GFS was undertaken. The first objective of this study was to explore factors that motivate GFS to pursue a construction-related degree. This objective was fulfilled using literature review and the CCT. The use of literature and the theoretical framework assisted in deriving a purpose-designed questionnaire. This questionnaire revealed that career opportunities available to GFS after graduation and the prospective financial stability that comes with a career in the C.I were major factors that motivated them to study a construction-related degree, fulfilling objective 1.

The second objective of this study was to investigate internal barriers GFS face during the ConE process. The use of the CCT and literature review were used to derive a purpose-designed questionnaire. The questionnaire revealed that the male-dominated faculty and academic staff and gender-based discrimination experienced during the ConE process are major internal barriers GFS faced during the ConE process. The CCT also revealed how the internal barriers experienced affect the perceptions female students have of the C.I and shape their long-term career decisions. The theory suggested that the internal barriers experienced create perceptions of a mirror image of the C.I. GFS who seek entry and career advancement into the male-dominated industry have a perception that they must adapt to the male culture to have a successful career, leave the industry or ultimately remain in unimportant positions within the organisation. The study thus fulfilled objective 2.

The third objective of this study was to explore common external barriers GFS perceive female professionals in SA's C.I to be facing. The use of the CCT and literature review derived a purpose-designed questionnaire. The questionnaire revealed that the organisational culture found in the C.I, gender stereotypes that exist within the C.I and the masculine nature of the C.I are major external barriers GFS perceive women in the C.I to be faced with. The CCT suggests that GFS use these perceived external barriers and the experienced internal barriers to form long-term career decisions within SA's C.I.

When graduating students were asked whether they will be entering the C.I to pursue long-term careers, some students indicated that they will not be entering the industry and other indicated that they will only be spending a period of 0-5 years in the industry. This shows that the leaky pipeline phenomenon affects the C.I soon after female students graduate from university. The nature of the C.I, sexist attitudes and the working conditions found in SA's C.I are barriers which deter female students from pursuing long-term careers, causing the leaky bucket phenomenon. This suggests that the C.I cannot retain the increased number of female graduates universities produce, causing the imbalance between the number of female students in universities and females within the C.I.

5.3 RECOMMENDATIONS

The career opportunities available in the C.I and the prospective financial stability that comes with a career in the C.I have been identified as the major factors that motivated GFS to study a construction-related degree. Since the perceived career rewards have been a positive motivating factor, it is recommended that universities and the C.I work together to raise awareness amongst high school students to increase the entry of female students. Mentorship programmes to support female high school students who want to pursue a construction-related degree are also recommended.

The male-dominated faculty and academic staff and gender-based discrimination have been identified as the major internal barriers experienced during the ConE process. The male-dominated faculty and academic staff are argued to be a mirror image of the female representation in SA's C.I. It is recommended that universities increase their female academic participation. It is also recommended that male students are taught about the gender-based discrimination GFS experience during ConE. This will have a long-term benefit on the representation of females in SA's C.I.

The organisational culture, gender stereotypes and the masculine nature of the C.I have been identified as major external barriers GFS perceive females in SA's C.I to be faced with. It is recommended that construction companies perform audits on their organisational culture and create cultures that are accommodating enough to foster transformation. It is also recommended that female professionals increase their visibility by having more networking events aimed at encouraging GFS to pursue long-term careers in the C.I. These events could be focused on

female professionals sharing their experiences of the industry and ways on how GFS can have successful long-term careers in the industry.

5.4 CONTRIBUTION TO THEORY AND BODY OF KNOWLEDGE

This study developed a conceptual model that shows a link between the early days when female students make their career decisions in high school until the time they enter SA's C.I (See Figure 2.2). The study provides an understanding of the internal barriers experienced during the ConE process, the perceived external barriers females face in SA's C.I and how these barriers influence the long-term career decisions of GFS. The study further contributed to the body of knowledge by providing an understanding of how the long-term career decisions of GFS impact the under-representation of females in SA's C.I. In doing so, the study contributed to the body of knowledge by providing empirical data that the career decision to not have long-term careers within the industry is made before entering the CI. Furthermore, an understanding of the factors that contribute to the leaky bucket phenomenon SA's C.I is experiencing. This study has therefore filled a gap in knowledge.

5.5 LIMITATIONS OF THE RESEARCH

The sample size of the GFS was small, relative to what could potentially constitute the true size of GFS in construction-related degree programs in SA. Furthermore, the study only covered two SA universities that offer construction-related degree programs. This purposively stratified sample excluded other universities who may have offered a different insight into GFS' long-term career decisions.

5.6 CONCLUSION

The aim of this study was to explore factors that influence the long-term career decisions of GFS and the implication they have on the under-representation of females in SA's C.I. The study fulfilled its aim in the findings of how the experienced internal barriers shape the perceptions GFS have of SA's C.I. Not only do the experienced internal barriers have an influence on GFS' long-term career decisions but the perceived external barriers females in the C.I face were also found to influence GFS' long-term careers within SA's C.I. The experienced internal barriers, combined with the perceived external barriers, have been found to deter GFS from pursuing long-term careers within SA's C.I, contributing to the leaky bucket phenomenon. This fills an identified gap in the existing literature.

5.7 RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should focus on conducting interviews with both the 24% graduating females who reported they would not be entering SA's C.I after graduating and the 50% of the group who will be joining the industry for a period of 0-5 years. The interviews could focus on getting in-depth knowledge of the GFS' experiences during the ConE process, their perception of the barriers females face and how these perceptions and involvements influenced their long-term career decisions. Future studies could focus on developing a framework the universities can use to limit the internal barriers GFS face during the ConE process. This framework can be used to ensure that the industry does not lose more female graduates from the increased pool of female students entering universities to study construction-related degree programs.

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LIST OF ANNEXURES

ANNEXURE 1: REQUEST FOR PERMISSION TO CONDUCT RESEARCH





School of Construction, Economics and Management

University of the Witwatersrand

RE: Request for permission to conduct research

Dear Department Representative

My name is Mmanoko Yolanda Moraba. I am researching to obtain a Masters degree (MSc Building) at the University of the Witwatersrand under the supervision of Dr Oluwayomi Babatunde. My research aims to explore factors that motivated GFS to join the C.I. And how their long-term career decision within the C.I. influences the under-representation of women in South Africa's C.I.

I would like to invite female honours students at your school to take part in the study. Should you agree to grant permission for your students to take part of the study, they will be required to fill in an online questionnaire (please see attached) which will be sent to them through their student portal. Participation is entirely voluntary, and participants will not be an advantage or disadvantage in any way if they choose to partake in the study. The students may decide to drop out of the study at any time and they will not be threatened or have anything held against them by leaving the study. While questions about their personal experiences within the C.I. are asked, no personal information such as full names and student numbers will be asked. Group reporting and statistical analysis will be utilised, which will ensure the anonymity and confidentiality of your students. No one will have access to the completed questionnaires except my supervisor and me. Furthermore, the information provided will be stored in a secure location and destroyed after five years.

An information sheet and consent form that students will be required to sign will be issued to all the participants. Thank you for considering granting permission for your students to take part in this study. Your permission will be much appreciated.

Kind Regards,

Mmanoko Yolanda Moraba

ANNEXURE 2: PARTICIPANT INFORMATION SHEET (PIS)





School of Construction, Economics and Management

University of the Witwatersrand

Dear Potential Participant

My name is Mmanoko Yolanda Moraba. I am researching to obtain a Master's degree (MSc Building) at the University of the Witwatersrand under the supervision of Dr Oluwayomi Babatunde. I would like to invite you to participate in a study that aims to explore factors that motivated you to join the C.I. and how your long-term career decision within the industry influences the under-representation of women in South Africa's C.I.

Participation is entirely voluntary, and you will not be advantaged or disadvantaged in any way if you choose to participate in the study. You may decide to drop out of the study at any time and you will not be threatened or have anything held against you by leaving the study. While questions about your personal experiences within the C.I are asked, no personal information such as full names and student numbers will be asked. Group reporting and statistical analysis will be utilised, which will ensure that you remain anonymous and ensure your confidentiality. No one will have access to the completed questionnaires except my supervisor and me. Furthermore, the information you have provided will be stored in a secure location and destroyed after five years.

The study is not sponsored by any organisation. It is an independent study that will be used for academic purposes. The questionnaire comprises of closed-ended and open-ended questions. It will, therefore, take you approximately 20 minutes to complete.

I have read and understood what this research study is about and what is expected of me. I understand that I can choose not to take part in the study and can leave at any point where I do not feel comfortable.

By signing in the box below, I am giving my consent.

Date: _____

Kind Regards

Mmanoko Yolanda Moraba

ANNEXURE 3: QUESTIONNAIRE

Please tick the option corresponding to your response where appropriate.

Section 1: Participants' demographic profile

1. Which degree are you currently registered for?
   - ☐ BSc Honours (QS)
   - ☐ BSc Honours (CM)
   - ☐ Bachelor of Architectural Studies (Honours)

2. Which university are you registered at?
   - ☐ University of Cape Town
   - ☐ Wits University

3. Do you have any C.I experience?
   - ☐ None
   - ☐ Vac-work Experience
   - ☐ Part-time employement
   - ☐ Full-time employement
   - ☐ Other (Please specify)

     _____

SECTION 2: FACTORS MOTIVATING CONSTRUCTION EDUCATION

4. For each of the following factors, please indicate how they have influenced your decision to study a construction related degree?

	Least motivated	Negative	No influence	Motivated	Highly motivated
1. Image of the C.I					
2. Family, Friends and teachers					
3. Media					
4. Mentor and high school career counsellors					
5. Prospective financial stability					
6. Career Opportunities					

SECTION 3: INTERNAL BARRIERS

5. For each of the internal barriers, please indicate the barriers you have faced during your construction education.

	Never	Seldom	Sometimes	Often	Almost always
1. Lack of networking opportunities					
2. Male-dominated faculty and academic staff					
3. Male culture exists in construction-related degree programs					
4. Graduating female student is not readily accepted by their male counterparts					
5. Graduating female student face gender-based discrimination in construction education					

SECTION 4: EXTERNAL BARRIERS

6. For each of the following external barriers, please indicate the barriers you perceive females to be facing in the C.I

	Never	Seldom	Sometimes	Often	Almost always
1. The Image of the C.I					
2. Masculinity					
3. Gender stereotypes					
4. Glass ceiling					
5. Organisational culture					
6. C.I's work environment requires females to work for long hours which come at the expense of family responsibilities.					
7. Graduating female student face biased recruitment practices and are not given equal opportunities with their male counterparts					

7. What motivated your decision to enrol for an Honours degree after graduating with an undergraduate degree?

☐ A postgraduate degree will aid in my career progression in the C.I.

☐ I registered to delay my entry into the C.I.

☐ I want to pursue a career in academia

☐ Having an Honours degree will allow me to change industries easily

☐ Other (Please specify)

_____

8. Will you be entering South Africa's C.I after completing your Honours degree?

☐ Yes

☐ No

9. If yes, how long do you plan on being an active participant in South Africa's C.I?

☐ I will be staying for 0-5 years

☐ I will be staying for 5-10 years

☐ I will be staying for 10-20 years

☐ I will be staying for 20+ years

☐ Other (Please specify)

_____

10. if no, which industry do you plan on entering upon graduation?

I'm changing to the following industry_____

11. If no, what influenced your decision to not join the C.I after completing your Honours degree?

☐ My initial choice to study a construction-related degree was a mistake (Please specify) _____

☐ The internal barriers I have faced during university made me realise that the C.I is not for me.

☐ The nature of the C.I, sexist attitudes and the working conditions found in South Africa's construction are barriers which deter me from entering the industry.

☐ Other (Please specify) _____

ANNEXURE 4: ETHICS CLEARANCE CERTIFICATES

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Moraba

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H18/11/61**
PROJECT TITLE	Graduating female students' long-term career decisions and under-representation of females in South Africa's construction industry
INVESTIGATOR(S)	Miss M Moraba
SCHOOL/DEPARTMENT	Construction, Economics and Management/
DATE CONSIDERED	23 November 2018
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	17 April 2022

DATE 18 April 2019 **CHAIRPERSON** (Professor J Knight)

cc: Supervisor : Dr O Babatunde

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

20 / 04 / 2019
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

RESEARCH ACCESS TO STUDENTS

DSA 100

NOTES

1. This form must be **FULLY** completed by all applicants who want to access UCT students for the purpose of research or surveys.
2. Return the fully completed **(a) DSA 100** application form **by email,** in **the same word format,** together with **your: (b) research proposal inclusive of your survey, (c) copy of your ethics approval letter / proof (d) informed consent letter** to: Moonira.Khan@uct.ac.za. You application will be attended to by the Executive Director, Department of Student Affairs (DSA), UCT.
3. The turnaround time for a reply is **approximately 10 working days.**
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively: (a) **Ethics:** Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

Position	Staff / Student No	Title and Name	Contact Details (Email / Cell / land line)
A.1 Student Number	553544 (Wits)	Miss Mmanoko Yolanda Moraba	553544@students.wits.ac.za / 060 608 4771
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	Wits University	Address if *not* UCT:	
A.5 Faculty/ Department/School	School of Construction, Economics and Management		
A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Dr Oluwayomi Babatunde	011 717 7664	Oluwayomi.babatunde@wits.ac.za
B.2 Co-Supervisor/s			

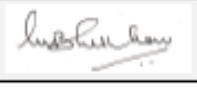
SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	MSc (Building Science and Quantity Surveying)
C.2 Research Project Title	Graduating female students' long-term career decisions and under-representation of females in South Africa's construction industry
C.3 Research Proposal	Attached: Yes ■ No ☐
C.4 Target population	BSc with Honours (Quantity Surveying), BSc with Honours (Construction Management)
C.5 Lead Researcher details	If different from applicant:
C6. Will use research assistant/s	Yes ☐ No ■ If yes- provide a list of names, contact details :
C.7 Research Methodology and Informed consent	**Research methodology**: Quantitative research using surveys/ questionnaires to collect data **Informed consent:** Participant information sheet to be provided with questionnaire
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EIRC)	Approved by the UCT EIRC: Yes ■ With amendments: Yes ■ No ☐ (a) Attach copy of your UCT ethics approval. Attached: Yes ■ No ☐ (b) State date / Ref. No / Faculty of your UCT ethics approval: 25/03/2019 Ref. /Faculty.: EBE

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE

(To be completed by the UCT - ED, DSA or Nominee)

	Approved / With Terms / Not	* Conditional approval with terms	Applicant/s Ref. No.:
D.1 APPROVAL STATUS	(i) Approved ■ ~~(ii) With terms~~ ~~(iii) Not approved~~	a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. *b)* In event any ethics conditions are attached, these must be complied with before access to students.	553544 / Miss Mmanoko Yolanda Moraba / WITS

	Designation	Name	Signature	Date of Approval
D.2 APPROVED BY:	Executive Director Department of Student Affairs	*Dr Moonira Khan*		*7 May 2019*