NELSON MANDELA UNIVERSITY

Business School

SOUTH AFRICAN WOMEN IN INFORMATION TECHNOLOGY

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I. DECLARATION BY CANDIDATE

I, Linda Motaung, hereby declare that:

- The work contained in this treatise is my own original work;
- The work being submitted has not previously been submitted in full or partial to any other recognised university for any degree;
- This treatise is being submitted in partial fulfilment of the requirements for the degree of Masters in Business Administration;
- All sources used or referred have been recognised and duly stated on the reference list page.

07 December 2018

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Linda Motaung **Date**

II. ACKNOWLEDGEMENTS

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III. ABSTRACT

Information Technology (IT) is a contemporary field of study which is driven by society's use of computer based technology. Computer tools such as web applications and networks are useful resources that collect, analyse and distribute large volumes of information globally. The various uses of IT can be seen in many aspects of modern daily life from transportation to communication systems, they feature significantly in meeting the needs of the fast-paced world of business.

Globally IT is recognised as a 'key' skill required to meet the needs of the current and future job market. However, the field is faced with a skills shortage challenge as job vacancies remain largely unfilled due to the low supply of technically qualified talent. The challenge faced in the field of IT is that the demand for highly skilled and qualified talent in the job market is high, while the supply of talent is not sufficient. Thus, there is a gap between the opportunities and skills available in the IT workforce.

A factor that compounds the lack of available talent in IT is the low levels of participation and representation of women. Technology is part of the universally significant STEM (Science, Technology, Engineering and Mathematics) subjects, which prior academic research has indicated as critical fields that have previously been male dominated and have low levels of participation from women. In this treatise an in-depth examination of women's career choices with regards to the profession of IT in the global and South African context will be discussed. A thorough analysis into the various factors that influence the participation of women, the implications this has for South African businesses and the proposed interventions for future implementation will be included.

The aim of this empirical study is to primarily identify current career trends that relate to female choices in the field of IT, to recognise the leading factors that impact women to enter the profession and to identify the factors that lead to a high turnover mid-career. Lastly, this treatise will propose how businesses can combat these negative gender gap trends and attract female talent. The literature review extensively considered published academic articles that have discussed the personality traits and external environmental factors that substantially influence the female gender's choice of career. The underlying theories that explain gender

involvement in career choices will be examined with a focus on the application of these theories in the IT field.

A quantitative study in the form of an online survey was conducted to test the formulated conceptual model. Inferential statistics coupled with descriptive tests evaluated and analysed the feedback of the respondents. The survey was conducted amongst professional women, currently working in an IT career to establish the factors that have attracted their participation in the field and the factors that influence their longevity in the IT field.

The main findings of the study indicate that women who opt for a career in IT have high levels of intrinsic motivation, confidence and possess similar mental abilities as their male counterparts. The respondents indicated the lack of encouragement or discouragement from close sources of support such as peers, family members and religious circle. The recommendations are based on the fact that entrance to the field of IT, for women, is through raising interest in IT from early schooling life. This, interest results in growing familiarity with the subject area, IT careers and the IT environment.

The lack of women in IT academic and top-level management positions has resulted in less solutions being availed for attracting and retaining women in IT. Women in IT face similar working conditions of male dominated environments where family demands, gender bias and alienation result in occupational challenges.

The research identified the factors that have largely influenced the career choices of women in IT and investigate the social structures that affect the retention of women in IT. The research contribution of this study is to increase the awareness by young females regarding careers in IT.

Future research in obtaining larger sample sizes affecting all parts of South Africa will increase the understanding of South African Women in IT. Through research, the investigation of modern factors that affect the choices of the younger generation including practice and application of practical solutions will result in a bigger impact in the IT sector.

Keywords: Gender gap, STEM, IT, women in information technology, under-representation, barriers, attract, retain.

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IV. LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
CHE	Council on Higher Education
EFA	Exploratory Factor Analysis
EU	European Union
IITPSA	Institute of Information Technology Professionals in South Africa
IT	Information Technology
NMU	Nelson Mandela University
NWU	North West University
UJ	University of Johannesburg
UK	United Kingdom
UNISA	University of South Africa
US	United States Of America
PhD	Doctor of Philosophy
STEM	Science, Technology, Engineering and Mathematics

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1. CHAPTER 1: INTRODUCTION AND PROBLEM STATEMENT

1.1 Introduction

The introduction of the modern programmable computer during the early 19th century has transformed the way data is sourced, processed and distributed as valuable forms of information worldwide (Rogers, 2015). Computer based technology has permeated into many aspects of modern daily life removing previously existing geographical, cultural and industry based boundaries. Widespread tools such as the internet, radio, wireless technology, television and software applications have increased technology usage in the general population. All spheres of society are affected by the advances in technology, importantly this has revolutionised the world of business (Muro & Gabriel, 2016).

The technological solutions required to meet dynamic business needs in the industrialisation age have resulted in rapid industry developments and decades later businesses are using computer technology as a key driver of daily operations (Adya & Kaiser, 2005). The benefits of technology have been tangible with increased operational efficiencies, quicker real-time transactions, reliable tools for decision making and global connectivity that has enabled trading outside regional borders thus increasing market share and profits (Trauth, Quesenberry & Yeo, 2008). The abundant availability of high quality information has been a valuable commodity to big and small businesses alike, being instrumental in growing trade.

The continuing availability and use of information through computer technology has brought economic benefits, thus creating an important link between technology sourced information and economic benefits (Trauth et al., 2008). This relationship of knowledge, technology and information is also referred to as the ‘knowledge economy’. This economy is the driving force behind economic growth, directly raising the standard of living for many in the world (Trauth, Adya, Armstrong, Joshi, Kvasny, Riemenschneider & Quesenberry, 2010). These dynamic technological advances have created a new field of study, which is the study discipline of Information Technology (IT). This professional field of study focuses on computer technology development, incorporating hardware and software along with the maintenance of existing computer based technology (Appianing & Van Eck, 2015).

The IT industry has been a vital element in modern business evolution and has enabled sustained business success. Break-throughs in portable computer hardware and cost-effective software have been essential in growing business efficiency and meeting dynamic needs of a diverse world population. While other study disciplines such as the field of education and humanities are over-populated and experiencing diminishing labour demand, the technology discipline has experienced the opposite with global increases in the demand for skilled and qualified technical workforce (Oehlhorn, 2017; Njoki, Wabwoba & Micheni, 2016).

Worldwide, females are a large pool of participants in the workforce with over half the global workforce being female (Rogers, 2015). However, in the IT industry there is a notable gender imbalance with fewer females participating by sharing their skills in the workforce when compared to males and an even lesser number is involved in technical leadership positions (Drury, 2011). Worldwide, IT is mentioned as one of the 10 most important and fastest growing professions (Rogers, 2015), significantly the lack of women participating in the field is apparent as women are only 30% of this workforce (Njoki et al., 2016).

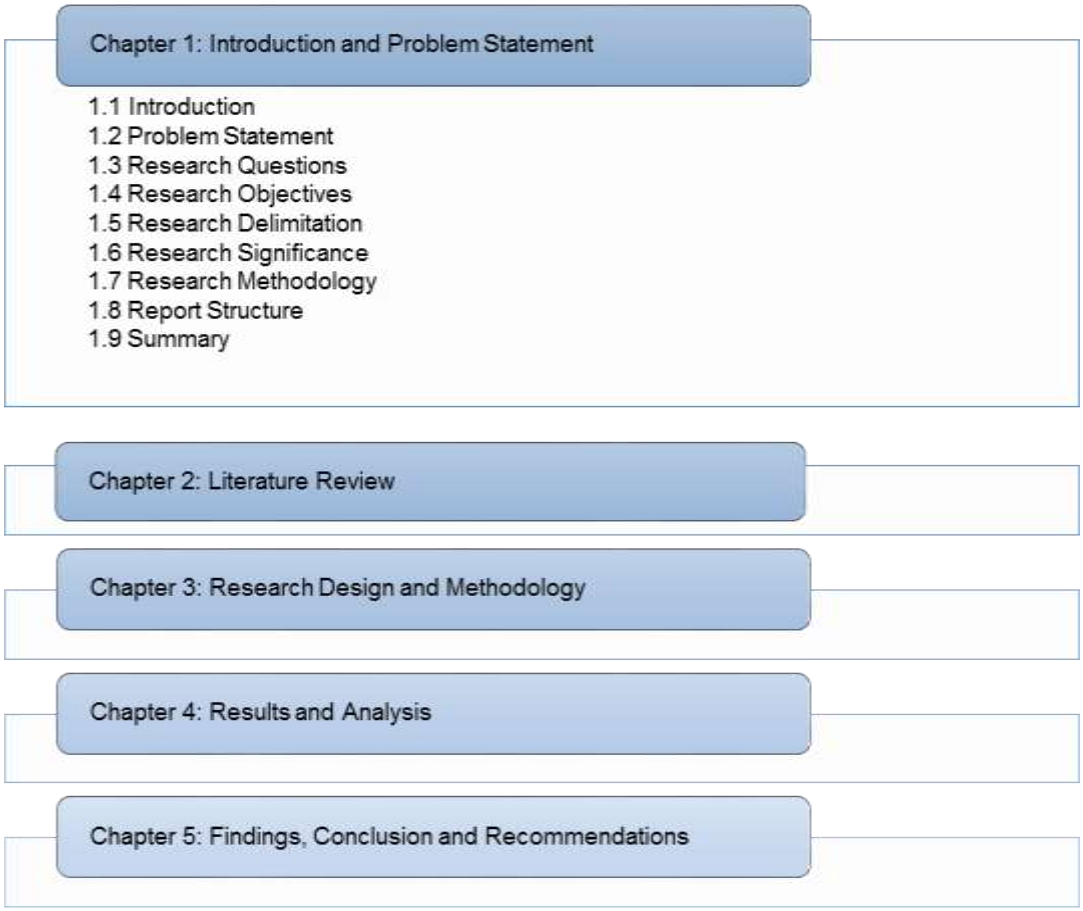
In the global context, numerous studies by academics such as Azjen (Armstrong & Riemenschneider, 2014) have explored the participation levels of women in the field of IT and there have been various proposals of intervention. However, statistics have revealed that these have not translated into increased participation from women. The field continues to have low levels of female participation, more prevalently in the South African IT job industry (Njoki et al., 2016). This indicates that there is a gap between the existing body of knowledge and the implementation of available solutions to stop and turn-around the low numbers of female representation in IT (Patitsas, 2014).

The aim of this treatise is to build on existing research. The treatise will analyse various factors and theories that assist with clarifying the low levels of participation from South African women in the Information Technology profession. When the factors have been stated and explored, managerial solutions will be proposed with practical interventions and implementation strategies designed to bridge the gender imbalance.

In this chapter, the problem statement will be expanded on the topic of South African Women in Information Technology. Thereafter, the relevant primary and secondary Research Questions with the related Research Objectives will be stated. Subsequently, the significance and limitations of this research along with the ethical considerations under-taken will be detailed. Lastly the report structure of the full treatise will be defined to outline the ensuing chapters.

Figure 1.1 illustrates the outline for Chapter 1.

Figure 1.1: Chapter 1 Outline



(Source: Author's own construction)

1.2 Problem Statement

The daily use of computer based technology has swiftly increased since the wide accessibility of the personal computer. The introduction of operating systems such as the Windows Operating System during 1984 have led to an upward demand for qualified computing workforce (Guthrie, Yakura & Soe, 2011). Notably in the IT field,

gender participation is unequal with males dominating the industry by 70% while limited and dwindling numbers of women choose to enter and remain in this profession (Du Bow, 2014). Other study disciplines such as the field of Medicine and Engineering which were previously male dominated have been able to successfully increase female participation (Patitsas, 2014).

The IT field however has remained stagnant with low levels of female participation in the mainstream professional, academic and leadership arena (Rogers, 2015). This is despite women making up 51% of the adult population in the world and the notable widespread use of technology by women who currently make up more than half of global internet users (Adya, 2008; Du Bow, 2014). This lack of gender diversity affects broad economic activity, leading to limited innovation, one-sided viewpoints and loss in business competitiveness (Main & Schimpf, 2017; Patitsas, 2014).

The importance of diversity of genders in IT was seen significantly when a research study was completed comparing IT companies with the highest representation of women in senior management positions to those with less gender inclusiveness (NCWIT, 2009). It was established that the companies with women in leadership had a 35% higher return on equity and a higher 34% return to shareholders compared with those with lesser female representation (NCWIT, 2009). Various research studies and conceptual models have been developed to explore the reasons for continuous low levels of female participation in the IT industry however the slow turnaround of the results indicate that there has been no sustained solution to eradicate this problem. The numbers of females participating in providing IT skills have not stabilised or increased (Du Bow, 2014).

Worldwide, there has been a noticeable increase in the number of women enrolling in higher education (Appelbaum, Asham & Argheyd, 2011). The South African Council on Higher Education (CHE) provides a picture of where high school graduates are going when seeking higher educational qualifications in South Africa. Higher Education has experienced an increase in university undergraduate enrolments especially from females, who significantly outnumber their male counterparts (Stats SA, 2017).

During 2016, over 327 224 female enrolments in higher education were recorded, which is a higher number when compared to the male enrolment numbers of

278 244 (Stats SA, 2017). Such increases have led to a more diverse number of students filtering through into all available study disciplines including those traditionally dominated by males. On investigation, out of the 2016 recorded enrolments numbers, 39% of pupils opted for the field of Sciences, Technology and Engineering and of this combined share of 39%, only 7% registered to study in the field of computer and Information technology (Stats SA, 2017). This trend exposes the low numbers of those opting for a future career in the Information Technology field and indicates the lack of talent being attracted and streaming into the IT profession.

Low levels of female representation in the IT field result in even less representation of females in IT leadership positions. Globally, countries with high levels of technological innovation, economic competitiveness and technological infrastructure such as the United Kingdom (UK), Netherlands and Germany have similar trends of low representation of women in IT. Less than 30% of women in these countries were recorded as being active in the IT sector (Verhoeven, Heerwegha & De Wit, 2010).

Similarly, in the United States (US) the IT workforce comprises of only 26% females as active participants in the field, thus solidifying the reality of male dominance in the field (Appianing & Van Eck, 2015; Muro & Gabriel, 2016). In South Africa, the number of women professionals participating in the IT industry is less than 20%, specifically when compared to male participation of over 80% (Alexander, Schoeman, Alexander & Piderit, 2011; Muro & Gabriel, 2016). In statistical terms female participation in the South African Information Technology field is at (2:5) while in other mathematical and statistical fields it is at (4:5) (PWC, 2018).

The IT profession is thus experiencing a problem with attracting high performing female talent to the profession and being the primary ideal career choice for high school leaving students. Attracting female talent is not the only challenge, the profession also experiences a leak of qualified talent, being unable to retain those females who had initially opted for a career in IT. Females are noted to leave the profession mid-career at a rate of 56% as opposed to their male counterparts who leave at less than half that rate (Thiele, Miller & Berg, 2013; Armstrong & Riemenschneider, 2014). In research, this talent leak in IT is termed as the “the leaky pipeline” and indicates the loss of key skills in the profession as the output

(leavers) is significantly more than the input (joiners) thus enlarging the gender gap already in the IT profession (Nelson & Veltri, 2011).

Literature by other researchers has identified that females tend to shy away from technical professions due to a variety of reasons. Factors such as personality characteristics, negatively held perceptions of the IT profession by societal influencers and the barriers experienced while working in the job environment have a significant influence on a choice of a long-lasting career by women in IT (Main & Schimpf, 2017).

The under-representation of women in the IT sector is a global challenge as there are continuous low levels of female participation. Globally participation numbers have decreased from 36% in 1991 to 25% in 2016 (Main & Schimpf, 2017). This has prompted various in-depth international studies into the field of Information Technology. Previous studies provide insight however they are limited in scope as they do not singularly investigate the South African IT sector.

In an economic environment where there are high levels of unemployment with over 26.7% of the population unemployed (Stats SA, 2018), the South African IT job market is an open field of available job opportunities. The field is constantly in need of skilled professionals and lies untapped by those who would benefit the most from this employment. Women are at an advantage as they feature as the largest portion of the workforce in South Africa, however the lack of IT education, interest and skill means that the available female job seeker is not suited to meet the needs of the technical field.

There are numerous internal and external factors that affect a woman's choice of career and the progression within a certain field. Primarily, interest in the field of IT must be promoted. Interest in a career is often stirred long before choice of subjects and graduation by various factors such as the availability of role models, job image, security and perceptions about the quality of life presented by a profession (Hodges & Corley, 2016).

The common underlying factors that attract those who enter the IT profession range from intrinsic personality traits, such as high levels of self-efficacy and a strong sense of internal locus of control. This is coupled with external factors such as social

perceptions, family support, work content, job environment, inclusiveness which is encountered from school going years to the real job environment. Those who enter and remain in the IT field cite work-life dynamics as an important factor to keeping females happy. Thus, women are often seeking to balance home life with professional progression throughout their careers (Du Bow, 2014).

The conditions of the early schooling environment are also critical, scholars who have studied at modern schools with access to computers have been exposed to technical work content and this familiarity with technology results in greater interest and balanced views of what to expect in the field of Information Technology (Armstrong & Riemenschneider, 2014).

The practical teaching methods allow students to form a better view of course content, have practical knowledge through experiments, thus these students are more likely to opt for a future in the IT field as they are not fearful of the unknown. Numerous academic studies have indicated that educational support from basic school to university has an influence in the student's choice of future career (Armstrong & Riemenschneider, 2014).

Two important factors that lead to the gender gap in IT and influence female career decisions are career progression and retention. This involves managing personal and societal misconceptions that persist in the present day regarding the field of IT. Business leaders in the private and public-sectors and academic institutions need to recognise and remove the barriers that have hindered the participation of women for decades in the IT field thus build for the future a gender inclusive IT workforce that accommodates and nurtures all skilled individuals regardless of their gender.

Problem Statement: Many South African women do not view a career in Information Technology as an ideal career. Furthermore, the women who are already working in the IT Industry often leave the IT field mid-career.

1.3 Research Questions

The primary Research Question (RQ_m) has been formulated to address the Problem Statement mentioned in Section 1.2 and is as follows:

RQ_m: *What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?*

The supportive secondary research questions (RQ) that will expand the analysis of the problem statement are:

RQ_1: *What are the national and international trends of women's career choices?*

RQ_2: *What important personality traits do women in IT possess?*

RQ_3: *What are the factors that affect women to choose IT as a career?*

RQ_4: *What research design can be used in this study?*

RQ_5: What management strategy can be used to retain and increase the number of females working in IT as professionals?

1.4 Research Objectives

The main Research Objective (RO_m) will address the Research Questions (RQ) mentioned in section 1.3 and is as follows:

RO_m: *To identify and analyse the factors that attract women to the Information Technology profession.*

Secondary objectives that will assist with addressing the main research objective are as follows:

RO_1: *Analyse international and national employment trends for women in Information Technology;*

RO_2: *Determine the common personal traits of women who choose a career in Information Technology;*

RO_3: *Establish the factors that influence women's career choices in Information technology;*

RO_4: *Formulate a research methodology to test the proposed model;*

RO_5: Recommend a management strategy to retain and increase the number of females who are working in IT as professionals.

The research alignment plan details all Research Questions and the accompanying Research Objectives and is structured as below:

The Research Alignment plan – Table 1.1

Table 1.1: Research Alignment Plan

Research Alignment Plan	
Title: SOUTH AFRICAN WOMEN IN INFORMATION TECHNOLOGY: AN IN-DEPTH EXAMINATION INTO THE GROWING GENDER GAP	
Problem statement: Many South African women do not view a career in Information Technology as an ideal career. Furthermore, the women who are already working in the IT Industry often leave the IT field mid-career.	
Main Research question: What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?.	
Main Research Objective: To identify and analyse the factors that attract women to the Information Technology profession.	
Research Questions	**Research Objectives**
• RQ1: What are the national and international trends of women's career choices? • RQ2: What important personality traits do women in IT possess? • RQ3: What are the factors that affect women to choose IT as a career? • RQ4: What research design can be used in this study? • RQ5: What management strategy can be used to retain and increase the number of females working in IT as professionals?	• RO1: Analyse international and national employment trends for women in Information Technology; • RO2: Determine the common personal traits of women who choose a career in Information Technology; • RO3: Establish the factors that influence women's career choices in Information technology; • RO4: Formulate a research methodology to test the proposed model; • RO5: Recommend a management strategy to retain and increase the number of females who are working in IT as professionals.

(*Source: Author's own construction)*

1.5 Research Delimitations

This treatise will explore the participation levels of women in Information Technology, with the emphasis on identifying the factors that attract and retain women in the profession. The researcher has used the membership database of the Institute of IT Professionals in SA (IITPSA), Alumni known by her supervisor, various higher education academic institutions and businesses to collect data from professional females currently involved in IT. The e-mail survey was sent only to those residing in South Africa.

1.6 Research Significance

In the dynamic world of business, leaders, managers and investors will require further IT based developments brought on by innovative, competitive and diverse IT teams. Development is further driven by those in IT leadership, academic and the professional IT job industry. The IT industry desperately needs gender inclusive

business solutions to solve future market requirements. Low levels of female participation in the field have led to job environments that cater to the “boys club” or ‘old boys club’ (Njoki et al., 2016). Should this representation not be addressed, the IT field will continue to offer a singular voice and cater to one gender’s needs which is a limiting perspective, preventing access and profits to other markets.

Addressing the current representation gaps will lead to combined levels of innovation that benefit society and importantly all business spheres. Female led technological companies have been noted to often perform better than their male counterparts and therefore this opportunity of growth deserves attention from both business and society (PWC, 2018).

The purpose of this study is to develop a model that assists with insights and provides solutions into the personal and environmental factors that influence the female choice of a long-lasting career in IT. The study will analyse international and national IT trends from high school years through to the working life. These trends will provide insight into the career choices of women. In this study an in-depth examination into the common personality traits held by women in IT, structural external social factors that influence the personal decision of choosing an IT career and remaining involved, understanding these factors will aid in removing the barriers found in this field.

1.7 Research Methodology

1.7.1 Research Approach

This study will be based on the philosophy of positivistic paradigm. A quantitative sample using online Platform (Question-Pro) was used to collect the data and thereafter exported to Excel for analysis, thus enabling the researcher to reach a scientifically logical conclusion. The results will be independent of the researcher as various scientific tools will be used to test the hypothesis and obtain reliable empirical results. Various identified independent and dependent variables were explored to understand the significance of the responses to the questionnaire. Data responses from Question-Pro were cleaned by NMU Statistician Dr D Venter.

Descriptive statistics were used to analyse the data and the findings were generalised to the greater population by using inferential statistics (Kothari, 2010).

Multiple methods of data analysis including Exploratory Factor Analysis (EFA), Cronbach's Alpha and Pearson's correlation have been used in this study, these will further be explained in Chapter 3.

1.7.2 Literature Study

A wide range of sources consisting of academic's books, journals and reports about the subject under study were thoroughly studied to understand available academic knowledge and to provide a theoretical background. Various library databases were used to extract the information including the Nelson Mandela University Online library as well as the University of Johannesburg online database. All relevant articles used in the study and cited in the text have been referenced and duly included in the reference page.

1.7.3 Data Collection and Analysis

As secondary research in the form of previously published literature will be expanded in Chapter 2 & Chapter 3. Primary research in the form of a survey was conducted for the purposes of this study. The population of information technology professionals registered with the South African IT association (ITPSA) is over 8000 members, a survey was posted on the monthly association newsletter, thus potentially reaching all women who are part of this association. The IITPSA organisation currently has 83.43% male membership and female membership is at 16.18%.

In order to reach more professionals, various lecturers and alumni at academic Institutions from the North-West University's (NWU) Department of Computer Science, University of South Africa (UNISA), Nelson Mandela University's (NMU) Department of Computing science were sent the survey and requested to complete. This study was also extended to businesses such as BCX Eastern Cape, Dimension Data and Britehouse Eastern Cape, Syspro ERP Johannesburg, Tigers Eastern Cape, Volkswagen SA and Mercedes Benz SA. The survey was sent out using the online survey service from Question-Pro. The sample was selected randomly by using gender as a differentiating factor from the full database. This method of sampling and feedback will be analysed in Chapter 3 and Chapter 4, the results will

be taken to represent the views of the population and will be generalised to the IT industry population.

As an online survey will used as the data collection instrument, the results will be collected and recorded as per each participants response. Most of the questions will use a 5-point Likert scale with rankings from strongly disagree (1), disagree (2), neutral (3), agree (4) to strongly agree (5) available to assist gather meaningful information from the respondents regarding internal and external factors leading to choosing a career in information technology.

The questionnaire questions were coded using numbers that uniquely represent and collect each answer, this allows for correct capturing of feedback and precise statistical interpretation. The coded answers received via the online survey will be recorded in Excel and grouped according to the respondent's answer**.** Once the Excel data is recorded and completed it was sent to the Nelson Mandela University statistician Dr Danie Venter for cleaning, reliability and validity testing before analysis and interpretation.

1.7.4 Ethical Clearance

Nelson Mandela University requires that each academic research paper adhere to ethical research protocols of the Business school and a form E clearance form was completed and authorised before the research was conducted. The aim of the form is to protect both the research participants who engage in research by responding to a questionnaire as well as the researcher who produces the research survey. The clearance form is for ethical purposes and this clearance form E has been approved by the Nelson Mandela Business School Ethics committee for the study. The Form E is attached as Appendix 1.

1.8 Report Structure

1.8.1 Chapter 1: Introduction and Problem statement

This chapter serves to introduce the content and purpose of the study, included will be an overview and requirement of the study, the structure of the treatise and the research methodology that was used. The chapter will reveal the Research Questions, Research Objectives and outline the research alignment plan for this treatise.

1.8.2 Chapter 2: Literature Review

This chapter will present existing knowledge which has been published over the years. This literature explores and answers the first three research questions and objectives. The chapter will address the following Research Questions along with the Research Objective:

1. RQ_1: *What are the national and international trends of women career choices?* And the accompanying research objective RO_1: *Analyse international and national employment trends for women in Information Technology.*

2. RQ_2: *What important personality traits do women in IT possess?* With RO_2: *Determine the common personal traits of women who choose a career in Information Technology*.

3. RQ_3: *What are the factors that affect women in IT's career choice?* along with RO_3: *Establish the factors that influence women's career choices in Information technology*.

1.8.3 Chapter 3: Research Design Methodology

This chapter will explore the selected research methodology, design and the accompanying philosophies that guide the researcher. The methodology will guide to answer the Research Question 4 which is concerned with the researcher of this treatise: RQ_4: *What research design can be used in this study?* alongside research objective 4: RO_4: *Formulate a research methodology to test the proposed model.*

1.8.4 Chapter 4: Results and Analysis

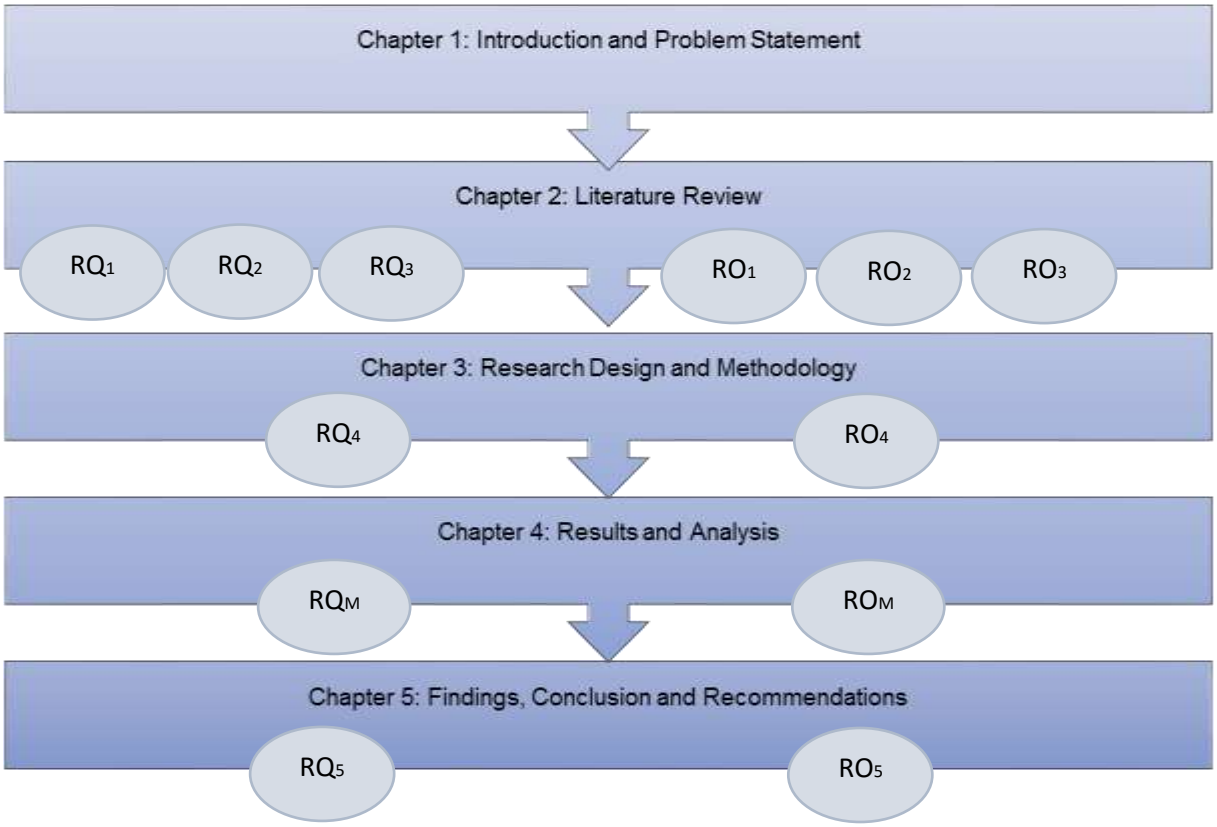
This chapter will present the results received from the survey questionnaire and break down the various feedback received from demographics to dependent and independent variables and the accompanying reliability and validity measurements.

1.8.5 Chapter 5: Findings, Conclusions and recommendation

This chapter will conclude by recommending the research conclusion and address the last research question: RQ_5: *What management strategy can be used to retain and increase the number of females working in IT as professionals?* and research objective: RO_5: *Recommend a management strategy to retain and increase the number of females who are working in IT as professionals.*

Figure 1.2 outlines the structure of the treatise that will be followed throughout this paper.

Figure 1.2: Chapter layout



(Source: Author's own contruction)

1.9 Summary

In this Chapter, the problem statement has been introduced and expanded to introduce the topic of the treatise. The numbers of women in the field of IT are low and the challenge to increase the number is twofold. The field has low attraction levels of high school leaving graduates and has a leak of women talent which is also known as the leaky pipeline.

The Research Question and the Research Objectives have been highlighted, as well as the research limitations and significance. The chapter outlined the research methodology, data collection method and the ethical requirements that will be followed for purposes of this study. In the next chapter, the three research questions along with the accompanying research objectives will be discussed in depth and

expanded using literature to review current factors that explain the involvement and in many cases, the not so lengthy participation of women in IT.

2. CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Technology has been entrenched in modern society with the use of computers accessible to over 47% of the global population which is above 3.5 billion inhabitants of the world's population (UN Information Society Report, 2017). The universal use of digital technology is in most facets of daily life and is visible in areas such as communication and transportation, which have been transformed by using Information Technology. This has been revolutionary for the world of business and has increased the demand for computer based skills in the global job market. This need, is however unfulfilled globally as there are more vacant positions in Information Technology than in any other profession (Hunter & Boersen, 2015). The under-representation of females in Information Technology (IT) has compounded the professions skills scarcity challenge as the field of study lies largely untapped by the female gender who make up more than half of the global workforce.

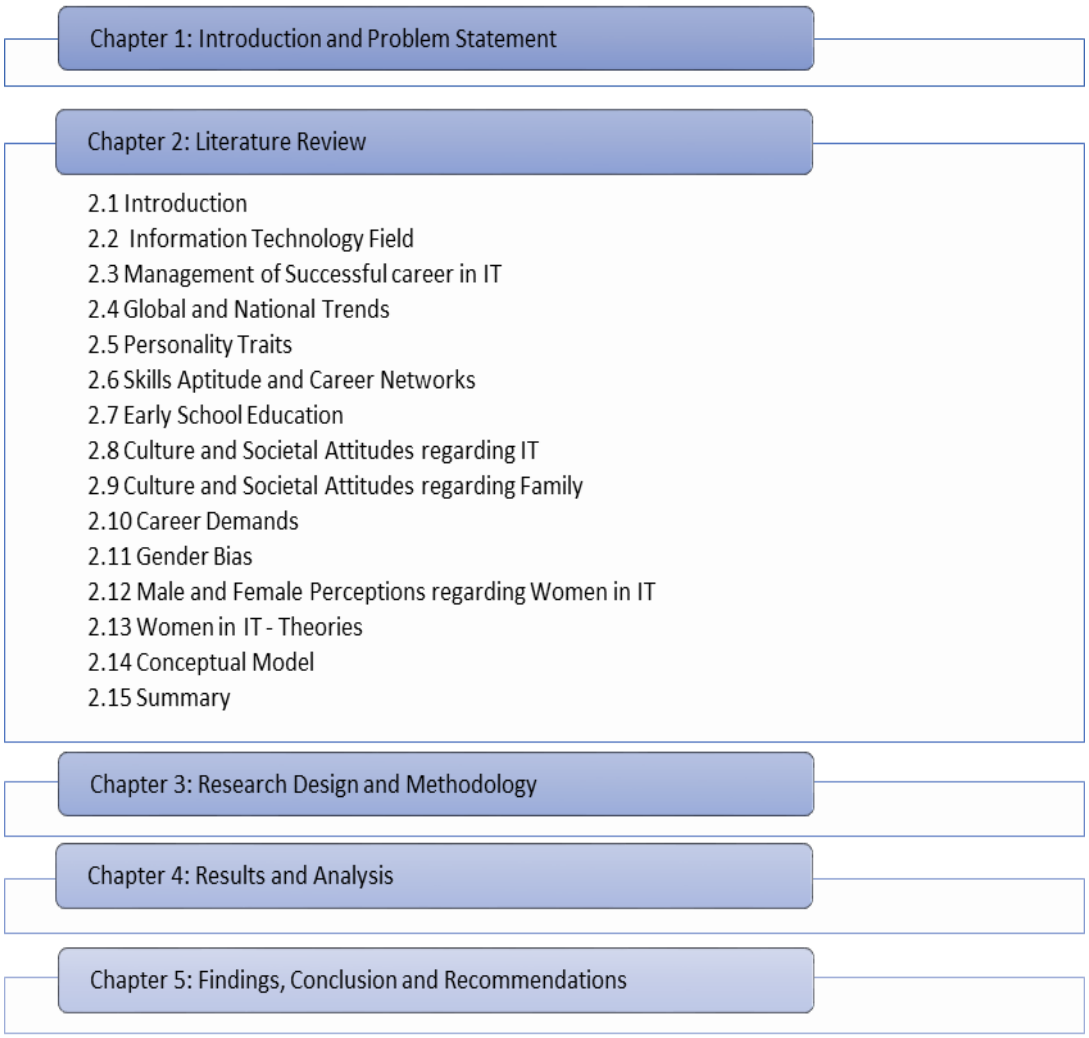
In the previous chapter, the need for the participation of women and gender inclusivity in the Information Technology workforce were established. The diversity of genders in the work environment was noted by Main & Schimpf (2014; 1) as a tool to increase healthy competition and encourage innovation within business teams. This resulted in positive developments such as broad socio-economic equality and human development. Globally, fully fledged and functional economies that continue to grow in the modern world are driven by the usage of technology (Njoki et al., 2016). Technology removes regional borders and allows various forms of trade internationally and is nationally supported by the immediate means of communication required for global business operations (Pretorius & De Villiers, 2009).

In this chapter there will be a discussion on the various factors that literature has revealed as having an influence in the choice of careers chosen by women, particularly in the Information Technology field. The various theories that seek to explain the low levels of interest by women in certain professions, especially in Information Technology will be expanded. The chapter will address Research Questions along with the accompanying Research Objectives: RQ_1, RQ_2 and RQ_3 along with RO_1, RO_2 and RO_3. The chapter will address RQ_1: *What are the national*

and international trends of women's career choices? This corresponds to RO_1: *Analyse international and national employment trends for women in information Technology.* This will then lead to an examination of RQ_2: *What important personality traits do women in IT possess?* This is aligned to RO_2: *Determine the common personal traits of women who choose a career in Information Technology*. This will further address RQ_3: *What are the factors that affect women to choose IT as a career?* This is aligned to RO_3: *Establish the factors that influence women's career choices in Information technology*.

Figure 2.1 provides an outline for Chapter 2.

Figure 2.1: Chapter 2 Outline



(Source: Authors own construction)

2.2 Information Technology Field

The Information Technology field can be classified into three main fields which are the Information Technology (IT), Information Systems (IS) and Computer Science (CS), this broad professional field of study is concerned with pioneering, designing and developing computer software and hardware (Govender & Khumalo, 2014). Information Technology as a young profession was introduced to the world after the industrialisation age during the early 19th century (Rogers, 2015) largely due to the technological solutions offered to its diverse users, notably the efficiencies it brought to business and the governmental sphere.

The users utilise this computer technology to support normal day to day activities. This is evident in the business world where the manner of conducting daily business operations and making decisions has evolved and is driven mainly by use of Information Technology. After the crash of the dot.com era, there has been visible increased interest by businesses in technology based solutions from both developed or developing countries, whereby computer based technology has enabled rapid advancement which has improved business output (Pretorius & De Villiers, 2009).

Rogers (2015; 96) indicates that the IT field can further be split into two specialities which are categorised as ‘Soft’ and ‘Hard’ technical sciences, and remarkably both disciplines require different sets of qualities and skills from the skill providers. ‘Hard’ sciences are core technical skills such as software development, network design and security, computer programming which are skills currently dominantly filled by male professionals (Rogers, 2015; Appianing & Van Eck, 2015).

‘Soft’ technical skills are technology based roles of a supportive nature and include services such as desktop application, project management, service desk and database maintenance where the use of people skills is mixed with technical skills to fulfil the role successfully. These “soft skills” have been noted to draw more female participation when compared to ‘hard’ sciences due to the high communal nature of the ‘soft’ jobs. These are notably aligned to women’s intrinsic personality traits and sense of community (Pretorius & De Villiers, 2009).

Globally, the demand for computer technology when matched with the increase of computer technology awareness has not translated into solid computer interest and

there has been no visible increase in participation from the female population in formal computer education (Main & Schimpf, 2017). The profession is experiencing growth globally, however interest from females is not at a similar level when compared to males. IT related jobs were revealed to be 4 of the 10 jobs on the list of the worlds' 10th fastest growing occupations, affecting the needs of global economic powerhouses such as the US and the member countries of the EU (Rogers, 2015). While the relatively new field of IT has introduced a new career path, traditional career choices of females today have remained similar to career choices made by women from earlier decades and the numbers of women entering the Information Technology field are relatively low and are worsening (Thiele et al., 2013).

The IT industry is a rapidly changing environment; therefore, it presents two separate challenges: Firstly, engaging and attracting women to the field of IT. Secondly, retaining women and allowing women who are already active participants in providing their skills in the IT profession to advance and be promoted in the profession. Notably, the women who have already made the decision to enter the field of IT need practical measures to keep them engaged as they are more likely to leave the profession due to alienation thus the challenge in the field is to ensure that there is no 'leakage' or change of career by women at all transition points (Vitores & Gil-Juarez, 2015).

It has been noted by Griffiths & Moore (2010; 101) that women who actively participate by bringing their skills into IT find it necessary to take a break from the job environment during child bearing years. This natural passage causes a momentary pause in a woman's technical career resulting in a disruption to career growth plans. As the industry moves at a fast pace, this pause ends up being the reason females leave the profession as they experience the stress of re-joining and catching up when they resume the profession and often having to catch up and learn new systems (Alexander et al., 2011).

In Figure 2.2, the various needs required by the field of IT to engage women are established and explained as a four-stage process. Initially the priority is to engage and recruit high performing school leaving female pupils and draw them to choose university courses in IT. When the women are qualified and skilled in the IT

profession, their professional needs evolve and the profession needs to offer measures that promote and retain women to IT.

Figure 2.2: Actions required to increase participation levels of Women in IT

Source: (Authors own construction)

The challenges facing the global community of enticing and retaining women to the IT profession are multi-layered and require factor specific interventions, along with direct strategies that address each factor and thus remove each barrier that contributes to the shunning of IT by high performing women. In this chapter, the factors that influence the choice of career for females will be discussed in detail and they range from women's intrinsic personality traits, early school career, teacher and family guidance, societal and cultural expectations, on-the job challenges such as career advancement in a male dominated environment and work-life balance.

Societal hindrances such as generally held social biases and gender stereotypes often lead to an incorrect perception being held by females that IT coursework is technically difficult and favours males. This view is presented from school going level through to the job environment thus diminishing interest from female participants will be expanded (Cohoon, Wu & Luo, 2008).

2.3 Management of a successful career in IT

Professional success in a job field is the effective combination of meeting most of the needs of the individual skill provider while simultaneously meeting the requirements of the job industry. The equally beneficial relationship is enabled by positive environmental conditions, positive individual characteristics and positive societal perceptions regarding the profession (Thiele et al., 2013). This partnership is a positive psychological contract that requires effort and engagement from the industry

in question along with strong support from external institutions such as government, family structures, academic and research institutions.

As creating an equally beneficial work environment is not an automatic occurrence, the involvement of diverse groups and specifically those previously stigmatised needs careful cultivation and promotion by businesses, and often require business leaders to introduce measures that boldly face and change deep-seated industry and societal views. Thus, business is at the forefront of removing the societal status quo. (Appianing & Van Eck, 2015). The factors that enable women to attain success in IT have been studied in countries like India, Brazil and the Soviet Union as these countries have notable high participation from women in IT. Up to 70% of the computer and information technology job population in these countries is female, unlike the statistics from other countries around the globe which are further indicated in Section 2.4 (Gharibyan & Gunsaulus, 2006).

The differences in participation levels for women are thus significant. High employment of women has been noted as global exceptions rather than being the norm in the IT industry (Gharibyan & Gunsaulus, 2006). A prominent difference in these countries who have successfully drawn women to IT industry is the neutral views held by these societies when it comes to gender aptitude. Secondly, family support structures have been found to heavily favour women to join the profession as it is seen as a stable and respectable career. Thus, attitudes and practices in the industry that alienate females are non-existent and societal views including those held by males heavily support the involvement of female IT skill providers (Gharibyan & Gunsaulus, 2006).

In the Soviet Union, females have been noted to have high levels of confidence due to unbiased teaching methods at school and often the women are encouraged towards mathematical fields. This society is known for its high levels of practicality and is termed a realistic society thus IT is positively linked to female aptitude. Positive societal views on IT and mathematical skills, women's abilities and high levels of education attained affect the perception of the population that technology is difficult. Technology is seen as part of the mathematical field suited for females and caters to their future needs. This perception is encouraged from school going years

to working life. Conditions in employment and the 'respect' of the profession is similar to that of other study disciplines (Gharibyan & Gunsaulus, 2006).

In the pursuit of a successful IT career, Success by woman participants can be attributed to numerous factors such as the type of personality of an individual, confidence, the compatibility of the individual to the job offered, mental aptitude, resilience, attractive pay, growth opportunities, sense of belonging, family and societal support along with the perceived ability to make a positive impact in society (Rogers, 2015; Hodges & Corley, 2016).

In the latter part of the 20th century, the global environment has seen a considerable shift from the business world to include women in traditional and non-traditional job roles that were previously predominantly male. Regular female participation and visible female success in these fields has meant that leaders of industries globally face and challenge previously held negative perceptions held by society, cultural and religious circles and thus encourage females to freely try new fields of study with renewed confidence and support (Smith, 2013).

As women stream into the profession successful integration with their male counterparts and the creation of visible career growth paths in IT is vital and is often the cornerstone which keeps woman engaged in the field. This is beneficial as women bring a fresh new voice to any previously dominantly male field, and there are numerous available examples of success. One such example is in the automotive industry at Ford, when during the mid-1990's the company opted to include more women engineers in their design team for the signature Windstar minivan (Appianing & Van Eck, 2015).

The contributions of female engineers were visible changes which were introduced to the original van, innovative features such as the automatic door locking system which was aimed at assisting parents who have young children to maintain safety. The baby-mode dome light which came on at night for visual assistance was from the contribution of females and this contribution led to the rebounding of sales and stabilised Ford's minivan market share (Appianing & Van Eck, 2015).

Success in the recruiting of females in the Information technology field requires that the individual personality traits be influenced through intentional teaching methods

that rouse interest in computing for females at an early age by using competence based initiatives that equally level the playing field, build character and confidence. External factors that influence the choice of career can be managed through positive media portrayals of women in IT and by encouraging an enabling family support system. Barrier-free work environments that prioritise female growth through mentorship, broad female career paths need to be set up. Relevant networking opportunities that enable the socialisation of females and thus assist women to adapt in the predominantly male environment should be encouraged (Main & Schimpf, 2017).

In information technology, women are often treated as women thus they are delicately handed easier assignments and thus deemed less technical by their male counterparts and not treated as fellow equals to their detriment. This superficial exchange of work was noted by Smith, (2013; 96) to be the cause of discomfort for women in the profession. At times when a women employee is hired in a company to be part of the IT department, they are the first and only women that have been hired or ever have been hired for such a job thus facing all these barriers alone.

In order to succeed in the IT field, women desire work content and opportunities which are equivalent to their male counterparts and the removal of barriers stemming from societal perceptions. Allowing for the involvement of more females in the IT space can lead to appropriate interventions and increase the numbers of women in technical, academic and leadership arena (Armstrong & Riemenschneider, 2014).

Legislation and other governmental initiatives such as women empowerment have helped ease boundaries in IT, bringing success to some females in the field and removing gender practices that are harmful to women. These measures have helped to combat sexism thus allowing women to climb the corporate ladder without the barriers of discrimination based on their gender (Patitsas, 2014).

The down side of the interventions is that women who come through the ranks of empowerment and preferential initiatives constantly face being stigmatised. They face the pressure of having to prove themselves repeatedly as they are taken as token appointments and their skills are not regarded as of the same standard by their male counterparts (Patitsas, 2014). Males are often aware of the additional challenges their female colleagues face (Reid, Allen, Armstrong & Riemenschneider,

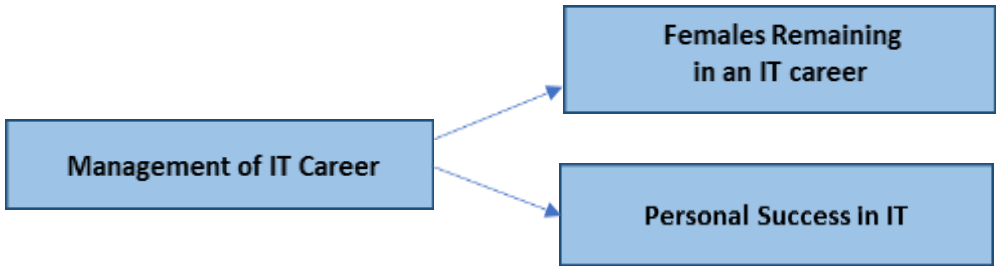
2010) however this has been noted to be superficial as little is done to close the gaps by these males.

As intelligence is gender neutral neither gender has an edge over the other, women with the aptitude for the job can do well in any chosen career thus success inducing factors are not linked to gender aptitude (Njoki et al., 2016). High performance in school on problem solving subjects like mathematics is linked with increased self-confidence and women who opt for a successful career in IT have been noted to be those who experimented with technology and viewed themselves early in life as qualified. By choosing this career path women often want to engage with their skills, grow through promotional opportunities and have the ability to reach top management levels. Successful women in IT have been noted by Appianing & Van Eck (2015; 34) to be those that either come from regions where technology is gender neutralised and families encourage participation of women to join the ranks of IT professionals.

Women who have opted for IT find the attractive salaries a drawing feature of the job. Women with STEM degrees were noted to earn more than their peers who opted for other degrees and had projected job growth of 17% compared to 9.8% of those in non-STEM degrees (Boedeker, Capraro, Capraro & Nite, 2015). The field of IT also allows for cross industry, cross regional participation, thus the flexibility of the profession allows for IT professionals to go into self-employment, private employment and be entrepreneurial and increase their earning potential.

Successful women in the field of IT are an urgent requirement for global businesses in the competitive world, the inclusion of the female gender is in the positive interest of the IT industry. Gender neutral countries that view skills as part of human competencies rather than gender based often have high levels of woman participation and success. Initiatives that change the work environment to be more inclusive and to allow for female participation by streamlining and managing empowerment initiatives and encouraging the family structure lead to women's successful participation in IT. Figure 2.3 illustrates that management of IT as a career can impact women to remain in the IT field and result in women attaining success.

Figure 2.3: Management of IT Career - relationships



(*Source: Author's own construction*)

2.4 Global and national trends

Careers in the field of Science, Technology, Engineering and Mathematics (STEM) have historically experienced low levels of representation from females when compared to males (Diekman, Brown & Samarach, 2010). Increased research and intentional career advancement projects have produced some positive success, as an example in other previously male dominated study fields such as Medicine (Rogers, 2015; Diekman et al., 2010) have achieved successes in recruiting more females to this profession than in the past due to their early career education, focused training methods and research strategies that are designed to attract female participants to the profession. Information Technology on the other hand continues to lag behind and is experiencing the opposite with decreasing numbers of women participants compared to earlier decades (Main & Schimpf, 2017).

New industries formed due to computer driven networks known as "knowledge economies" have created a global demand for IT professionals (Trauth et al., 2010). However, meeting this demand has been a challenge as the participation of females is lagging. In examining the contrasts of the genders participating in IT leadership positions, Rogers (2015; 95) noted that the number of women professionals involved in high ranking professional Information Technology jobs was significantly lower compared to their male counterparts. Less than 15% of females are in leadership positions (Muro & Gabriel, 2016). During the year 2014, technology companies that are IT industry drivers disclosed their staff demographics. These companies such as Google, revealed only 17% of their IT staff was females while Apple and Facebook had 20% and 15% respectively (Appianing & Van Eck, 2015).

Online encyclopaedia Wikipedia has women contributors making up only 15% of the total online content. Few females create viewing channels on YouTube compared to the male counterparts (Guthrie et al., 2011). World leading mobile application developers for Android, Windows Phone and IOS have predominantly male employees (Govender & Khumalo, 2014). These low female participation statistics present a similar picture to the recorded numbers of global female participation in technology. Muro & Schimpf (2016; 443) noted that in 2012 women only accounted for 30% of operational technicians and 15% of managers in technical positions.

In the United States, only 26.6% of computer and mathematics occupations are filled by women (McKinney, Wilson, Brooks, O'Leary-Kelly & Hardgrave, 2008). In the period between 2008 and 2016 there was a 30% increase in computer technology related jobs (Croasdell, Mcleod & Simkin, 2011). It is expected that by the year 2022, the US will have over 1.2 million open IT related vacancies (Appianing & Van Eck, 2015). In Europe, women make up 43% of the total workforce but only 18% are computing professionals.

Concerned countries belonging to the European Union recorded only 20% of women over the age of 30 had ICT related degrees. This phenomenon is globally extended to countries such as Australia where women in IT are regarded as an equity group by government but the target of meeting 40% participation remains unmet (Pretorius & De Villiers, 2009). In South Africa, women make up only 20% of the ICT workforce (Muro & Schimpf, 2016) and while the numbers of university enrolees registered for IT have increased from earlier decades, the graduating figures remain low at just over 30.1% during the year 2010 (Alexander et al., 2011).

Globally, the trends indicate that females do not opt for a career in IT as a primary destination for a lengthy career. This is mirrored in the South African context, as the participation of women in the field of IT is low, women are still in the minority and face various personal and structural barriers.

2.5 Personality Traits

Self-confidence plays an important part in women's participation in IT, affecting their entry and departure (Cohoon et al., 2008). Females entering the field of IT in recent times are diverse and come from varying backgrounds which have shaped their

individual personalities and their perception of self. Although each personality is different there are however similarities in the intrinsic qualities that lead them to opt for a career in IT. Career path choices are based on an individual's sense of self-confidence in the career subject and on the individual's perception of future success in the chosen field (Cohoon et al., 2008). Warren, Young & Williams, (2012; 4) noted that an individual's personality traits are key qualities as they affect career choice and determine whether an individual succeeds at work or not (Warren et al., 2012).

Personal characteristic such as age, self-esteem and personality when matched with ethnic background affect the familiarity and fondness of females of the technical environment (Alexander, 2011). Personality traits are constant from early childhood are noted by Warren et al. (2012; 4) as stable characteristics across an individual's lifespan. Negative self-perception has affected females as they have been noted by Govender et al. (2014; 36) to be less inclined to perceive themselves as excellent in the technical environment. This is driven by their own internal personal limitations based on lack of confidence in computers and additionally on societal perceptions. These are norms that each individual grows up with which seek to channel females to people oriented careers rather than the technical environment.

The negative perception in society influences the women around them as they end up being the personal perceptions of women. Incorrectly these negatively held perceptions that imply that IT is difficult and male oriented hinder females from believing that they have the necessary aptitude required for the profession (Warren et al., 2012). Information Technology is described by Warren et al. (2012; 3) as a field that requires problem solving, critical and analytical thinking which are key skills required to succeed. These skills are not gender specific and hence the lack of confidence by females is an incorrect perception.

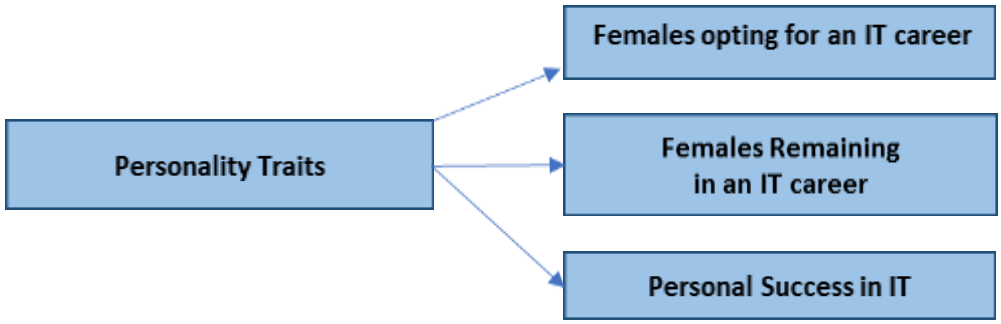
According to Croasdell et al. (2011; 160) women who enter the field of IT begin the analytical journey by succeeding in Maths and Science at school and they can be seen early in their life by their engagement in various problem-solving exercises, classes and puzzles. Alexander et al. (2011; 7) argues that although these traits are personality driven and not gender specific, males intrinsically have more confidence levels and this innate self-assurance leads to them overestimating their abilities and skills. Female confidence on the other hand is often lacking due to neglect and this

confidence needs to be built from a young age by introducing a correct sense of self perception and confidence that will instil in females the ability to trust their own intelligence and later technical ability. Male confidence enables males to over-estimate their abilities to handle complex technical matters and thus they have a high sense of computer 'self-efficacy' and they measure themselves as highly competent as compared to their female counterparts (Vitores & Gil-Juarez, 2015; Govender & Khumalo, 2014).

'Self-Efficacy' is described by Main & Schimpf (2016; 5) as the belief in one's ability to accomplish a given task or achieve a certain goal, and this is associated with internal motivation and behaviour. When this is directed to the technical field it is termed 'computer self-efficacy'. Computer 'self-efficacy' is explained by Alexander et al. (2011; 4) as an individual's assessment of their ability to succeed in computer activities. This confidence is driven by internal confidence in one's ability but can be affected by rampant societal gender stereotypes. First-hand computer familiarity which is due to computer access at home and at school which is encouraged from an early age can increase confidence levels due to acquaintance with technical content.

Intrinsic personality traits have been identified as an important driver behind the choice of women to enter a career in IT, as indicated below in Figure 2.4. High confidence levels are required in the individual's perception of his/her own abilities, and they need intrinsic assurance in their prospect of success to succeed in the IT profession. This confidence leads to a positive view of computer based careers and high computer -efficacy.

Figure 2.4: Personality Traits – factor relationship



(*Source: Author's own construction)*

2.6 Skills aptitude and career networks

Women are equally Intelligent and possess similar mental capabilities as their male counterparts (Njoki et al., 2016) however they face challenges such as deep-seated social discrimination, personal lack of confidence in their own skills and lack of support from colleagues which leads to timidity in the skills environment. The IT field has been noted as a good career choice as it presents good job opportunities, attractive salaries, a fast-paced interesting environment, a chance to be creative and be involved in problem solving thus bringing a sense of achievement (Appianing & Van Eck, 2015, Vitores & Gil-Juarez, 2015).

In countries such as the Soviet Union where aptitude is gender neutral and woman are viewed as equals to males when it comes to aptitude, this positively influences their choices when it comes to choosing a career. Often, they choose a career in IT and perform similar tasks to their male counterparts but they are hired more due to aptitude and perceived loyalty to their employers (Gharibyan & Gunsaulus, 2006)

Females are good at problem solving subjects such as mathematics and science and possess the same abilities. In countries such as the US and UK females are noted to be above 45% of the mathematics class while only being less than 30% of the technology class (Leach & Turner, 2015). These high performing females from school going age do not translate this aptitude in problem solving and align it into joining the technical field. This is due to lack if education on IT and thus IT loses out on attracting this talent.

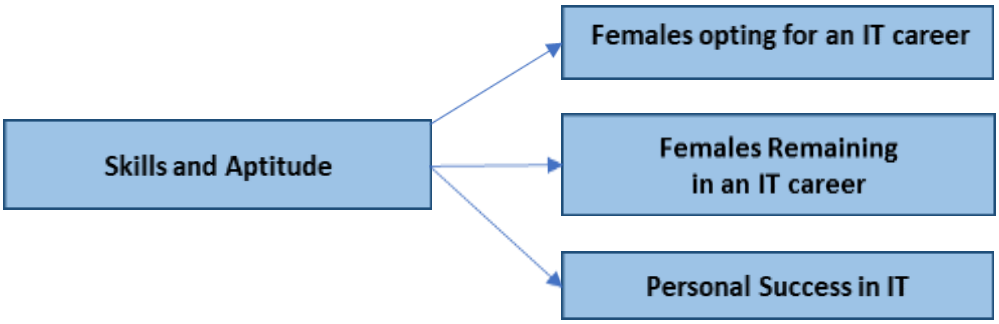
As a male dominated field, the professional networks are skewed towards the needs of males. Networking is important for growth opportunities, skills sharing and building relationships however the chances are few for females to be involved in these networks as they are at times informal networks. The timing of these interactive sessions can be late after working time and thereby clash with other demanding personal responsibilities of women (Smith, 2013). To belong to professional bodies assists women to have an equal footing in the conversations in the professional environment and obtain a sense of belonging and a connectedness to their male counterparts and the profession (Smith 2013; Thiele et al., 2013).

The work environment in IT is constantly changing, IT professionals of either genders often learn that skills acquired at University evolve and they have to learn more on the job. For females this means learning from male colleagues who might not understand them and at times alienate them (Armstrong & Riemenschneider, 2014). Management and organisational support at this stage is crucial to assist in retaining female IT professionals (Valenduc, 2011). Similarly, females thrive on well-defined career environments and career paths where the goals, networks are well structured but in the IT field these paths are not well defined and promotions are rare and based on professional networks (Valenduc, 2011). Thus, promotional opportunities are not well structured for females and this leads to frustration and changing of careers by women.

Male dominated environments come with a level of male behaviours such as those noted by Nielsen, Von Hellens, Beekhuyzen & Trauth (2010; 70) of assertiveness, ambitiousness, matter of fact in the job environment which may encourage an environment that features conflict. This makes it difficult for women in the professional environment to deal daily with the challenges of abrasive behaviour in the work environment and having to assert themselves regularly, skilfully co-operating while not being submissive and deemed passive (Pretorius & De Villiers, 2009). Lack of supportive networks to deal with such environments results in the lack of male accountability when changes are made by males in the job environment and in leadership positions. Female assertiveness can be attained through experience, networking, skilful management which can change the environment for females and thus attract women to the field of IT.

Aptitude is gender neutral and all genders have the mental capacity required to meet the demands of the job. The inclusion of women, creating networks that foster opportunities and growth will lead to the raising of the standard of living for half the workforce as they will be attracted to the field. This is indicated below in Figure 2.5. It is thus critical to increase the career networks for women in the Information Technology field.

Figure 2.5: Skills and Aptitude



(*Source: Author's own construction)*

2.7 Early school education

Career choices are made by young students during their early secondary school career (Njoki et al., 2016), this is a similar assertion made by Armstrong & Riemenschneider (2014; 85) who examined an earlier model by scholar Ahuja which noted that the choice in a career in IT is chosen years before the individual is working. The high school era is a critical time where students are guided by their family, teachers, career counsellors and those role models most influential to them to choose school subjects that later direct them to future fields of study and career.

The lack of girls opting for a career in IT displays the lack of socialisation done to familiarise young women to computer technologies from an early age (Vitores & Gil-Juarez, 2015). Thus, early stimulation and enticement to the field of IT has been noted as a necessary missing early exercise for all countries that seek to increase women participation (Hunter & Boersen, 2015).

From an investigation conducted by Govender et al. (2014; 36), the inability to cultivate female interest at an early stage, is driven by the lack of computer courses that ignite the interest of intelligent students during high school years, thus IT silently remains incorrectly seen as a male field. The trust in males to resolve technical matters is seen early in little ways such as most technological projects are handed to males by teachers and family units due to their perceived affinity to technology gadgets and games (Govender & Khumalo, 2014). Technology education and a full understanding of what the career entails is frequently lacking at early stages of school life. Thus, the confusion for females about what the field is about leads to

incorrect notions such as the “perceived difficulty of the subject” (Govender & Khumalo, 2014; Croasdell et al., 2011) and thus they avoid the profession.

In South Africa, school subject content has remained relatively the same from basic school level through to university with no intentional strategies to affect and attract the career choice of females in this field. Computer studies are offered in high school, yet this is optional to a gender that has not been socialised to technology and thus perpetuates the gap. In University Education, the output of computer technology graduates remains narrow for women and there are fewer female enrolments in computer fields than in other fields (Alexander et al., 2011).

Teachers who act as career counsellors have been noted to have a strong influence on the career choices of their students however this advice has resulted in furthering the gender imbalance in IT. Adya & Kaiser (2005; 8) discovered that teachers were more likely to encourage girls towards traditional careers and males to non-traditional careers. This is due to their own limited perspectives, societal biases with partial information on the profession of IT. Job stresses also leave little time for career counselling.

After high school, women pursuing higher education through formal technology training have been noted by Njoki et al. (2016; 63), to leave early in the IT education content with only their undergraduate degrees. Fewer women are choosing to continue with a master’s degree and PhD’s in IT, thus at academic education level there’s a gender imbalance in working academics worldwide (Njoki et al., 2016).

Notably, the technology sector is a rapidly changing environment that requires continuous learning to keep up with the evolving demands of the industry (Pretorius & De Villiers, 2010). Reviewing the course content at early school age and changing it to stimulate the interest of diverse gender populations can bridge the gap from school level to the work environment. Changing societal thinking will require concerted effort from basic school level to University Education and creation of support structures from family to organisational units can assist in the recruiting and retention of IT professionals (Du Bow, 2014).

Exposure to technology at an early age at home and school has been established as an influencer of the attitude of women towards the field of IT. Informal and formal

technological experience through classes, games, smartphone application increases confidence, interest and attitude. Figure 2.6 indicates the relationship between the school environment and a choice of career in IT for women.

Figure 2.6: Early School Years

(Source: Author's own construction)

2.8 Culture and societal attitudes regarding career

Access to computers is an important means of rousing of interest at an early age for the current workforce (Njoki et al., 2016; Armstrong & Riemenschneider, 2014). This is a challenge in the current economic conditions for low income earning households that do not possess a computer at home. This then places emphasis on the need for computers in the school environment from primary school where both genders can have equal access to technology. When there are computers in the home environment, males are coached and noted often to use computers at the encouragement of family for social activities, thus ensuring familiarity with technical work that snowballs to serious technical interest until University going age (Armstrong & Riemenschneider, 2014).

Historically, some jobs have been linked to certain genders and technical jobs were reserved for males while administrative jobs were reserved for women. Other professional fields of study which were previously male dominated such as the field of medicine enjoy societal prestige, this has enabled them to receive favourable support from the general population and family structures which culturally did not support female involvement in these careers.

Great lengths have been taken by society and families to attract and encourage young high school graduates of all genders to enter these careers due to increased status for the family (Appianing & Van Eck, 2015; Vitores & Gil-Juarez, 2015). IT whilst misunderstood as a profession by society and families at large is seen and

respected as a ‘smart’ profession often reserved for technical males (McKinney et al., 2008).

The lack of prominent female IT role models influences societal views on the profession. Culturally, females have not been socialised to view the field of IT as an important field of study just not reserved for males. Pretorius & De Villiers (2010; 270) revealed that 66% of females in South Africa view the field of IT as cold with great emphasis on functional, abstract, procedural and task oriented characteristics thus they associate IT as mainly concerned with programming and building hardware.

Male dominance and the results of one-sided involvement in the IT field can be seen in the entertainment industry of gaming where technology has been used to develop recreational games. These games largely cater to the male population thus possibly reducing the potential profits that could be earned from involving female participants. They are not being used as a tool to raise interest in technology in females (Adya & Kaiser, 2005). The use of video games was noted by Main & Schimpf (2017; 2) as a contributing factor to computer biases. Access to games arouses technical interest, improves skills such as design and rotational abilities and thus serves as an entry to the IT field and a promoter of interest as it develops skills such as graphic design in participants.

In the world of media, exposure through globally distributed television content, advertisements and popular culture has negatively influenced the perceptions of women regarding the field of IT, as most portrayals of competent IT professional are an image of geeks and nerds who are socially awkward and introverts. Von Hellens, Pringle, Nielsen & Greenhill (2000; 152) noted that in films and television, computer geeks are portrayed as nerds who sleep in the office and are incapable of social relationships (Von Hellens et al., 2000). This image makes it difficult to attract young impressionable high performing women to view IT as a desirable profession, especially one that females can relate to.

Gender biases frequently portray technical and analytical skills as male oriented. Females are often portrayed as innately skilled when it comes to people management and orientated to the community but with a lack of technical skills. The culture of dualism noted by Nielsen et al., (2003; 70) is a social construct that fixedly

attributes certain qualities to certain genders such as assertive = males, unassertive = females. This perception incorrectly affects gender choices as females are not attracted to other fields due to stereotypes and do not view IT as a compatible profession.

The gender stereotypes of personal qualities noted in Table 2.1 and the blanket approach of norms for women as to 'what should' compared to 'what are' female behaviours have resulted in individuals behaving in ways consistent to general gender perception and thus these set back the global advancement strides made by females in venturing into male dominated professions.

Table 2.1: Dualism attributes

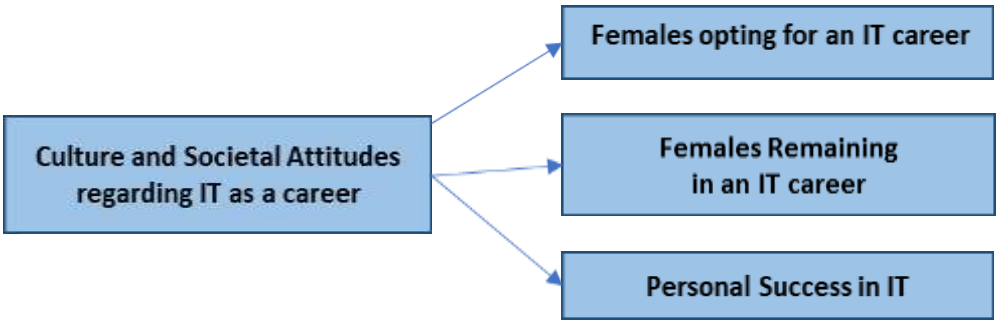
FEMININE	MASCULINE
Social	Technical
Kind	Dominant
Thoughtful	Assertive
Loyal	Competent
Sensitive	Ambitious

(Source: Nielsen et al.2000)

Women who leave the IT profession after graduating and working in the field are noted by Griffith & Moore (2010; 101) to leave due to work-life balance, unfulfillment, pressure to out- perform male colleagues and alienation. Adya (2008; 66) establishes that alienation of women in IT is at times the result of perpetuated societal stereotypes regarding the technical competence of females in the working environment and this leads to dissatisfaction, erosion of self-confidence and thus an early career exit.

External environmental factors such as family support, traditional roles of women in the working world which includes the maintaining of a work- life balance has been established as a contributor to attracting and retaining women in the IT field. This relationship of the factors is indicated in Figure 2.7.

Figure 2.7: Culture and societal attitudes re: IT as a career



(*Source: Author's own construction)*

2.9 Culture and societal attitudes regarding family

Females have been noted often to have strong societal ties to family units, religion and cultural activities and thus participation in a career often hinges on the support from these communities and the ability to continue with the associated activities with these groups (Main et al., 2017; Pretorius & De Villiers, 2010). Du Bow outlined that even though high achieving females outnumber males in the mathematics field, the under-representation of women in IT reflects social, cultural and family thinking (Du Bow, 2014).

While women live in modern times the traditional family structure has not changed, women continue to be the primary care givers of families, Pretorius & De Villiers (2010; 268) observed that women battle to balance a demanding IT job while still being heavily involved at home. Fifty percent of women prepare meals at home as compared to 9% of males, 51% of women attend a sick child as compared to 9% of males and house cleaning is done by 45% of women and 5% of men. These statistics reveal that women have demanding roles at home thus they have less free time than their male colleagues as they have demanding home activities to attend to while balancing work, family and social activities.

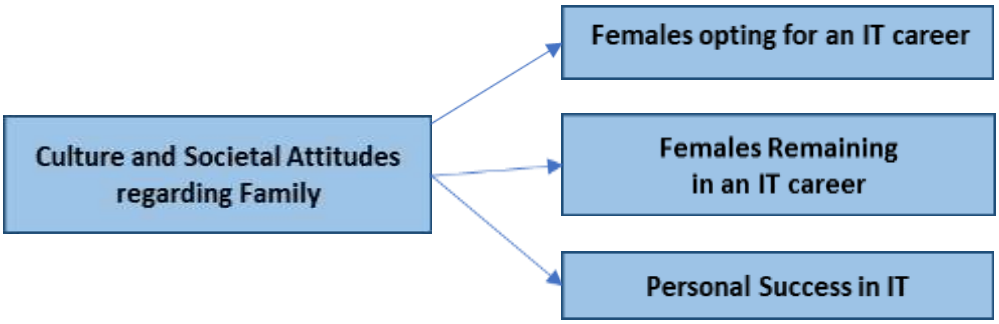
Family influence is observed by Pretorius & De Villiers (2010; 269) as the reason for the high volume of females participating in the IT field in Mauritius as the family and national culture encourages females to view IT as a potential viable career. Over 53% of computer science enrolments in 2011 were from women. This is a similar situation in the Indian society where the family structure supports the idea of women actively choosing the IT field as a career of choice.

In South Africa, this reality is different as women view themselves according to traditional society's expectations which emphasises women as homemakers before being viewed as career women. Adya & Kaiser (2005; 5) concurred that females who opt for IT have been noted to come from families where the parents are highly educated. The influence of parents with degrees allows the family structure to choose non-traditional careers where success is highly valued.

Females are primary givers of family units and this results in dual demanding roles at home and in the workplace. Child rearing includes times where females suddenly take time off to care for their young children which is a threat as in the field of IT as the industry information is constantly changing. Female roles in the family often require long hours of nurturing and involvement and thus the long hours which are expected in the IT environment do not accommodate work and life balances. Du Bow states that flexibility for females in the IT workforce should be commonplace and treated as basic employment conditions (Du Bow, 2014).

In recent years, females have become equal earners in the household. Widespread education regarding the field of IT highlights the similarity of the profession to other professional fields. Consequently, supportive family structures and supportive religious circles can influence the choice of a woman to enter the IT field and remain in the field regardless of the various family roles that feature through a female's lifetime. In Figure 2.8 the relationship between culture and societal attitudes regarding family and the three dependent variables: (1) females opting for an IT career, (2) Females remaining in an IT career and (3) Personal success in IT is indicated.

Figure 2.8: Culture and Societal Attitudes regarding Family



(*Source: Author's own construction)*

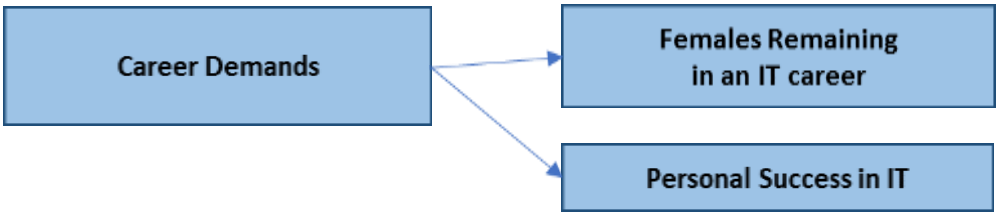
2.10 Career Demands

The IT career is filled with job opportunities that require qualified talent however the job environment has notable differences as females do not attain the same job levels as males (Mckinney et al., 2008). The environment includes long hours of work, awkward working times and frequent travel which affects the lives of females with families. This poses a challenge for females especially during the child bearing years where the demands of the job clash with the demands of the family.

IT has features of autonomous work as the work content requires isolated problem solving that at times the demands of the environment are time sensitive. Thus, the achievement of exceptional work includes frequently going the extra mile which can lead to burn-out as it encompasses long hours of work. Patitsas (2014, 168) notes that females often require positive interventions such as quota systems. Minority preferential treatment however, can backfire as the stereotypes and perceptions of colleagues can lead to low self-esteem in one's technical abilities.

Due to the small number of females in the profession and as successful females are exceptions, females who are active in the profession face the pressure of being exceptional, being career pioneers in the environment thus encountering first hand isolation and sexism (Smith, 2013; Warren et al, 2012). The competing demands of family and work result in job frustration and eventually leaving the profession. Figure 2.9 indicates a relationship between career demands and the dependent variables that relate to females remaining in an IT career and attaining personal success in IT.

Figure 2.9: Career Demands



(*Source: Author's own construction)*

2.11 Gender Bias

Due to the small number of females in the profession, the work environment of IT professionals is male dominated and females often find the work environment

unfriendly as they face sexism and varied forms of harassment, isolation and belittlement from their male colleagues (Thiele et al., 2013; Smith, 2013). The lack of female representation in leadership positions is visible with women holding less than 10% of management positions in the ICT sector (Thiele et al., 2013). This results in alienation in the workplace, few informal gender-based job networks and poor relationships with peers (Rogers, 2015; Adya, 2008).

Griffiths & Moore (2010; 98) notes that the physical job environment in IT is filled with long hours, travelling, individual behaviour and constantly changing work. This is challenging for females who although technically competent, possess other soft communal skills and yearn for collective collaboration and success (Weinberger, 2004). Females enjoy variety in tasks and have the ability to connect with others using these 'soft skills' (Armstrong & Riemenschneider, 2014). They seek meaningful or socially useful work. This has led to bias that when these skills are not used, females cannot be involved in such careers.

The uneven wage gap whereby males earn more than females is another known factor that leads to dissatisfaction. The lack of females in leading roles has led to the wage gap increasing. Women however, are initiators and addressing societal roles by driving women involvement can lead to the elimination of these barriers. Adya & Kaiser (2005; 18) believe that male sponsored solutions such as initiatives to groom females should be encouraged. IT can benefit by leveraging the strengths of women by introducing females to technical roles that combine soft skills with core technical expertise such as business and process analysis.

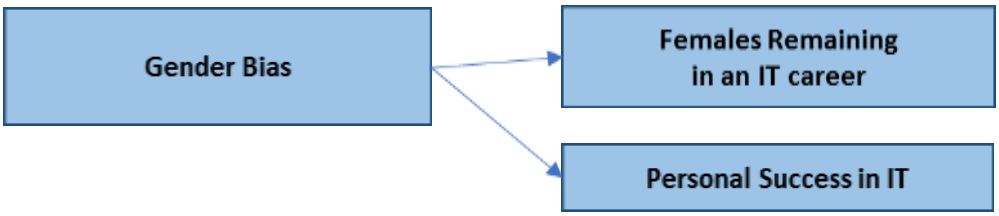
Career progression is necessary and allows for the bringing of skills to the work environment while having a tangible impact. Having the ability to influence decisions drives females into certain professions. Women in male dominated fields often reach a "glass ceiling" as they reach levels within corporations and they cannot break into other levels of executive management which are male dominated. They become frustrated as they cannot influence job policy and be part of the decision-making process (McGee, 2018).

Stereotypes about certain ethnic and gender groups can introduce invisible barriers for females who grow to believe that certain achievements are aligned to male

strengths (Du Bow, 2014). Cultural perceptions that favour male prowess on technical matters often dissuades females from entering the field.

IT careers offer better than average salaries as noted by Warren et al. (2012; 1) thus the field represents a sought-after earnings potential which is expected to remain constant into the near future. In the top 10 highest paying jobs in South Africa, the field of Computer technology and IT is ranked number one, noted as the country's most important job (Careerjunction, 2018). Gender biases held by society and women themselves which attribute certain skills to a particular gender hinder the progress of women in IT. Figure 2.10 indicates the relationship between gender bias and the dependent variables (1) females remaining in an IT career and (2) personal success in IT.

Figure 2.10: Gender Bias



(*Source: Author's own construction)*

2.12 Male and Female perception regarding woman in IT

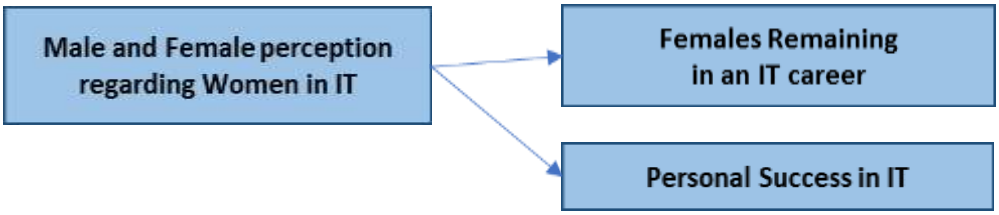
Male dominated fields in the business world were distinguished by Armstrong & Riemenschneider (2014; 86) to produce barriers for females in the field as the 'boys network' notion means those with power appoint and advance and trust those who are like them in gender with regards to key higher positions (Rogers, 2015) Managerial opportunities are often reserved for males, thus the rules in the IT field are generally set by males and exclude the needs of women. Similar to other professions respect and equal opportunities in IT are critical for gender success and organisational processes need to be changed by those on power to eliminate masculinity in the work environment.

Role models are few in this profession and this leads to isolation at work (Thiele et al., 2013). The Chief Operating Officer of Facebook is female and by her own admission, because of the lack of females in the boardroom and the challenges

currently being faced by females, the attitude of the males often increases the marginalisation of females in the profession (Branson et al., 2013). Lack of mentors who assist in career guidance, understand the barriers and share in common experiences has led to women being on their own when it comes to surviving in the field. Informal or formal mentorship arrangement provide a supportive structure and the lack of these has resulted in the gender gap widening.

The information Technology field has been established as largely male dominated with low levels of female representation. This is enabled by the work environment which is masculine and has traces of gender gaps in promotional opportunities and pay. These factors influence the choice of career by women who consider the long-term view of being in the field. Figure 2.11 indicates a relationship between male and female perception regarding women in IT and the dependent variables of females remaining in an IT career and personal success in IT.

Figure 2.11: Male and Female perception regarding women in IT



(*Source: Author's own construction)*

2.13 Women in IT - Theories

Despite the global rise of feminist movements there is a need to socially reconstruct social hierarchies that attach masculinity to IT (Bosch, Ramos & Samaranch, 2014). In Trauth's individual differences theory, it is argued that women should not be classified only by the gender as they possess different technical talents and inclinations and respond to the social shaping of gender in unique and particular ways (Trauth et al., 2010).

Instead of focusing on the differences between males and females it is important to examine the differences between women themselves, Individual Identity, Individual Influences and environmental influences are the three-high level contributing factors that differentiate one woman from another (Trauth et al., 2010). Thus, in order as to

not paint all women with one brush, there is a need to converse and appeal to women to determine what personal attributes, experiences, world view have shaped their individual personality (Alexander, 2011). Adya & Kaiser (2005; 12) suggests that women in IT often felt 'odd' at enjoying the mathematical, logical and less social profession due to societal views.

The three constructs (Table 2.2) by Trauth emphasise the various factors that shape an individual: (1) Individual Identity captures the individuals background with an examination of the demographics, it also considers the type of work each individual enjoys (2) Individual influences, which are the various personal characteristics such as personality traits that influence and personal abilities that determine capabilities. This also includes the role of mentors and models along with significant life experiences (3) Environmental Influences, these include societal, cultural and economic influences that build on the individuals perception of IT.

Table 2.2: The individual Differences Theory of Gender and IT: constructs and sub- constructs

<table>
<tr><th>Individual Identity</th><th>Individual Influences</th><th>Environmental Influences</th></tr>
<tr><td>Personal demographics (Age, race, nationality, ethnicity, socio-economic status)</td><td>Personal Characteristics (Education, traits, abilities, aptitudes)</td><td>Cultural Influences (national, regional, and institutional attitudes and values)</td></tr>
<tr><td>Career Items (Type of IT discipline)</td><td rowspan="3">Personal Influences (Mentors, role models, exposure to computers, life experiences)</td><td>Economic Influences (employment opportunities, economic conditions, cost of living)</td></tr>
<tr><td rowspan="2">Gender Identity (Implicitly or explicit)</td><td>Policy Influences (anti-discrimination policies)</td></tr>
<tr><td>Societal Infrastructure Influences (child-care availability and support)</td></tr>
</table>

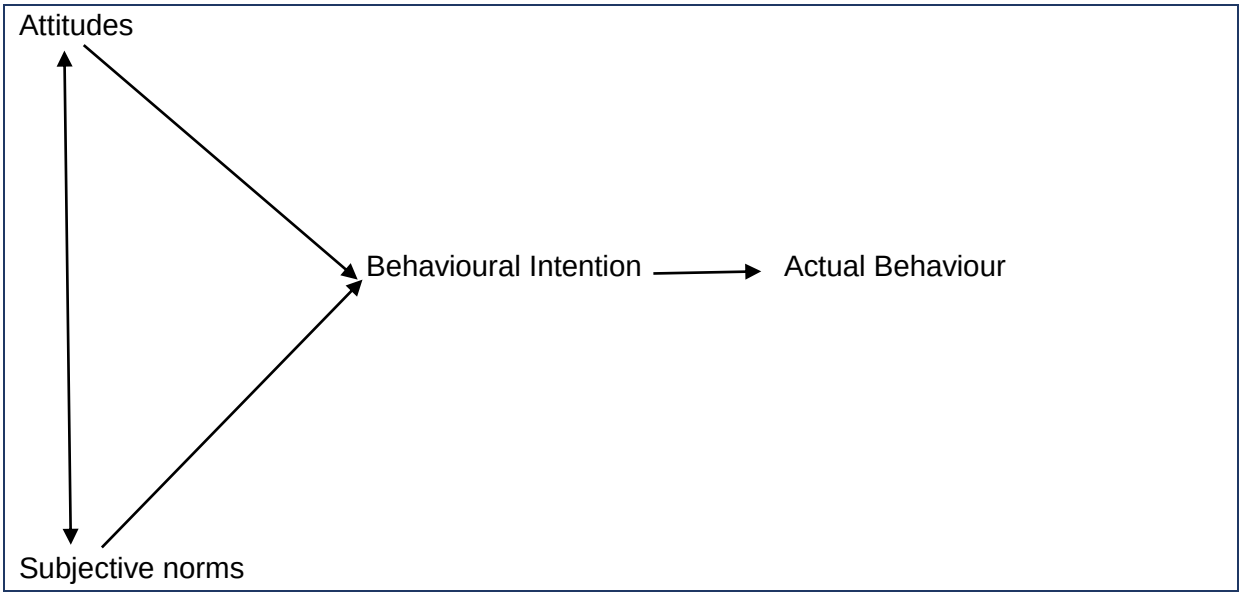
(Source: Trauth et al., 2010)

Another important theory that relates to career choices is the theory of reasoned action (TRA) by Azjen and Fishbein (1980), which states that an individual's behavioural intention is influenced by his/her own attitude and the social subjective norms prevalent in their environment (Figure 2.12). This theory is derived from the expectancy theory which indicates that motivation for career decision is the result of

the individual's belief in future possible outcomes. The theory of reasoned action stresses that an individual's behaviour can be examined and predicted through the examination of their underlying basic motivation. Thus, voluntary decisions of women such as career choices can be predicted based on their respective attitude and the influence of those in their social circle (Govender & Khumalo, 2014).

In formative years, the influence of others is important and thus a young person's preferences may be influenced by the perceptions of those in their circle. In Figure 2.11 the TRA model is illustrated with the display of the important factors that influence decision making and career intention. Attitudes are defined as the personal perceptions of the individual whether favourable and unfavourable while subjective norms reflect the perception of how others think an individual should behave (Azjen & Fishbein, 1980).

Figure 2.12: The theory of reasoned action by (Azjen & Fishbein, 1980)



(*Source: Azjen & Fishbein, 1980)*

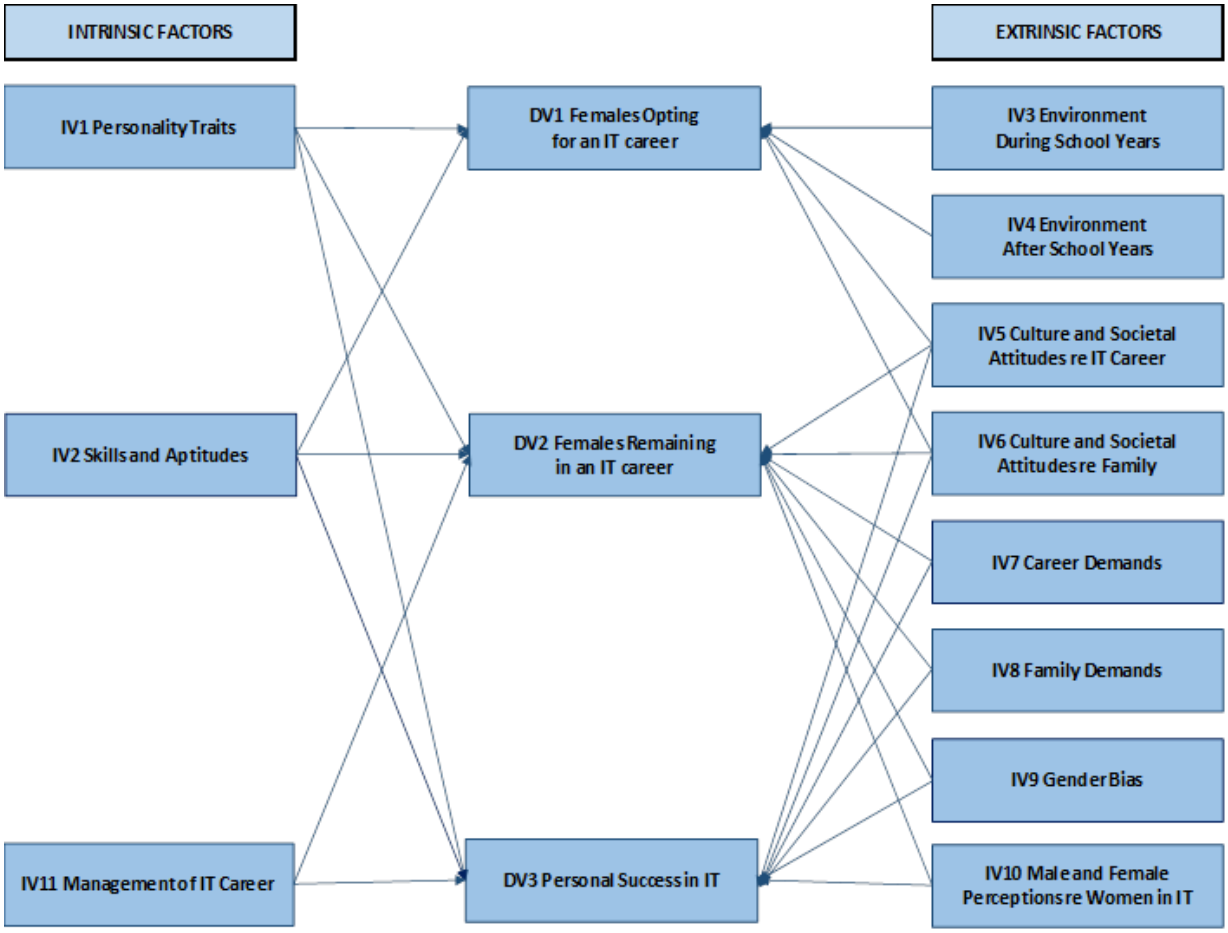
2.14 Conceptual Model

The business world and society faces a challenge to attract and retain professional women. In this chapter the factors that affect interest and long-term participation have been established. In this chapter, an in-depth investigation has been done to reveal the factors that affect career choices of females in IT namely, global and national trends, intrinsic personality traits, early school education, Environmental,

cultural and other societal attitudes, barriers in the workplace, skills aptitude and career network, male perceptions and female role models.

After this had been established, a conceptual model was designed to test the various factors that contribute to participation levels. The model to test these variables is demonstrated in Figure 2.13. The eleven independent variables and the three dependent variables are included. The Independent variables are grouped into two categories, namely intrinsic and extrinsic factors.

Figure 2.13: Proposed Conceptual Model



(Source: Author's own construction)

2.15 Summary

In this chapter secondary sources in the form of literature was reviewed to address the first three Research Questions: RQ_1: *What are the national and international*

trends of women career choices? and RO_1: *Analyse international and national employment trends for women in Information Technology* indicated that there was an apparent global under-representation of women. The gap between females and males has impacted the profession, stagnated innovation as there are fewer qualified females in IT than males. In RQ_2: *What important personality traits do women in IT possess?* And RO_2: *Determine the common personal traits of women who choose a career in Information Technology* women who opted for a career in IT were noted to have high levels of self-confidence and an internal locus of control. Self-perception and confidence in one's abilities was established as critical and led to computer confidence or 'computer self-efficacy". In RQ_3: *What are the factors that affect women in IT's career choice?* And RO_3: *Establish the factors that influence women's career choices in Information technology.* Various factors were considered and were established to have an impact in women's career choices. Factors such as family demands, gender biases, societal perceptions, growth opportunities and the work environment were established to be key factors in attracting and retaining female talent.

In this chapter the three research questions along with their corresponding research objectives have been addressed. The paper first examined the definition of IT in the global environment. This was followed by the national and international trends of women's participation in IT. Additionally an examination into the kind of personal characteristics that influence career choices at an early age as well as the role of early school education were discussed. The aligned theory of Individual differences of Gender and IT highlighted that women cannot be defined in blanket terms as they have different personality traits. In the Theory of reasoned action, it was established that societal norms and perceptions play a pivotal role and affect future career choices.

In the following chapter, the research design and methodology will be discussed in depth. This will include an expanded discussion into the research approach taken for purposes of this study. Thus, addressing research question four with the aligning research objective four.

3. CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

In the previous chapter, a detailed review into published literature was completed to identify the key factors that affect career choices for females, specifically for those women who opt for a career in the Information Technology field. Chapter 2 addressed the critical success factors that influence professional women attraction and retention in the IT industry. This review addressed the Research Question RQ_1: *What are the national and international trends of women career choices?* which is aligned to RO_1: *Analyse international and national Information Technology employment trends for women*. Internationally women are underrepresented in IT and this gap is notable in all spheres of IT industry including academic, management and the professional arena in general. A similar pattern was noted in South Africa, with the field of IT being *2:5* dominated by males (PWC, 2018).

Additionally, an in-depth analysis was conducted to address RQ_2*: What important personality traits do women in IT possess?* which is aligned to RO_2*: Determine the common personal traits of women who choose a career in Information Technology*. Women with a high level of self-confidence were highlighted as most likely to assess their abilities and find them equal to their male counterparts. They were established to have an internal locus of control and more willing to opt for IT, developing computer self-efficacy. An investigation into RQ_3*: What are the factors that affect women in IT's career choice?* was conducted and this established a response to RO_3*: Establish the factors that influence women's career choices in Information technology.*

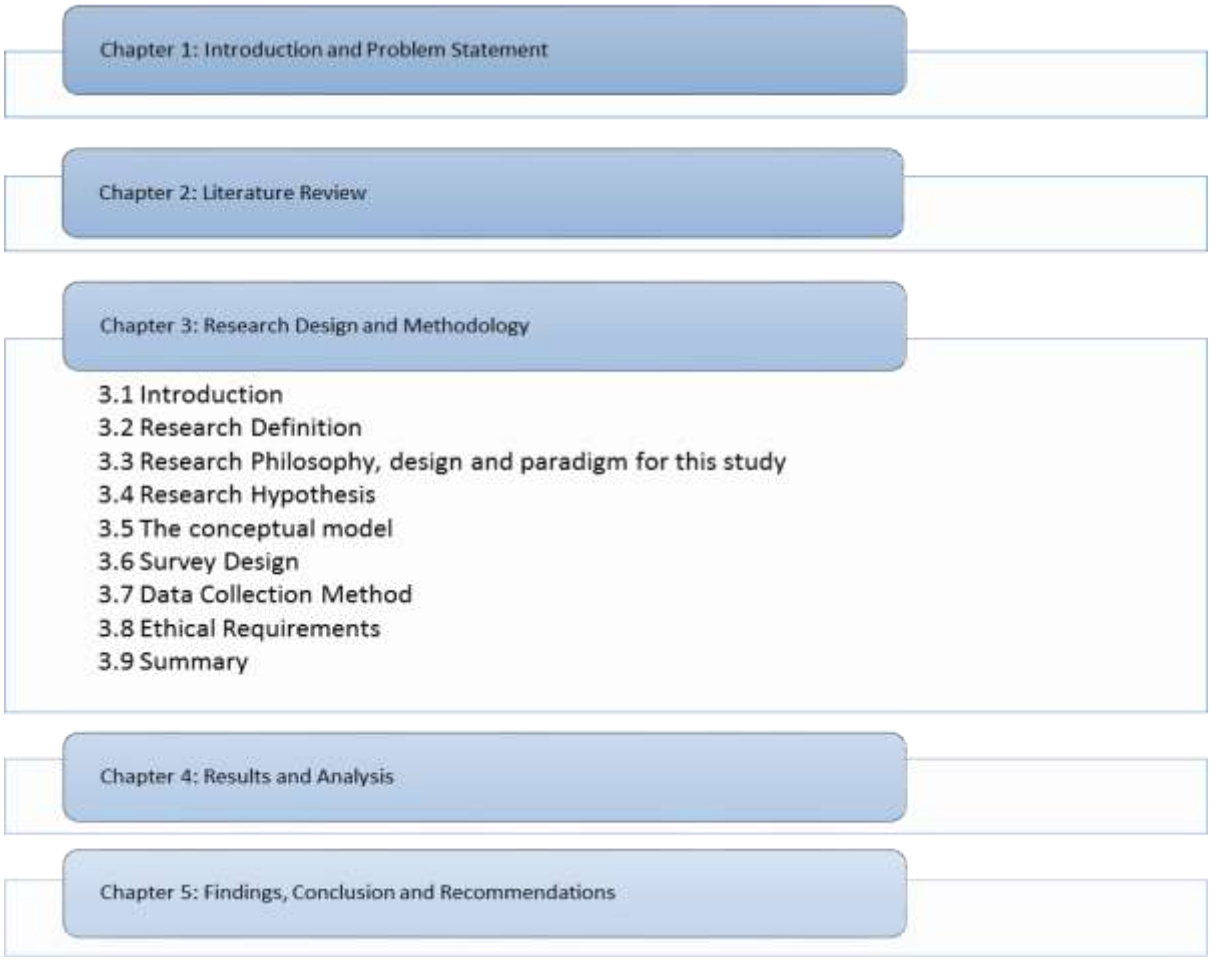
The literature established that the family structure, early access to technology, guidance from teachers and counsellors was the key interest raiser for women while in their early years. This established interest led to familiarity with the content and environment of IT and thus women more socialised to this environment were prone to enter and remain in the field of IT. The literature review highlighted that barriers in the workplace in the form of male dominated environments with notable gender gaps in pay, lack of professional networks and mentors along with long and rigid hours led to women battling to continue with IT after starting a family.

In this Chapter, an outline of the research approach and research design will be expanded to methodically explain the research process, data collection and ethical requirements adhered to as part of the empirical research of the treatise. Chapter 3 will specifically address research question 4: RQ_4: *What research design can be used in this study?* Which will provide answers for the fourth research objective *RO_4: Formulate a research methodology to test the proposed model.*

To begin the section, an understanding of research methodology will be clarified which will clarify the meaning, purpose and approach selected to conduct this research. This will provide a theoretical background for the methods used in this treatise.

The Chapter outline will be illustrated as follows in Figure 3.1.

Figure 3.1: Chapter 3 Outline



(Source: Author's own creation)

3.2 Research Definition

New knowledge is acquired through undertaking research; thus, research is the important creation of a new body of information using data collection tools, methods and techniques (Almalki, 2016). Research is a way to contribute to existing knowledge or produce new knowledge on a specific topic (Saunders, Lewis & Thornhill, 2009). Kothari, (2010: 1) describes research as a "systematic inquiry aimed at providing information to solve problems" and further details research as a 'scientific and systematic search for pertinent information on a specific topic' this description is similar to the explanation used by Collis & Hussey (2014: 2) who described research as a "systematic and methodical process of inquiry and investigation with a view to increasing knowledge".

Research is a planned process that is undertaken to establish facts about a certain question or problem, testing a hypothesis and using scientific along with technical tools to reach a conclusion. Research has various sources that can be classified into two groups, namely primary and secondary sources. Primary sources are instruments that collect and produce new knowledge on a certain topic, tools such as survey's, interviews and focus groups which are utilised to produce this original information. Secondary sources comprise of information already collected, published and available, this source of secondary information helps with establishing the topic, it provides a background into the topic and assists with understanding what is already known. Secondary sources enlighten as to the current debates on subject matter before the research is undertaken (Zikmund, Babin, Carr & Griffin, 2013).

Kothari (2010: 11) details the steps required for research to be undertaken as follows:

- Defining and redefining the problem,
- Formulating a hypothesis or a suggested solution,
- Collecting, organising and evaluating data,
- Making deductions and reaching conclusions, and
- Testing the conclusion to determine a fit to the hypothesis.

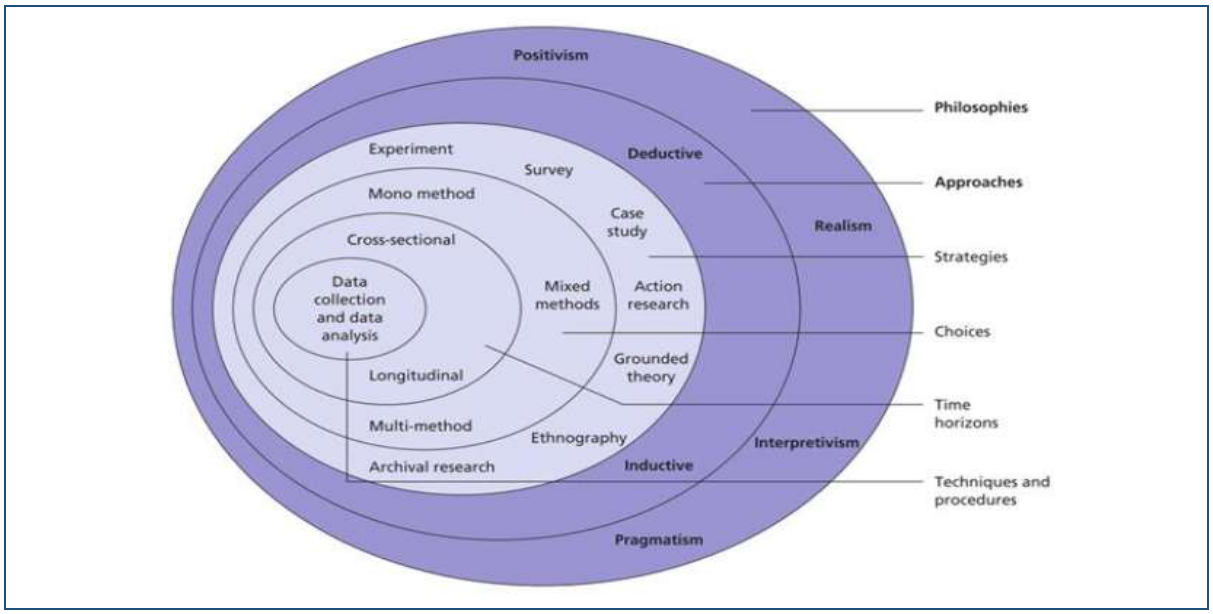
There are various types of research with opposing patterns and each attribute can be described according to the research purpose. Kothari (2010; 2) explains the various types of research as follows:

- Descriptive vs Analytical. Descriptive research seeks to establish the facts through collecting data and ultimately describes the state of affairs and the results as they are. The researcher has no control over the variables and is only a narrator to what the tools have indicated. In analytical research, the information is already available for the researcher, an analysis is performed to make a conclusion;
- Applied vs Fundamental. Applied research is aimed at seeking an immediate practical solution for a current problem that is affecting society or business while Fundamental is aimed at formulating and theory and generalising it to general society;
- Qualitative vs Quantitative. Qualitative research is concerned with discovering motives for certain actions and desires using techniques such as personal interviews, this type of research is key for research on finding motives for human behaviour. Quantitative research is objective data collection whereby the researcher is independent of the study. Scientific methods are used to reach a conclusion; and
- Conceptual vs Empirical. Empirical research is research conducted and concluded using data collected through the study. Conceptual is research based on an abstract idea or theory that is used by philosophers to develop concepts or re-interpret existing concepts.

The research process has different elements involved from initial problem definition phase to conclusion. A model which illustrates this process is metaphorically termed the ‘research onion model’ (Saunders et al., 2009) in Figure 3.2, this model provides guidance and direction that needs to be adopted by a researcher when undertaking research. The onion illustrates the range of available philosophies, choices, strategies paradigms and other critical steps that need to be considered by researchers from the beginning to the end, in the form of layers the research process is demonstrated.

The research process model in Figure 3.2 moves from the outside towards the inside, summarising important choices to be considered and reviewed before research is undertaken. Initially, the researcher must choose the philosophical orientation of the study, peeling towards the centre. He/she then needs to adopt a research approach, establish a research strategy, review research time lines and establish data collection techniques.

Figure 3.2: The research process onion



(Source: Saunders et al., 2009)

3.2.1 Research Paradigms and approaches

A research study is guided by a set of beliefs of the researcher, these are what is termed a 'Paradigm' or research philosophy, in the research process onion model this is the outer layer of the onion. Creswell (2014: 31) notes that before a study is undertaken, the researcher during the design process assumes a philosophical assumption which then informs the conduct and writing of the research. The questions and method of collecting the answers for a research topic will be influenced by the choice of paradigm. The paradigm is at times referred to as the 'world view' by Creswell (2014: 35) and this view includes elements of epistemology (what is possible for one to know), ontology (beliefs about the nature of reality), axiology and methodology (different ways of attaining knowledge) (Collis & Hussey, 2014).

There are several research philosophies, namely positivism, realism, interpretivism or pragmatism and most recently critical post-modernist with the two major views being positivism and interpretivism (Zikmund et al., 2013, Collis & Hussey, 2014). Historically, there were two opposing choices, the positivist which is associated with quantitative methods and interpretivism which is associated with qualitative methods. Over time the philosophy of pragmatism and realism was introduced to allow for researchers to choose the view that is most suited to the study, whether it be social or scientific.

The positivist approach as detailed by Saunders et al., (2009; 15) adopts that there is a single reality and necessitates the researcher to be objective and unbiased while conducting the study. The common characteristics of this approach are that it is largely scientific, logical, traditional and experimental, the research approach is deductive as all possible variables are isolated before the study and the study is used to find an explanation and an understanding of these variables (Collis & Hussey, 2014). A large sample of data is commonly used to ascertain the hypothesis and avoid bias thus the researcher remains detached and neutral.

Interpretivism is the opposite of positivism as it is intuitive and subjective (Saunders et al., 2009). The interpretivism paradigm requires that a qualitative method be used to conduct the study, whereby the researcher is subjective and interpretive on the topic under study. This approach assumes that there are multiple realities with different interpretations and thus careful detailing of the human experience is critical to reaching a conclusion. The researcher immerses her/herself and thus has a level of subjectivity. This philosophy stresses the need to place observations and conclusions from a data sample in context. This means the researcher tries to make sense of the information including all human and social complexities to make population inferences (Collis & Hussey, 2014).

This interactive philosophy is based on the presumption that using qualitative data collection methods which are small in sample size and may include interviews and personal observations leads to better conclusions, which are subjectively drawn from

experiences of the researcher. The research approach is inductive in nature as only after research are variables uncovered based on sample results (Collis & Hussey, 2014).

When research does not fit into positivism and interpretivism, other research philosophies such as pragmatism or realism can be adopted (Creswell, 2014). The pragmatism philosophy stresses that there is no single viewpoint to paint an entire picture therefore the realities can be in multiples. Various techniques and tools are used to collect and analyse data, and most times researchers used mixed methods of qualitative and quantitative data collection to form a conclusion. This 'worldview' is pluralistic and problem centred as it seeks to answer the what and how in research.

Realism is similar to the philosophy of positivism and is concerned with scientific enquiries. In this philosophy, the researcher's reality is not dependent on the mind, the researcher can rely on the senses to present the truth (Creswell, 2014). There are two classifications of realism: direct realism and critical realism. Direct realism is centred on the belief that accurate representation of the truth can be derived from experiences which are provided by senses while critical realism believes that everything is experienced by the senses and later processed by the mind subjectively. A researcher can use either or both qualitative and quantitative methods to collect and analyse data.

In this study, the philosophy of positivistic paradigm will be adopted. This will enable a large qualitative sample to be used to draw a scientifically logical conclusion. The results will be independent of the researcher and scientific tools will be used to test the hypothesis and obtain reliable empirical results. Various independent and dependent variables will be explored to understand the trends revealed by the sample.

3.2.2 Qualitative Research

The qualitative method seeks to discover and explore a certain problem whereby little information has been gathered, this method is subjective as the researcher decides on the context (Collis & Hussey, 2014). Kothari (2010: 5) explains that

qualitative research is concerned with assessing the attitudes, behaviour and opinions of the population under study and its thus non-quantitative as it delves into human analysis rather than scientific analysis (Almalki, 2016).

Creswell (2014: 45) defines methods undertaken in a qualitative study as follows:

- Emerging methods;
- Inductive;
- 'Rich' data;
- Open ended questions;
- Interview data, observation data, document data and audio-visual data;
- Text and image analysis; and
- Themes, patterns interpretation.

3.2.3 Quantitative Research

The quantitative method uses statistical numerical tools to collect and analyse the researcher's variables (Almalki, 2016). The research is to provide in-depth analysis into a problem. The researcher is objective of the results and does not form an opinion and is guided by the results to conclude on the research topic.

Creswell (2014: 45) describes the methods used in quantitative research as follows:

- Pre-determined;
- Deductive;
- Instrument based questions;
- Performance data, attitude data, observational data and census data;
- Statistical analysis; and
- Statistical interpretation.

3.3 Research Philosophy, design and paradigm for this study

The research design is the conceptual structure and strategy with which the research will be conducted. The design provides a structure to collect, measure and analyse the data. According to Kothari (2010: 32), research design facilitates the smooth sailing of research operations enabling maximum information to be gathered with minimal costs and money. Research design enables the researcher to have a plan of action that help reach the goal, taking into consideration the plan to reach research

participants, collect information and answer the research question (Zikmund et al., 2013).

The following sub-sections will detail the research paradigm, quantitative approach and time horizon taken for this treatise.

3.3.1 Research Paradigm

As the different philosophies modelled in the research onion were explained in Sub-section 3.2.1 and illustrated on Figure 3.1, for the purpose of this treatise a positivistic research paradigm will be adopted. This allows the researcher to distance his/herself from subjective participation in the research (Collis and Hussey, 2014). Scientific tools will be used to objectively study the subject being investigated. Zikmund et al, (2013: 14) expands this paradigm as quantitative, objectivist, traditional and scientific.

Women choices with regards to opting for a career in Information Technology and remaining in the field of IT will be investigated with a focus on the factors that aid and influence women when choosing a career in IT. A sample of women who are IT professionals has been selected for the study and the findings will be generalised in order to represent the South African population. The expected respondents are women who are in the IT professional environment.

This treatise will explain the relationships between the three dependent variables Females o*pting for a career in IT, females remaining in an IT career,* to the ten independent variables *personality traits, skills and aptitude, management of IT career, environment during school years, environment after school years, culture and societal attitudes regarding IT career, career demands, family demands, gender bias and male, female perceptions regarding women in IT and personal success in IT*

3.3.2 Research Strategy

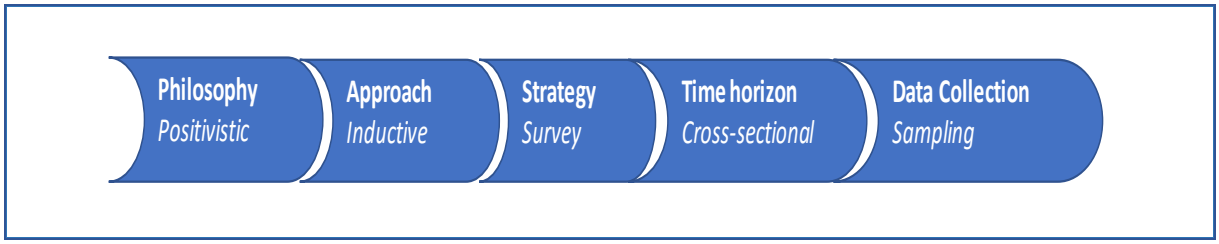
The positivist paradigm uses the quantitative methods to collect data (Collis & Hussey, 2014). Using a survey design questionnaire, a sample of random females will be sent a survey to complete. The response received will be collected and analysed to reach a conclusion regarding women in IT's career choices. This conclusion will be inferred to the general Information Technology population. The

results will contain the scientific features of quantitative research with high levels of reliability as the conclusion will be precise and based on scientific information obtained.

3.3.3 Time Horizon

In Figure 3.2, the research onion model's inner layer in the research process before the core emphasises the time horizon undertaken for the research. Research can be conducted at a point in time to solve a problem, this short time frame for research is termed cross-sectional. Research instruments such as surveys, polls and case studies are used to gather information and act as a snapshot of sample regarding a certain topic at a particular point in time (Saunders et al., 2009). When research is conducted over a lengthy period, it is termed longitudinal. This type of research is performed to monitor changes and observe trends of the unit under study. The research for this treatise was undertaken at a particular time thus falls into the cross-sectional research approach. The research methodology for this treatise is illustrated in Figure 3.3 addressing all layers of the 'research process onion'.

Figure 3.3: Research Methodology for this treatise



(Source: Authors own construction)

3.3.4 Unit of analysis

The participants in this study are individual women who are working or employed in the Information Technology field. This population is aligned to the topic as the examination of the treatise is in studying women who are in the IT profession. Collis & Hussey, (2014; 101) clarifies that the unit of analysis is the population that provides feedback for a conclusion, thus providing answers to the main research problem and research question. As the survey is online, geographically all females who reside in South Africa have access to reach and complete the survey.

3.4 Research Hypothesis

In Chapter 2, the proposed conceptual model illustrated the dependent and independent variables that are under study. These variables will be tested to assess if there are correlations between them. All hypotheses will be accepted or rejected based on the statistical analysis.

The following is a list of the hypotheses of the conceptual model shown in Figure 3.4:

3.4.1 Personality Traits

$H0_1$: 'Personality traits' exerts no influence on females opting for a career in IT.
HA_1: 'Personality traits' positively influence females on opting for a career in IT.

3.4.2 Skills and Aptitudes

$H0_{2A}$: 'Skills and aptitude' exerts no influence on females opting for a career in IT.
HA_{2A}: 'Skills and aptitude' positively influences females on opting for a career in IT.

$H0_{2B}$: 'Skills and aptitude' exerts no influence on females remaining in the field of IT.
HA_{2B}: 'Skills and aptitude' positively influences females remaining in the field of IT.

3.4.3 Environment during school years

$H0_3$: 'Environment during school years' exerts no influence on females opting for a career in IT.
HA_3: 'Environment during school years' positively influence females on opting for a career in IT.

3.4.4 Environment after school years

$H0_4$: 'Environment after school years' exerts no influence on females opting for a career in IT.
HA_4: 'Environment after school years' positively influence females on opting for a career in IT**.**

3.4.5 Culture and societal attitudes regarding IT career

$H0_{5A}$: 'Culture and societal attitudes regarding an IT career' exerts no influence on females opting for a career in IT with a measure of personal success.
HA_{5A}: 'Culture and societal attitudes regarding an IT career' positively influences females on opting for a career in with a measure of personal success.

$H0_{5B}$: 'Culture and societal attitudes regarding IT career' exerts no influence on females remaining in the field of IT with a measure of personal success.
HA_{5B}: 'Culture and societal attitudes regarding IT career' positively influences females remaining in the field of IT with a measure of personal success.

3.4.6 Career demands

$H0_{6}$: 'Career demands' exerts no influence on females opting to remain in the field of IT with a measure of personal success.
HA_{6}: 'Career demands' positively influences females opting to remain in the field of IT with a measure of personal success.

3.4.7 Family demands

$H0_{7}$: 'Family demands' exerts no influence on females opting to remain in the field of IT with a measure of personal success.
HA_{7}: 'Family demands' positively influences females opting to remain in the field of IT with a measure of personal success.

3.4.8 Gender Bias

$H0_{8}$: 'Gender bias' exerts no influence on females opting to remain in the field of IT with a measure of personal success.
HA_{8}: 'Gender bias' positively influences females on opting to remain in the field with a measure of personal success.

3.4.9 Male and female perceptions regarding women in IT

$H0_{9A}$: 'Male and female perceptions regarding women in IT' exerts no influence on females on opting for a career in IT with a measure of personal success.
HA_{9A}: 'Male and female perceptions regarding women in IT' positively influences females on opting for a career in IT with a measure of personal success.

$H0_{9B}$: ‘Male and female perceptions regarding women in IT’ exerts no influence on females remaining in the field of IT with a measure of personal success.
HA_{9B}: ‘Male and female perceptions regarding women in IT’ positively influences females remaining in the field of IT with a measure of personal success.

3.4.10 Management of IT career and remaining in the field.

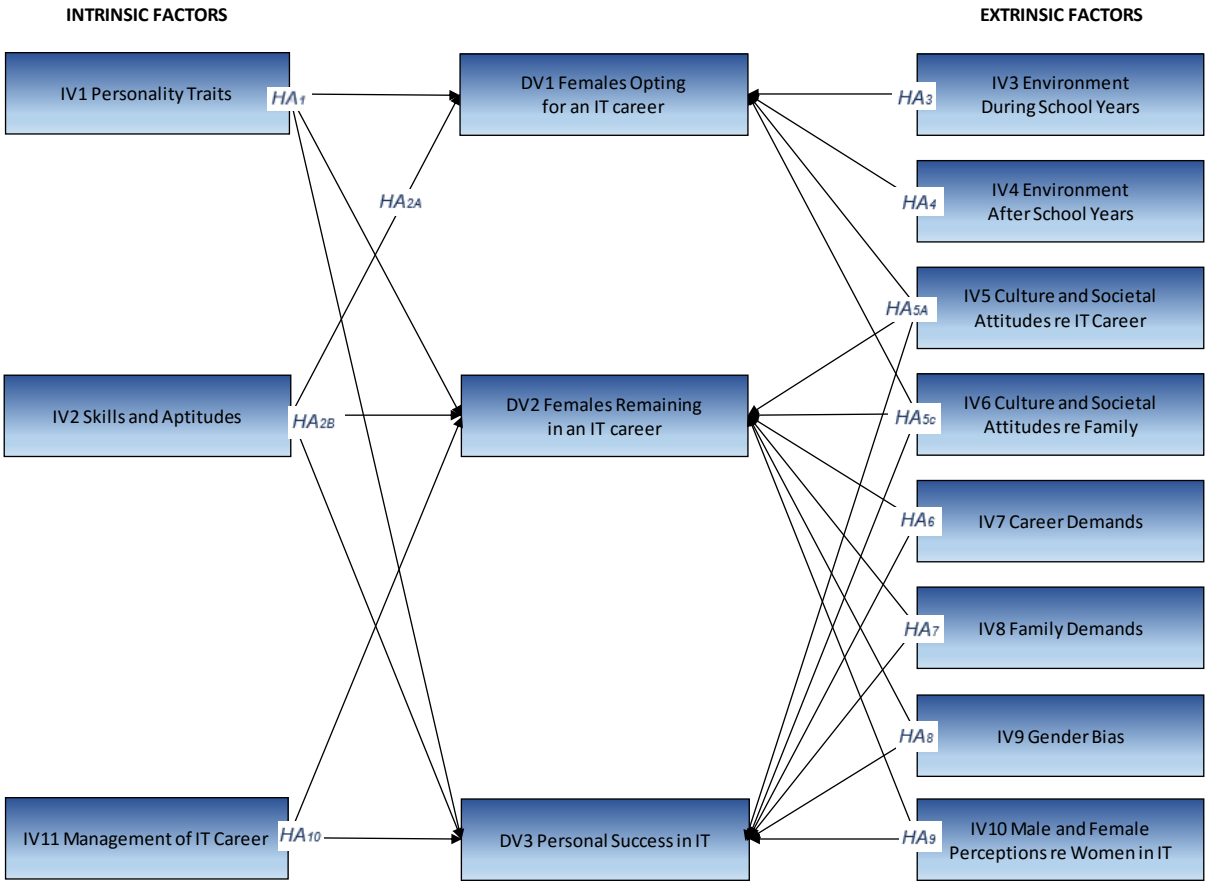
$H0_{10}$: ‘Skills and aptitude’ exerts no influence on females on opting for a career in IT and remaining in the field with a measure of personal success.
HA_{10}: ‘Skills and aptitude’ positively influences females on opting for a career in IT and remaining in the field with a measure of personal success.

3.5 The conceptual model

The conceptual model consists of independent (IV) and dependent variables (DV). These variables are to test intrinsic and extrinsic factors that affect career choice for females. Three dependent variables will be tested being 1) Females opting for a career in IT, 2) Females remaining in an IT career and 3) Personal success in IT.

The Independent variables under the study were eleven and comprised of 1) Personality Traits, 2) Skills and Aptitude, 3) Environment during school years, 4) Environment after school years, 5) Culture and societal attitudes regarding career in IT, 6) Culture and societal attitudes regarding family, 7) Career Demands, 8) Family demands, 9) Gender Bias, 10) Male and female role models and 11) Management of IT career. Illustrated in Figure 3.4 is the complete hypothesised conceptual model.

Figure 3.4: Hypothesised Conceptual model



(Source: Authors own construction)

3.6 Survey Design

The following sub-sections will elaborate on the survey design adopted for this treatise in order to validate the proposed Hypothesised Conceptual Model.

3.6.1 Survey design defined

Surveys are research collection instruments that allow for greater reach of the population while saving on time and costs. Creswell (2014: 202) describes surveys as the numeric tool to gather trends, attitudes and opinions of the population under study. As a researcher uses a survey, the ability to be objective is heightened and greater accuracy can be expected as the results are recorded mathematically (Almalki, 2016).

A survey approach was chosen to collect information from the female IT population and to attain a higher response rate to the research questions and research objectives. Surveys allow for the gathering of large data which is scientifically

analysed to guarantee that the information received is current, conclusive and accurate. The sample method used will be non-probability sampling as the questionnaire will be sent to a selected sample size from an Information Technology company database, academics and alumni of the North-West University, University of South Africa and Nelson Mandela University. Companies such as BCX Eastern Cape, Dimension Data, Britehouse, Syspro ERP Johannesburg, Tigers Eastern Cape, Volkswagen SA and Mercedes Benz SA were sent survey's to be completed.

3.6.2 Questionnaire design and scale

Data will be collected using a questionnaire incorporating both close and open-ended questions. The questionnaire will be divided into two sections consisting of demographic information and independent variables. A Likert rating scale statement with ratings from (5), Strongly disagree (4), disagree (3), Not sure (2) agree (5) strongly agree was used to clarify the replies and assist with gather meaningful information from respondents regarding their feelings and factors that led them to choose a career in information technology and to continue staying in the profession.

The survey will be accompanied by a cover page that will introduce the purpose of the research study, advise of the ethical consideration and encourage participation. The first part of the questionnaire will obtain demographic information such as age, marital status and educational qualifications while the lengthy party of the questionnaire will gather data relating to each factor. The online platform Question Pro will be used to collect responses, and the statistical analysis will be done on Statistica which is provided by the Nelson Mandela University.

3.7 Data Collection Method

The following sub-sections will detail the data collection methods used for purposes of this study.

3.7.1 Literature review

Literature according to Creswell (2014: 60) is an important part of research as it exposes the researcher to ongoing dialogue on the topic of study, fills in the gap and provides a framework for the research. Primary and secondary sources of information were used to complete the study. Secondary sources were used to gain

insight into what is already known and to establish the gaps in the current literature, this helps benchmark the findings to existing literature (Creswell, 2014).

A wide range of sources provided the information such as the library at Nelson Mandela University, University of Johannesburg library which provided textbooks and articles while online platforms such as Google Scholar assisted with national and international sources. Primary research was conducted in the form of an online questionnaire and the methods of data collection will be elaborated in the following paragraphs.

3.7.2 Population

Cooper & Schindler (2011: 345) describe population as the body of people under examination for research purposes, who have a set of shared characteristics that can be identified by the researcher. The population of information technology professionals that is registered with the South African IT body IITPSA is over 8000 members, a survey sent via the monthly newsletter was released to the IT population which has more than a 1000 woman registered as members to test the attitudes and barriers affecting this population.

The IITPSA organisation currently has 83% male membership and female membership is at 17%. Various academic institutions such as the Nelson Mandela University, University of South Africa and private technology companies such as BCX Eastern Cape, Dimension Data, Britehouse, Syspro ERP Johannesburg, Tigers Eastern Cape, Volkswagen SA and Mercedes Benz SA will be sent the e-mail survey, these heads of IT department will distribute the email to their relative IT department members, selecting only females to be sent the survey for completion. The email survey will be collected via an online platform service from Question Pro.

Thus, included in the population are women in:

- Academia;
- Private business and Government; and
- Leadership positions In the IT field.

3.7.3 Sample and sampling method

The feedback required is from females working in the IT profession, thus in order to reach the population intended, targeted sampling will be used to send the survey to selected female IT women professionals. The sample will be placed in the monthly IT newsletter allowing for randomly targeted females to partake in the study. With this sampling complete, the results will be taken to represent the views of women in the IT population and will be generalised to the industry. Numerically coded responses allow for mathematical based techniques to be used to generalise the information gathered (Almalki, 2016).

3.7.4 Questionnaire distribution

A larger sample was sent via e-mail to women in IT, this was done through various sources. Initially the IITPSA that enlists IT professionals from different industries assisted in reaching the population of women under study. An e-mail survey is effective in reaching large sections of the population while being low in cost. A once off cross-sectional survey was chosen that was aimed at gathering data on attitudes, external factors and industry trends from various participants at a time of their convenience and at the comfort of their desk.

The results received will be used to generalise to the general information technology population in South Africa. The sample method has been chosen as it provides greater objective responses as at that current period. In Table 3.1 the operalisation of the questionnaire is illustrated, with each factor being guided by the literature review.

Table 3.1: Questionnaire with dependent and independent variables

Code	**South African women in IT**	
	Variable	**Source**
	Personality traits	
	Independent Variable 1	
IPT1	I am confident I can handle future unexpected events	Main et al., 2016, Patitsas, 2014
IPT2	I need re-assurance for my good work	Alexander et al., 2011
IPT3	I'm confident I can resolve complex technical problems on my own	Alexander et al., 2011
IPT4	I am happy with myself	Main et al., 2016

IPT5	I am able to do my work as well as most other people	Patitsas, 2014
IPT6	I am satisfied with myself	Alexander et al., 2011
IPT7	It is easy for me to accomplish my goals	Govender et al., 2014
IPT8	I am not intimidated by a predominantly male environment	Alexander et al., 2011
IPT9	I am passionate about the work I do	Main et al., 2016
	Skills and Aptitude	
	Independent Variable 2	
SE1	I like solving problems and getting things to work	Croasdel et al., 2010
SE2	I am able to handle conflict in a team environment	Pretorius et al.,2009
SE3	I am able to handle conflict with my male colleagues	Pretorius et al.,2009
SE4	I am able to handle conflict with my female colleagues	Pretorius et al.,2009
SE5	In my job, I am competent working with computers	Appianing & Van Eck, 2015
SE6	In my job, I am confident working with computers	Appianing & Van Eck, 2015
SE7	I am able to do my work as well as most other people	Appianing & Van Eck, 2015
SE8	In my job, I have confidence to work with team members who have many years of experience	Pretorius et al.,2009
SE9	I am compatible with my colleagues	Pretorius et al.,2009
	Environment during school years	
	Independent Variable 3	
ED1	I was introduced to computers during my early basic education years	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
ED2	I had a computer at home growing up	Njoki et al., 2016
ED3	I received adequate training at school which prepared me for higher education	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
ED4	I found IT to be an enjoyable subject whilst growing up	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
ED5	I was encouraged to believe that girls could do anything they pursued, just like boys	Appianing & Van Eck, 2015; Hunter & Boersen, 2015
ED6	I received family encouragement to pursue an IT career	Appianing & Van Eck, 2015; Armstrong & Riemenschneider, 2014
ED7	At school, my friends encouraged me to pursue an IT career	Appianing & Van Eck, 2015; Armstrong & Riemenschneider, 2014
ED8	At school, IT was considered for boys only	Njoki et al., 2016
ED9	At school, girls did not consider pursuing IT careers	Armstrong & Riemenschneider, 2014
ED10	At school, girls doing IT were seen as different	Njoki et al., 2016; Armstrong & Riemenschneider, 2014

ED11	At school, I was involved in computer projects/classes	Armstrong & Riemenschneider, 2014
ED12	At school, I received career guidance from my career counsellors	Armstrong & Riemenschneider, 2014
ED13	At school, I received career guidance from my teachers	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
ED14	At school, IT was perceived as a difficult subject	Armstrong & Riemenschneider, 2014
ED15	My passion for IT started during my schooling years	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
ED16	After school, I had friends working in the IT industry	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
	Tertiary Education	
	Independent Variable 4	
TE1	Tertiary education prepared me well for the job environment	Njoki et al., 2016
TE2	I received a bursary to study for an IT qualification	Njoki et al., 2016, Patitsas, 2014
TE3	I studied the correct IT qualification for my profession	Njoki et al., 2016
TE4	Tertiary education prepared me well for a career in IT	Njoki et al., 2016
TE5	A tertiary education is important for a successful career in IT	Njoki et al., 2016
	Environment after School years	
	Independent Variable 5	
ES1	My family encouraged me to choose IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
ES2	My friends encouraged me to choose IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
ES3	My religious circle encouraged me to choose IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
ES4	My family discouraged me from choosing IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
ES5	My friends discouraged me from choosing IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
ES6	My religious circle discouraged me from choosing IT as a career	Appianing & Van Eck, 2015, Vitores et al., 2015
	Culture and Societal Attitudes about IT	
	Independent Variable 6	
CS1	An IT career is respected in my community	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
CS2	In my culture, IT is not seen as a career for women	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
CS3	In my culture, people have a clear understanding of IT	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
CS4	In my culture, people have a clear understanding of IT careers	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
CS5	In my community, people are familiar with-IT careers	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014

CS6	In my culture, having a large family is important	Pretorius & De Villiers, 2010, Nilsen et al., 2000
CS7	In my culture, a woman is expected to have a family and children	Pretorius & De Villiers, 2010, Nilsen et al., 2000
	Career Demands	
	Independent Variable 7	
CD1	I am at times burnt out by the demands of my job	Mckinney, 2008; Patitsas 2014
CD2	My career allows me to have both, a career and a family life	Pretorius & De Villiers, 2010; Du Bow 2014
CD3	I control my time at work	Mckinney, 2008; Patitsas 2014
CD4	I have a good relationship with my colleagues	Mckinney, 2008; Patitsas 2014
CD5	I have been given adequate resources to fulfil my job	Pretorius & De Villiers, 2010; Du Bow 2014
CD6	An IT career allows me to have a balanced family life	Pretorius & De Villiers, 2010; Du Bow 2014
CD7	An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	Pretorius & De Villiers, 2010; Du Bow 2014
CD8	My IT career requires me to travel to other cities/towns	Pretorius & De Villiers, 2010; Du Bow 2014
CD9	My IT career requires me to work long hours	Pretorius & De Villiers, 2010; Du Bow 2014
CD10	My IT career requires me to work after hours	Pretorius & De Villiers, 2010; Du Bow 2014
	Family Demands	
	Independent Variable 8	
FD1	I control my time away from work	Mckinney, 2008; Patitsas 2014
FD2	I feel guilty for sacrificing family time to pursue my career in IT	Pretorius & De Villiers, 2010; Du Bow 2014
FD3	I need to prove that having a family will not impact my work-life	Pretorius & De Villiers, 2010; Du Bow 2014
FD4	Family responsibilities prevent me from growing further in an IT career	Pretorius & De Villiers, 2010; Du Bow 2014
FD5	My work-life commitments impact the time I can spend with my family	Pretorius & De Villiers, 2010; Du Bow 2014
FD6	It is difficult to manage my work-life and family time	Pretorius & De Villiers, 2010; Du Bow 2014
FD7	I would like to have more available time to spend with my family	Pretorius & De Villiers, 2010; Du Bow 2014
	Gender Bias	
	Independent Variable 9	
GB1	My IT career has a glass ceiling because I am a woman	Rogers, 2015; Armstrong & Riemenschneider, 2014
GB2	Women in IT are paid less than men doing the same work	Mckinney, 2008; Patitsas 2014
GB3	Family responsibilities prevent women from travelling, nationally and internationally	Pretorius & De Villiers, 2010; Nielsen et al., 2000

GB4	Family responsibilities prevent men from travelling, nationally and internationally	Pretorius & De Villiers, 2010
GB5	I have enough support to manage the dual role of being a working woman and being a mother to my children	Mckinney, 2008; Patitsas 2014
GB6	I have been given equal opportunities as my male counterparts	Armstrong & Riemenschneider, 2014
GB7	My workload is the same as that of male colleagues	Mckinney, 2008; Patitsas 2014
GB8	Professional standards are higher for women than men	Mckinney, 2008; Patitsas 2014
GB9	I need to work harder at my career because I am female	Mckinney, 2008; Patitsas 2014
	Male and female perceptions	
	Independent Variable 10	
MF1	My male colleagues respect my work	Thiele et al., 2013; Smith 2013
MF2	My female colleagues respect my work more than my male colleagues	Thiele et al., 2013; Smith 2013
MF3	My female colleagues are more competitive than my male colleagues	Thiele et al., 2013; Smith 2013
MF4	My female colleagues appear to feel threatened by my abilities	Thiele et al., 2013; Smith 2013
MF5	My male colleagues appear to feel threatened by my abilities	Thiele et al., 2013; Smith 2013
MF6	In my job, I am comfortable working within male dominated teams	Thiele et al., 2013; Smith 2013
MF7	I have a lot of support from my male colleagues	Thiele et al., 2013; Smith 2013
MF8	I have a lot of support from my female colleagues	Appianing & Van Eck, 2015; Patitsas, 2014
MF9	At work, I have received support from my male manager/employer	Thiele et al., 2013; Smith 2013
MF10	At work, I have received support from my female manager/employer	Thiele et al., 2013; Smith 2013
MF11	Socialising with male team members can be awkward/sensitive	Thiele et al., 2013; Smith 2013
	Management of IT career	
	Independent Variable 11	
MO1	Belonging to a professional IT body is important for my career	
MO2	I spend time with my colleagues after work	Thiele et al., 2013; Smith 2013
MO3	I have female role models working in IT	Appianing & Van Eck, 2015
MO4	I network with other women in IT	McGee, 2018
MO5	I engage with successful women in IT	McGee, 2018
	Perceptions about IT as a career	
	Independent Variable 12	
PA1	I would recommend an IT career to other females	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014

PA2	My IT career makes a positive contribution to my community	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
PA3	I have a long career ahead of me in IT	Njoki et al, 2016
PA4	My IT career has been rewarding	Njoki et al, 2016
PA5	Women must consider IT as a career	Njoki et al, 2016
PA6	There are different career paths for women in IT	Pretorius & De Villiers, 2010; Von Hellens et al ., 2000; Du Bow 2014
	Successful Women in IT	
	Dependent Variable	
SW1	I have been promoted in my IT career	
SW2	I see myself as a successful woman in IT	Thiele et al., 2013; Smith 2013
SW3	Other people see me as a successful woman in IT	Thiele et al., 2013; Smith 2013
SW4	Successful women in IT perform equivalent jobs to their male counterparts	Thiele et al., 2013; Smith 2013
SW5	Successful women in IT require an appropriate qualification	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
SW6	Successful women in IT have sacrificed their personal life for their career	Pretorius & De Villiers, 2010; Nielsen et al., 2000
SW7	Successful women in IT have work-life balance	Pretorius & De Villiers, 2010; Du Bow 2014
SW8	Successful women in IT are mostly self employed	Pretorius & De Villiers, 2010; Nielsen et al., 2000
SW9	Successful women in IT were exposed to technology early in their life	Njoki et al., 2016; Armstrong & Riemenschneider, 2014
SW10	Successful women in IT had to overcome cultural prejudice	Pretorius & De Villiers, 2010; Du Bow 2014
SW11	Successful women in IT received family support	Pretorius & De Villiers, 2010, Appianing & Van Eck, 2015
SW12	Successful woman in IT are required to constantly keep ahead of change and new technologies	Pretorius & De Villiers, 2010; Nielsen et al., 2000

3.7.5 Data Analysis

Data collection and analysis are based on the scientific tools available for the researcher. In this study, STATISTICA will be used to analyse the feedback. The hypothesis will be accepted or rejected based on a 95% ($p<0.005$) confidence interval. Thus, for any hypothesis to be accepted, there will be a 95% certainty that the finding is accurate, the level of error is 5%.

Pearson's correlation will be used to examine if a relationship exists between variables. A relationship will be deemed existing when one variable increases and simultaneously another variable increase. A relationship will be deemed non-

existent if the variables decrease. The correlation coefficient measures the strength of such correlation. The correlation will be deemed significant at 0.05 level for n ranging from 71 to 55 if |r| >= rcrit ranging from .234 to .266, Practically significant if |r| >= .300. Thus significant (both statistically and practically) if |r| >= .300.

This correlation coefficient (r) can range from -1 (a perfect negative correlation) to +1 (a perfect positive correlation). The various levels of correlations are illustrated below in Table 3.2.

Table 3.2: Strengths of Correlation

0.90 to 0.99	Very high positive correlation
0.70 to 0.89	High positive correlation
0.40 to 0.69	Medium positive correlation
0.00 to 0.39	Low positive correlation
0.00 to -0.39	Low negative correlation
0.40 to -0.69	Medium negative correlation
0.70 to -0.89	High negative correlation
0.90 to 0.99	Very high negative correlation

(Collis and Hussey, 2014)

3.7.6 Reliability and Validity

Reliability is concerned with the measurement of accuracy and precision, ensuring consistency through a study (Cooper & Schindler, 2014) thus a study can be repeated with an expectation of achieving similar results. Validity is concerned with the extent which a test measures what the researcher actually wishes to measure and thus the findings will test and yield the information that the researcher intended to test (Cooper & Schindler, 2014). Combined, these two instruments are the core characteristics of a good measurement tool.

Reliability is a contributor to validity and can be broken down into the following three estimates, Cooper & Schindler (2014: 260):

- Test – retest – this is the test of the consistency and stability of the instrument. A test can be administered twice to the same respondents over an interval or period less than six months to test the feedback;

- Parallel forms – this is the tester of the equivalence. Alternative forms of the same measure administered at the same time or over an interval yield similar results. Correlation methods are used to establish this form of reliability; and
- Cronbach's Alpha – this is to test the measure of internal consistency in a study. The instruments test the degree that the factors are reflecting on the same constructs. Cronbach established that good reliability needs to be a score of over 0.70 (Nunally) while Zikmund et al., (2013) accept 0.60 as fair reliability (Table 3.3).

Table 3.3: Cronbach Alpha – NMU Statistician

Cronbach's Alpha	
<0.50	Unacceptable
0.50 - 0.69	Acceptable
0.70 - 0.79	Good
0.80+	Excellent

- Cohen's D is a statistic tool used to measure practical significance in a One-sample T-test and ANOVA test. The test is used to indicate the difference between two means. The ranges are illustrated in Table 3.4 below.

Table 3.4: Intervals for Cohen's D

Interpretation intervals for Cohen's d:	
<0.20	Not significant
0.20 - 0.49	Small
0.50 - 0.79	Medium
0.80+	Large

(Gravetter & Wallnau)

In this study, to test for reliability, Cronbach's alpha will be used as a guideline to the reliability.

Validity can be scaled down to two forms being external and internal. External validity means that data can be generalised to people, settings and times while internal is limited to the particular study, the research instrument measures only what the researcher aimed to measure.

Validity can be measures in three ways as expanded by Cooper & Schindler (2014: 257):

- Content Validity – At times referred to as face validity. This is the extent to which a measurement instrument provides coverage of all the items which are under the investigation for the study. The instrument is valid if the relevant attitudes and knowledge are collected for the research. This determination is however guided by the researchers own judgement and intuition or that of a panel of people;
- Criterion-related validity – this is predictive and combines the use of estimation by the researcher of the outcome. The researcher can estimate or predict a future or current topic and will have to judge on the qualities of relevance, freedom from bias, reliability and availability to confirm the validity of the study; and
- Construct Validity – this is concerned with the degree by which an instrument conforms to the predicted correlations of other established theories. The effective use of this tool includes convergent techniques along with factor analysis.

Validity in this study was achieved by using literature to guide the research questions. The Questions to measure the various dependent and independent variables were sent to the statistician as well as the research supervisor.

3.8 Ethical Requirements

A researcher needs to conform to certain moral standards and ethics whilst completing the research, in this case a Form E (Appendix 1) for clearance was obtained and approved by the Nelson Mandela University. This form provides assurance that strict research protocols for academic research will be followed. This

form protects the anonymity of the research participant, ensuring that participation is voluntary. Research Participants are assured of the below:

- Freedom from harm;
- Protection of personal data;
- Freedom from exploitation; and
- Ensuring respondents are left with self-dignity after study.

3.9 Summary

In this chapter the research definition and methodology was expanded. Research Question 4 along with Research Objective 4 were established. In this treatise, the researcher opted for a positivism paradigm, which allow for quantitative data collection methods to be used. Data was collected using an online survey platform, Question-Pro. An e-mail survey was sent to women in the field of IT, with an aim to gather cause and effect relationship between the two dependent variables and the 10 independent variables. The data was collected and analysed using Statistica for accuracy, data findings will be generalised to the IT population.

In the following chapter, the results from the survey will be discussed and analysed. This will be done using the statistical tool discussed in this chapter. The results that will be presented will assist in determining the recommendations for the concluding chapter.

4. CHAPTER 4: RESULTS AND CONCLUSIONS

4.1 Introduction

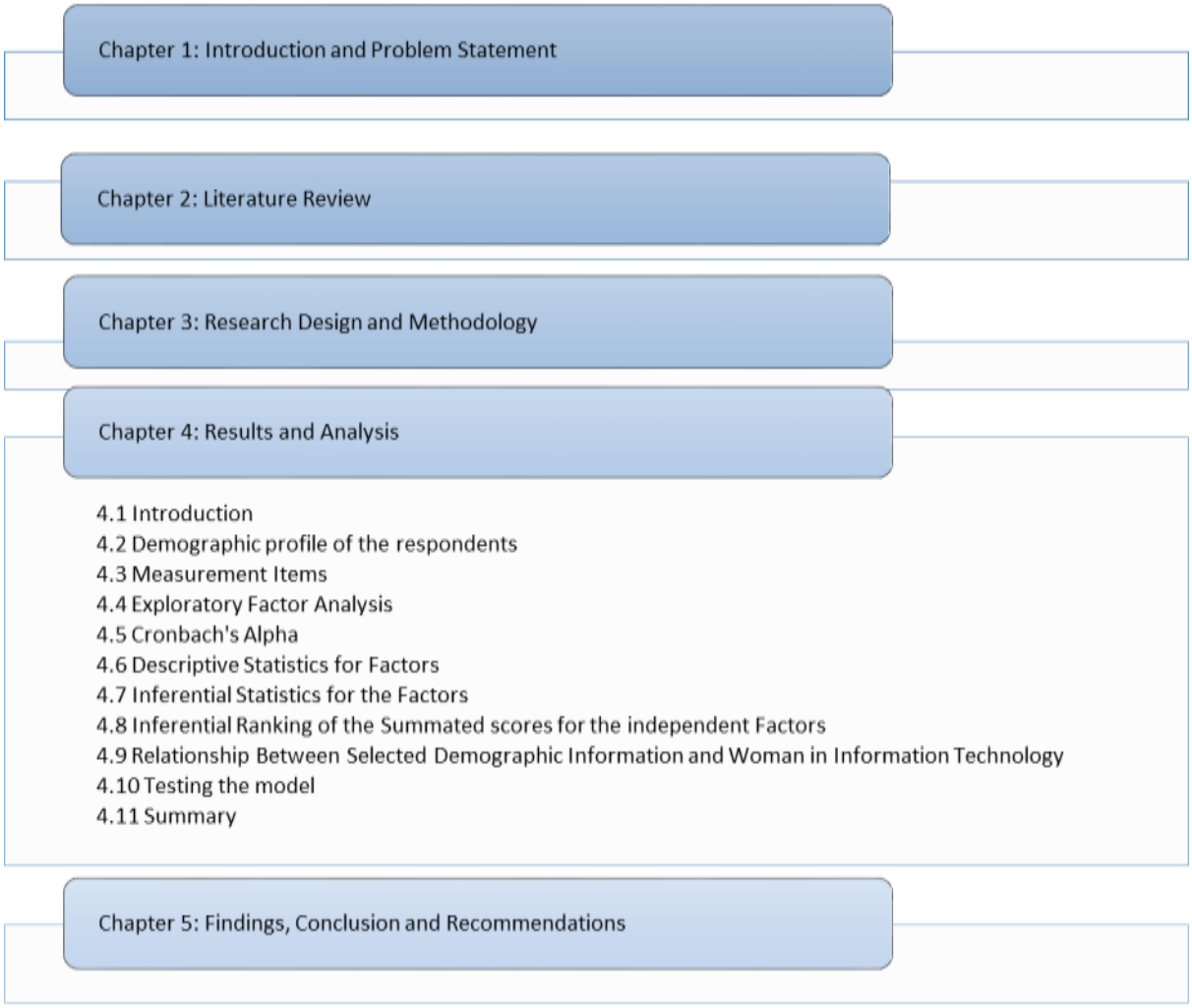
In the preceding chapter, Chapter 3, the research methodology, design and approach for this treatise was expanded. This led to the answer to RQ_4: *What research design can be used in this study?* Which equivalently addressed Research Objective RO_4: *Formulate a research methodology to test the proposed model.* The conceptual model was illustrated in figure 3.2 and indicated the various dependent and independent variables that will be tested under this study of Women in IT.

In this chapter, the results from the survey will be presented, this will address the main research question and answer the main research objective. RQ_m: *What personal characteristics and factors influence women to choose IT as the ideal long-lasting career? T*his addresses the research objective: RO_m: *To identify and analyse the factors that attract women to the Information Technology profession.*

Initially the demographic profile of the respondents which is the first part of the questionnaire will be presented, this section will be followed by the section for the measurement of factors by using frequency distribution tables. Thereafter, the Exploratory Factor Analysis (EFA) which will present the validity and reliability results of the instruments using Eigenvalues, descriptive statistics and Cronbach's Alpha. The chapter will conclude with presenting descriptive statistics such as t-tests to test the proposed model.

Figure 4.1 Provides an outline of this chapter.

Figure 4.1: Chapter Outline



(Source: Author's own creation)

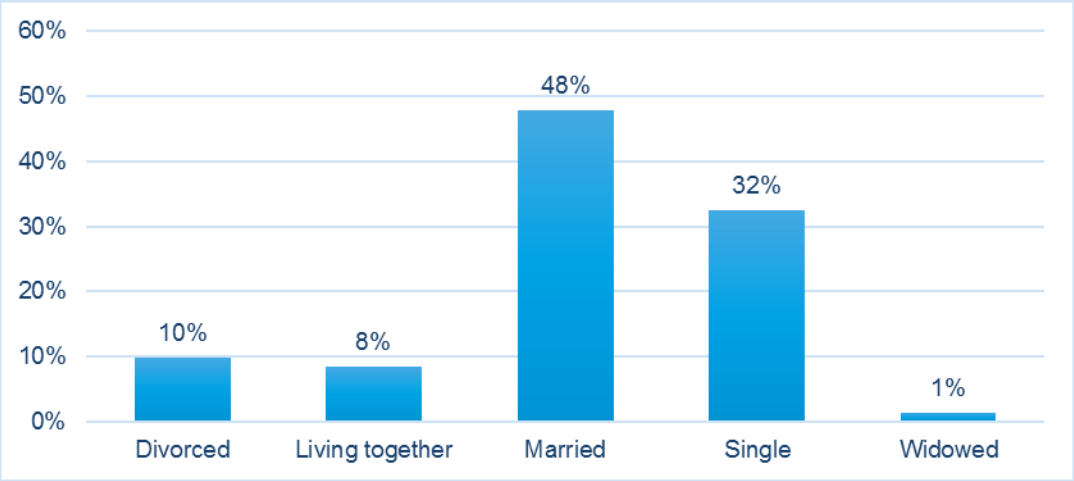
4.2 Demographic Profile of the Respondents

The following sub–section will detail the demographic profile of the survey respondents. The e-mail survey was posted online to a random population of women currently working in the field of IT. Of this population 338 viewed the survey and 75 completed some aspects of the survey. The total response was at a rate of 22%. In the following sub-sections, the demographic information of the respondents will be presented in the form of tables and charts to indicate the identified profiles of the respondents.

4.2.1 Marital Status

Figure 4.2 illustrates the marital status of the survey respondents in the sample of 75, 71 respondents answered regarding their marital status. The highest number of respondents were married woman at 48% (n=34), the second highest group was that of single women who comprised of 32% (n=23). There were a few cases recorded of those who are divorced (n=7, 10%), living together (n=6,8%) and widowed (n=1, 1%).

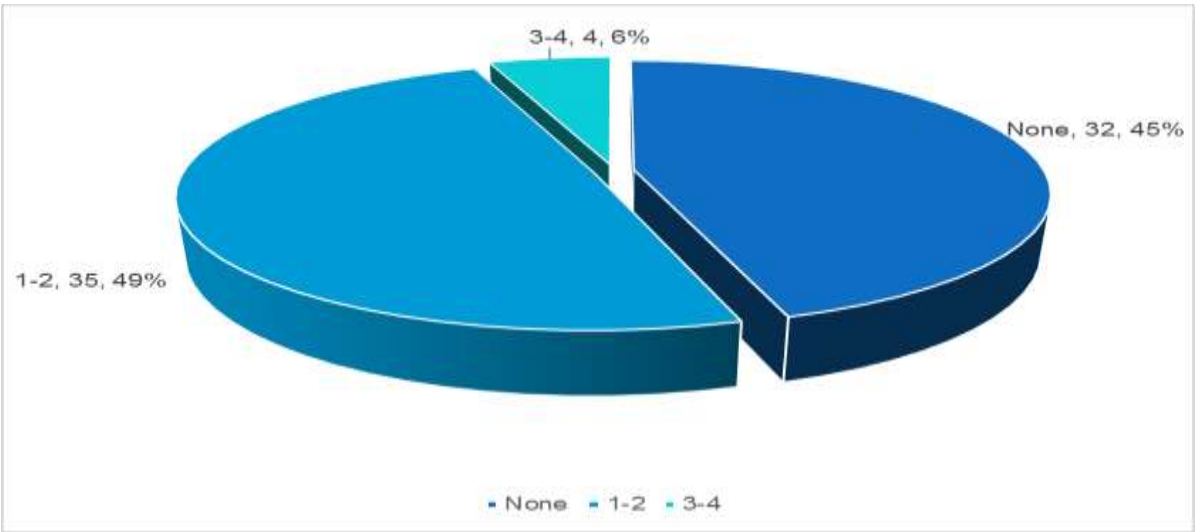
Figure 4.2: Marital Status



4.2.2 Number of Children

In Figure 4.3 it was established that an equal number of respondents that completed their marital status, similarly completed the number of children they had (n=71). Between the three groups being measured, the largest group was of the respondents that had between 1 to 2 children who were 49% (n=35) and they were followed by the respondents that had no children at 45% (n=32), the respondents with 3-4 children were the lowest group with a representation of 6% (n=4).

Figure 4.3: Number of Children



4.2.3 Age

The respondents ages were grouped and measured amongst four different age groups, with two age groups receiving the same number of responses. The age group of those who are between the ages of 21 to 29 years had 32% (n=23) representation, this number is equal to the recorded number of respondents between the ages of 30 to 39 which was similarly 32% (n=23). The recorded figures indicate that the women actively participating in the field of IT are those between the age groups of young adults and middle-aged women. Those between the ages of 40 to 49 were the second highest age group at 21% (n=15) and those in the age group of 50 to 59 were the lowest age group represented in the study with 14% (n=10). This is illustrated below in Table 4.1.

Table 4.1: Age of the respondents

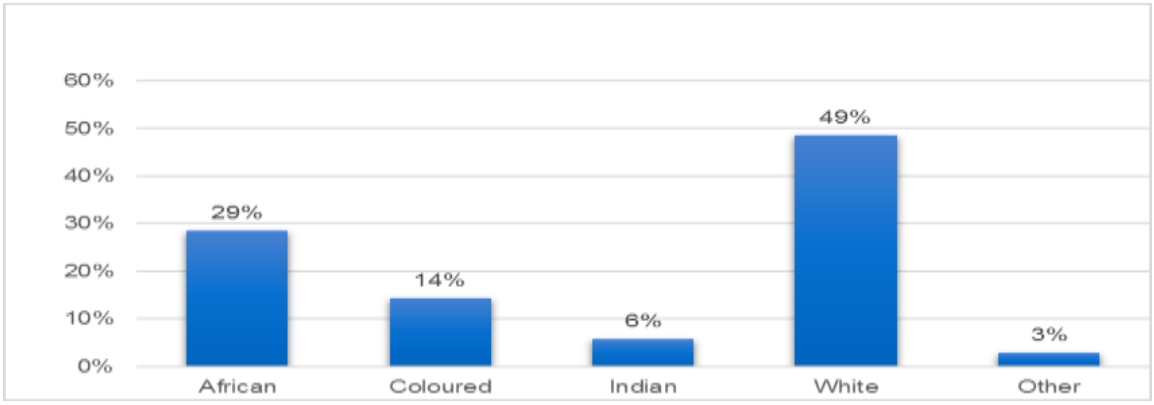
Age	Number of respondents	Percentage
21-29	23	32%
30-39	23	32%
40-49	15	21%
50-59	10	14%
Total	**71**	**100%**

4.2.4 Ethnicity

In Figure 4.4 a total number of 71 respondents recorded their ethnicity and the majority of the respondents were white women (n=71, 49%). This result will be taken as an indication that the largest ethnic group of women participating in the field of IT

are those of white ethnicity. The second largest ethnic group of the respondents was of African women who were 29% (n=20).

Figure 4.4: Ethnicity



4.2.5 Highest Qualification

In Figure 4.5 it is illustrated that the highest number of respondents had an honours or equivalent qualification (n=18, 25%). The second highest qualification held by respondents was tied between those with a master's degree and above (n=16, 23%) and those with a degree (n=16, 23%). The statistics indicate that a high number of women in IT have an educational qualification as the third highest number of respondents was of those who have diplomas (n=14, 20%). These results indicate a high level of educational qualification for women in IT, accumulatively an equivalent of 90% have diplomas and above qualifications.

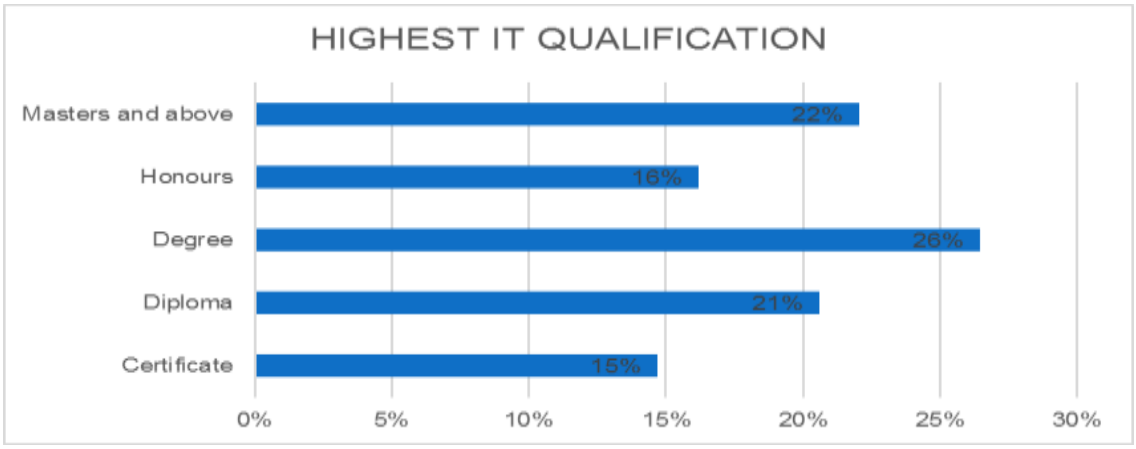
Figure 4.5: Highest Qualification

4.2.6 Highest IT Qualification

As illustrated in Figure 4.6, 68 respondents specified their highest IT related qualification. A degree in IT was the highest qualification that women respondents

had in IT (n=18, 26%). This was followed by those with a master's degree and above (n=15, 22%) and those with diploma (n=14, 21%). The lowest number recorded was of those with certificates which was at 15% (n=10).

Figure 4.6: Highest IT Qualification



4.2.7 IT work Experience

The response received regarding work experience indicates a mixture of experiences when it came to the number of years the women respondents had been working in the IT profession. An accumulated 71% of the respondents had been in the industry between 5 to 20 years. The highest number of women with experience was of those between 5 to 9 years working in the IT industry who were recorded at 28% (n=20), this was followed by those with 20 years or more at 23% (n=16). The lowest number was of those who have been in the IT industry with work experience between 3 to 4 years who were 8% of the respondents (n=6). This is illustrated below in Table 4.2.

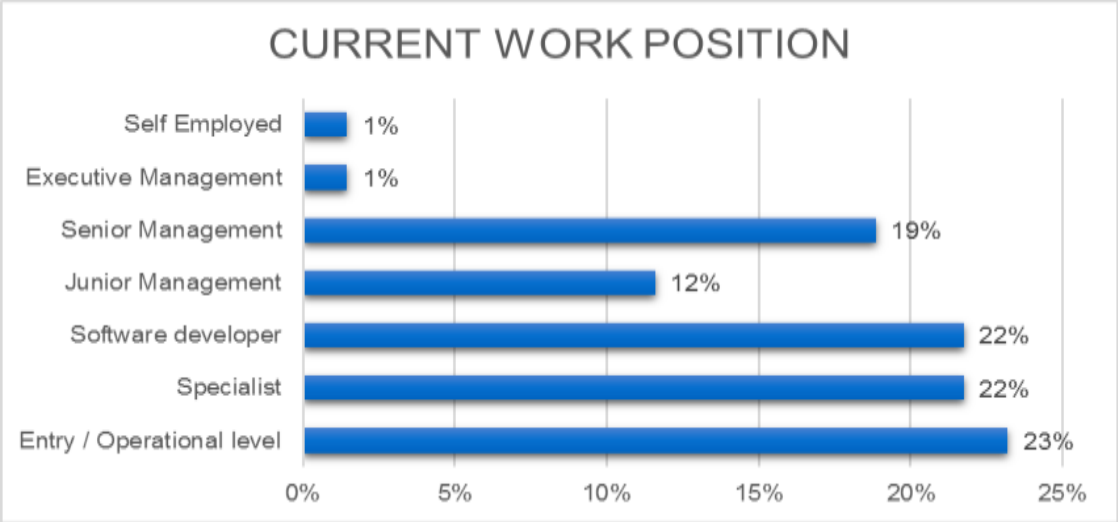
Table 4.2: IT work experience

Age	Number of respondents	Percentage
0-2 Years	15	21%
3-4 Years	6	8%
5-9 Years	20	28%
10-19 Years	14	20%
20 years or more	16	23%
Total	**71**	**100%**

4.2.8 Current work position

In Figure 4.7 it is illustrated that several of the respondents that completed this question (n=69) indicated that they were in entry or operational level positions with a recorded number of 23% (n=16). They were followed by software developers who were tied second at 22% (n=15) with those in specialist roles similarly at 22% (n=15). Low recorded levels were of those who were self-employed (n=1, 1%) or in executive management (n= 1, 1%).

Figure 4.7: Current Work Position



4.2.9 Province

The Eastern Cape was the province with the highest number of respondents with 60% (n=42) recorded. This was followed by the Gauteng province where 29% (n=20) of the respondents were based. There were insignificant numbers of respondents from Kwazulu-Natal, North West and those outside South Africa with only 1% (n-1) response recorded for each of these provinces. This is illustrated below in Table 4.3.

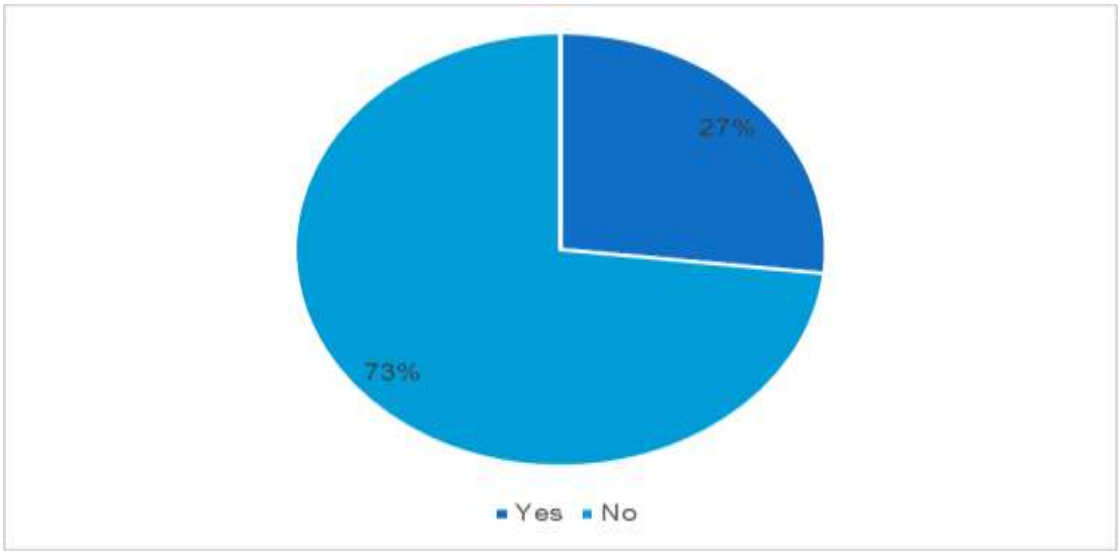
Table 4.3: Province

Age	Number of respondents	Percentage
Eastern Cape	42	60%
Gauteng	20	29%
KwaZulu-Natal	1	1%
North West	1	1%
Western Cape	5	7%
Outside SA	1	1%
Total	**70**	**100%**

4.2.10 Role models at start of IT Career

As illustrates in Figure 4.8 over 73% (n=52) of the respondents indicated that they had no role model at the start of their IT career. The number of women respondents who had role models were 27% (n=19).

Figure 4.8: Role models at start of IT Career



4.3 Measurement Items

4.3.1 Dependent Variable 1(DV1): Successful Women in IT

This section of the questionnaire sought to establish the elements and qualities of what makes a successful woman in IT. Descriptive statistics derived from the responses will be outlined, these will be in the form of frequency distribution tables which are attached as Appendix 4.

The results illustrated in Appendix 4 under dependent variable successful women in IT show that 64% (SW1; n=41) of the respondents agreed that they had been promoted before in their IT career, 73% (SW2; n=52) responded that they see themselves as successful and that (SW3; n=47) other people see them as successful (67%). Eighty two percent (SW4; n=58) agreed that successful women performed equivalent tasks to their male counterparts, 75% (SW5; n=53) emphasised the requirement of an appropriate qualification, 38% (SW6; n=26) agreed that they had sacrificed for their personal careers, 61% (SW7; n=43) have work life balance although 46% were found to be undecided on the statement that successful women in IT were self-employed (SW8; n=32). Fifty-seven percentage

(SW9; n=39) disagreed that successful women in IT were exposed to technology early in life, 43% (SW10; n=29) agreed that they have had to overcome some cultural prejudice, 54% (SW11; n=38) received family support and 90% (SW12; n=64) agreed that they needed to keep ahead of change and new technologies.

In summary, it can be concluded that various factors were recorded as key elements of a successful career for women in IT, these included the correct qualifications and sacrifice.

4.3.2 Dependent Variable 2 (DV2): Perceptions about IT as a Career

As illustrated in Appendix 4, the results obtained regarding perceptions of respondents on IT as a career revealed that 96% (PIT1; n=68) of the respondents would recommend IT to other females. Eighty-five percentage (PIT2; n=58) felt that IT makes a positive contribution to the community, 87% (PIT3; n=60) believed they had a long career ahead of them in IT. Eighty seven percent of all respondents (PIT4; n= 60) believed that the IT career has been rewarding and 97% (PIT5; n=67) believed that women must be consider IT as a career while 96% (PIT6; n=68) believed that different career paths are available in IT.

4.3.3 Independent Variable 1 (IV1): Personality Traits

In this section of the questionnaire as illustrated in Appendix 4, the aim was to establish the personality traits of women in Information technology. As presented in Appendix 4, (IPT1; n=70) the respondents agreed by 99% that they were confident in their ability to handle future unexpected events. In (IPT2; n=32) 46% agreed that they at times need re-assurance for their good work. Many of the respondents agreed that were happy with themselves (IPT3; n=65) by (93%) while (IPT4; n=61) were satisfied with themselves (88%).

In IPT5 (n=57) when it came to accomplishing goals 80% of the respondents found this to be an easy task while 85% were not intimidated by being in a predominantly male environment (IPT6; n=60). Finally, (IPT9; n=62) 87% of the respondents expressed that they were passionate about the work that they did in IT. Thus, the respondents displayed high levels of confidence in themselves and their abilities.

4.3.4 Independent Variable 2 (IV2): Skills and Aptitude

In this section of the questionnaire as illustrated by Appendix 4, the objective was to establish the respondent's views on their skills and aptitude. The respondents recorded high levels of confidence in their abilities at 81% (SE1; n=55), 99% (SE2; n=69) enjoyed solving problems and getting things to work and 89% (SE3: n=62) could handle conflict in a male environment. Over 86% (SE4; n=59) agreed that they could handle conflict with male colleagues similarly to 86% (SE5; n=60) to their handling of conflict with female colleagues.

Ninety nine percent of the respondents (SE6; n=68) agreed that they were competent when working with computers while 99% (SE7; n=68) were confident working with computers. The survey respondents were 97% (SE8; n=68) confident in their abilities to do the work as well as most other people and 100% (SE9; n=70) had the confidence to work in a team where other team members had more years of experience. Ninety seven percent of the respondents (SE10; n=67) indicated that they felt compatible with their colleagues. Generally, the respondents expressed confidence in their technical skills and their ability to handle their working environment.

4.3.5 Independent Variable 3 (IV3): Environment during School Years

As illustrated in Appendix 4, the aim of this section of the questionnaire was to establish the early school environment. Sixty-nine percent (ED1: n=18) of the survey population disagreed that they were introduced to computers during their early basic education years. Over 57% (ED2; n=21) did not have a computer at home while growing up, 54% (ED3; n=37) did not receive adequate training at school which would prepare them for higher education and 49% (ED4; n=14) did not find IT to be an enjoyable subject while growing up.

Over 84% of the survey respondents (ED5; n=58) agreed that they were encouraged to believe that girls could do anything they pursued just as boys while 62% (ED6; n=42) received encouragement from the family structure to pursue a career in IT. In the school environment, 65% (ED7; n=36) did not agree to receiving encouragement from school friends to pursue a career in IT, 54% (ED8: n=27) disagreed that at school IT was considered for boys while 53% (ED9; n=29) agreed that the girls at

school did not consider pursuing a career in IT. An equal number of 42% agreed and disagreed on the statement that girls in IT were seen as different (ED10; n=22).

Of the respondents 63% (ED11; n=32) were not involved in projects or classes at school, 64% (ED12; n=37) did not receive career guidance from career counsellors or teachers at 57% (ED13; n=35). Sixty-four percent (ED14; n=28) agreed that IT was viewed as a difficult subject at school while 64% (ED15; n=36) did not agree that their passion for IT started while at school (ED16).

4.3.6 Independent Variable 4 (IV4): Tertiary education

As indicated in Appendix 4, 69% (TE1; n=48) of the women respondents agreed that their tertiary education prepared them well for the job environment, 65% (TE2: n=40) did not receive a bursary to study IT. Eighty-two percent (TE3; n=55) believed that they studied the correct IT qualification while 75% (TE4; n=49) confirmed that their tertiary education prepared them well for a career in IT. Lastly, 68% (TE5; n=47) agreed that a tertiary education is important for a successful career in IT.

4.3.7 Independent Variable 5 (IV5): Environment After School Years

The response regarding the environment after school and noted in Appendix 4 revealed that 54% (ES1; n=32) did not have friends working in the IT industry. Fifty-four percent (ES2; n=35) of the respondents agreed that they had received family encouragement to choose IT as a career. This is aligned to 83% (ES4; n=35) positive result received which indicated that the respondents' families did not discourage them from pursuing an IT career.

Thirty nine percent (ES3; n=23) disagreed that their friends had encouraged them to pursue IT while 71% (ES5; n=52) disagreed that their friends discouraged them from pursuing an IT career. Seventy percent (ES4; n=35) were not encouraged by their religious circle for a career in IT however 70% (ES6; n=33) also disagreed that they were discouraged by their religious circle to opt for a career in IT. Thus, the religious circle can be deemed as neutral. These statistics are illustrated in Appendix 4.

4.3.8 Independent Variable 6 (IV6): Culture and Societal Attitudes About IT

As noted in Appendix 4, mixed responses were received pertaining to culture and societal attitudes about IT. Primarily 88% (CS1; n=60) of the respondents agreed

that a career in IT was respected in the community. Sixty-nine percent (CS2; n=47) did not agree with the statement that culturally IT was not seen as a career for women. A mixed response to the statement that people in their respective cultures had a clear understanding of IT with 41% (CS3; n=29) disagreeing, 36% agreeing while 23% were neutral. Fifty one percent (CS4; n=36) disagreed that people in their cultures had a clear understanding of IT careers, 50% (CS5; n=35) agreed that their community was familiar with careers in IT. When it came to societal and cultural perception of females, 71% (CS6; n=50) disagreed that in their cultures having a large family was important and 58% (CS7; n=41) agreed that in their culture a woman is expected to have a family and children.

4.3.9 Independent Variable 7 (IV7): Career Demands

Sixty two percent (CD1; n=44) of the total respondents at times felt burnt-out by the demands of the job, 74% (CD2; n=51) agreed that their career allowed them to have a career and family life. The survey respondents agreed by 80% (CD3; n=56) that they could control their time at work, 96% (CD4; n=68) agreed that they had a good relationship with their colleagues while 82% (CD5; n=58) agreed that they had been given adequate resources to fulfil their roles. In the family role.

Over 66% (CD6; n=45) agreed that they had a balanced life, 64% (CD7; n=42) of the respondents agreed that a career in IT allowed them to have a career and a family while 58% (CD8; n=35) agreed that they could travel to other towns for career purposes. They did however note that the job could take them long hours 57% (CD9; n=39) and 61% (CD10; n=43) agreed that their career required them to work long hours at times after hours.

4.3.10 Independent Variable 8 (IV8): Family Demands

Eighty percent (FD1; n=56) of the total survey respondents as per Appendix 4 agreed that they could control their time at work, 53% (FD2; n=33) disagreed that they at times felt guilty about sacrificing family time to pursue an IT career and 48% (FD3; n=31) agreed that they needed to prove that having a family does not impact work life. Of the respondents, 65% (FD4; n=42) disagreed that family responsibilities prevented them from growing further while 62% (FD5; n=41) did not agree that work life commitments impacted their time with family, 65% (FD6; n=42) disagreed that

they found it difficult to manage work life and family and lastly 52% (FD7; n=32) agreed that they would have liked to have more time to spend with family.

4.3.11 Independent Variable 9 (IV9): Gender Bias

Fifty nine percent (GD1; n=41) of the total respondents disagreed that they had a glass ceiling in IT, 51% (GB2; n=36) agreed that women were paid less than men, 46% (GD3; n=32) disagreed that travelling internationally was a barrier for a woman with family responsibilities compared to 80% (GD4; n=56) who disagreed that family responsibilities could prevent a male from travelling internationally. Sixty three percent (GD5; n=33) felt they received adequate support to have dual roles of being a mother and a career, 57% (GD6; n=39) agreed that they had been given equal opportunities as their male counterparts and 71% (GD7; n=50) felt they had equal workload as their male counterparts.

Mixed reviews were indicated by respondents on the statement that professional standards were higher for females than males (GD8; n=27) as 39% disagreed and 37% (n=32) agreed with 24% (n=17) being undecided, this is a similar trend to the response on whether females need to work harder than males in their IT career (GD9; n=30) with 43% agreeing, 40% (n=28) disagreeing and 17% (12) being undecided on the statement.

4.3.12 Independent Variable 10 (IV10): Male and Female Perceptions

Eighty six percent (MF1; n=60) of the survey respondents felt that their male colleagues respected their work while 47% (MF2; n=31) felt that their female colleagues respected their work more than male colleagues. The survey respondents expressed that (MF3; n=27) female colleagues were more competitive at 41%. There were 60% (MF4; n=41) who disagreed that their female colleagues felt threatened by their abilities as opposed to the 57% disagreement of the statement that males were threatened by females (MF5; n=39).

Ninety seven percent (MF6; n=69) of the respondents were comfortable working in a male dominated team, 80% (MF7; n=57) agreed that they had support from male colleagues, 83% (MF8; n=58) agreed that they had female support. Eighty seven percent (MF9; n=60) agreed that they received support from male managers and 86% (MF10; n=48) agreed that they received support from female managers. Of the

respondents 71% (MF11; n=50) disagreed that they felt awkward or sensitive when socialising with their team members.

4.3.13 Independent Variable 11 (IV11): Management of IT career

Thirty eight percent (MO1; n=23) of all respondents agreed that belonging to a professional IT body is important, 30% disagreed (n=18) and 33% (n=20) were neutral. Meanwhile 56% (MO2; n=38) disagreed that they spent their time with colleagues after work and 50% (MO3; n=32) disagreed that they have female role models working in IT. Fifty-five percent (MO4; n=36) agreed that they network with other women and 55% (MO5; n=36) expressed that they engage with other successful women in IT.

4.4 Exploratory Factor Analysis:

Exploratory Factor Analysis (EFA) is used to explore the relationships between factors, find relationships and through reductions and eliminations present the significant factors on a variable. There are various tools that have been used to establish the significance of the items which are the Eigenvalue, Scree Plots and Factor loadings. Eigenvalues are guided by factor values >1, scree plots are based on hinges, factor loadings on a significance of >.645 and a significance percentage of 60%.

4.4.1 Eigenvalues

In the tables below, the Eigenvalue factors and the accompanying variance percentage will be presented. This will be for each of the dependent and the independent variables identified for this study (Table 4.4 to Table 4.31). The initial Scree Plots will be displayed alongside the tables, for each construct (Figure 4.9 to Figure 4.22).

DV1: Females Opting for an IT career and DV2: Females Remaining in an IT career

In Table 4.4 it is indicated by Eigenvalues that two factors were obtained for females remaining in an IT career with a cumulative value of 73.3%. This encompasses those women opting for a career and those remaining in an IT career. The accompanying Scree plot identified one factor as illustrated in Figure 4.9.

Table 4.4: Career in IT

Factor	Eigenvalue	% Total Variance	Cumulative %
1	3.360	56.0	56.0
2	1.038	17.3	73.3
3	0.629	10.5	83.8
4	0.386	6.4	90.2
5	0.373	6.2	96.4
6	0.214	3.6	100.0

Figure 4.9: Career in IT

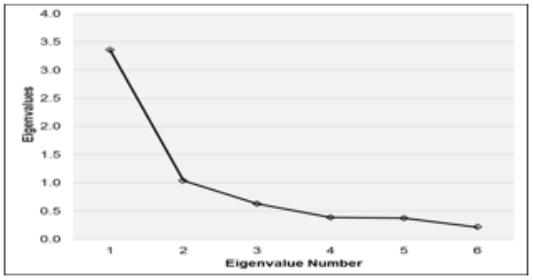


Table 4.5 indicates one factor with six items. The minimum loading deemed significant is at 0.645 and the percentage of total variance explained was at 56%. Additionally, the one factor model was named IT as a career.

Table 4.5: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - ITC (n = 71) – Career in IT

ITEM	FACTOR 1
ITC.05 Women must consider IT as a career	**.829**
ITC.06 There are different career paths for women in IT	**.772**
ITC.01 I would recommend an IT career to other females	**.769**
ITC.03 I have a long career ahead of me in IT	**.731**
ITC.04 My IT career has been rewarding	**.714**
ITC.02 My IT career makes a positive contribution to my community	**.664**
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 56.0%	

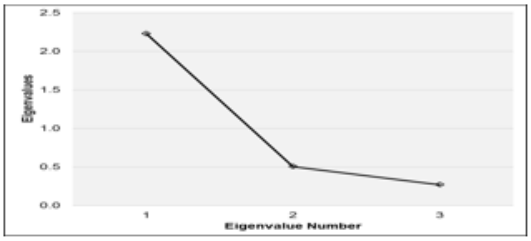
DV3A: Successful Woman in IT - Personal

In Table 4.6 one factor is indicated with the Eigenvalue of 2.229 and thus significantly explains 74.3% of the variance in Successful Woman in IT. The Scree plot indicated one factor as illustrated below in Figure 4.10.

Table 4.6: Successful Woman in IT

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.229	74.3	74.3
2	0.503	16.8	91.0
3	0.269	9.0	100.0

Figure 4.10: Successful Woman in IT- P



In Table 4.7, one factor with 3 items is indicated. The minimum loadings were deemed significant at 0.649 and explained 74.3% of the total variance. The one factor model was renamed Succesful Woman in IT – Personal.

Table 4.7: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - SWP (n = 70)

ITEM	FACTOR 1
SWP.02 I see myself as a successful woman in IT	.907
SWP.03 Other people see me as a successful woman in IT	.865
SWP.01 I have been promoted in my IT career	.812
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 74.3%	

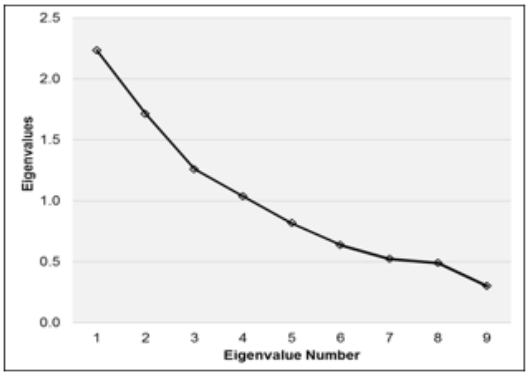
DV3B: Successful Woman in IT - General

In Table 4.8 four factors were indicated by the Eigenvalues with an accumulative variance percentage of 69.3%, two factors were identified by the Scree plot as indicated in Figure 4.11.

Table 4.8: Successful Woman in IT

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.233	24.8	24.8
2	1.712	19.0	43.8
3	1.258	14.0	57.8
4	1.035	11.5	69.3
5	0.814	9.0	78.4
6	0.636	7.1	85.4
7	0.523	5.8	91.2
8	0.490	5.4	96.7
9	0.300	3.3	100.0

Figure 4.11: Successful Woman in IT-G



The Exploratory Factor Analysis initailly explained a three factor model (57.8% of total variance), then a two factor model (43.8% of total variance) and lastly a one factor model (24.8% of total variance). Items SWG.02, SWG.05 and SWG.06 were omitted and the EFA was re-evaluated. The Eigenvalues then identified a two factor model, explaining a total percetage variance of 57.8%, similarly the Scree plot also indicated two factors. Further analysis required that items SWG.01, SWG.08 and SWG.09 to be ommited and the EFA was re-evaluated. Finally, a one factor model was indicated was indicated by the Eigenvalues and Scree Plot.

Table 4.9 indicates one factor with three items, with a minimum loading of 0.645 and the percentage total variance explained of 60.5%. Additionally, the one factor in Table 4.9 was named : Succesful Woman in IT – General.

Table 4.9: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - SWG (n = 71)

ITEM	FACTOR 1
SWG.03* Successful women in IT have sacrificed their personal life for their career	**.821**
SWG.04 Successful women in IT have work-life balance	**.790**
SWG.07* Successful women in IT had to overcome cultural prejudice	**.719**
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 60.5%	

*** ITEM REVERSED**

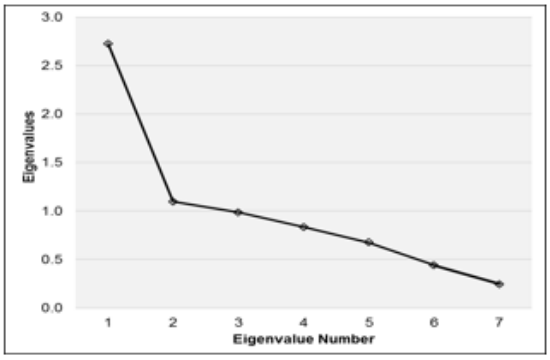
IV1: Personality traits

The Eigenvalue for personality traits illustrated in Table 4.10 indicates two factors explaining 54.6% of the total variance for Personality traits. The Scree plot differed and indicated one factor as illustrated in Figure 4.12.

Table 4.10: Personality Traits

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.725	38.9	38.9
2	1.096	15.7	54.6
3	0.984	14.1	68.6
4	0.834	11.9	80.6
5	0.676	9.7	90.2
6	0.440	6.3	96.5
7	0.245	3.5	100.0

Figure 4.12: Personality Traits



The Exploratory Factor Analysis initialy indicated a two factor model (54.6%) and thereafter a one factor model (38.9%). Items PT.01, PT.02, PT.06 and PT.07 were omitted as they had non-significant loadings and the EFA was re-evaluated. Finally, the Eigenvalue (72.9%) and the Scree plot indicated a one factor model.

Table 4.11 indicates the final model with one factor that has three items with a minimum loading of 0.645 and the percentage total variance explained of 72.9%. The one factor in Table 4.11 was named: Personality Traits.

Table 4.11: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - PT (n = 71)

ITEM	FACTOR 1
PT.04 I am satisfied with myself	**.894**
PT.03 I am happy with myself	.888
PT.05 It is easy for me to accomplish my goals	.774
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 72.9%	

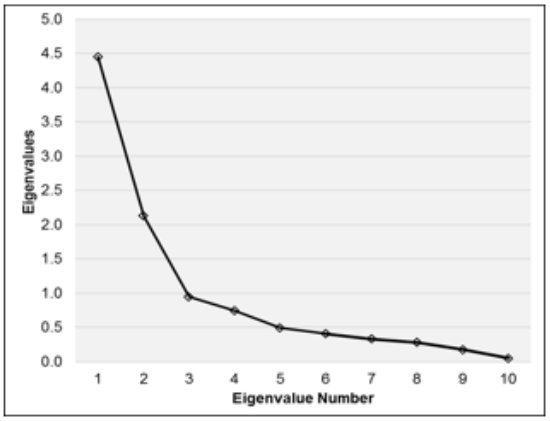
IV2: Skills and Aptitude

There were two factors that significantly indicated Eigenvalues of 44.5% = 4.451 and 21.3% (n=2.126) explaining 65.8% of the variance in skills and aptitude as displayed in Table 4.12. The Scree plot indicated two factors as indicated in Figure 4.13.

Table 4.12: Skills and Aptitude

Factor	Eigenvalue	% Total Variance	Cumulative %
1	4.451	44.5	44.5
2	2.126	21.3	65.8
3	0.942	9.4	75.2
4	0.741	7.4	82.6
5	0.492	4.9	87.5
6	0.408	4.1	91.6
7	0.332	3.3	94.9
8	0.282	2.8	97.7
9	0.177	1.8	99.5
10	0.049	0.5	100.0

Figure 4.13: Skills and Aptitude



The Exploratory Factor Analysis initialy indicated a two factor model that explained 65.8% of the total variance. Items SA.01, SA.02 and SA.10 were omitted as they had non-significant loadings. The EFA was re-evaluated and the results indicated final two factors on Eigenvalue (79.0%) and on the Scree plot.

The final CFA Table 4.13 indicates two factors with seven items, with a minimum loading of 0.649 and the percentage total variance explained of 79.0%. Additionally, the two factors were re-named Confidence and Conflict Management.

Table 4.13: Exploratory Factor Analysis (EFA) Loadings (2 Factor Model) - SA (n = 70)

ITEM	FACTOR 1	FACTOR 2
SA.07 In my job, I am confident working with computers	**.945**	**.029**
SA.06 In my job, I am competent working with computers	**.936**	**.056**
SA.08 I am able to do my work as well as most other people	**.853**	**.156**
SA.09 In my job, I have confidence to work with team members who have many years of experience	**.741**	**.306**
SA.03 I am able to handle conflict in a team environment	**.155**	**.922**
SA.04 I am able to handle conflict with my male colleagues	**.007**	**.866**
SA.05 I am able to handle conflict with my female colleagues	**.134**	**.847**
Expl.Var % of Total	3.088 .441	2.439 .348
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 79.0%		

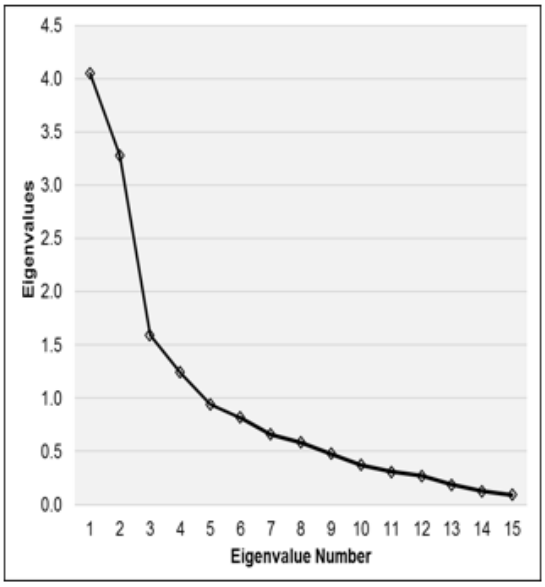
IV3: Environment during School Years

In Table 4.14, there were four factors indicated by the Eigenvalues with a cumulative variance explaining 67.7% of the factors. Meanwhile two factors were indicated by the Scree plot as indicated in Figure 4.14.

Table 4.14: Environment During School Yrs.

Factor	Eigenvalue	% Total Variance	Cumulative %
1	4.051	27.0	27.0
2	3.277	21.8	48.9
3	1.591	10.6	59.5
4	1.241	8.3	67.7
5	0.939	6.3	74.0
6	0.816	5.4	79.4
7	0.661	4.4	83.8
8	0.585	3.9	87.7
9	0.479	3.2	90.9
10	0.374	2.5	93.4
11	0.307	2.0	95.5
12	0.271	1.8	97.3
13	0.187	1.2	98.5
14	0.126	0.8	99.4
15	0.094	0.6	100.0

Figure 4.14: Environment During School Yrs.



The Exploratory Factor Analysis initialy indicated a four factor model that explained 67.7% of the total variance. The four factor solution seemed optimal while items EDS.05, EDS.06, EDS.07 and E.14 had non-significant loadings and were omitted. The factor for EDS.04 was retained because the loading was quite large and the item had the required face validity. Therefater the EFA was re-evaluated and the results indicated a three factor model, further item EDS.15 was omitted while EDS.11 was retained because loading was quite high and item had the required face validity. The EFA was subsequently re-evaluated and indicated three factors in Eigenvalue explaining 73.8% of the variance and three factors on the Scree plot.

The final CFA indicates three factors with ten items, with a minimum loading of 0.693 and the percentage total variance explained of 73.8%. Additionally, the three factors in Table 4.15 were re-named: Computer access, Peer Perception and School Career Guidance.

Table 4.15: Exploratory Factor Analysis (EFA) Loadings (3 Factor Model) - EDS (n = 61)

ITEM	FACTOR 1	FACTOR 2	FACTOR 3
EDS.01 I was introduced to computers during my early basic education years	**.824**	**-.069**	**-.015**
EDS.04 I found IT to be an enjoyable subject whilst growing up	**.800**	**-.204**	**.169**
EDS.03 I received adequate training at school which prepared me for higher education	**.793**	**.143**	**.196**
EDS.02 I had a computer at home growing up	**.748**	**-.106**	**-.154**
EDS.11 At school, I was involved in computer projects/classes	**.630**	**-.003**	**.419**
EDS.09* At school, girls did not consider pursuing IT careers	**-.016**	**.939**	**.054**
EDS.08* At school, IT was considered for boys only	**-.003**	**.933**	**.075**
EDS.10* At school, girls doing IT were seen as different	**-.112**	**.931**	**.075**
EDS.13 At school, I received career guidance from my teachers	**.003**	**.106**	**.851**
EDS.12 At school, I received career guidance from my career counsellors	**.161**	**.106**	**.840**
Expl.Var % of Total	2.944 .294	2.721 .272	1.710 .171
Minimum loading deemed significant = .693; Percentage of Total Variance Explained = 73.8%			

*** ITEMS REVERSED**

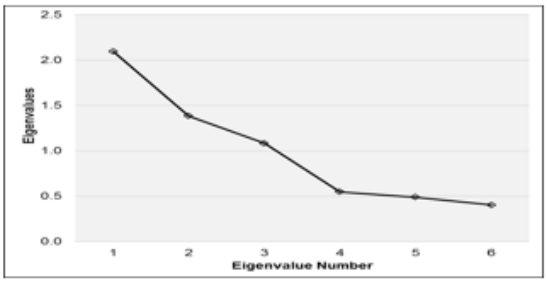
IV4A: Tertiary Education

One factor delivered a significant value which is illustrated by the result of both the Eigenvalues and the Scree plot as indicated in Table 4.16 and in Figure 4.15 respectively. This one factor had an Eigenvalue of 2.816 and thus explains 56.3% of the variance in Tertiary Education.

Table 4.16: Tertiary Education

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.816	56.3	56.3
2	0.907	18.1	74.5
3	0.596	11.9	86.4
4	0.515	10.3	96.7
5	0.167	3.3	100.0

Figure 4.15: Tertiary Education



On the Exploratory Factor Analysis, a one factor model was indicated explaining 56,3% of the variance. Item TE.02 was omitted and the EFA was re-evaluated. The final model indicated one factor with a minimum loading of 0.658 and that explains 65.4% of the total variance. The factor was named: Tertiary Education.

Table 4.17: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - TE (n = 68)

ITEM	FACTOR 1
TE.04 Tertiary education prepared me well for an career in IT	**.942**
TE.01 Tertiary education prepared me well for the job environment	**.795**
TE.05 A tertiary education is important for a successful career in IT	.785
TE.03 I studied the correct IT qualification for my profession	.693
Minimum loading deemed significant = .658; Percentage of Total Variance Explained = 65.4%	

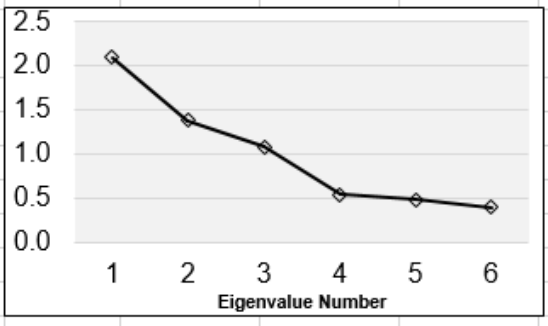
IV4B: Environment after School Years

Two factors were indicated in both the Eigenvalues (Table 4.18) and the Scree plot (Figure 4.16) on the significant factors that affected the environment after school years. These factors had Eigenvalues of 43.7% = 3.061 and 24.0% = 1.679 variance which cumulatively explains 67.7% of the variance in the environment after school years.

Table 4.18: Environment after School Yrs.

Factor	Eigenvalue	% Total Variance	Cumulative %
1	3.061	43.7	43.7
2	1.679	24.0	67.7
3	0.946	13.5	81.2
4	0.702	10.0	91.3
5	0.324	4.6	95.9
6	0.178	2.5	98.4
7	0.109	1.6	100.0

Figure 4.16: Environment after School Yrs.



The EFA indicated a two factors with a minimum loading of 0.698 and explaining 67.7% of the total variance. Item EAS.01 was omitted and the EFA re-evaluated. Finally, two factors were indicated by both the Eigenvalues (77.9%) and the Scree Plot. The final model illustrated in Table 4.19 indicates two factors with six items. The minimum loading was 0.698 explaining 77.9% of the total variance. The factors were renamed: Family and societal discouragement and Family and societal encouragement.

Table 4.19: Exploratory Factor Analysis (EFA) Loadings (2 Factor Model) - EAS (n = 60)

ITEM	FACTOR 1	FACTOR 2
EAS.07* My religious circle discouraged me from choosing IT as a career	.948	.045
EAS.06* My friends discouraged me from choosing IT as a career	.943	.121
EAS.05* My family discouraged me from choosing IT as a career	.753	.253
EAS.02 My family encouraged me to choose IT as a career	.000	.862
EAS.04 My religious circle encouraged me to choose IT as a career	.123	.849
EAS.03 My friends encouraged me to choose IT as a career	.267	.830
Expl.Var % of Total	2.441 .407	2.233 .372
Minimum loading deemed significant = .698; Percentage of Total Variance Explained = 77.9%		

*** ITEMS REVERSED**

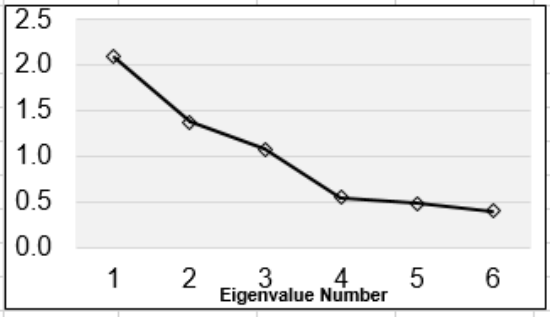
IV5 and IV6: Culture and Societal Attitudes about IT and Family

Two factors are indicated by both the Eigenvalues with an accumulated variance of 63.5% and the Scree plot as indicated in Table 4.20 and Figure 4.17 respectively.

Table 4.20: Culture and Societal attitudes

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.701	38.6	38.6
2	1.741	24.9	63.5
3	0.813	11.6	75.1
4	0.742	10.6	85.7
5	0.485	6.9	92.6
6	0.379	5.4	98.0
7	0.139	2.0	100.0

Figure 4.17: Culture and Societal attitudes



The Exploratory Factor Analysis initialy indicated a two factor model (63.5%) with a mimimum loading of 0.649. Item CSA.01 was omitted and the EFA was re-evaluated. The Scree plot still indicated two factors and the Eigenvalues indicated two factors explaining 70% of the total variance. The results of the EFA indicated a two factor model with six items.

The minimum loading were 0.649 and the percentage total variance explained was of 70%. Additionally, the two factors indicated in Table 4.21 were named: Cultural understanding of career and Cultural expectations.

Table 4.21: Exploratory Factor Analysis (EFA) Loadings (2 Factor Model) - CSA (n = 70)

ITEM	FACTOR 1	FACTOR 2
CSA.04 In my culture, people have a clear understanding of IT careers	**.936**	**.029**
CSA.03 In my culture, people have a clear understanding of IT	**.913**	**.037**
CSA.05 In my community, people are familiar with-IT careers	**.839**	**-.121**
CSA.07* In my culture, a woman is expected to have a family and children	**.021**	**.826**
CSA.06* In my culture, having a large family is important	**-.151**	**.770**
CSA.02* In my culture, IT is not seen as a career for women	**.145**	**.670**
Expl.Var % of Total	2.459 .410	1.742 .290
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 70.0%		

*** ITEMS REVERSED**

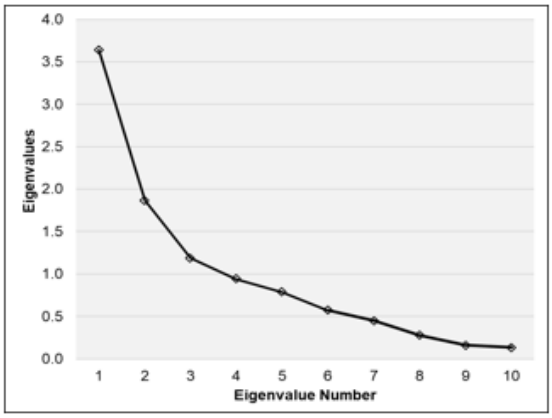
IV7: Career Demands

Three factors delivered significant Eigenvalues with an accumulative variance of 66.9% as illustrated in Table 4.22. Two factors are indicated by the Scree plot as indicated in Figure 4.18.

Table 4.22: Career Demands

Factor	Eigenvalue	% Total Variance	Cumulative %
1	3.638	36.4	36.4
2	1.864	18.6	55.0
3	1.184	11.8	66.9
4	0.940	9.4	76.3
5	0.785	7.8	84.1
6	0.572	5.7	89.8
7	0.448	4.5	94.3
8	0.277	2.8	97.1
9	0.160	1.6	98.7
10	0.132	1.3	100.0

Figure 4.18: Career Demands



The Exploratory Factor Analysis initialy indicated a two factor model explaning 55% of the total variance with a minimum loading of 0.645. Items CD.01, CD.04, CD.05 and CD.08 were omitted and the EFA was re-evaluated. The Scree plot indicated two factors and similarly the Eigenvalues indicated two factors explaining 77.7% of the variance. The results thus indicated a two factor EFA model with six items.

The minimum loading was of 0.645 and the percentage total variance explained 77.7% of total variance. Additionally, the two factors in Table 4.23 were named: Work-Life Balance and After-hour work.

Table 4.23: Exploratory Factor Analysis (EFA) Loadings (2 Factor Model) - CD (n = 71)

ITEM	FACTOR 1	FACTOR 2
CD.02 My career allows me to have both, a career and a family life	**.893**	**.005**
CD.06 An IT career allows me to have a balanced family life	**.880**	**.325**
CD.07 An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	**.809**	**.139**
CD.03 I control my time at work	**.719**	**.075**
CD.10* My IT career requires me to work after hours	**.082**	**.941**
CD.09* My IT career requires me to work long hours	**.158**	**.933**
Expl.Var % of Total	2.776 .463	1.887 .315
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 77.7%		

*** ITEMS REVERSED**

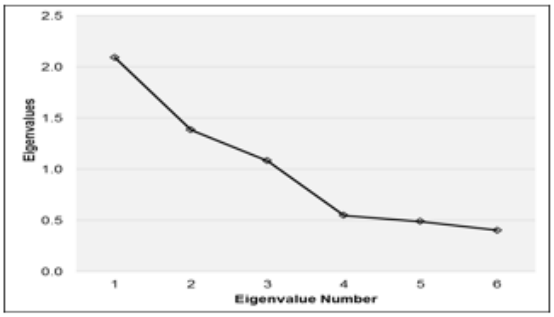
IV8: Family Demands

One factor delivered significant Eigenvalue of 61.6% (n=4.311) as illustrated in Table 4.24 and one factor indicated by the Scree plot as indicated in Figure 4.19.

Table 4.24: Family Demands

Factor	Eigenvalue	% Total Variance	Cumulative %
1	4.311	61.6	61.6
2	0.894	12.8	74.4
3	0.497	7.1	81.5
4	0.448	6.4	87.9
5	0.352	5.0	92.9
6	0.335	4.8	97.7
7	0.163	2.3	100.0

Figure 4.19: Family demands



On the Exploratory Factor Analysis, a one factor model was indicated explaining 61.6% of the total variance, with a minimum loading of 0.667. The table was named Family Demands.

Table 4.25: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - FD (n = 66)

ITEM	FACTOR 1
FD.06* It is difficult to manage my work-life and family time	**.883**
FD.05* My work-life commitments impact the time I can spend with my family	**.812**
FD.02* I feel guilty for sacrificing family time to pursue my career in IT	**.811**
FD.04* Family responsibilities prevent me from growing further in an IT career	**.799**
FD.07* I would like to have more available time to spend with my family	**.763**
FD.03* I need to prove that having a family will not impact my work-life	**.740**
FD.01 I control my time away from work	**.668**
Minimum loading deemed significant = .667; Percentage of Total Variance Explained = 61.6%	

*** ITEMS REVERSED**

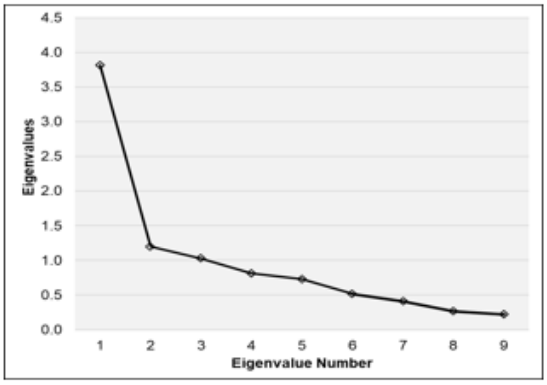
IV9: Gender Bias

Three factors delivered significant Eigenvalues with a cumulative 67.1% while one factor was indicated by the Scree plot as indicated in Table 4.26 and Figure 4.20 respectively.

Table 4.26: Gender Bias

Factor	Eigenvalue	% Total Variance	Cumulative %
1	3.819	42.4	42.4
2	1.196	13.3	55.7
3	1.027	11.4	67.1
4	0.811	9.0	76.2
5	0.729	8.1	84.3
6	0.517	5.7	90.0
7	0.411	4.6	94.6
8	0.269	3.0	97.6
9	0.220	2.4	100.0

Figure 4.20: Gender Bias



The Exploratory Factor Analysis initialy indicated a two factor model (42.4%) with a minimum loading of 0.645. Items GB.01 was omitted and the EFA was re-evaluated. The Scree plot indicated one factor while the Eigenvalues indicated two factors explaining 56.7% of the total variance.

Items GB.03, GB.04 and GB.07 were omitted and the EFA was re-evaluated, the results indicated one factor with five items. The minimum loading was of 0.645 and the percentage total variance explained of 51.8%. The factors in Table 4.27 was named: Gender Bias.

Table 4.27: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - GB (n = 71)

ITEM	FACTOR 1
GB.06* I have been given equal opportunities as my male counterparts	.795
GB.05* I have enough support to manage the dual role of being a working woman and being a mother to my children	.749
GB.08 Professional standards are higher for women than men	.700
GB.09 I need to work harder at my career because I am female	.686
GB.02 Women in IT are paid less than men doing the same work	.661
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 51.8%	

*** ITEMS REVERSED**

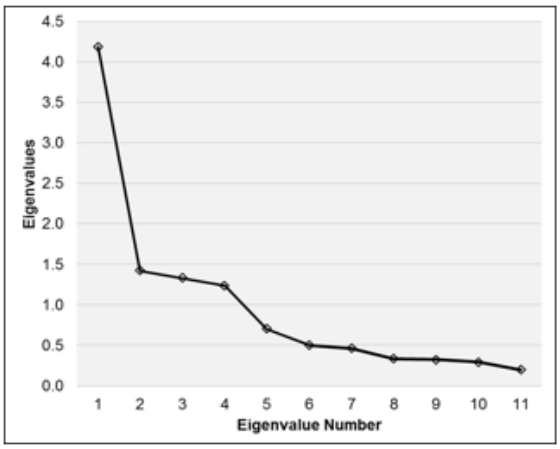
IV10: Male and Female Perceptions

Four factors delivered significant Eigenvalues with a cumulative 74.3% as indicated by Table 4.28. This explains 74.3% of the variance in male and female perceptions. The Scree plot illustrated in Figure 4.21 similarly indicated four factors.

Table 4.28: Male and Female Perception

Factor	Eigenvalue	% Total Variance	Cumulative %
1	4.189	38.1	38.1
2	1.420	12.9	51.0
3	1.329	12.1	63.1
4	1.236	11.2	74.3
5	0.703	6.4	80.7
6	0.503	4.6	85.3
7	0.465	4.2	89.5
8	0.335	3.0	92.6
9	0.326	3.0	95.5
10	0.295	2.7	98.2
11	0.199	1.8	100.0

Figure 4.21: Male and Female Perception



The Exploratory Factor Analysis initialy indicated a four factor model (74.3%). Items MFP.03 and MFP.11 were omitted and the EFA was re-evaluatated. The results indicated a two factor model with a minumum loading of 0.645 and explained 51% of the total variance. For the two-factor solution MFP.02 and MFP.06 did not constitute a valid dimension of the construct; one factor solution appeared optimal and thus items MFP.06 was omitted as well as MFP.03, MFP.01 and MFP.11 were omitted. This resulted in a one factor model with a minimum significance of .645 and explained 34.9% of the variance.

Further evaluations were performed after item MFP.02 was omitted and the final results indicated one factor with two items. The minimum loading was at 0.645 explained 74.2% of the variance. Additionally, the core factor in Table 4.29 relates to Female and Male Colleagues perceptions.

Table 4.29: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - MFP (n = 71)

ITEM	FACTOR 1
MFP.04* My female colleagues appear to feel threatened by my abilities	.862
MFP.05* My male colleagues appear to feel threatened by my abilities	.862
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 74.2%	

*** ITEMS REVERSED**

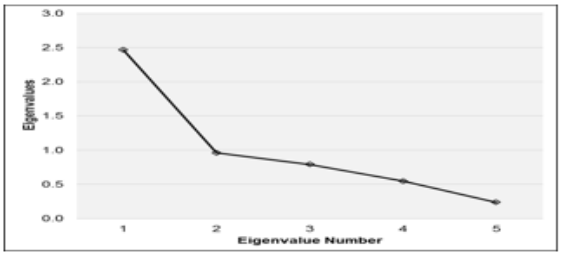
IV11: Management of IT career

One factor is indicated as significant by both the Eigenvalue of 49.9% =2.469 and the Scree plot as illustrated in Table 4.30 and Figure 4.22.

Table 4.30: Management of IT Career

Factor	Eigenvalue	% Total Variance	Cumulative %
1	2.469	49.4	49.4
2	0.959	19.2	68.6
3	0.790	15.8	84.4
4	0.547	10.9	95.3
5	0.235	4.7	100.0

Figure 4.22: Management of IT Career



On the Exploratory Factor Analysis, a one factor model was indicated explaining 49.4% of the variance, with a minimum loading of 0.663. Item MC.01 and MC.02 was omitted. The EFA was re-evaluated and indicated a one factor model with a minimum loading 0.663 and explaining 73.3% of the total variance. The Table 4.31 was named Management of IT career.

Table 4.31: Exploratory Factor Analysis (EFA) Loadings (1 Factor Model) - MC (n = 67)

ITEM	FACTOR 1
MC.05 I engage with successful women in IT	.901
MC.04 I network with other women in IT	.895
MC.03 I have female role models working in IT	.765
Minimum loading deemed significant = .663; Percentage of Total Variance Explained = 73.3%	

4.4.2 Factors that did not load or were reversed

In Table 4.32 the factors identified along with each loading are listed. A minimum factor loading of .645 is deemed significant at α = 0.05 significance level. Some items were omitted due to the factor loading being less than .645, these have been struck-through.

Table 4.32: Factors that did not load

Personality Traits	
PT.04 I am satisfied with myself	**.894**
PT.03 I am happy with myself	.888
PT.05 It is easy for me to accomplish my goals	.774
~~PT.06 I am not intimidated by a predominantly male environment~~	-
~~PT.07 I am passionate about the work I do~~	-
~~PT.02 I need reassurance for my good work~~	-
~~PT.01 I am confident I can handle future unexpected events~~	-
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 72.9%	
Skills and Aptitudes Items	
SA.06 In my job, I am competent working with computers	**.936**
SA.07 In my job, I am confident working with computers	**.945**
SA.08 I am able to do my work as well as most other people	**.853**
SA.09 In my job, I have confidence to work with team members who have many years of experience	**.741**
~~SA.01 I am confident I can resolve complex technical problems on my own~~	~~-~~
~~SA.02 I like solving problems and getting things to work~~	~~-~~
SA.03 I am able to handle conflict in a team environment	**.922**
SA.04 I am able to handle conflict with my male colleagues	**.866**
SA.05 I am able to handle conflict with my female colleagues	**.847**
~~SA.10 I am compatible with my colleagues~~	~~-~~
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 79.0%	
Environment During School Years Items	
EDS.11 At school, I was involved in computer projects/classes	**.630**
~~EDS.15 My passion for IT started during my schooling years~~	~~-~~
EDS.03 I received adequate training at school which prepared me for higher education	**.793**
EDS.04 I found IT to be an enjoyable subject whilst growing up	**.800**
EDS.09* At school, girls did not consider pursuing IT careers* REVERSED At school, girls did consider pursuing IT career	**.939**
EDS.08* At school, IT was considered for boys only* REVERSED At school, IT was not considered for boys only	**.933**
~~EDS.10* At school, girls doing IT were seen as different *REVERSED~~ ~~At school, girls doing IT were not seen as different~~	~~**.075**~~
~~EDS.14* At school, IT was perceived as a difficult subject* REVERSED~~ ~~At school, IT was not perceived as a difficult subject~~	~~-~~
~~EDS.12 At school, I received career guidance from my career counsellors~~	~~**.106**~~
~~EDS.13 At school, I received career guidance from my teachers~~	~~**.003**~~
~~EDS.07 At school, my friends encouraged me to pursue an IT career~~	~~-~~
EDS.01 I was introduced to computers during my early basic education years	**.824**
EDS.02 I had a computer at home growing up	**.748**
~~EDS.05 I was encouraged to believe that girls could do anything they pursued, just like boys~~	~~-~~
~~EDS.06 I received family encouragement to pursue an IT career~~	~~-~~
Minimum loading deemed significant = .693;	

Percentage of Total Variance Explained = 73.8%	
Tertiary Education	
TE.04 Tertiary education prepared me well for an career in IT	**.942**
TE.01 Tertiary education prepared me well for the job environment	**.795**
TE.05 A tertiary education is important for a successful career in IT	**.785**
TE.03 I studied the correct IT qualification for my profession	**.693**
~~TE.02 I received a bursary to study for an IT qualification~~	~~.530~~
Minimum loading deemed significant = .658; Percentage of Total Variance Explained = 65.4%	
Environment After School Years	
EAS.07* My religious circle discouraged me from choosing IT as a career*REVERSED My religious circle discouraged me from choosing IT as a career	**.948**
EAS.06* My friends discouraged me from choosing IT as a career* REVERSED My friends encouraged me to choose IT as a career	**.943**
EAS.05* My family discouraged me from choosing IT as a career* REVERSED My family encouraged me to choose IT as a career	**.753**
~~EAS.01 After school, I had friends working in the IT industry~~	~~**.338**~~
EAS.02 My family encouraged me to choose IT as a career	**.862**
EAS.04 My religious circle encouraged me to choose IT as a career	**.849**
EAS.03 My friends encouraged me to choose IT as a career	**.830**
Minimum loading deemed significant = .698; Percentage of Total Variance Explained = 77.9%	
Culture and Societal Attitudes about IT	
CSA.04 In my culture, people have a clear understanding of IT careers	**.936**
CSA.03 In my culture, people have a clear understanding of IT	**.913**
CSA.05 In my community, people are familiar with IT careers	**.839**
~~CSA.01 An IT career is respected in my community~~	~~**.580**~~
CSA.07* In my culture, a woman is expected to have a family and children*REVERSED In my culture, a woman is not expected to have a family and children	**.826**
CSA.06* In my culture, having a large family is important *REVERSED In my culture, having a large family is not important	**.770**
CSA.02* In my culture, IT is not seen as a career for women*REVERSED IN my culture, IT is seen as a career for women	**.670**
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 70.0%	
Career Demands	
CD.06 An IT career allows me to have a balanced family life	**.880**
CD.02 My career allows me to have both, a career and a family life	**.893**
CD.07 An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	**.809**
CD.03 I control my time at work	**.758**
~~CD.04 I have a good relationship with my colleagues~~	~~**.570**~~
~~CD.01 I am at times burnt out by the demands of my job~~	~~**.549**~~
CD.05 I have been given adequate resources to fulfil my job	**.432**
CD.10* My IT career requires me to work after hours*REVERSED My IT career does not require me to work after hours	**.941**
CD.09* My IT career requires me to work long hours*REVERSED	.933

My IT career does not require me to work long hours	
~~CD.08* My IT career requires me to travel to other cities/towns*REVERSED~~ ~~My IT career does not require me to travel to other cities/towns~~	~~.465~~
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 55.0%	
Career Demands	
CD.02 My career allows me to have both, a career and a family life	**.893**
CD.06 An IT career allows me to have a balanced family life	**.880**
CD.07 An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	**.809**
CD.03 I control my time at work	**.719**
CD.10* My IT career requires me to work after hours	**.941**
CD.09* My IT career requires me to work long hours	**.933**
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 77.7%	
Family Demands	
FD.06* It is difficult to manage my work-life and family time*REVERSED It is not difficult to manage my work-life and family time	**.883**
FD.05* My work-life commitments impact the time I can spend with my family*REVERSED My work life commitments do not impact the time I can spend with my family	**.812**
FD.02* I feel guilty for sacrificing family time to pursue my career in IT*REVERSED I do not feel guilty for sacrificing family time to pursue my career in IT	**.811**
FD.04* Family responsibilities prevent me from growing further in an IT career*REVERSED Family responsibilities do not prevent me from growing further in an IT career	**.799**
FD.07* I would like to have more available time to spend with my family*REVERSED I would not like to have more time available to spend with my family	**.763**
FD.03* I need to prove that having a family will not impact my work-life*REVERSED I do not need to prove that having a family will not impact my work-life	**.740**
FD.01 I control my time away from work	**.668**
Minimum loading deemed significant = .667; Percentage of Total Variance Explained = 61.6%	
Gender Bias	
~~GB.01 My IT career has a glass ceiling because I am a woman~~	~~**.740**~~
GB.09 I need to work harder at my career because I am female	**.686**
GB.06* I have been given equal opportunities as my male counterparts *REVERSED I have not been given equal opportunities as my male counterparts	**.795**
~~GB.07* My workload is the same as that of male colleagues*REVERSED~~ ~~My workload is not the same as that of male colleagues~~	~~**.475**~~
GB.08 Professional standards are higher for women than men	**.700**
GB.05* I have enough support to manage the dual role of being a working woman and being a mother to my children*REVERSED I do not have enough support to manage the dual role of being a working woman and being a mother to my children	**.749**
~~GB.03 Family responsibilities prevent women from travelling, nationally and internationally~~	~~**.359**~~
GB.02 Women in IT are paid less than men doing the same work	**.661**
~~GB.04 Family responsibilities prevent men from travelling, nationally and internationally~~	~~-.160~~
Minimum loading deemed significant = .645;	

Percentage of Total Variance Explained = 51.8%	
Male and Female Perceptions	
~~MFP.07 I have a lot of support from my male colleagues~~	~~.203~~
~~MFP.09 At work, I have received support from my male manager/employer~~	~~.129~~
~~MFP.08 I have a lot of support from my female colleagues~~	~~-.173~~
~~MFP.10 At work, I have received support from my female manager/employer~~	~~.229~~
~~MFP.01 My male colleagues respect my work~~	~~.335~~
~~MFP.06 In my job, I am comfortable working within male dominated teams~~	~~-.108~~
~~MFP.02* My female colleagues respect my work more than my male colleagues*REVERSED~~ ~~My female colleagues do not respect my work more than my male colleagues~~	~~.243~~
~~MFP.03* My female colleagues are more competitive than my male colleagues*REVERSED~~ ~~My female colleagues are not more competitive than my male colleagues~~	~~-.043~~
MFP.04* My female colleagues appear to feel threatened by my abilities*REVERSED My female colleagues do not appear to feel threatened by my abilities	.862
~~MFP.11* Socialising with male team members can be awkward/sensitive*REVERSED~~ ~~Socialising with my male team members is not awkward/sensitive~~	~~.108~~
MFP.05* My male colleagues appear to feel threatened by my abilities*REVERSED My male colleagues do not appear to feel threatened by my abilities	.862
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 74.2%	
Management of IT Career	
MC.05 I engage with successful women in IT	.901
MC.04 I network with other women in IT	.895
MC.03 I have female role models working in IT	.765
~~MC.01 Belonging to a professional IT body is important for my career~~	~~.499~~
~~MC.02 I spend time with my colleagues after work~~	~~.381~~
Minimum loading deemed significant = .663; Percentage of Total Variance Explained = 73.3%	
Successful Woman in IT - Personal	
SWP.02 I see myself as a successful woman in IT	.907
SWP.03 Other people see me as a successful woman in IT	.865
SWP.01 I have been promoted in my IT career	.812
Minimum loading deemed significant = .649; Percentage of Total Variance Explained = 74.3%	
Successful Woman in IT - In General	
SWG.03* Successful women in IT have sacrificed their personal life for their career*REVERSED Successful Women in IT have not sacrificed their personal life for their career	.821
SWG.04 Successful women in IT have work-life balance	.790
SWG.07* Successful women in IT had to overcome cultural prejudice*REVERSED Successful women in IT do not have to overcome cultural prejudice	.719
~~SWG.05* Successful women in IT are mostly self-employed*REVERSED~~ ~~Successful women in IT are not mostly self -employed~~	~~.541~~
~~SWG.08 Successful women in IT received family support~~	~~.082~~
~~SWG.09 Successful woman in IT are required to constantly keep ahead of change and new technologies~~	~~-.315~~

~~SWG.01 Successful women in IT perform equivalent jobs to their male counterparts~~	~~.224~~
~~SWG.02 Successful women in IT require an appropriate qualification~~	~~-.326~~
~~SWG.06 Successful women in IT were exposed to technology early in their life~~	~~-.025~~
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 60.5%	
IT as a Career	
ITC.05 Women must consider IT as a career	**.829**
ITC.06 There are different career paths for women in IT	**.772**
ITC.01 I would recommend an IT career to other females	**.769**
ITC.03 I have a long career ahead of me in IT	**.731**
ITC.04 My IT career has been rewarding	**.714**
ITC.02 My IT career makes a positive contribution to my community	**.664**
Minimum loading deemed significant = .645; Percentage of Total Variance Explained = 56.0%	

4.5 Cronbach's Alpha

In Table 4.33 the Cronbach's Alpha scores are illustrated. The scores are after the items removed in the preceding section have been removed.

The scores meet the minimum requirement required for good reliability (Nunnaly, 1978), who indicated that good reliability was at 0.70. Many of the factors achieved good reliability except for IV3: School career guidance (n=0.62), IV6 Cultural expectations (n=0.61), IV10 male colleague's perception (n=0.65) and IV11 Management of career (n=0.69). These are however acceptable by Zikmund's standards of 0.60 (Zikmund et al, 2013).

Table 4.33: Cronbach's Alpha

DV/IV	Factor	n	Chronbach's alpha
IV1	Personality Traits	71	0.81
IV2	Confidence	70	0.88
IV2	Conflict Management	70	0.87
IV3A	Computer Access	70	0.84
IV3B	Peer Perception	55	0.93
IV3C	School Career Guidance	66	0.62
IV4	Tertiary education	71	0.82
IV5A	Family and societal discouragement	65	0.79
IV5B	Family and societal encouragement	63	0.86
IV6A	Cultural understanding of career	70	0.88
IV6B	Cultural expectations	71	0.61
IV7A	Work-Life Balance	71	0.87
IV7B	After-hour work	70	0.88
IV8	Family demands	70	0.89
IV9	Gender Bias	71	0.74
IV10A	Female Colleagues perceptions	71	0.86
IV10B	Male Collegeaues perceptions	69	0.65
IV11	Management of Career	69	0.69
DV1 &2A	Succesful woman in IT - Personal	71	0.79
DV1 &2A	Succesful woman in IT - General	71	0.68
DV3	IT as a career	71	0.81

4.6 Descriptive Statistics for Factors

In this section, descriptive statistics for validity which was discussed in Chapter 3 and reliability which is illustrated above in the Cronbach Alpha have been established. In this section the descriptive statistics for these scores are presented.

4.6.1 Frequency Distribution of Factors

In Table 4.34 the frequency distribution for the factors are depicted. As explained in chapter 3, the scores were based on a 5-point Likert scale that used: Negative responses (1.00-2.59), Neutral (2.60 – 3.40) and Positive (3.41-5.00).

Table 4.34: Frequency of Distribution of factors

Factor	Negative 1.00 to 2.59	Neutral 2.60 to 3.40	Positive 3.41 to 5.00	Total
IV1: Personality Traits	3 (4%)	5 (7%)	63 (89%)	71 (100%)
IV2A: Confidence	0 (0%)	0 (0%)	70 (100%)	70 (100%)
IV2B: Conflict Management	0 (0%)	9 (13%)	61 (87%)	70 (100%)
IV3A: Computer Access	34 (49%)	14 (20%)	22 (31%)	70 (100%)
IV3B: Peer Perception	22 (40%)	12 (22%)	21 (38%)	55 (100%)
IV3C: School Career Guidance	38 (53%)	13 (20%)	18 (27%)	66 (100%)
IV4: Tertiary education	7 (10%)	11 15%)	53 (75%)	71 (100%)
IV5A: Family and societal discouragement	25 (38%)	19 (29%)	21 (32%)	65 (100%)
IV5B: Family and societal encouragement	5 (8%)	8 (13%)	50 (80%)	63 (100%)
IV6A: Cultural understanding of career	26 (37%)	22 (31%)	22 (31%)	70 (100%)
IV6B: Cultural expectations	15 (21%)	21 (30%)	35 (49%)	71 (100%)
IV7A: Work-Life Balance	6 (8%)	14 (20%)	51 (72%)	71 (100%)
IV7B: After-hour work	40 (57%)	9 (13%)	21 (30%)	70 (100%)
IV8: Family demands	18 (25%)	15 (21%)	37 (53%)	70 (100%)
IV9: Gender Bias	24 (34%)	26 (37%)	21 (30%)	71 (100%)
IV10A: Female Colleagues perceptions	3 (4%)	7 (10%)	61 (86%)	71 (100%)
IV10B: Male Colleagues perceptions	15 (22%)	15 (22%)	39 (57%)	69 (100%)
IV11: Management of Career	18 (26%)	31 (45%)	20 (29%)	69 (100%)
DV1 & DV2: Successful woman in IT - Personal	6 (8%)	18 (25%)	47 (66%)	71 (100%)
DV1 & DV2: Successful woman in IT - General	17 (24%)	30 (42%)	24 (34%)	71 (100%)
DV3: IT as a career	0 (0%)	2 (3%)	69 (97%)	71 (100%)

Many of the responses as illustrated in Table 4.34 were positive for the factors under study, the exception was on a few questions. Factors such as IV3 received negative responses at 49% disagreement to IV3A Computer access from early childhood, 40% negative responses for IV3B indicating poor peer perceptions and 53% for IV3C indicating lack of School career guidance. On IV5A family and societal discouragement was established to be negative at 38% as well as IV6A Cultural

understanding of career at 37% and IV7B After hour work at 57%. Neutral responses were obtained from IV9 Gender bias at 37%, IV11 Management of career at 45% and DV1, DV2 of successful woman in IT personal and general at 42%.

The above responses indicate that woman under the study had high levels of positivity regarding their career in IT and the work environment. Notable were internal satisfaction, confidence and the ability to work even in work environments that featured conflict. Guidance at an early age from school, peers and access to computers were noted as not prevalent alongside the understanding if IT careers by society. However, these factors did not deter the interest in IT from these women. Notably, tertiary education is seen as a key tool to prepare for the job environment and family demands are noted as not being prevalent.

4.6.2 Central Tendency and Dispersion of Factors

The central tendency measures the mean, median, standard deviation and the dispersion for each factor. Table 4.35 illustrates the following:

Table 4.35: Central Tendency and Dispersion

Factor	n	Mean	S.D.	Minimum	Quartile 1	Median	Quartile 3	Maximum
IV1: Personality Traits	71	4.21	0.68	2.00	4.00	4.33	4.67	5.00
IV2A: Confidence	70	4.67	0.41	3.60	4.25	4.90	5.00	5.00
IV2B: Conflict Management	70	4.22	0.61	2.67	4.00	4.00	5.00	5.00
IV3A: Computer Access	70	2.70	1.22	1.00	1.85	2.67	3.60	5.00
IV3B: Peer Perception	55	3.14	1.40	1.00	2.00	3.00	4.67	5.00
IV3C: School Career Guidance	66	2.66	1.12	1.00	2.00	2.33	3.63	5.00
IV4: Tertiary education	71	3.87	0.91	1.00	3.38	4.00	4.50	5.00
IV5A: Family and societal discouragement	65	2.97	1.18	1.00	2.00	3.00	4.00	5.00
IV5B: Family and societal encouragement	63	4.03	0.95	1.00	3.84	4.00	5.00	5.00
IV6A: Cultural understanding of career	70	2.91	1.10	1.00	2.00	3.00	3.67	5.00
IV6B: Cultural expectations	71	3.45	0.96	1.00	2.67	3.33	4.00	5.00
IV7A: Work-Life Balance	71	3.77	0.82	1.00	3.29	4.00	4.25	5.00
IV7B: After-hour	70	2.58	1.11	1.00	2.00	2.00	3.50	5.00

work								
IV8: Family demands	70	3.30	0.92	1.14	2.58	3.43	4.00	5.00
IV9: Gender Bias	71	2.95	0.90	1.00	2.40	3.00	3.60	5.00
IV10A: Female Colleagues perceptions	71	4.08	0.64	2.25	3.90	4.00	4.45	5.00
IV10B: Male Colleagues perceptions	69	3.45	0.91	1.00	3.00	3.50	4.00	5.00
IV11: Management of Career	69	3.04	0.79	1.00	2.50	3.00	3.60	4.80
DV1&DV2: Successful woman in IT – Personal	71	3.71	0.83	1.67	3.17	4.00	4.17	5.00
DV1&DV2: Successful woman in IT – General	71	3.07	0.85	1.33	2.67	3.00	3.67	5.00
DV3: IT as a career	71	4.39	0.55	2.67	4.00	4.50	5.00	5.00

Using the same threshold values used to classify scores into negative (1.00 to 2.59), neutral (2.60 to 3.40) and positive (3.41 to 5.00), it can be concluded based on the results presented in Table 4.34 only one of the factors obtained a negative mean (μ= <2.60). IV7B obtained a mean of μ=2.58<2.60 thus indicating negative perceptions of the work required after hours.

The positive means indicate positive responses from majority of the respondents regarding their own IV1: personality traits (μ=4.21), IV2A: Confidence (μ=4.67), IV2B: Conflict Management (μ=4.22). Further positivity was indicated on IV5B: Family and societal encouragement (μ=4.03), IV10A: Female Colleagues perceptions (μ=4.08) and DV3: IT as a career (μ=4.39) as they indicate positive views on work environments and family support. These results indicate the factors that positively impact women in IT to opt and remain in the field of IT as per the feedback of the respondents.

4.7 Inferential Statistics for the Factors

In the following section inferential statistics were generated to test the various hypotheses and the results for each factor are presented.

4.7.1 One Sample t-test

A one sample t-test illustrates the results obtained in Table 4.36. The test was conducted to determine if the population of women in IT's mean scores for the various factors can be describes as negative, neutral or positive.

Table 4.36: One Sample t-test

DV/IV	Factor	n	Mean	S.D.	H_1:μ	t	d.f.	p	Cohen's d
IV1	Personality Traits	71	4.21	0.68	≠3.40	9.97	70	<.0005	1.19
IV2	Confidence	70	4.67	0.41	≠3.40	26.07	69	<.0005	3.11
IV2B	Conflict Management	70	4.22	0.61	≠3.40	11.18	69	<.0005	1.33
IV3A	Computer Access	70	2.70	1.22	≠2.60	0.71	69	.481	n/a
IV3B	Peer Perception	55	3.14	1.40	≠3.40	-1.38	54	.173	n/a
IV3C	School Career Guidance	66	2.66	1.12	≠2.60	0.42	65	.673	n/a
IV4	Tertiary education	71	3.87	0.91	≠3.40	4.34	70	<.0005	0.51
IV5A	Family and societal discouragement	65	2.97	1.18	≠2.60	2.54	64	.014	0.31
IV5B	Family and societal encouragement	63	4.03	0.95	≠3.40	5.24	62	<.0005	0.66
IV6A	Cultural understanding of career	70	2.91	1.10	≠2.60	2.39	69	.019	0.28
IV6B	Cultural expectations	71	3.45	0.96	≠3.40	0.46	70	.644	n/a
IV7A	Work-Life Balance	71	3.77	0.82	≠3.40	3.73	70	<.0005	0.45
IV7B	After-hour work	70	2.58	1.11	≠2.60	-0.16	69	.872	n/a
IV8	Family demands	70	3.30	0.92	≠3.40	-0.91	69	.368	n/a
IV9	Gender Bias	71	2.95	0.90	≠2.60	3.32	70	.001	0.39
IV10A	Female Colleagues perceptions	71	4.08	0.64	≠3.40	9.04	70	<.0005	1.07
IV10B	Male Colleagues perceptions	69	3.45	0.91	≠3.40	0.45	68	.654	n/a
IV11	Management of Career	69	3.04	0.79	≠3.40	-3.79	68	<.0005	0.46
DV1 &2A	Successful woman in IT - Personal	71	3.71	0.83	≠3.40	3.15	70	.002	0.37
DV1 &2A	Successful woman in IT - General	71	3.07	0.85	≠3.40	-3.24	70	.002	0.39
DV3	IT as a career	71	4.39	0.55	≠3.40	15.23	70	<.0005	1.81

Table 4.36 depicts that the variables had positive mean scores with small practical significance except for IV7B for after-hour work at (M=2.58). Using the same threshold values as those used to classify scores into negative (1,00 to 2,59), neutral (2,60 to 3,40) and positive (3,41 to 5,00) categories, many of the factors indicated by the table were established to be positive.

Five of the factors had positive mean scores and a large affect as the Cohen's d was over 0.80. IV1: Personality traits (μ = 4.21; d = 1.19), IV2: Confidence (μ = 4.67; d = 3.11), IV2B: Conflict Management (μ = 4.22; d = 1.33), IV10A: Female Colleagues perceptions (μ = 4.08; d = 1.07) and DV3: IT as a career (μ = 4.39; d = 1.81). These results equally indicate the factors that positively impact the choice of women in IT with the underlying degree of agreement from the survey respondents.

4.7.2 Pearson's Correlation

As discussed in Chapter 3, a correlation coefficient is deemed statistically significant and moderate when it has an absolute value greater than 0.30. A strong relationship is indicated when value is greater than 0.50. In the below table the correlation between the dependent and the independent values is indicated;

Table 4.37: Pearson's Correlation

Factor		Successful woman in IT - Personal	Successful woman in IT - General	IT as a career
IV1	Personality Traits	.342	.291	.153
IV2	Confidence	.266	.048	.373
IV2	Conflict Management	.113	.060	.069
IV3A	Computer Access	.114	-.151	-.047
IV3B	Peer Perception	.077	.191	-.032
IV3C	School Career Guidance	.158	.189	.109
IV4	Tertiary education	.352	.081	.286
IV5A	Family and societal discouragement	.036	.200	.348
IV5B	Family and societal encouragement	.145	-.088	.065
IV6A	Cultural understanding of career	.068	.202	.034
IV6B	Cultural expectations	.094	.427	-.076
IV7A	Work-Life Balance	.059	.483	.385
IV7B	After-hour work	.049	.041	.108
IV8	Family demands	.035	.487	.242
IV9	Gender Bias	-.237	-.479	-.142
IV10A	Female Colleagues perceptions	.207	.385	.299
IV10B	Male Colleagues perceptions	.042	.525	.035
IV11	Management of Career	.161	-.250	.331

As depicted in Table 4.37 the correlations between the dependent and independent factors is positively correlated with the exception of Gender Bias (IV9) which obtained a negative correlation of (-237) to Successful Woman in IT, (-479)

Successful women in IT – General and (-142) to IT as a career. This indicates that gender bias does not increase the likeliness of success for women in the IT career.

Computer access (IV3A) had a negative correlation with successful woman in IT (-151) and IT as a career (-0.47), indicating that lack of computer access negatively impacts the choice of career in IT for women and the success of woman in IT. Peer Perception (IV3B) was negatively correlated to IT as a career at (-032), family and societal encouragement (IV5B) negatively correlated to successful woman in IT-General at (-088). Cultural expectations (IV6B) negatively correlated to IT as a career at (-076) and management of career (IV11) negatively correlated at (-250) to women in IT general.

As illustrated in Table 4.37 indicates that there is a positive relationship between personality traits, confidence and tertiary education to the personal successful woman in IT. Thus, this indicates that these factors are important for the personal success of women in IT. On the success of women in general, personality traits along with cultural expectation, work-life balance, family demands, female and male colleagues have a positive correlation and therefore indicate that they play a role in the achievement of success.

There is a positive relationship between confidence, tertiary education, family and societal discouragement to an IT career. This indicates that women who opt for a career in IT need these factors. The positive relationship also includes work-life balance, family demands, female colleagues and the management of career.

4.8 Inferential Ranking of the Summated Scores for the Independent Factors

In Table 4.38 independent variables are ranked, using matched-pair t-tests (statistical significance) and Cohen's d (practical significance), such that: a) The mean of the first variable in Signif.Group differs statistically and practically from the mean of the first variable in Signif.Group (i + 1); b) The mean of all variables in Signif.Group do not differ significantly from the mean of the first variable in that group.

Table 4.38: Inferential Ranking

	Variables	Rank	Signif. Group	n	Mean	SD
IV2	Confidence	1	1	70	4.67	0.41
IV2	Conflict Management	2	2	70	4.22	0.61
IV1	Personality Traits	2	2	71	4.21	0.68
IV10A	Female Colleagues perceptions	2	2	71	4.08	0.64
IV5B	Family and societal encouragement	2	2	63	4.03	0.95
IV4	Tertiary education	6	3	71	3.87	0.91
IV7A	Work-Life Balance	6	3	71	3.77	0.82
IV6B	Cultural expectations	8	4	71	3.45	0.96
IV10B	Male Colleagues perceptions	8	4	69	3.45	0.91
IV8	Family demands	8	4	70	3.30	0.92
IV3B	Peer Perception	8	4	55	3.14	1.40
IV11	Management of Career	12	5	69	3.04	0.79
IV5A	Family and societal discouragement	12	5	65	2.97	1.18
IV9	Gender Bias	12	5	71	2.95	0.90
IV6A	Cultural understanding of career	12	5	70	2.91	1.10
IV3A	Computer Access	12	5	70	2.70	1.22
IV3C	School Career Guidance	12	5	66	2.66	1.12
IV7B	After-hour work	18	6	70	2.58	1.11

The highest ranking independent factor was the personality trait of Confidence (IV2) with a significant mean of 4.67 and the factor that obtained the least in the rankings was After hour work (IV7B) at a mean of 2.58. This indicates that the most critical factor that affects the choice of career in IT is confidence. The factor that negatively impacts success of women in IT is after-hour work with a ranking of 18.

4.9 Relationship Between Selected Demographic information and Woman in Information Technology.

In this section, the relationships between the various demographic variables and the dependent variables will be presented. Measurement tools such as ANOVA's and t-tests will be presented to make conclusions on the relationships.

4.9.1 t –test: Marital Status

To evaluate the relationship between the respondent's marital status to the various dependent and independent variables, a t-test was conducted. All except one factor

had no significance, successful woman in IT – Personal had medium significance related to marital status (p=.013; Cohen's d=0.61), this indicates that there is a medium relationship between marital status and the successful course of women in IT. This is illustrated in the below Table 4.39.

Table 4.39: Marital status

Variable	Marital Status 2	n	Mean	S.D	Difference	t	d.f.	p	Cohen's d
Personality Traits	Single/Divorced/Widowed	31	4.08	0.76	-0.23	-1.44	69	.155	n/a
	Married/Living together	40	4.31	0.60					
Skills and Confidence A	Single/Divorced/Widowed	30	4.60	0.45	-0.13	-1.31	68	.194	n/a
	Married/Living together	40	4.73	0.37					
Skills and Confidence B	Single/Divorced/Widowed	30	4.09	0.60	-0.23	-1.58	68	.118	n/a
	Married/Living together	40	4.32	0.61					
Environment during school years A	Single/Divorced/Widowed	31	2.73	1.29	0.04	0.14	68	.891	n/a
	Married/Living together	39	2.69	1.17					
Environment during school years B	Single/Divorced/Widowed	25	3.07	1.35	-0.13	-0.35	53	.729	n/a
	Married/Living together	30	3.20	1.46					
Environment during school years C	Single/Divorced/Widowed	29	2.77	1.22	0.20	0.71	64	.481	n/a
	Married/Living together	37	2.57	1.05					
Tertiary Education	Single/Divorced/Widowed	31	3.73	0.77	-0.25	-1.16	69	.251	n/a
	Married/Living together	40	3.98	1.01					
Environment After School Years A	Single/Divorced/Widowed	28	3.03	1.11	0.10	0.34	63	.733	n/a
	Married/Living together	37	2.93	1.24					
Environment After School Years B	Single/Divorced/Widowed	26	3.96	0.87	-0.12	-0.47	61	.640	n/a
	Married/Living together	37	4.08	1.01					
Culture and Societal Attitudes A	Single/Divorced/Widowed	30	2.94	1.13	0.05	0.20	68	.842	n/a
	Married/Living together	40	2.89	1.09					
Culture and Societal Attitudes B	Single/Divorced/Widowed	31	3.42	0.94	-0.05	-0.22	69	.827	n/a
	Married/Living together	40	3.47	0.98					
Career Demands A	Single/Divorced/Widowed	31	3.70	0.75	-0.11	-0.57	69	.570	n/a
	Married/Living together	40	3.81	0.88					
Career Demands B	Single/Divorced/Widowed	30	2.58	1.01	0.01	0.03	68	.976	n/a
	Married/Living together	40	2.58	1.20					
Family Demands	Single/Divorced/Widowed	30	3.47	0.78	0.30	1.36	68	.180	n/a
	Married/Living together	40	3.17	1.00					
Gender Bias	Single/Divorced/Widowed	31	3.15	0.83	0.35	1.66	69	.101	n/a

	Married/Living together	40	2.80	0.92					
Male and Female Perceptions A	Single/Divorced/Widowed Married/Living together	31 40	3.92 4.20	0.67 0.59	-0.28	-1.87	69	.066	n/a
Male and Female Perceptions B	Single/Divorced/Widowed Married/Living together	30 39	3.32 3.55	0.99 0.84	-0.23	-1.06	67	.291	n/a
Management of Career	Single/Divorced/Widowed Married/Living together	30 39	3.17 2.94	0.66 0.87	0.23	1.19	67	.238	n/a
Successful Women in IT -Personal	Single/Divorced/Widowed Married/Living together	31 40	3.44 3.93	0.90 0.72	-0.49	-2.55	69	**.013**	**0.61 Medium**
Successful Women in IT - General	Single/Divorced/Widowed Married/Living together	31 40	2.91 3.20	0.78 0.89	-0.28	-1.39	69	.169	n/a
IT as a Career	Single/Divorced/Widowed Married/Living together	31 40	4.34 4.42	0.54 0.56	-0.08	-0.62	69	.537	n/a

4.9.2 t-test: Number of Children

In Table 4.40 the significance of the number of children by the respondents to the dependent and independent variable was investigated. Three medium relationships were found to be significant. The environment during school years (p=.017, Cohen's d=0.67), Culture and Societal attitudes (p=0.12, Cohen's d =0.62) and Gender Bias (p=0.15, Cohen's d = 0.59) were established to have a medium relationship with the number of children. This indicates that there is a medium relationship between the number of children women in IT gave to their social environment and social expectations.

Table 4.40: Number of children

Variable	Number of Children 2	n	Mean	S.D	Difference	t	d.f.	p	Cohen's d
Personality Traits	None 1 or more	32 39	4.07 4.32	0.77 0.59	-0.24	-1.51	69	.137	n/a
Skills and Confidence A	None 1 or more	32 38	4.69 4.66	0.42 0.41	0.04	0.38	68	.708	n/a
Skills and Confidence B	None 1 or more	32 38	4.14 4.29	0.61 0.62	-0.15	-1.01	68	.315	n/a
Environment during school years A	None 1 or more	32 38	2.73 2.68	1.22 1.23	0.05	0.18	68	.861	n/a
Environment during school years B	None 1 or more	26 29	2.67 3.56	1.15 1.49	-0.90	-2.47	53	**.017**	**0.67 Medium**

Environment during school years C	None	31	2.62	1.11	-0.07	-0.24	64	.810	n/a
	1 or more	35	2.69	1.15					
Tertiary Education	None	32	3.66	1.05	-0.39	-1.80	69	.077	n/a
	1 or more	39	4.04	0.76					
Environment After School years A	None	29	3.23	0.91	0.47	1.60	63	.114	n/a
	1 or more	36	2.76	1.33					
Environment After School Years B	None	29	3.99	0.83	-0.06	-0.27	61	.792	n/a
	1 or more	34	4.06	1.06					
Culture and Societal Attitudes A	None	32	2.91	1.11	-0.02	-0.06	68	.955	n/a
	1 or more	38	2.92	1.10					
Culture and Societal Attitudes B	None	32	3.14	0.94	-0.57	-2.59	69	**.012**	**0.62 Medium**
	1 or more	39	3.71	0.91					
Career Demands A	None	32	3.81	0.61	0.09	0.43	69	.666	n/a
	1 or more	39	3.73	0.97					
Career Demands B	None	31	2.69	1.22	0.21	0.77	68	.445	n/a
	1 or more	39	2.49	1.02					
Family Demands	None	31	3.39	0.81	0.16	0.73	68	.468	n/a
	1 or more	39	3.23	1.01					
Gender Bias	None	32	3.24	0.82	0.51	2.49	69	**.015**	**0.59 Medium**
	1 or more	39	2.72	0.90					
Male and Female Perceptions A	None	32	4.01	0.61	-0.12	-0.81	69	.421	n/a
	1 or more	39	4.14	0.66					
Male and Female Perceptions B	None	31	3.27	0.93	-0.32	-1.46	67	.149	n/a
	1 or more	38	3.59	0.88					
Management Of Career	None	31	3.20	0.78	0.29	1.53	67	.130	n/a
	1 or more	38	2.91	0.77					
Successful Women in IT - Personal	None	32	3.53	0.90	-0.33	-1.66	69	.101	n/a
	1 or more	39	3.86	0.75					
Successful Women in IT - General	None	32	2.88	0.70	-0.35	-1.75	69	.084	n/a
	1 or more	39	3.23	0.94					
IT as a Career	None	32	4.52	0.46	0.24	1.86	69	.068	n/a
	1 or more	39	4.28	0.59					

4.9.3 Selected Independent variables and Age: ANOVA and Descriptive tests

In Table 4.41, the relationship between personality traits and age was explored by means of descriptive statistics and the results of the mean between the different age groups was revealed as to be not significantly different between each age group. Thus, the results indicate similar levels of personalities throughout the respondents age groups.

Table 4.41: Descriptive Statistics -Personality Traits and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	4.21	4.06	4.16	4.39
SD	0.68	0.72	0.65	0.67
95% CI low	4.05	3.75	3.88	4.11
95% CI high	4.37	4.37	4.44	4.66

In order to further test this relationship, the ANOVA test was conducted and the test similarly indicated there was no difference between the various age groups and the personality traits (p=0.232), this is illustrated below in Table 4.42.

Table 4.42: ANOVA – Personality Traits and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	1.369	2	0.684	1.492	.232
Within Groups	31.201	68	0.459		
Total	32.570	70			

Skills and Aptitude and Age - Confidence

The descriptive statistics displayed in Table 4.43 indicate that no trend was established between the mean of Skills and Aptitude to the variable of Age.

Table 4.43: Descriptive Statistics Confidence and Age

Group	All	21-29	30-39	40 and above
n	70	23	23	24
Mean	4.67	4.63	4.69	4.70
SD	0.41	0.40	0.43	0.42
95% CI low	4.58	4.46	4.50	4.52
95% CI high	4.77	4.81	4.87	4.87

The ANOVA test similarly displayed no significant difference between the different age groups to the levels of confidence. A p value of (p=0.857) indicated below on Table 4.44 suggests that the relationship is similar for all age groups.

Table 4.44: ANOVA – Confidence and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.053	2	0.026	0.155	.857
Within Groups	11.471	67	0.171		
Total	11.524	69			

Skills and Aptitude and Age - Conflict Management

In an attempt to establish the relationship between Skills and Aptitude and Age, descriptive statistics established that there was no significant difference in age and skills and aptitude. This is displayed in Table 4.45.

Table 4.45: Descriptive statistics Conflict Management and Age

Group	All	21-29	30-39	40 and above
n	70	23	23	24
Mean	4.22	4.29	4.06	4.31
SD	0.61	0.49	0.68	0.65
95% CI low	4.07	4.08	3.77	4.03
95% CI high	4.37	4.50	4.36	4.58

The ANOVA similarly displayed no significant relationship and no difference between the various age groups (p=0.333), as indicated below on Table 4.46.

Table 4.46: ANOVA – Conflict Management and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.842	2	0.421	1.119	.333
Within Groups	25.212	67	0.376		
Total	26.054	69			

Environment during school years- Computer Access

In an attempt to establish a relationship between the variable of environment during school years and the demographic variable of age, descriptive statistics indicated in Table 4.47 specify that no significant difference was established between the two factors of environment during school years and age.

Table 4.47: Descriptive statistics Computer Access and Age

Group	All	21-29	30-39	40 and above
n	70	23	23	24
Mean	2.70	2.84	2.69	2.58
SD	1.22	1.36	1.17	1.16
95% CI low	2.41	2.25	2.19	2.09
95% CI high	2.99	3.43	3.20	3.07

The ANOVA test similarly displayed no significant relationship or difference between the various age groups with regard to Computer access(p=0.769). This is indicated below in Table 4.48.

Table 4.48: ANOVA – Environment After School and Age – Computer Access

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.797	2	0.398	0.264	.769
Within Groups	101.136	67	1.509		
Total	101.932	69			

Environment during school years - Peer Perception

In an attempt to establish a relationship between Environment during school years specifically peer perception and age, descriptive statistics in Table 4.49 indicate no significant difference between Peer perception and age.

Table 4.49 Descriptive statistics Peer Perception and Age

Group	All	21-29	30-39	40 and above
n	55	21	20	14
Mean	3.14	3.21	2.93	3.33
SD	1.40	1.26	1.54	1.47
95% CI low	2.76	2.63	2.21	2.49
95% CI high	3.52	3.78	3.65	4.18

The ANOVA similarly displayed that there was no significant relationship or trend between the two factors (p=0.733). This is indicated below in Table 4.50.

Table 4.50: ANOVA – Peer Perceptions and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.805	2	0.403	0.312	.733
Within Groups	81.192	63	1.289		
Total	81.997	65			

Environment during school years - School Career Guidance

The descriptive statistics displayed in Table 4.51 indicated that no trend was established between the means of the different age groups with regards to school guidance.

Table 4.51: Descriptive statistics School Career Guidance and Age

Group	All	21-29	30-39	40 and above
n	66	21	23	22
Mean	2.66	2.67	2.52	2.79
SD	1.12	1.18	0.93	1.28
95% CI low	2.38	2.14	2.12	2.22
95% CI high	2.93	3.21	2.92	3.36

The ANOVA similarly displayed no significant relationship between the two factors of career guidance and age (p=0.769) indicated below in Table 4.52.

Table 4.52: ANOVA - Career Guidance and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.805	2	0.403	0.312	.733
Within Groups	81.192	63	1.289		
Total	81.997	65			

Tertiary Education

The descriptive statistics in Table 4.53 indicated that no trend was established between the means of the respondents' tertiary education and the various age groups.

Table 4.53: Descriptive statistics Tertiary Education and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	3.87	3.90	3.74	3.96
SD	0.91	0.71	1.12	0.89
95% CI low	3.65	3.59	3.25	3.60
95% CI high	4.09	4.21	4.23	4.33

The ANOVA tests conducted (Table 4.54) indicate that no difference (p=0.691) was found between the respondent's Tertiary education and age.

Table 4.54: ANOVA – Tertiary Education and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.635	2	0.317	0.372	.691
Within Groups	57.970	68	0.852		
Total	58.605	70			

Environment After School - Family and societal discouragement

In an attempt to establish a relationship between family and societal discouragement and age, descriptive statistics indicated in Table 4.55 indicate no significant difference between family and societal discouragement and age.

Table 4.55: Descriptive statistics family and discouragement and Age

Group	All	21-29	30-39	40 and above
n	65	21	23	21
Mean	2.97	3.05	3.04	2.82
SD	1.18	0.88	1.15	1.48
95% CI low	2.68	2.66	2.54	2.14
95% CI high	3.26	3.45	3.53	3.49

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.772). This is indicated below in Table 4.56.

Table 4.56: ANOVA – Family and societal discouragement and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.739	2	0.369	0.260	.772
Within Groups	88.228	62	1.423		
Total	88.966	64			

Environment After School - Family and societal encouragement

In Table 4.57 it is established that the mean between the various age groups and family and societal encouragement was not different and thus there was no significant difference between the means.

Table 4.57: Descriptive statistics family and societal encouragement and Age

Group	All	21-29	30-39	40 and above
n	63	22	20	21
Mean	4.03	3.92	4.13	4.05
SD	0.95	0.88	0.80	1.17
95% CI low	3.79	3.53	3.76	3.52
95% CI high	4.27	4.31	4.51	4.58

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.764). This is indicated below in Table 4.58.

Table 4.58: ANOVA- family and societal encouragement and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.503	2	0.251	0.271	.764
Within Groups	55.725	60	0.929		
Total	56.227	62			

Cultural and Societal Attitudes - Cultural understanding of career

The descriptive statistics in Table 4.59 indicated that no trend was established between the means of the respondents between age and cultural understanding of career.

Table 4.59: Descriptive statistics Cultural understanding of career and Age

Group	All	21-29	30-39	40 and above
n	70	23	22	25
Mean	2.91	2.71	2.68	3.31
SD	1.10	1.08	1.02	1.12
95% CI low	2.65	2.24	2.23	2.85
95% CI high	3.18	3.18	3.13	3.77

The ANOVA tests conducted (Table 4.60) indicate that no difference (p=0.082) was found between the respondents cultural understanding of career and age.

Table 4.60: ANOVA cultural understanding of career and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	5.993	2	2.997	2.598	.082
Within Groups	77.267	67	1.153		
Total	83.260	69			

Cultural and Societal Attitudes - Cultural expectations

In an attempt to establish a relationship between Cultural expectations and age, descriptive statistics in Table 4.61 indicate that there was no significant difference between cultural expectations and age.

Table 4.61: Descriptive statistics Cultural expectations and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	3.45	3.04	3.34	3.93
SD	0.96	0.71	0.93	1.00
95% CI low	3.23	2.74	2.94	3.52
95% CI high	3.68	3.35	3.74	4.35

The ANOVA similarly displayed a significant relationship between the cultural expectation and age (p.=0.003). This is indicated below in Table 4.62.

Table 4.62: ANOVA – cultural expectation and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	9.894	2	4.947	6.211	.003
Within Groups	54.167	68	0.797		
Total	64.061	70			

Career Demands - Work-Life Balance

In Table 4.63 it is established that the mean between the various age groups and work life balance was not different and thus there was no significant difference between the means.

Table 4.63: Descriptive statistics work life balance and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	3.77	3.80	3.70	3.80
SD	0.82	0.55	0.85	1.01
95% CI low	3.57	3.56	3.33	3.38
95% CI high	3.96	4.04	4.06	4.22

The ANOVA similarly displayed that there was no significant relationship or trend was between the two factors (p=0.899). This is indicated below in Table 4.64.

Table 4.64: ANOVA work life balance and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.164	2	0.082	0.118	.889
Within Groups	47.408	68	0.697		
Total	47.572	70			

Career Demands - After-hour work

The descriptive statistics in Table 4.65 indicated that no trend was established between the means of the respondents between after-hour work and age.

Table 4.65: Descriptive statistics After hour work - Age

Group	All	21-29	30-39	40 and above
n	70	23	23	24
Mean	2.58	2.85	2.50	2.40
SD	1.11	1.17	1.22	0.92
95% CI low	2.31	2.34	1.97	2.01
95% CI high	2.84	3.35	3.03	2.78

The ANOVA tests conducted (Table 4.66) indicate that no difference (p=0.353) was found between the respondents' perception on after hour work and age.

Table 4.66: ANOVA After-hour work and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	2.611	2	1.305	1.058	.353
Within Groups	82.707	67	1.234		
Total	85.318	69			

Family Demands

In an attempt to establish a relationship between Family demands and age, descriptive statistics presented in Table 4.67 indicate no significant difference between family demands and age.

Table 4.67: Descriptive statistics Family demands and Age

Group	All	21-29	30-39	40 and above
n	70	23	23	24
Mean	3.30	3.52	3.04	3.34
SD	0.92	0.66	0.87	1.13
95% CI low	3.08	3.24	2.66	2.86
95% CI high	3.52	3.81	3.42	3.82

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.199). This is indicated below in Table 4.68.

Table 4.68: ANOVA – Family demands and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	2.753	2	1.377	1.652	.199
Within Groups	55.824	67	0.833		
Total	58.577	69			

Gender Bias

In Table 4.69 it is established that the mean between the various age groups and Gender Bias was not different and thus there was no significant difference between the means.

Table 4.69: Descriptive statistics Gender Bias and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	2.95	3.10	2.93	2.84
SD	0.90	1.02	0.75	0.92
95% CI low	2.74	2.66	2.61	2.46
95% CI high	3.17	3.54	3.26	3.22

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.616). This is indicated below in Table 4.70.

Table 4.70: ANOVA – Gender Bias and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.799	2	0.399	0.488	.616
Within Groups	55.619	68	0.818		
Total	56.418	70			

Male and Female Perceptions - Female Colleagues perceptions

The descriptive statistics in Table 4.71 indicated that no trend was established between the means of the respondents age and female colleague perceptions.

Table 4.71: Descriptive statistics female colleague's perceptions and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	4.08	4.05	4.08	4.11
SD	0.64	0.55	0.70	0.67
95% CI low	3.93	3.81	3.78	3.84
95% CI high	4.23	4.29	4.39	4.39

The ANOVA tests conducted (Table 4.72) indicate that no difference (p=0.942) was found between the respondent's female colleagues perception and age.

Table 4.72: ANOVA female colleague's perceptions and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.049	2	0.025	0.059	.942
Within Groups	28.217	68	0.415		
Total	28.266	70			

Male and Female Perceptions - Male Colleagues perceptions

In Table 4.73 it is established that the mean between the various age groups and male colleagues' perceptions was not different and thus there was no significant difference between the means.

Table 4.73: Descriptive statistics male colleagues and Age

Group	All	21-29	30-39	40 and above
n	69	22	23	24
Mean	3.45	3.27	3.11	3.94
SD	0.91	0.94	0.80	0.80
95% CI low	3.23	2.86	2.76	3.60
95% CI high	3.67	3.69	3.45	4.27

The ANOVA however differed and displayed that there was significant relationship between the two factors of male colleagues and age (p=0.003). This is indicated below in Table 4.74.

Table 4.74: ANOVA – Male colleagues and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	9.074	2	4.537	6.372	**.003**
Within Groups	46.998	66	0.712		
Total	56.072	68			

Management of Career

In Table 4.75 it is established that the mean between the various age groups and management of career was not different and thus there was no significant difference between the means.

Table 4.75: Descriptive statistics management of career and Age

Group	All	21-29	30-39	40 and above
n	69	21	23	25
Mean	3.04	3.20	3.02	2.92
SD	0.79	0.77	0.60	0.94
95% CI low	2.85	2.85	2.76	2.54
95% CI high	3.23	3.56	3.28	3.31

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.483). This is indicated below in Table 4.76.

Table 4.76: ANOVA – management of career and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.916	2	0.458	0.737	.483
Within Groups	41.009	66	0.621		
Total	41.924	68			

Successful Woman in IT – Personal

In Table 4.77 it is established that the mean between the various age groups and Successful woman in IT - Personal was not different and thus there was no significant difference between the means.

Table 4.77: Descriptive statistics Woman in IT and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	3.71	3.49	3.70	3.93
SD	0.83	0.90	0.92	0.64
95% CI low	3.51	3.10	3.30	3.66
95% CI high	3.91	3.88	4.09	4.19

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.199). This is indicated below in Table 4.78.

Table 4.78: ANOVA – Woman in IT- Personal and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	2.257	2	1.129	1.651	.199
Within Groups	46.488	68	0.684		
Total	48.745	70			

Successful Woman in IT – General

In Table 4.79 it is established that the mean between the various age groups and Successful woman in IT - General was not different and thus there was no significant difference between the means.

Table 4.79: Descriptive statistics Woman in IT – General and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	3.07	2.83	3.04	3.33
SD	0.85	0.79	0.68	0.99
95% CI low	2.87	2.49	2.74	2.92
95% CI high	3.27	3.17	3.33	3.74

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.116). This is indicated below in Table 4.80.

Table 4.80 ANOVA – Successful Woman in IT- General and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	3.116	2	1.558	2.224	.116
Within Groups	47.633	68	0.700		
Total	50.749	70			

IT as a Career

The descriptive statistics in Table 4.81 indicated that no trend was established between the means of the respondents age and female colleague perceptions.

Table 4.81: Descriptive statistics IT as Career and Age

Group	All	21-29	30-39	40 and above
n	71	23	23	25
Mean	4.39	4.53	4.40	4.25
SD	0.55	0.51	0.54	0.58
95% CI low	4.26	4.31	4.16	4.02
95% CI high	4.52	4.75	4.63	4.49

The ANOVA similarly displayed that no significant relationship or trend was between the two factors (p=0.222). This is indicated below in Table 4.82.

Table 4.82: ANOVA – IT as a career and Age

Source of Variation	*SS*	*df*	*MS*	*F*	*p*-value
Between Groups	0.906	2	0.453	1.537	.222
Within Groups	20.048	68	0.295		
Total	20.954	70			

4.10 Testing the model

In the sub-sections below an adjusted conceptual model will be presented, this model is based on the results received from the survey.

4.10.1 Model 1

In Table 4.82 It is established that career demands – work life balance (p=0.001) and family and societal discouragement (p=0.002) were significant factors when it related

to personal success in IT. However, in Table 4.84 personality traits (p=0.002), confidence (p=0.002), and conflict resolution (p=0.002), were established to be significant factors related to the success of women in IT

Table 4.83 Stepwise Regression - Independent Factors and Success of Women in IT - General (n = 58)

	Mult. R^2	Adj.Mult.R^2	F(8,49)	p
	0.654	0.597	11.55	<.0005
	Coefficients	Std.Err.	t(49)	p-value
Intercept	2.1907	1.0462	2.09	.041
Male colleague's perceptions	0.2584	0.1000	2.58	.013
Career demands - work life balance	0.3332	0.0936	3.56	.001
Cultural expectations of IT career	0.1610	0.0978	1.65	.106
Family and societal discouragement	-0.2656	0.0830	-3.20	.002
Family and societal encouragement	0.1455	0.0712	2.04	.046
Gender Bias	-0.2970	0.1162	-2.56	.014
Management of IT career	-0.2276	0.1222	-1.86	.069
Cultural understanding of IT career	0.1213	0.0737	1.65	.106

Due to the responses received and the various tools used to analyse, various factors have significant relationship to the dependent variable and thus a new model was proposed. In the proposed model illustrated below the main test is for dependent variable three (Personal success in IT) this is due to the fact that all other dependent variables are tested indirectly using questions to probe from the independent variables. Tertiary Education was combined to independent factor: Environment after school years. After the responses were received, it was indicated that Tertiary education was a standalone factor and this was added to the model. The proposed model to test personal success in IT is illustrated in Figure 4.23.

Figure 4.23: New conceptual model for DV Personal success in IT

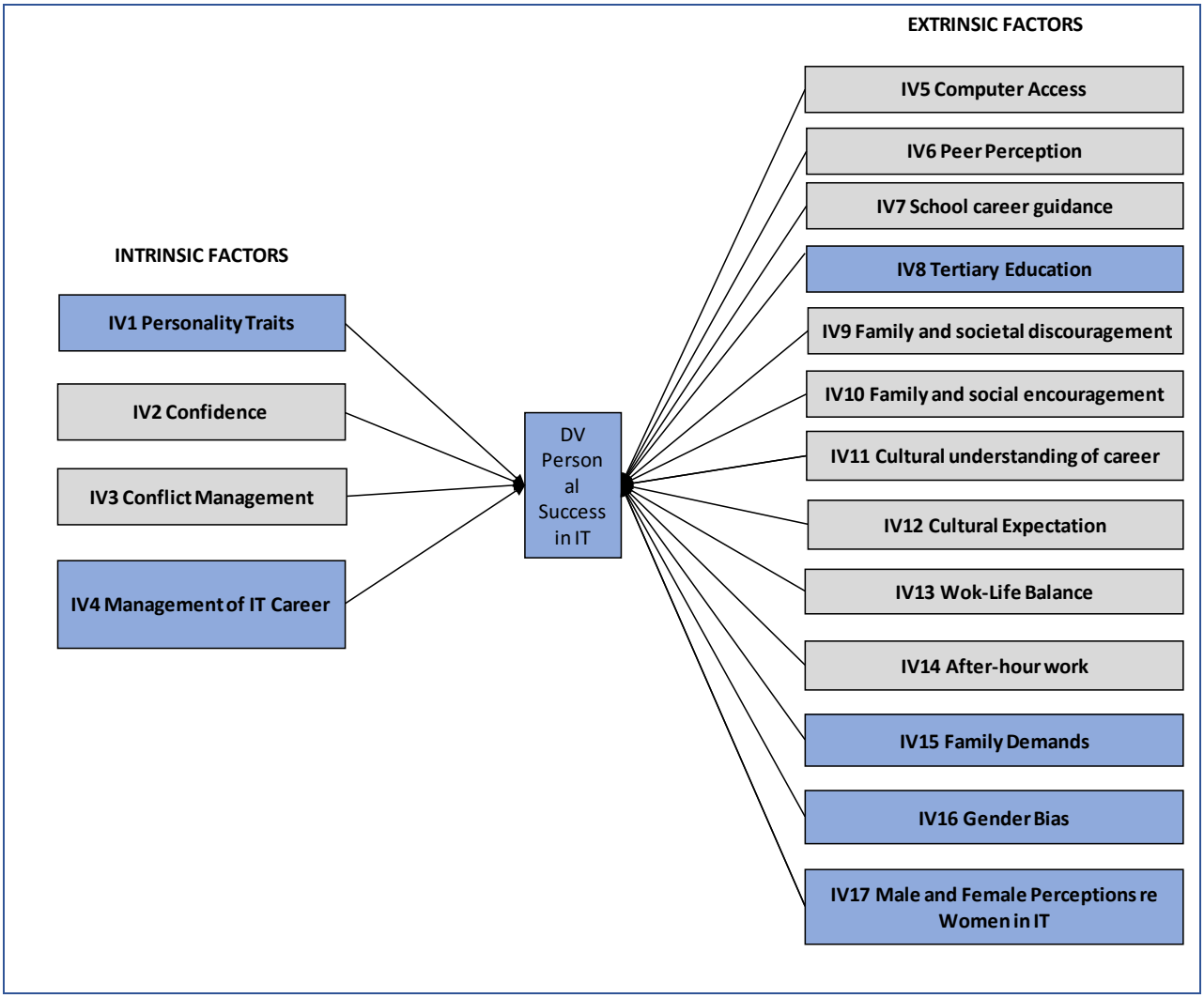


Table 4.84: Stepwise Regression - Independent Factors and IT as a Career (n = 60)

	Mult. R^2	Adj.Mult.R^2	F(8,50)	p
	0.571	0.494	7.41	<.0005
	Coefficients	Std.Err.	t(50)	p-value
Intercept	0.4302	0.6616	0.65	.519
Personality Traits - Confidence	-0.3397	0.1066	-3.19	.002
Skills and Aptitude - Confidence	0.4737	0.1437	3.30	.002
Tertiary Education	0.1886	0.0583	3.23	.002
Family and societal encouragement	0.0654	0.0474	1.38	.174
Career demands - work life balance	0.2179	0.1046	2.08	.042
Family Demands	0.1106	0.0925	1.20	.238
Female colleague's perceptions	0.2661	0.1097	2.42	.019
Male colleague's perceptions	-0.1399	0.0736	-1.90	.063
Management of IT career	0.1449	0.0785	1.85	.071

4.10.2 Model 2

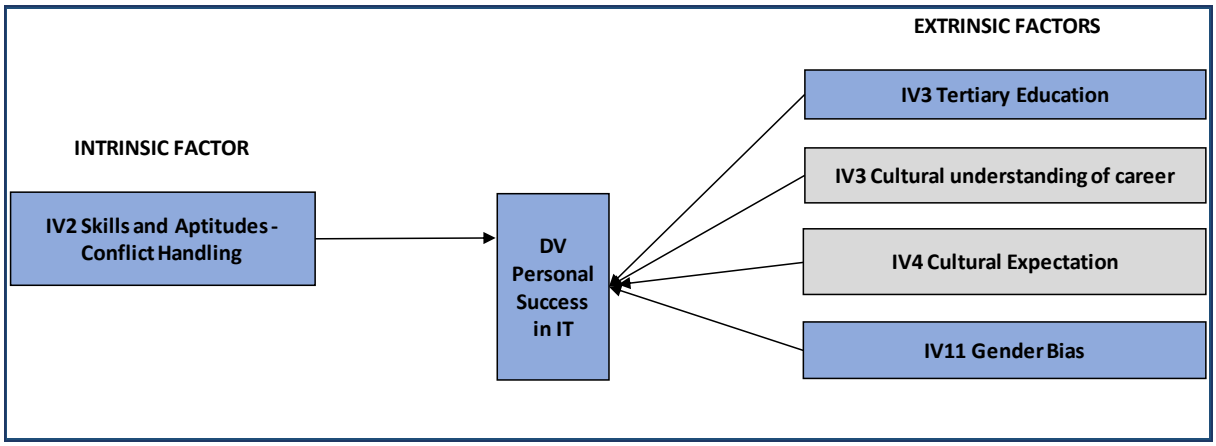
Tertiary education was most significant with (p=0.03) while Gender bias (p=.169), Conflict resolution (p=.284) and Cultural understanding of career (p=.285) had minimal significance as displayed in Table 4.85.

Table 4.85: Stepwise Regression - Independent Factors and Success of Women in IT - Personal (n = 67)

Factors	Mult. R^2	Adj.Mult.R^2	F(4,62)	p
	0.210	0.159	**4.12**	**.005**
	Coefficients	Std.Err.	t(62)	p-value
Intercept	1.9491	0.9317	2.09	.041
Tertiary Education	0.3260	0.1042	3.13	.003
Gender Bias	-0.1492	0.1073	-1.39	.169
Skills and Aptitude - Conflict resolution	0.1672	0.1548	1.08	.284
Cultural understanding of career	0.0926	0.0858	1.08	.285

The below model in Figure 4.24 is the proposed model after stepwise linear regression to measure personal success in IT.

Figure 4.24: New Empirical Model for DV Personal Success in IT



4.10.3 Hypothesis testing

The conceptual model with the proposed relationships as shown in Figure 3.4 was tested by using Pearson Correlations. Ten of the fifteen hypotheses developed in this research study were accepted by means of statistical analysis through empirical evaluation.

Table 4.86: Hypothesis testing

Hypothesis	Hypothesis Description	Pearson Correlations	Correlation Strength	Hypothesis Accepted or Rejected
HA_1	Personality traits positively influence females on opting for a career in IT with a measure of personal success	0.342	Low Positive	Accepted
HA_2	Skills and aptitude positively influences females on opting for a career in IT	0.373	Low Positive	Accepted
HA_{2B}	Skills and aptitude positively influences females remaining in the field of IT	0.266	Low Positive	Accepted
HA_3	Environment during school years positively influence females on opting for a career in IT	-0.047	Low Negative	Rejected
HA_4	Environment after school years positively influence females on opting for a career in IT	0.286	Low Positive	Accepted
HA_{5a}	Culture and societal attitudes regarding an IT career positively influences females on opting for a career in with a measure of personal success	0.348	Low Positive	Accepted
HA_{5B}	Culture and societal attitudes regarding IT career positively influences females remaining in the field of IT with a measure of personal success	0.145	Low Positive	Rejected
HA_{5C}	Culture and societal attitudes regarding family positively influences females opting for an IT career with a measure of personal success	0.034	Low Positive	Rejected
HA_{5D}	Culture and societal attitudes regarding family positively influences females remaining in the field of IT with a measure of personal success	0.094	Low Positive	Rejected
HA_6	Career demands positively influences females opting to remain in the field of IT with a measure of personal success	0.385	Low Positive	Accepted
HA_7	Family demands positively influences females opting for the field of IT and to remain in the field of IT with a measure of personal success	0.242	Low Positive	Accepted
HA_8	Gender bias positively influences females on opting for a career in IT and to remain in the field with a measure of personal success	-0.142	Low Negative	Rejected
	Male and female perceptions	0.299	Low	Accepted

HA_{9A}	regarding women in IT positively influences females opting for the field of IT with a measure of personal success		Positive	
HA_{9B}	Male and female perceptions regarding women in IT positively influences females remaining in the field of IT with a measure of personal success	0.525	Low Positive	Accepted
HA_{10}	Management of an IT career positively influences females on opting for a career in IT and remaining in the field with a measure of personal success	0.331	Low Positive	Accepted

4.11 Summary

This was a primary research study and to achieve conclusion the results of the survey were analysed and discussed. Over seventy-five respondents' answers were collated and used to discuss. Descriptive statistics and inferential statistics in the form of frequency tables, Cronbach Alpha's, tests and linear regression were used to compile the results.

Relationships between the independent factors, dependent factors and demographics were investigated and the results were presented in the form of Pearson's correlation analysis, t-tests, ANOVA and descriptive data tables. Chapter 4 concluded by proposing a new model to test how to attain personal success for women in Information Technology.

In this chapter, the research question four and the accompanying research objective were addressed. RQ_m: *What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?* this addresses the research objective: RO_m: *To identify and analyse the factors that attract women to the Information Technology Profession.* The results have indicated that women with intrinsic personal characteristics such as high levels of confidence in themselves and their abilities along with the ability to manage conflict are more likely to opt for a career in IT. External factors such as computer access from an early age, the perception of peers while at school and the career guidance received from early schooling life have the ability to rouse the interest of women in IT however these factors seem to be lacking as respondents outlined that these were not available.

Tertiary education has been noted as an important path that familiarises women to the content of the IT career as noted by the responses of the respondents. Family, religious and other societal structures have neutral reviews, although IT is respected in these circles, they neither encourage nor discourage women opt for a career in IT.

The respondents indicated that cultural barriers for women in IT are declining, a career in IT for women is respected and the community is now familiar with the career choice of women in the field IT. Although women still have family expectation that include shouldering family responsibilities, the women have been able to successfully balance the two responsibilities of work and family. At times women do feel burnt out and do wish to spend more time with their family.

Women currently working in IT notably, did not believe that they had a career glass ceiling although they noted that for male colleagues, travelling domestically and internationally did not impact their family responsibilities while for women there were mixed review on travelling impacts on family life.

In the work environment, females in IT expressed that they felt respected and comfortable in the largely male environment. Support was noted from colleagues and managers of all genders. There was no difference between the socialisation of women working in IT to their male colleagues and to their female colleagues.

The first four research questions and research objectives have been addressed in the first four chapters. In Chapter 5, a conclusion to the study will be made and *RQ_5 will be addressed RQ_5: What management strategy can be used to retain and increase the number of females working in IT as professionals?* As well as *RO_5: Recommend a management strategy to retain and increase the number of females who are working in IT as professionals.*

5. CHAPTER 5: FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

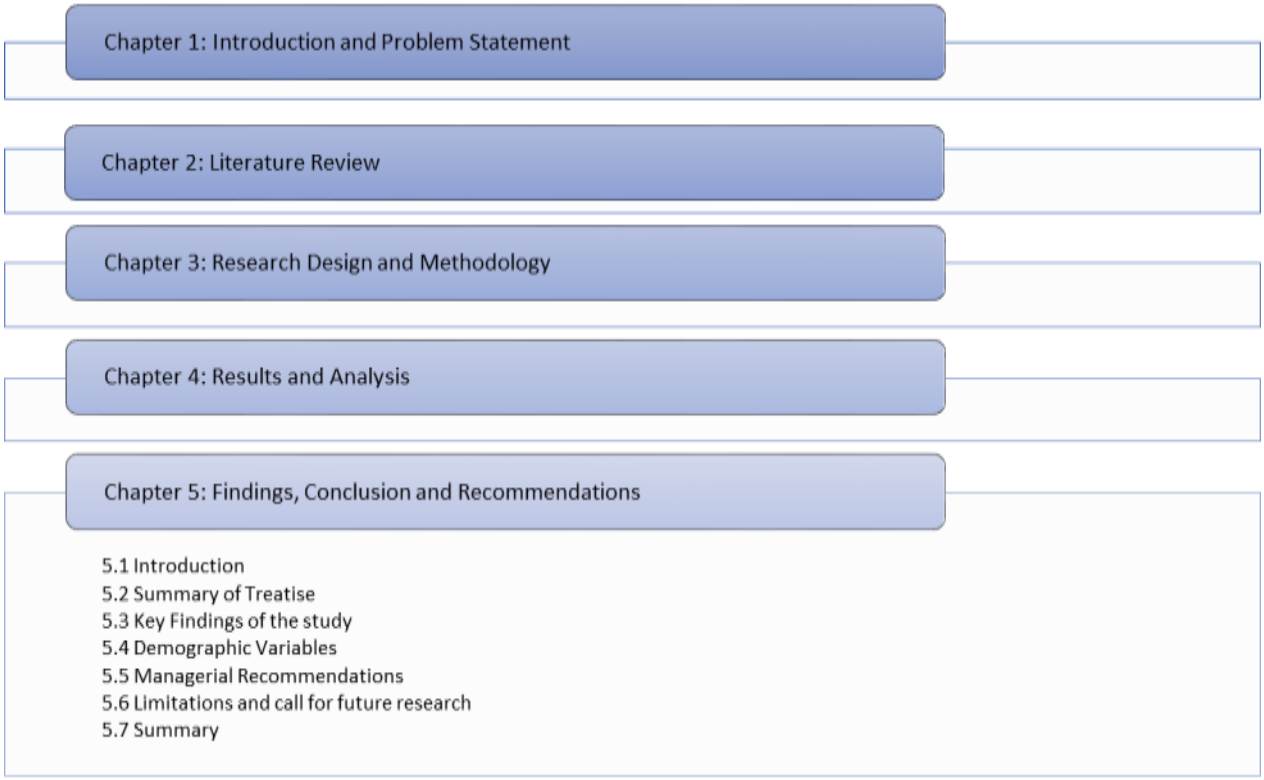
5.1 Introduction

In Chapter 4, the results collected from the survey were presented, analysed and expanded. In the latter part of the chapter the new conceptual model which was determined by the responses of the respondents was outlined, thus confirming the key factors that lead South African women to choose a career in Information Technology (IT). This chapter addressed RQ_m: *What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?* and further addressed RO_m: *To identify and analyse the factors that attract women to the Information Technology profession*.

This chapter will serve as the concluding chapter of the study whereby the key findings, managerial recommendations as well as the conclusion of the study is addressed. The Chapter will conclude by addressing the final research question RQ_5*: What management strategy can be used to retain and increase the number of females working in IT as professionals?* this is aligned to RO_5: *Recommend a management strategy to retain and increase the number of females who are working in IT as professionals.*

The Chapter outline is illustrated below in Figure 5.1

Figure 5.1: Chapter Outline



5.2 Summary of the Treatise

5.2.1 Chapter 1: Introduction and Problem Statement

Chapter 1 introduced the empirical study and probed into the subject of South African women's career choices especially in the field of Information Technology. The chapter provided an overview of the subject under study, the research significance, delimitations as well as the research alignment plan. Furthermore, the problem statement was clarified as*: Many South African women do not view a career in Information Technology as an ideal career. Furthermore, the women who are already working in the IT Industry often leave the IT field mid-career.*

This established the main research question (RQ_M): *What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?* And the equally aligned research objective (RO_M): *To identify and analyse the factors that attract women to the Information Technology profession.* The chapter concluded with a report structure that outlined the various chapters that were to follow.

5.2.2 Chapter 2: Literature Review

Chapter 2 presented and expanded on previous literature regarding women in Information Technology and the factors that led to a career choice in IT. Various sources such as books, journal articles, internet websites were used to address the first three research questions: RQ_1: *What are the national and international trends of women's career choices?* RO_1: *Analyse international and national Information Technology employment trends for women.* The national and international trends indicate low participation of women in IT, worldwide women make up less than 30% of the IT workforce (Njoki et al., 2016). Less than 10% are in management positions and leave IT mid-career at 56% (Thiele et al, 2013).

RQ_2: *What important personality traits do women in IT possess?* RO_2: *Determine the common personal traits of women who choose a career in Information Technology,* Confidence was indicated as the personal quality most prevalent to women in IT. The women who opt for a career in IT have high confidence levels in their skills and aptitude and they are able to manage conflict in a diverse environment.

RQ_3: *What are the factors that affect the career choice of women in IT? a*nd RO_3: *Establish the factors that influence women's career choices in Information technology*. Access to computers, Peer perception, school career guidance, tertiary education were the first factors that roused interest at an early age and prepared women in IT for the job content and environment.

Family and social structures such as friends and religious circle have little encouragement and discouragement to women choosing an IT profession. Society has the respect for a career in IT however have little understanding of what the career entails. Women have competing demands of family responsibilities that is being balanced with work responsibilities and are not able to socialise after hours thus have little networks and role models in IT.

The chapter concluded with a proposed conceptual model which was formed by using literature.

5.2.3 Chapter 3: Research Design and Methodology

Chapter 3 expanded on the various research philosophies, approaches and designs that guide a researcher during the research process. The chapter further clarified the

research approach taken for the purposes of this study which are guided by the research onion. In this study the following approach was taken: Philosophy: Positivistic, Approach: Inductive, Strategy: Survey, Choice: Mixed Method and Time Horizon: Cross sectional.

Additionally, Chapter 3 discussed the formation of the questionnaire which was based on the findings of previous literature. Measurement tools, reliability and validity tests used for purposes of this study were discussed. This chapter addressed RQ_4: *What research design can be used in this study?* And RO_4: *Formulate a research methodology to test the proposed model.* The research philosophy used was positivistic, the approach inductive and the strategy used was that of a survey. The time horizon was cross sectional and data was collected using a sampling method.

5.2.4 Chapter 4: Results

In Chapter 4, the data collected from respondents who are South African women in the field of Information Technology was presented and analysed. Descriptive and Inferential statistics were used to detail and generalise the findings of the study. The study through Exploratory Factor Analysis, Confirmatory Factor Analyses and Structural Equation Modelling explored the various responses. The conceptual model proposed in Chapter 2 was tested and a new model was presented that addressed the factors that affected women when it came to a career choice in Information Technology.

This addressed the main research question RQ_m: *What personal characteristics and factors influence women to choose IT as an ideal long-lasting career?* The main research objective was addressed RO_m: *To identify and analyse the factors that attract women to the Information Technology profession*. Women who opt for a long-lasting career in IT personally are happy and satisfied with themselves. They have high levels of internal confidence, internal motivation and the ability to manage their emotions. Women in IT are comfortable with the skills and aptitude, they are able to manage a diverse environment with an ability to manage conflict.

5.2.5 Chapter 5: Findings, Conclusion and Recommendation

Chapter 5 serves as a concluding chapter that summarises the key findings from the literature and the empirical study. Additionally, the implications, limitations of the study, call for future studies along with managerial recommendations are made. Finally, the final research question was addressed RQ_5: *What management strategy can be used to retain and increase the number of females working in IT as professionals?* Along with the last research objective RO_5: *Recommend a management strategy to retain and increase the number of females who are working in IT as professionals*.

5.3 Key Findings of the Study

5.3.1 Personality Traits

Women who opt for a career in IT are few when compared to women enrolling to other disciplines of study. There are numerous factors that contribute to this career choice, the biggest element noted by previous literature such as by Main & Schimpf (2017, 4) was the element of the women's personality which had a need for a sense of belonging in a career field, achievement motivation internal locus of control and high levels of confidence.

Women were noted to be co-operative, submissive and lacking self-confidence while their male counterparts were aggressive, assertive and full of confidence which influenced their view on their abilities. (Alexander et al, 2011). Ninety nine percent (n=70) of the survey respondents were confident of themselves and their abilities. The Cronbach Alpha score of (n=0.81) indicates excellent reliability of this response, and Cohen's d indicates large practical significance at (n=1.12). In the inferential ranking of mean's, the ranking of personality traits was at number 2 when it relates to women opting for a career in IT and succeeding personally and in general.

5.3.2 Skills and Aptitude

Previous literature indicated that the male-dominated field environment of IT requires women to have a strong sense of confidence in themselves, being assertive and having the ability to manage conflict. When examined closely, the content of IT is similar to the content in other mathematical fields and requires problem solving skills, logic, innovation and reasonability. These thinking abilities are gender neutral and

thus women are equally able to participate in these fields (Gharibyan & Gunsaulus 2006).

In Ireland, females in their early development were noted to have high levels of IQ's and natural affinity to mathematical sciences. However, over a length of time the gap in the similar group of females under observation noted that these women later opted out of careers in Maths, Science and technology (Appianing & Van Eck, 2015). This is largely due to low confidence levels, incorrect stereotypes and fear of the unconventional ((Appianing & Van Eck, 2015). Choice of IT as a subject is for both male and female genders changed over time to accommodate diverse needs and concepts (Bosch, 2014).

The findings of the study indicate high levels of confidence and conflict management skills in the respondents. Over 99% (n=68) had a positive belief in their IT skills and 81% (n=55) were confident to resolve complex technical problems on their own. The Cronbach Alpha was at 0.87 and 0.88 respectively indicating excellent reliability. Cohen's d showed great significance (p=3.11) and (p=1.33) indicating that personality traits is a significant factor in women opting for a career in IT. Thus, nurturing confidence in young women from an early age can lead to more women opting for a career in IT as they will equally have the confidence in their abilities, which is a catalyst for women to opt for a career in IT.

5.3.3 Early School Education

Choice of a future career, especially of the unconventional career choices is achieved by rousing the interest of students while they are in their early schooling years between the ages of eleven and seventeen (Adya, 2008). This is possible through access to computers at home and in the school environment at an early age. Teaching and training method that capture the interest and inform of the content of the IT field can lead to increased positive perceptions from peers and students alike. In females the interest is often captured in earlier classes but the interest in IT reduces as the female students grow older (Njoki et al., 2016)

The spontaneous questions and enthusiasm of boys in computer classes is mistaken by some teachers and often boys are encouraged to pursue IT more than girls. Teachers at times act as career counsellors and as they have little time to coach,

they might draw on social stereotypes and encourage more males to pursue IT than girls (Appianing & Van Eck, 2015).

The results of the study revealed reliability through the Cronbach Alpha of Computer access 0.84, Peer perception 0.93 and School career guidance at 0.62. Low levels of computer access for women were recorded in the home environment (n=18, 69%) and at school (n=37, 54%). There was no notable support from peers (n=36, 65%) and no guidance from teachers (n=37, 64%). Therefore, interest in IT is currently not optimised for females in their early school environment, and there is a gap with the cultivation of interest in IT at an early age.

5.3.4 Culture and Societal Attitudes regarding IT and family

Societal gender stereotypes regarding IT limit the number of females streaming and staying in the profession as they find that they are not understood. Women are noted to have communal needs that support IT. However, due to misunderstanding these can be deemed as not required for hard technical sciences.

Cultural stereotypes of the duties of women have resulted in competing demands for women in IT. Women have remained with the caregiving responsibilities of the household and at the same time are now required to bring an income from successful careers. Women, in general are less informed about the content of the work in IT however they are informed about the inequalities in the field (Main, 2017).

Women who have support and guidance from the parental structure are noted to participate more in the IT field. Often children coming from homes where the parents are educated and interact with technology are more likely to opt for non-traditional career choices due to home support (Appianing & Van Eck, 2015). In societies, women's capabilities are treated as equal to men such as in India and the Soviet Union, where women participate in IT in higher numbers when compared to men (Gharibyan & Gunsaulus 2006).

The findings of this study indicate that although IT is noted as not being understood in the community (n=29, 41%) it is seen as a respectable profession in society (n=60, 88%). This can be relied on with a Cronbach Alpha of 0.88, (p=.019), small Cohen's d of 0.45 for the cultural understanding of career and 0.61 for the cultural expectations (p=0.644). Thus, culturally the barriers have decreased for women to

opt for a career in IT as the profession is respected. Negative media portrayals do not deter women to opt for a career in IT.

5.3.5 Career Demands

The job environment of IT is creative and fulfilling with high earning potential and positive job image. However long hours of work, work exhaustion, role ambiguity and travelling often hinder the participation of women. (Hodges & Corley, 2016) The growth path for women in IT is often narrow due to the “boys club’ in management positions (Rogers, 2015). Social exclusion is possible due to the low availability of role models, mentors and networking opportunities. As females are few, they often face alienation and sexism resulting in change of careers to non-technical positions (Thiele et al., 2013).

Career choices can be influenced by role models however in the current society. The influence of looks and glamour noted in the lifestyle of sport stars and movie stars opposed to the regular negative nerdy perception of the field IT employees have led an incorrect perception of IT (Appianing & Van Eck, 2015).

The findings of this study indicate the women in IT at times do experience burn-out (n=44, 62%), have a good relationship with colleagues (n= 68, 98%) and could have a balanced family life (n=51, 74%). The Cronbach Alpha’s reliability on work life balance is 0.87 (p=0.005) and a small practical significant Cohen’s d at 0.45 and after hour work at 0.88 (p=.872). This indicates that the work environment is not alienating women as they have good relations with their colleagues of all genders however women are more susceptible to burn out as they have competing demands of family and work. Thus, interventions are necessary from business to alleviate burn-out.

5.3.6 Family Demands

Family responsibilities for women have not changed in modern times and women face similar challenges of balancing family with work responsibilities as decades before (Pretorius, 2009; Teague, 2002). In a woman’s IT career there is a notable turnover of over 56%. This is women leaving in mid-career due to pressures faced upon returning to the field after leaving for some time during child bearing periods

(Thiele et al., 2013). The fast pace of the environment and isolation lead to women opting out of a career in IT.

The findings of the study indicate that 86% (n=56) of women in IT believe that they can control their time away from work and 65% (n=42) disagreed that work commitments prevented them from a growing further in their IT careers. The Cronbach Alpha to test reliability was 0.89 (p=.368).

5.3.7 Tertiary Education

Enrolments in IT have lagged behind in tertiary education while other STEM disciplines have increased with women's participation. Women have opted for Social sciences and humanities due to traditional perceptions of the world of IT (Njoki et al., 2016). The shortage of enrolments in IT leads to fewer women with PhD's thus fewer academics and fewer women in management positions.

The findings of the study indicated that the time spent in tertiary education was crucial as it prepared the women for the job environment. Over 75%(n=49) believed that tertiary education prepared them and (82%) believed that they had studied the correct qualification. The Cronbach Alpha was at 0.82 (p=0.005) and Cohen's d was of medium practical significance of 0.51. These results indicate that tertiary education is a key tool to helping women understand the IT environment and prepares women for the actual IT job environment.

5.3.8 Male and Female perceptions regarding IT

In the past the field of IT was perceived as a male field. Images in the media created the stereotype that IT was nerdy and for those socially awkward (Warren et al., 2012). Males often have positive experiences with IT as the affinity to IT is increased by the use of games which largely cater to the male population (Main & Schimpf, 2017).

The findings of the study indicate that the females working in IT felt that they are respected by their male colleagues (n=60, 86%) and received support from their female employer/employer (n=48, 86%) and male colleagues/employer (n=60, 87%). Female colleagues had obtained the Cronbach Alpha score of 0.86, (p=0.005), Cohen's d was practically significant at 1.07 and Male colleagues, of 0.65 (p= .654).

5.3.9 Management of IT career

Success of women in IT is a new phenomenon and previously was limited to exceptions (Rogers, 2015). The field environment of IT often has women face sexism and alienation (Armstrong, 2014).

The findings of the study indicate that females do not have role models (n=32, 50%) nor do they network with other women (n=36, 55%). An acceptable Cronbach Alpha was acceptable at 0.69 and (p=0.005) and Cohen's d had small practical significance at 0.46.

5.4 Managerial Recommendations

The managerial recommendations are formulated to bridge the gap between current literature and the empirical study. The recommendations are aimed at improving the number of women who opt for and remain in an IT career. The recommendations will address:

- Personality Trait: Most of the women who responded to the survey agreed that they opted for a career in IT willingly and that they were happy with themselves and confident in their abilities (=70, 99%). They indicated their happiness at their choice of career. This indicates that once women are in the in the field of IT, similar levels of happiness when compared to other disciplines can be attained. Thus, the major obstacle is attraction to the field of IT, and not the work content once in the field.
- The demographic results reveal that the talent of women currently in the field of IT are the young (n=23, 32%) to the middle-aged population (n=23, 32%). Thus attraction, management and retention strategies need to be intentional for these age groups. The millennial workforce, with young children and family responsibilities is open to making non-traditional choices, thus they need more awareness of the content and benefits offered by the field of IT. Involvement by management in the form of organisational supportive policies for minorities and intentional recruitment practices, will grow the representation of minorities displayed in the demographics.
- Early school environment: Gender aptitude is gender neutral, however mathematical participation from women tends to reduce as they grow older.

Lack of knowledge on the content of IT by young students' needs to be addressed and removed. Knowledge sharing expos and information sessions for parents, teachers and career guidance counsellors will assist with IT awareness. Accessible computers, game technology for women and the availability of computers at home can assist with rousing interest in females at a young age.

- Environment after school: Low levels of participation in enrolments in tertiary education result in even fewer numbers available for the growing field. This reduction leads to fewer numbers available for the field of IT in academics and management needs to be redressed with more bursaries for women who opt for a career in IT.

- Career demands: Most women indicated that they experienced burn-out some time in their jobs, this is due to the long hours required in the IT environment. Although over 97% (n=67) felt that they were compatible with their colleagues, support from colleagues in the job environment is a notable, helpful feature and removes work alienation. Thus, mentors during work time team building activities will increase the comfort of women in the environment and with their male colleagues.

- Family demands: Traditional responsibilities of women have not changed and women have dual roles at home and at work. This at times leads to sacrifices of career and women are noted to struggle with the dual demands of competing responsibilities. Structures dealing with the education of family and support will help change societal perceptions regarding the roles of women in the household. Flexible work assignments such as remote work environments can assist with managing the demands of the career in IT for women.

- Management of career: Lack of networking opportunities, role models and women in management often result in one sided viewpoints and limited growth opportunities. Thus, increasing the number of channels whereby women in IT can interact, introduce formal mentorship programmes and creating affirmative opportunities will increase the participation of women in IT.

5.5 Limitations and Future research

The limitations of this study are that certain items were reversed or removed from the study due to insufficient factor loadings. After these factors were removed, the Cronbach's Alpha scores improved. All Cronbach's Alpha scores were either acceptable, good or excellent.

Pearson's correlation was conducted to establish the relationship between the dependent and independent variables. In dependent variable one: Personality Traits (IV1), Tertiary education (IV4) was positively correlated to Successful Women in IT (DV1), while gender bias (IV9) was negatively correlated to Successful women in IT (DV1). In Dependent variable two: Personality Traits (IV1), Cultural Expectations(IV6B), Work-life balance (IV7A), Family demands, female perception of female colleagues (IV10A) and male perception (IV10B) were positively correlated to successful women in IT (DV2). Gender Bias (IV) and management of career were negatively correlated to successful women in IT(DV2).

Lastly, Confidence (IV2), Tertiary education (IV4), Family and societal discouragement (IV5A), Work life balance (IV7A), family demands (IV8) female colleague perceptions(IV10A) and management of career (IV11) are positively correlated to IT as a career (DV3).

The study was conducted only in South Africa with a small sample of professionals thus, can be replicated in a bigger sample.

5.6 Conclusions

The main objective of this treatise was to identify and analyse the factors that attract women to the Information Technology profession. A questionnaire was designed to gather information from women currently in the field of IT. Additionally, a conceptual model was constructed by using previously written literature to determine the factors that attracted women to an IT career.

The deliverable objectives of the study were as follows:

- Analyse international and national Information Technology employment trends for women;

- Determine the common personal traits of women who choose a career in Information Technology;
- Establish the factors that influence women's career choices in Information technology;
- Formulate a research methodology to test the proposed model;
- Recommend a management strategy to retain and grow the number of females who are working in IT as professionals.

In conclusion the results were analysed and presented. Finally, the recommendations of management and the limitations of the study and future considerations were discussed. If the recommendations are implemented, the world of business will be able to attract more women to the field of IT.

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APPENDIX 1 – FORM E ETHICS CLEARANCE

NELSON MANDELA UNIVERSITY

FORM E

ETHICS CLEARANCE FOR TREATISES/~~DISSERTATIONS/THESES~~

Please type or complete in black ink

FACULTY: Business & Economic Sciences

SCHOOL/~~DEPARTMENT~~: Business School

I, (surname and initials of supervisor) Prof A. Calitz.

the supervisor for (surname and initials of candidate) Motaung L. N.

(student number) 217885470

a candidate for the degree of Master in Business Administration

with a treatise/~~dissertation/thesis~~ entitled (full title of treatise/~~dissertation/thesis~~):

Factors Influencing Women in IT Career Decisions.

considered the following ethics criteria *(please tick the appropriate block)*:

	YES	NO
1. Is there any risk of harm, embarrassment of offence, however slight or temporary, to the participant, third parties or to the communities at large?		X
2. Is the study based on a research population defined as 'vulnerable' in terms of age, physical characteristics and/or disease status?		X
2.1 Are subjects/participants/respondents of your study:		
(a) Children under the age of 18?		X
(b) NMMU staff?		X
(c) NMMU students?		X
(d) The elderly/persons over the age of 60?		X

(e) A sample from an institution (e.g. hospital/school)?		X
(f) Handicapped (e.g. mentally or physically)?		X
3. Does the data that will be collected require consent of an institutional authority for this study? (An institutional authority refers to an organisation that is established by government to protect vulnerable people)		X
3.1 Are you intending to access participant data from an existing, stored repository (e.g. school, institutional or university records)?		X
4. Will the participant's privacy, anonymity or confidentiality be compromised?		
4.1 Are you administering a questionnaire/survey that:		
(a) Collects sensitive/identifiable data from participants?		X
(b) Does not guarantee the anonymity of the participant?		X
(c) Does not guarantee the confidentiality of the participant and the data?		X
(d) Will offer an incentive to respondents to participate, i.e. a lucky draw or any other prize?		X
(e) Will create doubt whether sample control measures are in place?		X
(f) Will be distributed electronically via email (and requesting an email response)?		X
Note: • If your questionnaire **DOES NOT** request respondents' identification, is distributed electronically and you request respondents to return it *manually* (print out and deliver/mail); **AND** respondent anonymity can be guaranteed, your answer will be NO. • If your questionnaire **DOES NOT** request respondents' identification, is *distributed via an email link and works through a web response system (e.g. the university survey system);* ***AND*** respondent anonymity can be guaranteed, your answer will be NO.		

*Please note that if **ANY** of the questions above have been answered in the affirmative **(YES)** the student will need to complete the full ethics clearance form (REC-H application) and submit it with the relevant documentation to the Faculty RECH (Ethics) representative.*

and hereby certify that the student has given his/her research ethical consideration and full ethics approval is not required.

A. Caldy
SUPERVISOR(S)

25 April 2018
DATE

HEAD OF DEPARTMENT

DATE

STUDENT(S)

25 April 2018
DATE

Student(s) contact details (e.g. telephone number and email address):
Telephone: 060 974 8735
E-mail : lindaneom@gmail.com

Please ensure that the research methodology section from the proposal is attached to this form.

APPENDIX 2 – ONLINE SURVEY QUESTIONNAIRE

Dear Professional Women in IT

Women are under-represented in the IT industry. Presently the IT workforce in South Africa consists of only 18% women. The aim of this study is to identify the factors that made women working in the IT field, choose an IT career and what influenced their decisions to pursue an IT career.

We would appreciate your feedback by completing the online survey. All responses will remain confidential. Thank you in advance for your valuable contribution. Your participation is voluntary and you may withdraw from the survey at any time. Your input will be used to assist with career educational advice for girls and promoting careers in the IT field for women. The survey will take you +-10 minutes to complete.

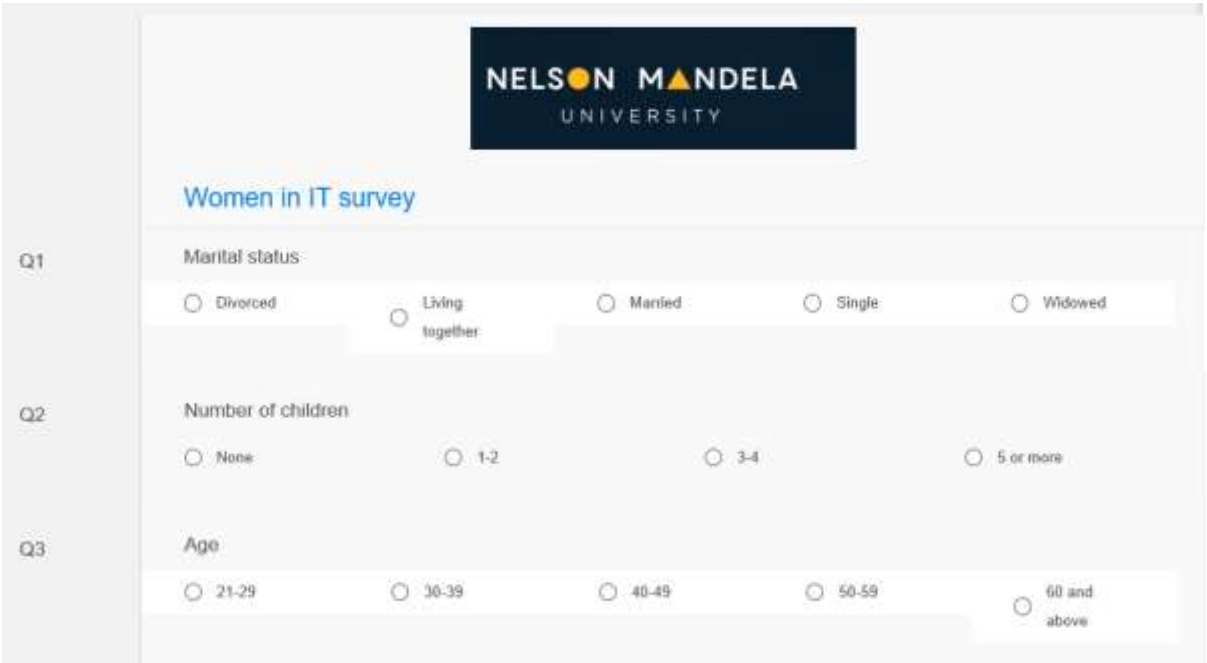
Please send the link to other woman working in the IT field. If you would like to receive the Executive Summary of the survey, please include an e-mail address at the end of the survey.

Please click on this link to complete the survey:

Start Survey

Should you have any questions, please contact Linda Motaung an MBA student at the Nelson Mandela University Business School on s217885470@nmmu.ac.za

Thank You



Q4 Ethnicity

○ African ○ Coloured ○ Indian ○ White ○ Other

Q5 Highest qualification

○ Matric ○ Certificate ○ Diploma ○ Degree ○ Honours

○ Masters and above

Q6 Indicate your highest IT qualification

○ Certificate ○ Diploma ○ Degree ○ Honours ○ Masters and above

Q7 At which Institution did you study your highest IT qualification?

Answer text

Q8 Please indicate your IT work experience

○ 0-2 years ○ 3-4 years ○ 5-9 years ○ 10-19 years ○ 20 years or more

Q9 Indicate your current work position

○ Entry / Operational level ○ Specialist ○ Software developer ○ Junior Management ○ Senior Management

○ Executive Management ○ Self Employed ○ Not Employed

Q9 IT work experience

○ 0-2 years ○ 3-4 years ○ 5-9 years ○ 10-19 years ○ 20 years or more

Q11 Where do you live (City/Town) name?

Answer text

Q12 Job title when you started your IT career?

Answer text

Q13 Job title at present?

Answer text

Q14 Why did you choose a career in IT?

Multiple Row Answer text

Q15 Did you have role models when you started your IT career?

○ Yes ○ No

Q16

If you had role models, who were they and why?

Multiple Row Answer text

Q17

Personality traits

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I am confident I can handle future unexpected events	○	○	○	○	○	○
I need reassurance for my good work	○	○	○	○	○	○
I am confident I can resolve complex technical problems on my own	○	○	○	○	○	○
I am happy with myself	○	○	○	○	○	○
I am able to do my work as well as most other people	○	○	○	○	○	○
I am satisfied with myself	○	○	○	○	○	○
It is easy for me to accomplish my goals	○	○	○	○	○	○
I am not intimidated by a predominantly male environment	○	○	○	○	○	○
I am passionate about the work I do	○	○	○	○	○	○

Q18

Skills and aptitudes

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I like solving problems and getting things to work	○	○	○	○	○	○
I am able to handle conflict in a team environment	○	○	○	○	○	○
I am able to handle conflict with my male colleagues	○	○	○	○	○	○
I am able to handle conflict with my female colleagues	○	○	○	○	○	○
In my job, I am competent working with computers	○	○	○	○	○	○
In my job, I am confident working with computers	○	○	○	○	○	○
I am able to do my work as well as most other people	○	○	○	○	○	○
In my job, I have confidence to work with team members who have many years of experience	○	○	○	○	○	○
I am compatible with my colleagues	○	○	○	○	○	○

Q19 Environment during school years

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Not Applicable
I was introduced to computers during my early basic education years	○	○	○	○	○	○
I had a computer at home growing up	○	○	○	○	○	○
I received adequate training at school which prepared me for higher education	○	○	○	○	○	○
I found IT to be an enjoyable subject whilst growing up	○	○	○	○	○	○
I was encouraged to believe that girls could do anything they pursued, just like boys	○	○	○	○	○	○
I received family encouragement to pursue an IT career	○	○	○	○	○	○
At school, my friends encouraged me to pursue an IT career	○	○	○	○	○	○
At school, IT was considered for boys only	○	○	○	○	○	○
At school, girls did not consider pursuing IT careers	○	○	○	○	○	○
At school, girls doing IT were seen as different	○	○	○	○	○	○
At school, I was involved in computer projects/classes	○	○	○	○	○	○
At school, I received career guidance from my career counsellors	○	○	○	○	○	○
At school, I received career guidance from my teachers	○	○	○	○	○	○

Q20 Tertiary education

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
Tertiary education prepared me well for the job environment	○	○	○	○	○	○
I received a bursary to study for an IT qualification	○	○	○	○	○	○
I studied the correct IT qualification for my profession	○	○	○	○	○	○
Tertiary education prepared me well for an career in IT	○	○	○	○	○	○
A tertiary education is important for a successful career in IT	○	○	○	○	○	○

	At school, IT was perceived as a difficult subject	○	○	○	○	○	○
	My passion for IT started during my schooling years	○	○	○	○	○	○
	After school, I had friends working in the IT industry	○	○	○	○	○	○

Q21

Environment after school years

	Left Anchor					Right Anchor
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
My family encouraged me to choose IT as a career	○	○	○	○	○	○
My friends encouraged me to choose IT as a career	○	○	○	○	○	○
My religious circle encouraged me to choose IT as a career	○	○	○	○	○	○
My family discouraged me from choosing IT as a career	○	○	○	○	○	○
My friends discouraged me from choosing IT as a career	○	○	○	○	○	○
My religious circle discouraged me from choosing IT as a career	○	○	○	○	○	○

Q22

Culture and Societal Attitudes about IT

	Left Anchor					Right Anchor
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
An IT career is respected in my community	○	○	○	○	○	○
In my culture, IT is not seen as a career for women	○	○	○	○	○	○
In my culture, people have a clear understanding of IT	○	○	○	○	○	○
In my culture, people have a clear understanding of IT careers	○	○	○	○	○	○
In my community, people are familiar with IT careers	○	○	○	○	○	○
In my culture, having a large family is important	○	○	○	○	○	○
In my culture, a woman is expected to have a family and children	○	○	○	○	○	○

Q23

Career Demands

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I am at times burnt out by the demands of my job	○	○	○	○	○	○
My career allows me to have both, a career and a family life	○	○	○	○	○	○
I control my time at work	○	○	○	○	○	○
I have a good relationship with my colleagues	○	○	○	○	○	○
I have been given adequate resources to fulfil my job	○	○	○	○	○	○
An IT career allows me to have a balanced family life	○	○	○	○	○	○
An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	○	○	○	○	○	○
My IT career requires me to travel to other cities/towns	○	○	○	○	○	○
My IT career requires me to work long hours	○	○	○	○	○	○
My IT career requires me to work after hours	○	○	○	○	○	○

Q24

Family demands

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I control my time away from work	○	○	○	○	○	○
I feel guilty for sacrificing family time to pursue my career in IT	○	○	○	○	○	○
I need to prove that having a family will not impact my work-life	○	○	○	○	○	○
Family responsibilities prevent me from growing further in an IT career	○	○	○	○	○	○
My work-life commitments impact the time I can spend with my family	○	○	○	○	○	○
It is difficult to manage my work-life and family time	○	○	○	○	○	○
I would like to have more available time to spend with my family	○	○	○	○	○	○

Q25 Gender bias

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
My IT career has a glass ceiling because I am a woman	○	○	○	○	○	○
Women in IT are paid less than men doing the same work	○	○	○	○	○	○
Family responsibilities prevent women from travelling, nationally and internationally	○	○	○	○	○	○
Family responsibilities prevent men from travelling, nationally and internationally	○	○	○	○	○	○
I have enough support to manage the dual role of being a working woman and being a mother to my children	○	○	○	○	○	○
I have been given equal opportunities as my male counterparts	○	○	○	○	○	○
My workload is the same as that of male colleagues	○	○	○	○	○	○
Professional standards are higher for women than men	○	○	○	○	○	○
I need to work harder at my career because I am female	○	○	○	○	○	○

Q26 Male and female perceptions

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
My male colleagues respect my work	○	○	○	○	○	○
My female colleagues respect my work more than my male colleagues	○	○	○	○	○	○
My female colleagues are more competitive than my male colleagues	○	○	○	○	○	○
My female colleagues appear to feel threatened by my abilities	○	○	○	○	○	○
My male colleagues appear to feel threatened by my abilities	○	○	○	○	○	○
In my job, I am comfortable working within male dominated teams	○	○	○	○	○	○
I have a lot of support from my male colleagues	○	○	○	○	○	○
I have a lot of support from my female colleagues	○	○	○	○	○	○
At work, I have received support from my male manager/employer	○	○	○	○	○	○
At work, I have received support from my female manager/employer	○	○	○	○	○	○
Socialising with male team members can be awkward/sensitive	○	○	○	○	○	○

Q27 Management of IT career

	Left Anchor					Right Anchor
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
Belonging to a professional IT body is important for my career	○	○	○	○	○	○
I spend time with my colleagues after work	○	○	○	○	○	○
I have female role models working in IT	○	○	○	○	○	○
I network with other women in IT	○	○	○	○	○	○
I engage with successful women in IT	○	○	○	○	○	○

Q28 Successful woman in IT

	Left Anchor					Right Anchor
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I have been promoted in my IT career	○	○	○	○	○	○
I see myself as a successful woman in IT	○	○	○	○	○	○
Other people see me as a successful woman in IT	○	○	○	○	○	○
Successful women in IT perform equivalent jobs to their male counterparts	○	○	○	○	○	○
Successful women in IT require an appropriate qualification	○	○	○	○	○	○
Successful women in IT have sacrificed their personal life for their career	○	○	○	○	○	○
Successful women in IT have work-life balance	○	○	○	○	○	○
Successful women in IT are mostly self employed	○	○	○	○	○	○
Successful women in IT were exposed to technology early in their life	○	○	○	○	○	○
Successful women in IT had to overcome cultural prejudice	○	○	○	○	○	○
Successful women in IT received family support	○	○	○	○	○	○
Successful woman in IT are required to constantly keep ahead of change and new technologies	○	○	○	○	○	○

Q29

Perceptions about IT as a career

	Left Anchor				Right Anchor	
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N/A
I would recommend an IT career to other females	○	○	○	○	○	○
My IT career makes a positive contribution to my community	○	○	○	○	○	○
I have a long career ahead of me in IT	○	○	○	○	○	○
My IT career has been rewarding	○	○	○	○	○	○
Women must consider IT as a career	○	○	○	○	○	○
There are different career paths for women in IT	○	○	○	○	○	○

Q30

What career advice would you give school girls who want to study IT?

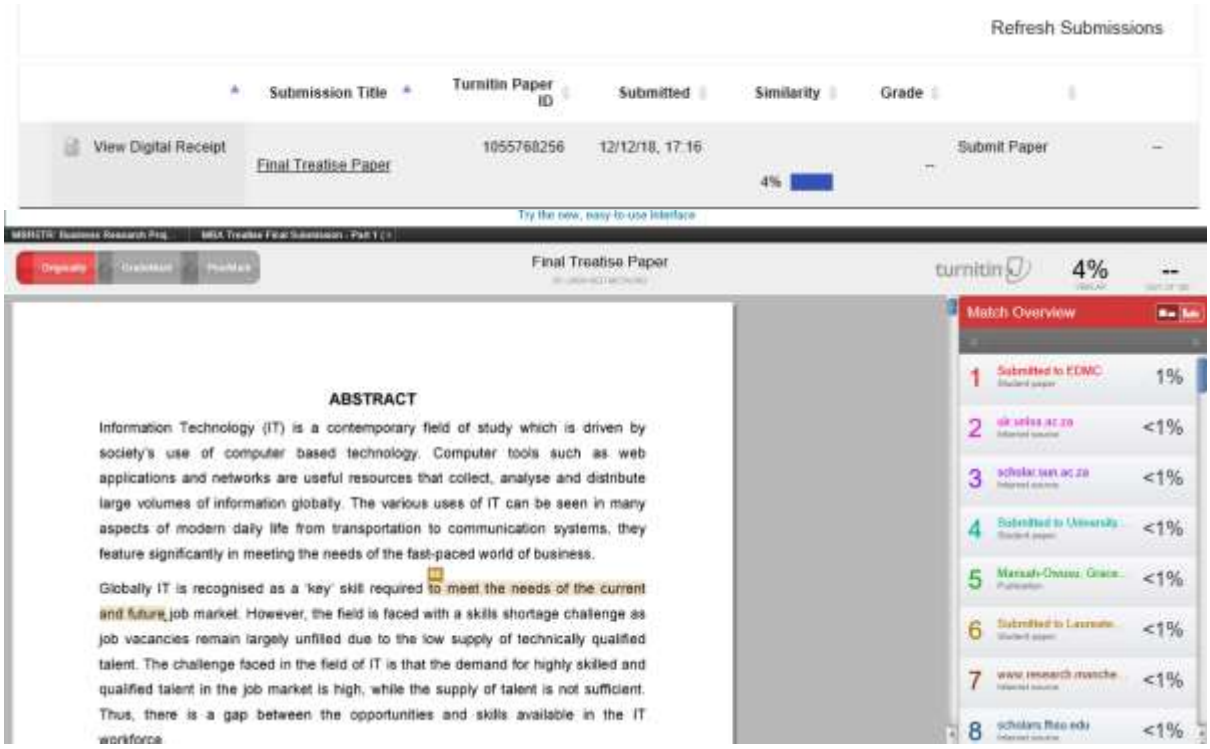
Multiple Row Answer text

Q31

If you would like to receive the Executive Summary of the survey, please include an e-mail address.

Answer text

APPENDIX 3 – TURNITIN REPORT



APPENDIX 4 – FREQUENCY DISTRIBUTION

Personality Traits Items		Disagree	Undecided	Agree	Total
IPT1	I am confident I can handle future unexpected events	1 (1%)	0 (0%)	70 (99%)	71 (100%)
IPT2	I need reassurance for my good work	24 (34%)	14 (20%)	32 (46%)	70 (100%)
IPT3	I am happy with myself	2 (3%)	3 (4%)	65 (93%)	70 (100%)
IPT4	I am satisfied with myself	3 (4)	5 (7%)	61 (88%)	69 (100%)
IPT5	It is easy for me to accomplish my goals	3 (4%)	11 (15%)	57 (80%)	71 (100%)
IPT6	I am not intimidated by a predominantly male environment	6 (8%)	5 (7%)	60 (85%)	71 (100%)
IPT7	I am passionate about the work I do	2 (1%)	8 (11%)	62 (87%)	71 (100%)
Skills and Aptitudes Items		**Disagree**	**Undecided**	**Agree**	**Total**
SE1	I am confident I can resolve complex technical problems on my own	6 (9%)	7 (10%)	55 (81%)	68 (100%)
SE2	I like solving problems and getting things to work	1 (1%)	0 (0%)	69 (99%)	70 (100%)
SE3	I am able to handle conflict in a team environment	1 (1%)	7 (10%)	62 (89%)	70 (100%)
SE4	I am able to handle conflict with my male colleagues	0 (0%)	10 (14%)	59 (86%)	69 (100%)
SE5	I am able to handle conflict with my female colleagues	1 (1%)	9 (13%)	60 (86%)	70 (100%)
SE6	In my job I am competent working with computers	0 (0%)	1 (1%)	68 (99%)	69 (100%)
SE7	In my job I am confident working with computers	0 (0%)	1 (1%)	68 (99%)	69 (100%)
SE8	I am able to do my work as well as most other people	0 (0%)	2 (3%)	68 (97%)	70 (100%)
SE9	In my job I have confidence to work with team members who have many years of experience	0 (0%)	0 (0%)	70 (100%)	70 (100%)
SE10	I am compatible with my colleagues	2 (3%)	0 (0%)	67 (97%)	69 (100%)
Environment During School Years Items		**Disagree**	**Undecided**	**Agree**	**Total**
ED1	I was introduced to computers during my early basic education years	18 (69%)	0 (0%)	20 (31%)	65 (100%)
ED2	I had a computer at home growing up	21 (57%)	0 (0%)	29 (43%)	67 (100%)
ED3	I received adequate training at school which prepared me for higher education	37 (54%)	4 (6%)	28 (41%)	69 (100%)
ED4	I found IT to be an enjoyable subject whilst growing up	14 (49%)	3 (6%)	23 (45%)	51 (100%)
ED5	I was encouraged to believe that girls could do anything they pursued just like boys	10 (15%)	1 (1%)	58 (84%)	69 (100%)
ED6	I received family encouragement to pursue an IT career	15 (22%)	11 (16%)	42 (62%)	68 (100%)

ED7	At school my friends encouraged me to pursue an IT career	36 (65%)	11 (20%)	8 (15%)	55 (100%)
ED8	At school IT was considered for boys only	27 (54%)	7 (14%)	16 (32%)	50 (100%)
ED9	At school girls did not consider pursuing IT careers	20 (36%)	6 (11%)	29 (53%)	55 (100%)
ED10	At school girls doing IT were seen as different	22 (42%)	8 (15%)	22 (42%)	52 (100%)
ED11	At school I was involved in computer projects/classes	32 (63%)	0 (0%)	19 (37%)	51 (100%)
ED12	At school I received career guidance from my career counsellors	37 (64%)	5 (9%)	16 (28%)	58 (100%)
ED13	At school I received career guidance from my teachers	35 (56%)	5 (8%)	23 (37%)	63 (100%)
ED14	At school IT was perceived as a difficult subject	11 (25%)	5 (11%)	28 (64%)	44 (100%)
ED15	My passion for IT started during my schooling years	36 (64%)	5 (9%)	15 (27%)	56 (100%)
Tertiary Education Items		**Disagree**	**Undecided**	**Agree**	**Total**
TE1	Tertiary education prepared me well for the job environment	8 (11%)	14 (20%)	48 (69%)	70 (100%)
TE2	I received a bursary to study for an IT qualification	40 (65%)	2 (3%)	20 (32%)	62 (100%)
TE3	I studied the correct IT qualification for my profession	9 (13%)	3 (4%)	55 (82%)	67 (100%)
TE4	Tertiary education prepared me well for an career in IT	8 (12%)	8 (12%)	49 (75%)	65 (100%)
TE5	A tertiary education is important for a successful career in IT	13 (19%)	9 (13%)	47 (68%)	69 (100%)
Environment After School Years Items		**Disagree**	**Undecided**	**Agree**	**Total**
ES1	After school I had friends working in the IT industry	32 (55%)	2 (3%)	24 (41%)	58 (100%)
ES2	My family encouraged me to choose IT as a career	19 (32%)	11 (17%)	35 (54%)	65 (100%)
ES3	My friends encouraged me to choose IT as a career	23 (39%)	17 (29%)	19 (32%)	59 (100%)
ES4	My religious circle encouraged me to choose IT as a career	35 (70%)	8 (16%)	7 (14%)	50 (100%)
ES5	My family discouraged me from choosing IT as a career	52 (83%)	7 (11%)	4 (6%)	63 (100%)
ES6	My friends discouraged me from choosing IT as a career	41 (71%)	10 (17%)	7 (12%)	58 (100%)
ES6	My religious circle discouraged me from choosing IT as a career	33 (70%)	6 (13%)	8 (17%)	47 (100%)
Culture and Societal Attitudes about IT Items		**Disagree**	**Undecided**	**Agree**	**Total**
CS1	An IT career is respected in my community	3 (4%)	5 (7%)	60 (88%)	68 (100%)
CS2	In my culture IT is not seen as a career for women	47 (69%)	8 (12%)	13 (19%)	68 (100%)
CS3	In my culture people have a clear understanding of IT	29 (41%)	16 (23%)	25 (36%)	70 (100%)

CS4	In my culture people have a clear understanding of IT careers	36 (51%)	12 (17%)	22 (31%)	70 (100%)
CS5	In my community people are familiar with IT careers	25 (36%)	10 (14%)	35 (50%)	70 (100%)
CS6	In my culture having a large family is important	50 (71%)	4 (6%)	16 (23%)	70 (100%)
CS7	In my culture a woman is expected to have a family and children	35 (32%)	7 (10%)	41 (58%)	71 (100%)
Career Demands Items		**Disagree**	**Undecided**	**Agree**	**Total**
CD1	I am at times burnt out by the demands of my job	20 (28%)	7 (10%)	44 (62%)	71 (100%)
CD2	My career allows me to have both a career and a family life	6 (9%)	12 (17%)	51 (74%)	69 (100%)
CD3	I control my time at work	6 (9%)	8 (11%)	56 (80%)	70 (100%)
CD4	I have a good relationship with my colleagues	0 (0%)	3 (4%)	68 96%	71 (100%)
CD5	I have been given adequate resources to fulfil my job	8 (11%)	5 (7%)	58 (82%)	71 (100%)
CD6	An IT career allows me to have a balanced family life	8 (12%)	15 (22%)	45 (66%)	68 (100%)
CD7	An IT career provides women the opportunity to have children and the opportunity to pursue an IT career	7 (11%)	17 (27%)	42 (64%)	66 (100%)
CD8	My IT career requires me to travel to other cities/towns	17 (28%)	8 (13%)	35 (58%)	60 (100%)
CD9	My IT career requires me to work long hours	24 (35%)	5 (7%)	39 (57%)	68 (100%)
CD10	My IT career requires me to work after hours	17 (24%)	10 (14%)	43 (61%)	70 (100%)
Family Demands Items		**Disagree**	**Undecided**	**Agree**	**Total**
FD1	I control my time away from work	10 (14%)	4 (6%)	56 (80%)	70 (100%)
FD2	I feel guilty for sacrificing family time to pursue my career in IT	33 (53%)	5 (8%)	24 (39%)	62 (100%)
FD3	I need to prove that having a family will not impact my work-life	27 (42%)	7 (11%)	31 (48%)	65 (100%)
FD4	Family responsibilities prevent me from growing further in an IT career	42 (65%)	6 (9%)	17 (26%)	65 (100%)
FD5	My work-life commitments impact the time I can spend with my family	41 (62%)	5 (8%)	20 (30%)	66 (100%)
FD6	It is difficult to manage my work-life and family time	42 (65%)	7 (11%)	16 (25%)	65 (100%)
FD7	I would like to have more available time to spend with my family	16 (26%)	13 (21%)	32 (52%)	61 (100%)
Gender Bias Items		**Disagree**	**Undecided**	**Agree**	**Total**
GD1	My IT career has a glass ceiling because I am a woman	41 (59%)	15 (22%)	13 (19%)	69 (100%)
GD2	Women in IT are paid less than men doing the same work	13 (19%)	21 (30%)	36 (51%)	70 (100%)

GD3	Family responsibilities prevent women from travelling nationally and internationally	32 (46%)	12 (17%)	26 (37%)	70 (100%)
GD4	Family responsibilities prevent men from travelling nationally and internationally	56 (80%)	9 (13%)	5 (7%)	70 (100%)
GD5	I have enough support to manage the dual role of being a working woman and being a mother to my children	10 (20%)	9 (17%)	33 (63%)	52 (100%)
GD6	I have been given equal opportunities as my male counterparts	18 (26%)	11 (16%)	39 (57%)	68 (100%)
GD7	My workload is the same as that of male colleagues	12 (17%)	8 (11%)	50 (71%)	70 (100%)
GD8	Professional standards are higher for women than men	27 (39%)	17 (24%)	32 (37%)	70 (100%)
GD9	I need to work harder at my career because I am female	28 (40%)	12 (17%)	30 (43%)	70 (100%)
Male and Female Perceptions Items		**Disagree**	**Undecided**	**Agree**	**Total**
MF1	My male colleagues respect my work	2 (3%)	8 (11%)	60 (86%)	70 (100%)
MF2	My female colleagues respect my work more than my male colleagues	31 (47%)	19 (29%)	16 (24%)	66 (100%)
MF3	My female colleagues are more competitive than my male colleagues	27 (41%)	18 (27%)	21 (32%)	66 (100%)
MF4	My female colleagues appear to feel threatened by my abilities	41 (60%)	14 (21%)	13 (19%)	68 (100%)
MF5	My male colleagues appear to feel threatened by my abilities	39 (57%)	12 (17%)	18 (26%)	69 (100%)
MF6	In my job I am comfortable working within male dominated teams	1 (1%)	1 (1%)	69 (97%)	71 (100%)
MF7	I have a lot of support from my male colleagues	6 (8%)	8 (11%)	57 (80%)	71 (100%)
MF8	I have a lot of support from my female colleagues	3 (4%)	9 (13%)	58 (83%)	70 (100%)
MF9	At work I have received support from my male manager/employer	4 (5%)	5 (7%)	60 (87%)	69 (100%)
MF10	At work I have received support from my female manager/employer	3 (5%)	5 (9%)	48 (86%)	56 (100%)
MF11	Socialising with male team members can be awkward/sensitive	50 (71%)	4 (6%)	16 (23%)	70 (100%)
Management of IT Career Items		**Disagree**	**Undecided**	**Agree**	**Total**
MO1	Belonging to a professional IT body is important for my career	18 (30%)	20 (33%)	23 (38%)	61 (100%)
MO2	I spend time with my colleagues after work	38 (56%)	8 (12%)	22 (32%)	68 (100%)
MO3	I have female role models working in IT	32 (50%)	5 (8%)	27 (42%)	64 (100%)
MO4	I network with other women in IT	21 (32%)	9 (14%)	36 (55%)	66 (100%)
MO5	I engage with successful women in IT	22 (34%)	7 (11%)	36 (55%)	65 (100%)
Successful Woman in IT Items		**Disagree**	**Undecided**	**Agree**	**Total**

SW1	I have been promoted in my IT career	20 (31%)	3 (5%)	41 (64%)	64 (100%)
SW2	I see myself as a successful woman in IT	7 (10%)	12 (17%)	52 (73%)	71 (100%)
SW3	Other people see me as a successful woman in IT	5 (7%)	18 (26%)	47 (67%)	70 (100%)
SW4	Successful women in IT perform equivalent jobs to their male counterparts	7 (10%)	6 (8%)	58 (82%)	71 (100%)
SW5	Successful women in IT require an appropriate qualification	8 (11%)	10 (14%)	53 (75%)	71 (100%)
SW6	Successful women in IT have sacrificed their personal life for their career	25 (36%)	18 (26%)	26 (38%)	69 (100%)
SW7	Successful women in IT have work-life balance	14 (19%)	14 (20%)	43 (61%)	71 (100%)
SW8	Successful women in IT are mostly self employed	28 (41%)	32 (46%)	9 (13%)	69 (100%)
SW9	Successful women in IT were exposed to technology early in their life	39 (57%)	17 (25%)	13 (19%)	69 (100%)
SW10	Successful women in IT had to overcome cultural prejudice	15 (22%)	24 (35%)	29 (43%)	68 (100%)
SW11	Successful women in IT received family support	4 (4%)	28 (40%)	38 (54%)	70 (100%)
SW12	Successful woman in IT are required to constantly keep ahead of change and new technologies	1 (1%)	6 (8%)	64 (90%)	71 (100%)
Perceptions about IT as a Career Items		**Disagree**	**Undecided**	**Agree**	**Total**
PIT1	I would recommend an IT career to other females	0 (0%)	3 (4%)	68 (96%)	71 (100%)
PIT2	My IT career makes a positive contribution to my community	0 (0%)	10 (15%)	58 (85%)	68 (100%)
PIT3	I have a long career ahead of me in IT	5 (7%)	4 (6%)	60 (87%)	69 (100%)
PIT4	My IT career has been rewarding	5 (7%)	4 (6%)	62 (87%)	71 (100%)
PIT5	Women must consider IT as a career	0 (0%)	2 (3%)	67 (97%)	69 (100%)
PIT6	There are different career paths for women in IT	1 (1%)	2 (3%)	68 (96%)	71 (100%)