

# **Engineering a manager: Assessing the factors affecting the career transition from engineer to manager**

**MC Maree**

 **orcid.org 0000-0002-6732-7513**

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Supervisor:

Prof RA Lotriet

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Student number: 20286937

## PREFACE

The influencing factors on the transition are seen to be any aspect that could influence the efficiency and success of the transition process. This study aimed to identify the factors that influenced the transition from engineer to managerial positions in the South African market. By identifying these factors, it will be possible for individuals and organisations in the industry to gain an understanding of what transitioning engineers experience and how to improve efficiency of the transition through preparation and training. This study was performed from a retrospective view by successful managers in the industry.

The first chapter contains the introduction to the study as well as the problem statement as well as the purpose of the study. Chapter 2 contains a literature review of the pertaining literature. This included engineering development methods, career development theory, career paths, managerial skill requirements and transition process literature.

A qualitative research approach was used and 12 people were interviewed through the use of a semi-structured interview guide. The data was audio recorded, field notes were made and the recordings were transcribed. The data was analysed on MaxQDA by using codes, code groups and themes. This data is represented in Chapter 3.

Chapter 4 is the assembly of the findings, conclusions and the assessment of the study through the comparison with primary and secondary study objectives. This chapter was concluded with the recommendation for further study.

**Key words:** factors, success factors, transition, engineer, management, influences, managerial roles, engineers in management.

## **ABSTRACT**

The appointment to a managerial position brings with it various managerial challenges. Engineering is one of the most seen careers among managerial positions. A study found that 33% of the S&P 500 CEO's have engineering degrees (Aquino, 2011). The engineering council of South Africa have further conducted a study that shows that 36% of engineers are in management roles (ECSA, 2013). Roles such as General Manager, Technical Director, Managing Director and Chief operating officer have all been seen to be filled by engineers to name a few but there is little understanding of the hardships experienced in this transition.

The literature review contains review of the applied literature. This included engineering development methods, career development theory, career paths, managerial skill requirements and transition process literature.

This study will aim to identify the factors that were perceived to affect the transition from engineer to manager. A qualitative research approach was used and 12 people were interviewed through the use of a semi-structured interview guide.

The findings showed that there are various influencing factors both from internal as well as environmental sources. These factors were divided into difficulty factors, transition drivers and expectations as seen by the industry. The study found that the factors were not sector specific as the overall population had overlapping perceptions of these factors.

The study identified factors that could serve individuals and organisations in adequately preparing for the transition to management through training and environmental control through career development structures. Although some organisations do have these processes the view of the respondents was still aligned on these matters and could serve to optimise their development.

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*\*Waves\**

## CONTENTS

Preface.....	1
Abstract.....	3
Acknowledgements .....	4
List of figures.....	9
List of Tables.....	10
1 Chapter 1: Nature and Scope of study .....	11
1.1 Introduction .....	11
1.2 Problem Statement .....	12
1.3 Research methodology .....	14
1.4 Primary objective.....	14
1.5 Secondary objective.....	14
1.6 Contribution of the study .....	14
1.7 Limitations of the study .....	13
1.8 Ethical considerations .....	15
2 Literature Review .....	16
2.1 Introduction .....	16
2.2 Career development theory.....	16
2.3 Formal training of engineers.....	23
2.4 Typical engineer career paths.....	24
2.5 Management .....	25
2.5.1 Responsibilities.....	26
2.5.2 Skills .....	27
2.6 Leadership .....	28
2.7 Communication .....	31

2.8	Collaboration .....	36
2.9	Critical thinking .....	37
2.10	Financial understanding .....	39
2.11	Project management .....	40
2.12	engineering to management .....	40
2.13	Transition .....	41
2.14	Problems in the transition phase .....	43
2.14.1	Interpersonal roles .....	45
2.14.2	Informational roles .....	45
2.14.3	Decisional roles .....	45
2.15	Ethical considerations review .....	46
	Professional standards .....	46
	Researcher – Respondent .....	47
	Respondent – respondent .....	47
	Future review and complaints .....	47
2.16	Conclusion .....	48
2.17	Chapter summary .....	48
3	Empirical Investigation .....	50
3.1	Introduction .....	50
3.2	Research methodology .....	51
	Interview guide description .....	51
	Population identification .....	52
	Interviews .....	52
	Data Analysis .....	55
3.3	Demographic description .....	56

Age.....	56
Gender .....	57
Level of qualifications .....	58
Job Title .....	58
Sector.....	59
Summary of population .....	60
3.4 The experiences of successful managers from engineering background.....	61
Transition difficulty factor identification.....	61
Critical success factor identification .....	63
Positive reinforcement throughout the transition .....	65
Negative external influences on the transition.....	66
Retrospective advice .....	67
Mistakes made throughout the transition .....	69
Breakthroughs throughout the transition .....	70
What are organisations looking for in managers? .....	72
Frequency analysis .....	74
3.5 Chapter summary.....	76
4 Chapter 4 .....	77
4.1 Introduction .....	77
4.2 Discussion of findings .....	77
Demographic overview.....	77
Critical transition factor identification.....	78
Summary findings .....	84
4.3 Evaluation of the achievement of study objectives.....	89
4.4 Achievement of study objectives .....	89

Primary objective.....	90
Secondary objectives .....	90
4.5 Recommendations for further research.....	91
4.6 Conclusion .....	92
4.7 Summary.....	93
5 List of references.....	94
6 Annexure A .....	99
7 Annexure B .....	100
8 Annexure C .....	101

## LIST OF FIGURES

Figure 1: Engineering career path. Adapted from (Wilde, 2009) .....	25
Figure 2: Maturity model of leadership. Adapted from (Derler <i>et al</i> , 2017).....	29
Figure 3: Leadership and management comparison. (Disha, 2016).....	30
Figure 4: Communication process (Skillsyouneed, 2018). ....	33
Figure 5: Bridges transition model. (Bridges, 2013) .....	42
Figure 6: Transition process (National Institute of Health, 2014).....	43
Figure 7: Study process flow. ....	54
Figure 8: Age distribution of population sample. ....	57
Figure 9: Gender distribution of the population sample.....	57
Figure 10: Level of education distribution of population sample.....	58
Figure 11: Job title of the selected population sample.....	59
Figure 12: Sector distribution of the population sample.....	59
Figure 13: Interpretation of mentioned aspects .....	63
Figure 14: Success factor contributors. ....	64
Figure 15: Transition completion contributors. ....	66
Figure 16: Negative affecting factors.....	67
Figure 17: Retrospective advice for possible future engineers in transition by engineers who have been successful in their transition to management. ....	69
Figure 18: Mistakes made through transitions.....	70
Figure 20: Personal positively influencing factors from successful transitions. ....	72
Figure 21: The core competencies and skills managers look for in appointing new managers. ....	74
Figure 21: Word cloud.....	75

## LIST OF TABLES

Table 1: The history of career development theory summary. (CareersNZ, 2018).....	17
Table 2: Categories of career theories as seen by McMahon & Patton (2014). ....	18
Table 3: Career development theories (McMahon & Patton, 2014). ....	20
Table 4: Career Development Theories Overview (CareersNZ, 2018).....	21
Table 5: Population sample profile. ....	60
Table 6: Factors contributing to difficulty of transition.....	85
Table 7: Factors improving the transition to management.....	86
Table 8: Drivers of successful transitions. ....	86
Table 9: Retrospective advice. ....	87
Table 10: Mistakes that should be guarded against in a transition to management. ....	87
Table 11: Critical success factors summary. ....	88
Table 12: What managers want from managers they appoint. ....	89

# **1 CHAPTER 1: NATURE AND SCOPE OF STUDY**

## **1.1 INTRODUCTION**

The appointment to a managerial position brings with it various managerial challenges. It is not long before the realisation of unpreparedness occurs and leads to an attempt to obtain any form of literature or guidance from peers to assist with this transition just to find out that their experience held the same reality. Engineering is one of the most seen careers among managerial positions. A study found that 33% of the S&P 500 CEO's have engineering degrees (Aquino, 2011). The engineering council of South Africa have further conducted a study that shows that 36% of engineers are in management roles (ECSA, 2013). Roles such as General Manager, Technical Director, Managing Director and Chief operating officer have all been seen to be filled by engineers to name a few but there is little understanding of the hardships experienced in this transition.

"A full 24 of the 100 best-performing CEOs have a Bachelor's or Master's degree in engineering." (Baer, 2014)

"...engineering has long been ranked as the most common undergraduate degree among Fortune 500 CEOs." (Knowledge, 2014).

Successful management is a term used to describe a present-day concept which could be viewed as a reason why some organisations survive while others thrive (Nel, 2011). However, engineers are often not aware of what being a manager is about and most are left to their own devices in this transition. They are often expected to make the transition without any preparation or typical 'know-how'. This leaves them coming up short as their focus normally concentrates on technical aspects in their early career and only a few organisations supply the necessary managerial training or transition support. (Custovic, 2016).

Competition in the job market has fuelled the need to investigate this transition to management for an engineer to have a better opportunity to be successful and for organisational sustainability.

## **1.2 PROBLEM STATEMENT**

In a typical working environment, once a person has become good at his work or is seen as influential in his role, a promotion is imminent. In the case of the engineering profession, engineers are seen to take up more responsibility in the form of managerial roles. There are few grey haired engineers around with most moving in to management positions at some stage (Kaydee, 2015).

In the transition to management many engineers find themselves unprepared for the management of people and the lack of guidance forced to determine what is expected of them and what management entails on the go. This change is difficult for any person but especially hard on engineers and people with strong technical skills (Manketelow *et al*, 2017).

The success of the transition could also affect organisations by losses in time as the new manager tries to settle in his new position. Not all great engineers make great managers and not knowing what is expected of them could see them be driven by either excitement or fear and could react in a wide range of ways that could have an impact on the organisation (Reh, 2017).

This study will aim to identify the factors that were perceived to affect the transition from engineer to manager. It will also look to identify what factors were handled in what manner to possibly lead to successful transition. The question that will be focussed on is:

*What are the key success factors, as experienced by engineers in management roles, which affected their transition to managerial level?*

### **1.3 SCOPE OF STUDY**

This study focuses on the transition from engineer to management through analyses of empirical data collected. This study will specifically focus on the influencing factors throughout the transition phase.

### **1.4 LIMITATIONS OF THE STUDY**

For this study the limitations will be based mostly on the population used within the study. The population will be made up of people that conform to all the following criteria:

- Have engineering background or completed engineering studies
- Made a transition to a managerial role
- Successfully filled the role of manager (Stayed in a management position for most of career, retired from a managerial position or is still in a managerial position)
- South Africa

The population will **not** look at the following as determining factors:

- Male/Female
- Specific sector (Electric, Mechanical or Chemical)
- Specific age group (All ages)
- Race
- Place of education (University etc.)
- Industry of Work (Manufacturing, FMCG etc.)
- Place of work (Johannesburg, Cape Town etc.)

It needs to be also noted that due to the time constraints of this study a convenience sampling method will be used. The population sample size will also be considered in the findings of this report. The ethical considerations are discussed briefly.

## **1.5 RESEARCH METHODOLOGY**

This study will seek to answer the research question through achieving the following research objectives.

### **1.6 PRIMARY OBJECTIVE**

The main objective of this study is to identify the factors that affected engineers that have successfully made this career transition to managerial level so that critical factors of successful transitions can be identified.

### **1.7 SECONDARY OBJECTIVE**

To reach the main objective the following secondary objectives will serve as a guide:

- Conducting an in-depth literature review that will reveal important insights to help profile success cases.
- The defining of an accurate measurement tool for data collection in the form of a semi-structured interview.
- A structured assessment of individual transition factors to identify most important for their success.
- Final proposal and review of critical factors influencing the transition from engineer to manager.

### **1.8 CONTRIBUTION OF THE STUDY**

This study will aim to form part of a larger more encompassing study of which the outcome will be the improved management of the transition phase from engineer to managerial level. This will include the identification of critical factors in the transition period, how to prepare for this transition through steering your career development and how to manage the transition to have the best possibility for success. The principle is guided learning and development driven from an individual's own drive.

This study will form the first part of an iterative study to help engineers (and other technical personnel) to adequately identify what critical factors can be expected to play a role at

the transition time and serve as the foundation for further study in how to prepare for them.

In principle the identification of contributing factors will (in the long run) help improve the chances of a successful transition to managerial level.

## **1.9 ETHICAL CONSIDERATIONS**

In the assessment of the study it needs to be noted that no ethical issues of note were identified. To ensure this the interviews will be handled in a manner ensuring anonymity and a letter stating this will be signed by each respondent (Appendix A). The legitimacy of this study and the overall wellbeing of the respondents were ensured through adhering to a strict application of ethical principles.

These principles are set-out in detail in the literature review in section 2.15 and were explained to all the parties involved.

## **2 LITERATURE REVIEW**

### **2.1 INTRODUCTION**

The days of engineers working in seclusion and the stereotype of engineers not being capable of normal human interaction have past. Engineers have the difficulty of chasing career success through subject matter expertise and being self-help motivated. This causes lack of personal interaction skills and empathy. To sum it up in a phrase: “Where do you think the word ‘Nerd’ came from?” (Jim, 2011). They are often seen as technical specialist but lacking in social skills (Wilde, 2009). The role of the engineer is rapidly changing however and it is up to engineer to adapt with it. This has changed to such an extent that engineering is the most popular undergraduate degree amongst CEO’s of Fortune 500 companies and internationally the CEO’s of General motors’; Microsoft and Amazon are also engineers (Al-Saleh, 2014). A study found that 33% of the S&P 500 CEO’s have engineering degrees (Aquino, 2011) while the engineering council of South Africa have further conducted a study that shows that 36% of engineers are in management roles (ECSA, 2013). Engineers are moved into managerial positions and thus need to learn a different set of skills (Pratini, 2017). This chapter will look at the relevant theory to be able to make an accurate interpretation of the factors that engineers experience in the transition to a management role. This will be done by looking at literature and relevant research already done in the field. The stated findings will be followed by a short conclusion of the interpretations.

### **2.2 CAREER DEVELOPMENT THEORY**

In this section we will firstly look at the career development theory models. There are many different career theories and no individual one encompasses the entire description of the career development field (CareersNZ, 2018). The investigation in to career development is however seen as important as it analysis the process an individual work identity is formed throughout their lives and understanding why they make the decisions they do (Chism, 2018). What draws individuals to certain positions and towards achieving success can be an effective tool in goal planning (Uhlig, 2017). Career development is an ongoing process that consists of experiences from looking, obtaining and interpreting information about yourself and the situation you find yourself in. Career development can

then be seen as a process of determining where you fit in to the working environment and why.

The history of the development of career development theory is briefly summarised in the table below (CareersNZ, 2018):

**Table 1: The history of career development theory summary. (CareersNZ, 2018)**

<b>Time:</b>	<b>Theory:</b>	<b>Names:</b>	<b>Discription</b>
<b>1900's</b>	Person-environment fit, trait factor	Parsons, Williamson, Holland	Vocational guidance is accomplished first by studying the individual, then by surveying occupations, and finally by matching the individual with the occupation.
<b>1950's</b>	Developmental	Ginzberg & Associates, Tiedman, Super, Gottfredson, Roe	Career development is a process that takes place over the life span. Career development activities should be designed to meet the needs of individuals at all stages of life.
<b>1960's</b>	Client-centred	Rogers	Career development is focused on the nature of the relationship between the helper and client. It encompasses the core conditions of unconditional positive regards, genuineness, congruence and empathy.
<b>1970's</b>	Social learning	Krumboltz	The individual's unique learning experiences over their lifespan develop primary influences that lead to career choice.
<b>1980's</b>	Post-modern	Kelly, Cochran, Jepsen	Truth is discovered subjectively through dialogue rather than through objective testing. This approach emphasises the individual's experience and decision making through exploring personal constructs and the client's narrative about their life.

<b>1990's</b>	Neuro-linguistic programming	Richard Bandler, John Grinder	A way of coding thinking, language and behaviour based on the principle that changing the way one thinks can change behaviour.
<b>1990's</b>	Happenstance	John Krumboltz	Chance events play a role in every career. The goal for clients is to generate beneficial chance events and have the ability to take advantage of them.
<b>1990's</b>	Narrative therapy	Michael White and David Epston, Gregory Bateson	Clients are encouraged to separate themselves from their problems (ie, the problem becomes external). The client makes sense of their experiences by using stories.
<b>1990's</b>	Te Whare Tapa Whā	Dr. Mason Durie	Māori health is a balance between four interacting dimensions: te taha wairua (the spiritual side); te taha hinengaro (thoughts and feelings); te taha tinana (the physical side) and te taha whānau (family).
<b>2000's</b>	Coaching		A model of practice. All parts of the client's life are taken into account through regular sessions

There is a segmental nature in the career development theory as can be seen in attempts to categorise the different theories as seen in the categories depicted in the following table (McMahon & Patton, 2014):

**Table 2: Categories of career theories as seen by McMahon & Patton (2014).**

<b>Authors</b>	<b>Categories</b>
Crites (1969)	Psychological theories Non-psychological theories
Osipow (1968)	Trait and factor approaches Sociology and career choice Self-concept theory Vocational choice and personality theories
Herr & Cramer (1992)	Trait and factor Actuarial or matching Decision Situational or sociological Psychological, and developmental

Osipow & Fitzgerald (1996)	Trait-factor Society and career choice Developmental/self-conceptions Vocational choice and personality Behavioural
Osipow (1990)	Developmental Trait oriented Reinforcement based Personality focused.
Minor (1992)	Theories of content Theories of process

The categorising of career development theory has the following categories (CareersNZ, 2018):

- **Theory of process** – This relates to interaction and change as seen over time. This typically reflects stages and levels that an individual goes through.
- **Theory of content** – The context that an individual lives in and his characteristics play the biggest role. His decisions are either driven by conditions or intrinsically.
- **Theory of content and process** – This aspect combines individual characteristics, their context and the interaction that takes place between them.
- **Wider Explanations** – This theory is aimed at taking the influences of less represented groups based on socioeconomic status, women and racial and ethnic groups and other such as lesbians, gay men, bisexual and transgendered individuals and people with disabilities into account.
- **Constructivist/Social Constructionist Approaches** – New theories have emerged that reflect an influence of the constructivist worldview that emphasises a holism as well as the individual as a central influencer to the construction of their lives and careers.

For each of these categories there are numerous theories. For the purpose of this study we will only summarise these works and then only discuss five prominent theories. The summation of work in the fields can be seen to be (McMahon & Patton, 2014):

**Table 3: Career development theories (McMahon & Patton, 2014).**

<b>Theories of Content</b>	
Trait and factor theory	Parsons (1909)
Theory of personality	Holland (1973, 1985a, 1992, 1997); Nauta (2010, 2013)
Psychodynamic theory	Bordin (1990)
Values-based theory	D. Brown (1996a, 2002b, c)
Work adjustment person-environment correspondence theory	Dawis & Lofquist (1984); Dawis (1996, 2002, 2005)
Five factor theory	McCrae & John (1992); McCrae & Costa (1996, 2008)
<b>Theories of Process</b>	
Developmental theory	Ginzberg et al. (1951); Ginzberg (1972, 1984)
Life span life-space theory	Super (1953, 1957, 1980, 1990, 1992, 1994); Super et al. (1996); Hartung (2013b)
Theory of circumscription and compromise	L. S. Gottfredson (1981, 1996, 2002, 2005)
Individualistic approach	Miller-Tiedeman & Tiedeman (1990); MillerTiedeman (1999)
Theories of Content and Process	
Social learning career theory (SLTC)	L. K. Mitchell & Krumboltz (1990, 1996)
Happenstance Learning Theory (HLT)	Krumboltz (2009, 2011); Krumboltz et al., 2013)
Social Cognitive Career Theory (SCCT)	Lent et al. (1996, 2002); Lent & Brown (2002); Lent (2005, 2013)
Cognitive Information Processing Approach (CIP)	Peterson, Sampson, Reardon, & Lenz (1996); Peterson Sampson, Lenz, & Reardon (2002); Reardon, Lenz, Sampson, & Peterson (2011)
Developmental-contextual approach	Sampson, Reardon, Peterson, & Lenz (2004)
Contextual approach to career	Vondracek, Lerner & Schulenberg (1986); Vondracek & Porfeli (2008)
Personality development and career choice	Young, Valach & Collin (1996, 2002); Valach & Young (2009); Young, Domene, & Valach (2014)
	Roe (1956); Roe & Lunneborg (1990)

<b>Wider Explanations</b>	
Women's career development	Astin (1984); Hackett & Betz, (1981); Betz (2005); Farmer (1985, 1997); Betz & Fitzgerald (1987); Cook, Heppner, & O'Brien (2002a, b); Richardson & Schaeffer (2013); Schultheiss (2009, 2013)
Racial and ethnic groups	Arbona (1996); D. Brown (2002b); Hackett, Lent, & Greenhaus, (1991); E. J. Smith (1983)
Sexual orientation	Fitzgerald & Betz (1994); K. Morgan & L. Brown (1991)
Sociological or situational approaches	Roberts (1977, 2005, 2012); Blau & Duncan (1967); M. J. Miller (1983); Hotchkiss & Borow (1996); Johnson & Mortimer (2002)
<b>Constructivist /Social Constructionist Approaches</b>	
Systems Theory Framework	McMahon & Patton (1995); Patton & McMahon (1997, 1999, 2006a)
Career construction theory	Savickas (2001, 2002, 2005, 2011a, b, 2013a)
Chaos theory	Pryor & Bright (2003a, b, 2011) E
Ecological approach	Narrative Conyne & Cook (2004a) Bujold (2004); L. Cochran (1997); McIlveen & Patton (2007a, b)
Relational/Cultural	Blustein (2001, 2006, 2011); Schultheiss (2009) Schultheiss (2013)

For the purpose of this study we have identified five of these theories and they are summarised as can be seen the following table:

**Table 4: Career Development Theories Overview (CareersNZ, 2018).**

<b>Career Development Theories Overview</b>			
<b>#</b>	<b>Name</b>	<b>Type</b>	<b>Name of creator</b>
1	<b>Vocational Choice (RIASEC)</b>	Personality	John Holland
			<ul style="list-style-type: none"> <li>• Six personality types - Realistic, Investigative, Artistic, Social, Enterprising, Conventional</li> <li>• Occupational choice is an expression of personality</li> <li>• Congruence - the fit between personality and work environment</li> <li>• Consistency - personality types close together on hexagon</li> <li>• Differentiated - personality types are distinct</li> </ul>

<b>2 Trait and Factor</b>	Talent matching, theory of occupational choice	Frank Parsons	<ul style="list-style-type: none"> <li>• Trait: a characteristic of an individual that can be assessed through testing</li> <li>• Factor: characteristic required for successful job performance</li> <li>• Relies heavily on psychometric tests</li> <li>• Idea that there is an ideal job for all</li> <li>• It is possible to measure individual talents and attributes required in particular jobs</li> <li>• Seven attributes: physical characteristics, attainments, general intelligence, specialized aptitudes, interests, dispositions and circumstances</li> </ul>
<b>3 Happenstance</b>	Social learning theory of career decision-making and the role of happenstance	John Krumboltz	<ul style="list-style-type: none"> <li>• Fosters curiosity, persistence, flexibility, optimism, risk-taking</li> <li>• Incorporates chance into the counselling process</li> <li>• Cultivates capacity to recognize, create and incorporate chance events into ongoing career management</li> <li>• Unpredictable social factors, environmental conditions and chance events are important influences in decision making</li> <li>• Tests should be used to stimulate learning, not just match</li> </ul>
<b>4 Social Cognitive</b>	Decision Theory	Albert Bandura	<ul style="list-style-type: none"> <li>• Self-efficacy - belief in one's capabilities to produce or attain goals</li> <li>• Level and strength will determine how much effort will result</li> <li>• Four sources of self-efficacy: accomplishments, watching others, verbal persuasion, emotional factors</li> <li>• Self-esteem - a person's sense of self worth; not the same as self-efficacy</li> </ul>
<b>5 Developmental Self-Concept</b>	Developmental	Donald Super	<ul style="list-style-type: none"> <li>• Vocational development is the process of developing and implementing a self-concept</li> <li>• People choose occupations that permit them to express their self-concepts</li> <li>• Career maturity - expected vocational behaviour at a particular stage of career development</li> <li>• Five stages - growth, exploration, establishment, maintenance, decline</li> <li>• Five vocational stages tasks - crystallization, specification, implementation, stabilization, consolidation</li> </ul>

Investigating the various career development theories, we can now look at the formal development of engineers.

### **2.3 FORMAL TRAINING OF ENGINEERS**

Engineering is an old field and is divided into a wide range of different fields. To be an engineer we first need to define the term. The definition in the South African context is that: “Engineering is the practice of science, engineering science and technology concerned with the solution of problems of economic importance and those essential to the progress of society. Solutions are reliant on basic scientific, mathematical and engineering knowledge” (ECSA, 2018). Any person who practices engineering is then seen as an engineer.

To become an engineer there are two routes that can be followed when considering the core disciplines within engineering namely mechanical, civil, chemical and electrical. The first route is the educational route whereby you receive a degree in engineering from an institution such as an university or a technicon. The degrees according to the Engineering Council of South Africa can be either a recognised or an accredited degree. The second option is an apprenticeship that sees you working in a certain work environment while experience to become an engineer completing technical levels in either application or theory to a certain educational level. In the case of this route a candidate is required to have an educational level of an accredited national diploma. The experience needs to be at least ten years at a level of competence of a professional engineer and will be judged by the council (ECSA, 2018). It needs to be noted that there are two levels of engineering in practice that are considered, namely engineer and technologist.

The formal training for both of these are the completion of a certain level of technical understanding and practical experience to be considered for the next level in the career development which is the professional registration as an engineer. This is possible after four years of practical experience as an engineer and is done through interview and report submissions to indicate the required level of competence in the field as well as sound judgement in application (Engineering Chamber, 2015).

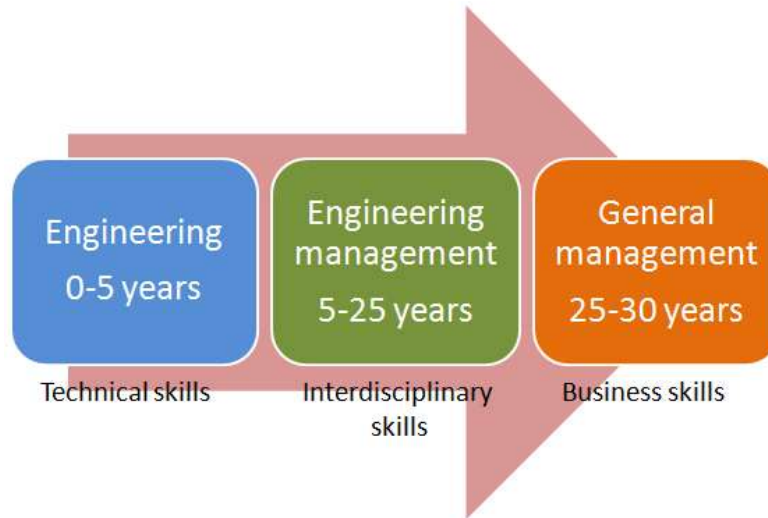
The completion of professional registration comes with responsibility of maintaining the level of professional development. It is required to maintain an accumulation of points gained through the attendance of certified courses. The development needs to be maintained or registration lapses (ECSA, 2018). From this point however it is the responsibility of the engineer to structure his own career and development and it can vary substantially from any other engineer.

Through the understanding of the technical training and background involved in becoming an engineer, we can now look at the different career paths that the engineering career will typically follow.

## **2.4 TYPICAL ENGINEER CAREER PATHS**

The engineering career path had two routes to follow in the 2000's. Engineers were appointed as technical employees, accumulated around 6 years of technical experience and then had to make the choice between a technical route and the management route (Wilde, 2009). This is no longer the case as managerial duties are given to engineers earlier in their careers (Custovic, 2016) and even if you do follow the technical career path, you are soon given the responsibility to oversee design teams or manage multi-disciplined teams or even projects.

Almost half of the people attempting the managerial transition fail, making it one of the most difficult challenges a first time manager can face (Roberts, 2008). Typically engineers are expected to make the transition without any preparation or typical 'know how' but are found short as their focus normally concentrates on technical aspects in their early career and only a few organisations supply the necessary managerial training or transition support (Custovic, 2016). The competition in the job market has fuelled this need further and for an engineer to have a better opportunity to be successful, social and leadership aspects need to be invested in. A simplified engineering career path can be seen in the diagram below:



**Figure 1: Engineering career path. Adapted from (Wilde, 2009)**

As the choice between the technical and managerial career paths have narrowed almost to the same outcome. The diagram above can be seen as indicative of both. This change in career lifecycle goes with its own difficulties, one of which is the incumbent managerial positions that engineers are due to experience in their lifetime. The effect thereof will be looked at in more detail throughout this study.

The shift from positions with technical focus to management positions is becoming almost a certainty. The conclusion in the industry has become that establishment of engineers as technical specialists within an organisation translates to the understanding that engineers in themselves are leaders and thus should be used as such. This has influenced the engineering career path and made engineers be confronted with the transition to management (Wilde, 2009). Understanding management through investigating the principles of leadership and management and their relationship towards another to give insight into what is required to be a successful manager.

## **2.5 MANAGEMENT**

To understanding management as a construct in itself the need exists to investigate the underlying values and skills that it is made up of. The description of a manager is someone who oversees a certain part of an organisation and its resources. It is the

managers' role to steer these resources to benefit the company or as Peter Drucker (1954) said in his book *The Practice of Management*: "make people productive". The higher the level of management in the company hierarchy is, the less a manager is involved in the day-to-day activities and the more involved in the strategy and overall coordination (Maccarthy, 2018). To understand management at the roles that management fill, the skills required to be able to perform these responsibilities, what companies want from a manager and what difficulties managers typically experience needs to be investigated. The investigation is divided into responsibilities and skills identification for managerial roles.

### 2.5.1 Responsibilities

Critical for accurate understanding and interpretation of what a good manager is, the responsibilities were found to be (Heathfield, 2017):

- **Planning** – Managers are responsible for the planning as to reach the goals set out for the division assigned in a manner that correlates to the goals of the organisation as a whole. This would include budgeting.
- **Organise and implement** – Organise processes, tasks, resources and time while implementing the required changes to reach targets. This would include hiring and terminating staff, training staff and dealing with performance issues. In the appointment of staff, managers typically pass it along but the impact thereof should not be underestimated.
- **Guidance** – Leading, assisting, coaching, developing, training and supporting resources to make sure they can obtain their outcomes and giving feedback or recognition. Team development is also important in this role as efficiency is the end goal.
- **Monitoring** – Following up continuously to ensure that everything is still on track in the manner specified.
- **Evaluate** – Review the outcomes, methods and resources to ensure continuous improvement. This is a people aspect of the role and includes bringing clarity while

setting desired outcomes, measuring, addressing performance shortfalls and doing performance reviews.

- **Miscellaneous** – All other tasks assigned by the reporting structure.

These responsibilities make certain aspects apparent that are of significance for this study. The responsibilities between an engineer and manager have fundamental differences in that engineers are much more technical orientated and although they do work in teams, the responsibility of overseeing others is an addition. Managers also need to offer guidance to others, monitor progress and evaluate others. Shifting from typical engineering roles the managerial role encompasses a broader view of the overall organisation. The role shifts focus from specific design or project tasks to actual strategic implementation with a key difference being the delegating of tasks to others while ensuring their efficiency. It is not stated specifically in the description but giving up of control of technical matters allows a manager to focus on overall control.

### **2.5.2 Skills**

The previous section leads us to the set of skills required to perform the managerial responsibilities effectively. These skills include (Reh, 2018):

- Leadership
- Communication
- Collaboration
- Critical thinking
- Financial understanding
- Project management

A wide variety of skills are needed to perform the functions of managerial responsibility. Management focuses on the performance of a team instead of an individual or oneself. There are also different managers that can be classified by field (financial, marketing and sales), level (manager of managers), product managers (responsible for a product specifically) or project managers (oversee a specific project). Each level of management is responsible to the level it reports to for deliverables of their division (Reh, 2018).

The importance of the managerial role is also vested in the oversight of people. People can be seen to be a main influencer on the activities of a manager by the overview of the responsibilities of a manager. As a manager has an obligation towards his followers the role of leadership needs to be investigated.

## **2.6 LEADERSHIP**

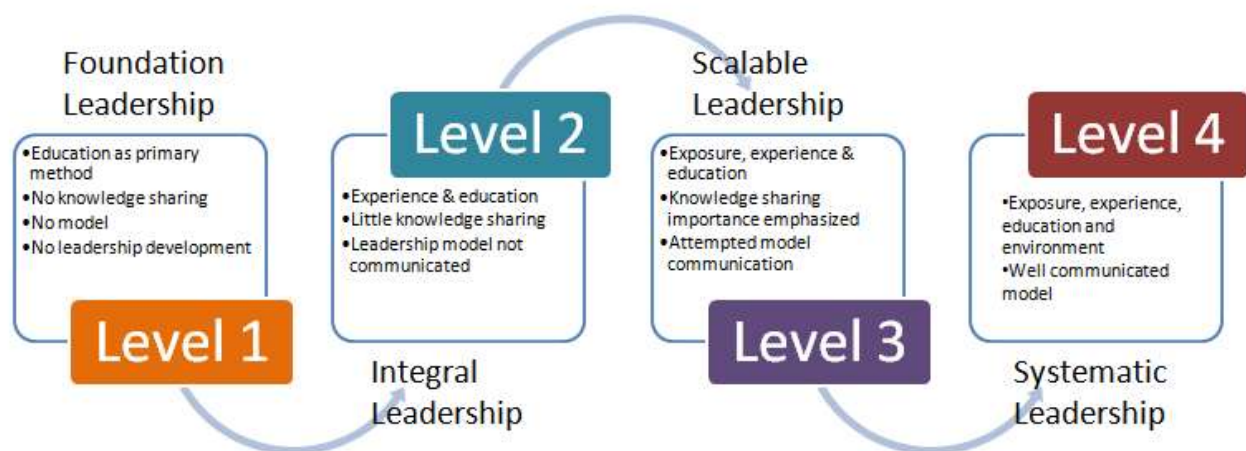
In this section the definition of leadership and the importance thereof will be looked at as management in itself requires leadership properties and to separate the two would be destructive (Mallaby, 2014). This also applies in the engineering field as leadership needs to be present in a good manager and the terms are typically interchanged in some literature. For this reason leadership will be discussed in more detail to gain insight as to the applicability in this study.

The definition of leadership varies in literature and although the word is heard regularly the meaning thereof it is hard to put in to words. The understanding is that leadership is an ability to motivate people to work towards a common predetermined outcome. Stating it simply: "The leader is the inspiration and director of the action" (Ward, 2017). A leader has certain qualities and skills that make parties work together and follow them towards a result. These skills are wide ranging and different weightings of importance are experienced by different people, however the following five skills are seen to surface concurrently (Ballance, 2018):

- **Honesty and integrity** – Personnel will follow instructions but when trust is broken due to things not being done as said or answers not being honest, a leader will see support dwindle and disappear. Leadership is to know that to give honest answers is to win trust.
- **Inspiration and motivation** – Motivating is a core function of leadership. Getting people going and keeping them going is required to reach objectives.
- **Communication** – Leadership is all about communicating as it takes place on such a regular basis through e-mails, meetings etc. To be able to accurately and powerfully communicate the what, why and how, is critical to leading and achieving the desired outcomes. This is also required in giving and receiving feedback as whether people are performing as required flows in to motivation.

- **Confidence** – Confidence in yourself, others and decisions in itself is a great motivator. When certainty is present commitment follows and can be seen in the manner that tasks are performed. Confidence in abilities can be seen to help new highs being reached.
- **Consistency** – A consistent leader gives certainty in action and of what is to be expected upon certain outcomes. When inconsistency is present, employees tend to stress more and respect and trust will be seen to disappear.

The concept of leadership and the theories have evolved over many decades and to understand and incorporate them requires investigation. The maturity model of leadership, as setup by Deloitte (2017) with the research of over 2000 companies, can be seen below. This shows that education as main driver for leadership development does not rank well. Only the combination of education, experience and exposure make leadership scalable and only if the environment for the development is also present can leadership be seen as systematic.

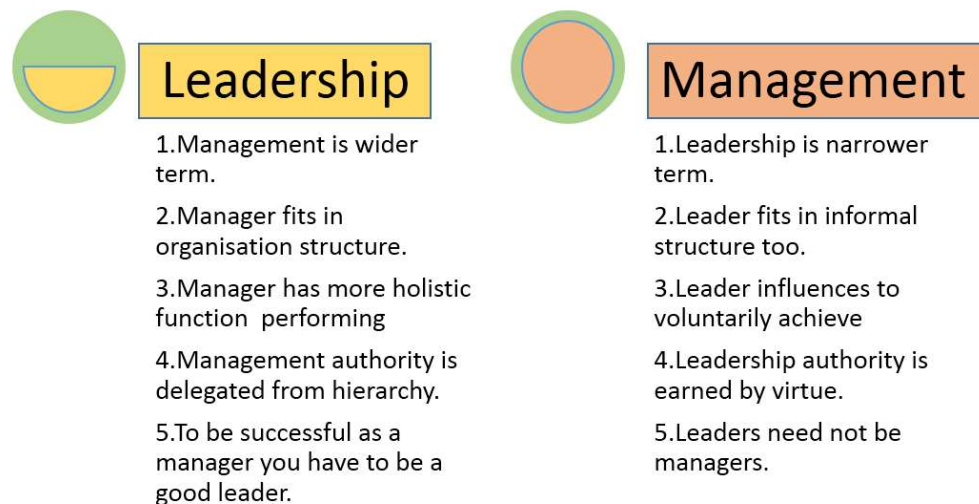


**Figure 2: Maturity model of leadership. Adapted from (Derler et al, 2017)**

Leadership theories have also evolved through time with a theory such as the transformational leadership theory, giving attention to behaviours, charisma, ideology,

values, vision and inspiration (Mallaby, 2014). Common theories all contribute to the question of whether leaders are born or made. The argument of it not being based on hereditary traits but on the experiences of an individual is made by Avolio *et al* (2009) and quoted by Mallaby (2014). This argument places the focus on the fact that leaders need to be developed through time matching the maturity model of leadership. It also indicates a shared belief that the career transition to management and success thereof is dependent on the preparation thereto through creating a development plan encompassing drive, education, communication and exposure. The fastest way to learn is to experience it.

This aspect also leads to the debate regarding the differences that are still relevant in the ability to make concise judgments and informed discussions (Disha, 2016). “A good leader may be a poor manager and a good manager may not be a good leader.” At this point it seems pertinent to draw the comparison between what is stated as management and leadership. A summative representation follows.



**Figure 3: Leadership and management comparison. (Disha, 2016)**

The key principles that can be taken from these notes are that when you become a manager you don't automatically become a leader (Arruda, 2016). There are more factors that set leadership apart from management as stated by Forbes (2016). These are:

- Leaders create vision and managers set goals – leaders inspire and managers set, measure and manage goals.

- Leaders are set on change and managers are set on maintaining – Leaders are known disrupters in the sense of innovation, managers stick to what works and optimise.
- Leaders look at being unique and managers look to duplicate what works.
- Leaders take risks and managers seek to control risk.
- Leaders are development driven and managers are driven by perfecting what comes across their path.
- Leaders build relationships and managers built sustainability.
- Leaders mentor and managers guide – Leaders trust the people that work for them and trust them to find the answers where managers give goals and guidance to achieve them and
- Leaders create a following and managers create staff.

In conclusion it is needed to have the insight into management and leadership is the understanding that leadership is required in management to be a good manager. It can be developed and if not applied properly, could lead to the failure of transition to a management. These aspects need to be considered in the data collection stage.

Gaining understanding of other skills required in the managerial responsibilities, it is necessary to research the functions and their roles in the managerial context.

## **2.7 COMMUNICATION**

This section will serve to identify what communication is and the importance thereof as it is a central skill in being a successful manager. In the managerial profession regular communication in the form of presentations and meetings is required and without the right communication uncertainty arises and purpose is lost (Eisenhauer, 2016).

Communication is any form of transferring information from one entity to another (Skillsyouneed, 2018). This simplified definition has a wide range of enclosing aspects

but this can only be seen once we look at the sub-groups that communication is divided into (Skillsyouneed, 2018):

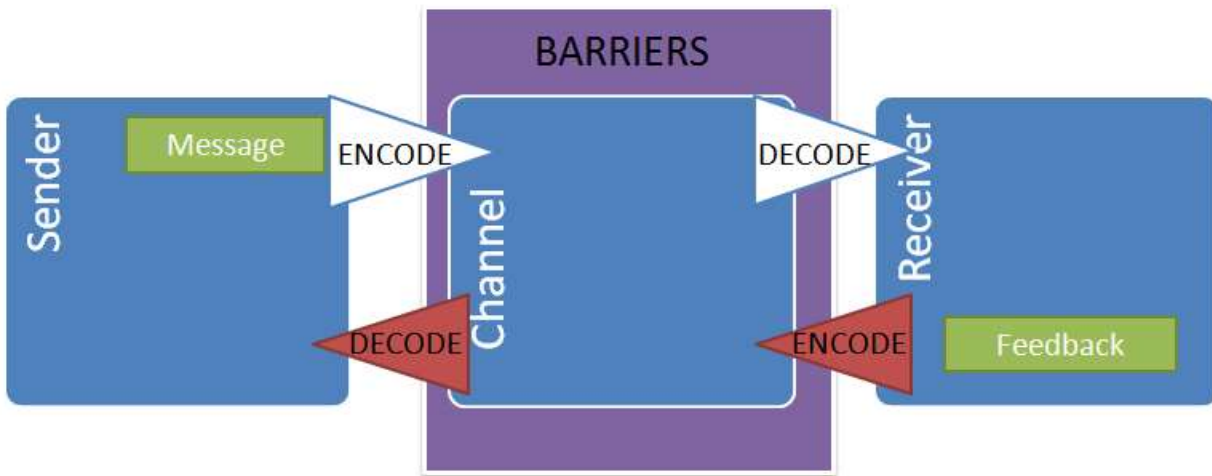
- Verbal Communication – Face-to-face, telephone, radio, television and other methods.
- Non-Verbal Communication – Body language, expressions, clothes, smell etc.
- Written communication – letters, e-mails, internet, billboards etc.
- Visualisations - Charts, maps, graphs and other representations.

Communication, as illustrated, can be seen to stretch over all interpersonal occurrences and a better idea can be formed on how incorrect communication can transfer the wrong message. It can also be seen that new methods of communication were introduced in the forms of instant messaging that in themselves require a new set control measures and the problem of “wrong” communication could easily spread further.

The communication process typically consists of a sender, receiver(s) and a channel. The sender sends a message (any form of information) through a channel (face-to-face, e-mail and telephonic) after it is coded (put in a form appropriate for receiver) after which it is received by the receiver and decoded (interpreted). When the receiver has decoded the message he could also send feedback (any of the four categories) and the process is repeated. This repeat in exchange of messages could serve to clarify and ensure understanding and whether the correct message was received. It is not a perfect system and there are barriers that need to be overcome. Common barriers can be seen as (Skillsyouneed, 2018):

- over complication and difficult terminology;
- emotional barriers – politics, religion and other forms of opinionated topics;
- attention, distraction or irrelevance – ineffective listening;
- perception;
- physical;
- language and speech;
- expectation, prejudice and stereotyping and
- cultural.

Effective communication then is to overcome these barriers and reduce misunderstandings to ensure the correct message is received. A representation of the communication process can be seen below.



**Figure 4: Communication process (Skillsyouneed, 2018).**

Identifying the difficulties organisations experience in their day to day activities could also be seen to stem from the barriers with reoccurring themes such as inadequate listening, attitude, ego, authority and gender bias but also identified problems of inadequate knowledge, poorly written communication, lack of standards, privacy and the lack of dispersing of communication (Frost, 2018). No standards are given in writing of e-mails, instant messaging or communication of goals. With the first two the void of not having actual emotions to couple to the text could further cause misinterpretation and the use of “slang” in messages has become a norm. The digital age has brought with it its own communication problems and the need to ensure that the coding used in correspondence is setup appropriately for each receiver. For the measure of effective communication there are seven C’s of communication. They are (Menon, 2015):

- Complete – Complete communication gives all the information required and leaves no question unanswered and helps with decision making. A simple guiding tool to ensure completeness is to answer the five W’s (Who, What, Where, When, Why).
- Concise – Being concise means to state the required information in as few words as possible and to reduce repetition and only including relevant material.

- Considerate – To be considerate means to take in to account the perceptions of others. Consideration allows for the receiver's background, likes, education level etc. For this approach it is crucial to use the word "you".
- Concrete – Concrete communication is clear and specific. The use of facts and figures help the message be not misinterpreted.
- Clarity – Clarity makes understanding easy and enhances the meaning of the message through the use of exact, concrete and appropriate words.
- Courtesy – Courteous communication takes all views and the emotions of the receiver into account. It is a form of respectful communication towards one another.
- Correct – The correctness of the message is the grammar, spelling punctuation. It could also account for timing, accuracy of data and level of communication.

The knowledge of these seven points helps to become an effective communicator. Communication being a simple concept is sometimes lost in importance of the correct application thereof (Pinola, 2014). A person is responsible for what he says and how it is understood and to be an effective communicator, this principle needs to be applied in all correspondence. Just as other skills this can also be developed and improved.

The first phase is to understand the basics of what communication actually is as we have done previously in this section. The next step is to say your say. Contributing and partaking in conversations is a big part of learning how to converse and will also give you ease in future discussions. This phase closes with this same principle, which is to practice. Daily communication and new and challenging situations help develop and open future possibilities. In communication there are other skills that will make for more effective communication such as (Pinola, 2014):

- Learning to listen – By listening you show interest and other people immediately picks this up. To listen to understand instead of just to respond should be your goal.

- Learn non-verbal cues – How people react using their body language indicates how they feel before they open their mouths. This could be used to adapt and change your approach to get your point across.
- Learn to be direct – using as few words as possible and getting to the point not only saves time but
- Show empathy – understand why and share in the feelings of the people that you talk to.
- Tailor to your audience – create the message to the target you are trying to reach.

Communication forms part of the core path to becoming a manager so some methods to ease the development will be mentioned briefly as reference for possible techniques (Wolff, 2016).

- Firstly, put down your mobile phone. This is one of the biggest obstacles to communicating effectively. To give someone your attention is the starting point to good communication.
- Secondly, learn from the people you admire. Study discussions of people you see to have good communication skills or people in talks and so on. Reading can also help you develop and constructs and phrasing will help you to speak correctly and how to present your information. Reviewing conversations could also help and therefore it is useful to record a conversation daily and listen to it while trying to recognise if tone, speed and other influencing factors of the discussion are conveying the message accurately. Anthony Fasano also recommends going to toast master's international and delivering speeches on a regular basis as to improve in this regard.
- Lastly role playing a difficult conversation or a stressful situation with a trusted friend could also help.

The importance of communication is focused in the central role it fulfils in the daily activities of any manager. To accurately transfer information to the receivers thereof could be the difference between success and failure but it could also save time in everyday operations. As the communication plays a role in the other responsibilities within the managerial context, an investigation to influenced responsibilities will now continue.

## 2.8 COLLABORATION

Collaboration is the working together with other people towards a common outcome. The term refers to co-ordinate the efforts of many towards a singular goal but still meets the party's needs. Working together with other teams and people are part of daily activities and operations. As managers typically manage projects and different people of different backgrounds and opinions it is important that managers themselves know how to collaborate and how to motivate it within others. Collaboration could involve people within the same or organisation or people from different companies and it is even harder today as international communications have made it possible to be across the world from another and still need to deliver the required outcomes. These outcomes could consist of tenders or multi-disciplined designs and projects. The efficiency of these collaborations is critical to the success and requires not only managers that are technically sound but also know what the required environment is to get the optimal results (Fitzell, 2014).

There are also benefits to collaborating. As the old saying goes, "two heads are better than one." The benefits of collaboration are (Hansen, 2016):

- Collaboration opens the world and opens your mind;
- Collaboration work management tools centralise communications;
- Increased visibility and transparency keeps all stakeholders up-to-date;
- Saves time by eliminating wasteful activities;
- Allows for agility;
- Inspires and allows innovation, creativity;
- Develops personnel;
- Boosts productivity and
- Reduces risk through increased involvement and expertise.

Seeing that collaboration could form part of the responsibilities resting on managerial employees and there is great benefit to be found therein. We will now look at factors that influence the efficiency of collaboration. These factors were seen to include the following (Rollins, 2015):

1. Communicate effectively – Being open, respectful and focused on the situation is based on trust. This builds common ground toward a common goal.
2. Involve everyone associated with the problem – Setting the right objectives with the right people saves a lot of time later.
3. Trust and Respect – Being able to trust the people you work with goes further than getting the work done and deliver to expectation.
4. Define problem solving tools – Setting out a process, rules or guidelines for conflict or problem resolutions is important to ensure cohesion within a team.
5. Compromise and tolerance – This refers to the belief that a person experiences that something is true or fact. In collaboration a person needs to allow room for others' opinions and a chance for them to state their point.
6. Positivity and authenticity – Being positive and authentic allows everyone to grow and work together by showing all their strengths and weaknesses.

People came together in groups to mitigate the risks of life, collaborated over a shared risk that later translated into a shared need. On the playground we play together and the skills we developed there are invulnerable and the same can be seen about work collaborations. Individuals need to learn how to play together to be able to offer their best.

Individually it is still required to apply the unique aspects of the managerial responsibilities to the overall problem. Collaboration should not set out to reduce individuality but should set the environment for other skills to prosper. The research into other skills can now be continued.

## **2.9 CRITICAL THINKING**

Critical thinking encompasses the objective analysis of facts in order to form a judgment (Glaser EM, 2017). There however are much more encompassing definitions as is the case of the statement made at the 1987 Annual international conference on critical thinking, it reads (Glaser EM, 2017):

*“Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.”*

The skill is of great importance to organisations and critical to being a good manager. The ability to make decisions through what is known at that stage could be the difference between success and failure in tenders, deadlines and overall effectiveness. It can further be seen to have two components (Glaser, 2017):

1. Set of information generating and processing skills and
2. Guided behaviour through habit.

This shows that these skills are more than just obtaining and retention of information as it speaks to the way information is obtained and indicated continuous use of it and the acceptance and guiding of the outcomes. The motivation behind critical thinking can also steer it as is the case in scenarios where the motives are selfish in nature, the interpretations can be manipulated to contribute to one's own required outcome that could be influenced by human flaws. The quality thereof is also influenced by the concentration and experience and as no one person is always focused on critical thinking the drive towards development is a lifelong one. A well-developed critical thinker will have the following traits (Glaser, 2017):

- Raises, formulates and communicates vital questions;
- gathers and assesses relevant information, comes to well-reasoned conclusions and solutions and testing them for conformance;

- recognises and assesses assumptions, implications and practical consequences; and
- communicates effectively with others in finding solutions to complex problems.

In management the ability to make quick decisions is important. It was also seen that the ability to be certain and maintain a decision is important for respect and displays of confidence. This ability assists in surety and indicates an insight unknown to others. Being able to be certain however requires a certain measure of understanding. Although engineers are technically strong the financial understanding of managerial responsibilities needs to be better understood.

## **2.10 FINANCIAL UNDERSTANDING**

In managerial positions a manner of budget control and understanding of cost control need to be part of an individual's skill set (Reh, 2018). The need to set financial targets and how to manage certain influencing factors to obtain these results also forms part of managerial responsibilities. It does however only encompass managerial finance aspects that are mostly driven by assessment of situations.

Financial management is defined as the planning, organising, directing and controlling financial activities and resources to the best outcome of the organisation. The scope of these decisions is divided into three areas namely financial planning, financial decision-making and financial control. It is generally encompassing of procurement, allocation and control of the financial resources. In simple terms the accounting assigned to managerial functions consider the daily operations and drive the operations and strategy within the organisations. (Ohio University, 2018).

The objective of financial management is given as to (Juneja, 2018):

1. ensure adequate monetary support to the organisation in the form of capital;

2. ensure adequate returns on monetary investments and to shareholders;
3. ensure monetary assets are utilised fully and optimally;
4. ensure monetary assets are invested in the correct ventures; and
5. ensure optimal capital structure between debt and equity.

With the basic understanding of financial indicators, assessment thereof and the cause rectification measures understood financial guidance and management as a role of management is simplified to an understanding of how to make money. This is a critical part of any managerial role but may vary in methodology from role to role. The core principles still need to be understood and applied accordingly. The application of these principles carries over to other responsibilities in the managerial context. A skill that is particularly influenced through finances is project management.

## **2.11 PROJECT MANAGEMENT**

In the assignment of responsibility, it is important to know that an individual has the capability of initiating, planning and executing a project to completion. This makes up an important part of managerial functions and needs to be incorporated in a manager.

Project management can then be seen as the application of a certain set of skills and tools to ensure the required project outcome (PMI, 2018). These skills and tools can also be found in a good manager so that all endeavours are approached and finished with the required outcome in mind. Managers typically undertake various projects and the success thereof is important to any organisation and thus every manager.

## **2.12 ENGINEERING TO MANAGEMENT**

Although management books are best sellers every year, most companies still believe that they have a shortage of good leaders (Canwell *et al*, 2014). The demand for these

books, courses on management and the fact that managers fail when promoted into management positions show unpreparedness. Books such as “The one minute manager”, “Good to great”, “The 7 habits of highly effective people” and “How to win friends and influence people” were at the top of the reading list but reading and doing are two different things.

## **2.13 TRANSITION**

Following an understanding of what the expectations are of a manager, the need to understand what takes place to get there follows suit. This is the core phase and central to this study and will be discussed in detail.

Abundant research is available on how managers influence the day to day activities of organisations and the mentality of the people working below them. A good manager can create comfort and good organisational culture but the other side is just as true. Transitions to management being established as a risk, the needed insight into this topic was required before any meaningful discussion, statements or recommendations can be made.

It can also be noted at this stage that management is a social science and the difference between change and transition is that change happens without people transitioning and is situational and transition is psychological and the acceptance of the new situation forms part of it. The transition in this study will then be seen as the phase of changing from engineer to manager encompassing the change and the time frame. This takes place in two sections, first the change of title and then the change in duties (Howard, 2003). The process of transition is different for every situation but the basic aspects need to be known. The three core phases (Ioli, 2016) of job market transitions are identified as follows:

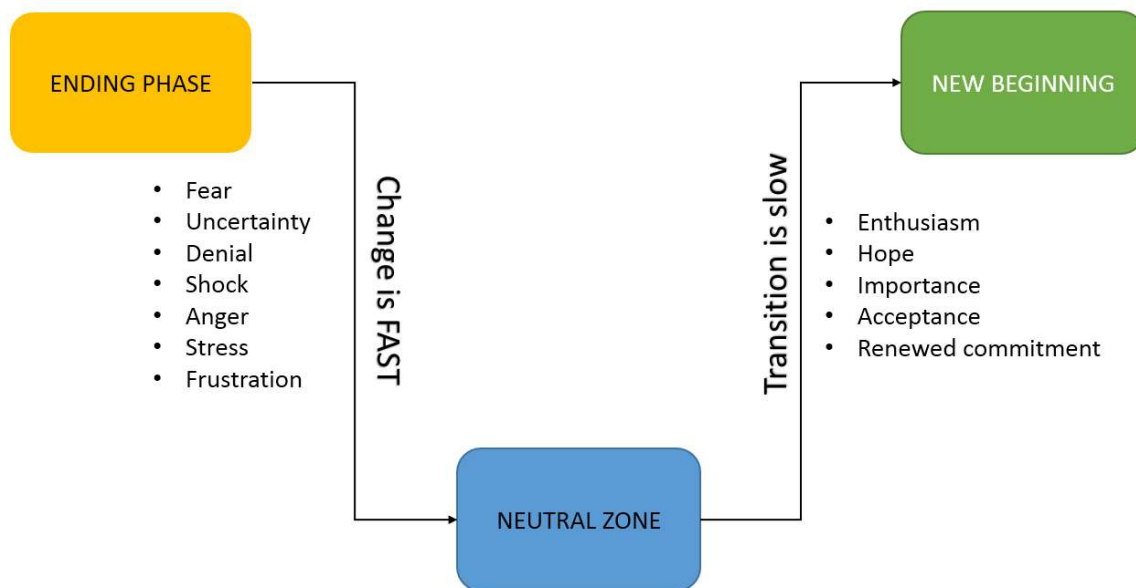
- Ending phase;
- neutral zone; and

- new beginning phase.

The ending phase comes with the realisation of change. Excitement, worry, grief and detachment could all be seen in this phase. The “letting go” of what is known is the focus here.

The neutral phase consists of leaving your old position, routines and habits behind but not yet being established in the new allocation. The purgatory scenario of what ‘was’ and what ‘is’ and the high risk uncertainty zone creates concern and breaks confidence (Bridges, 2013).

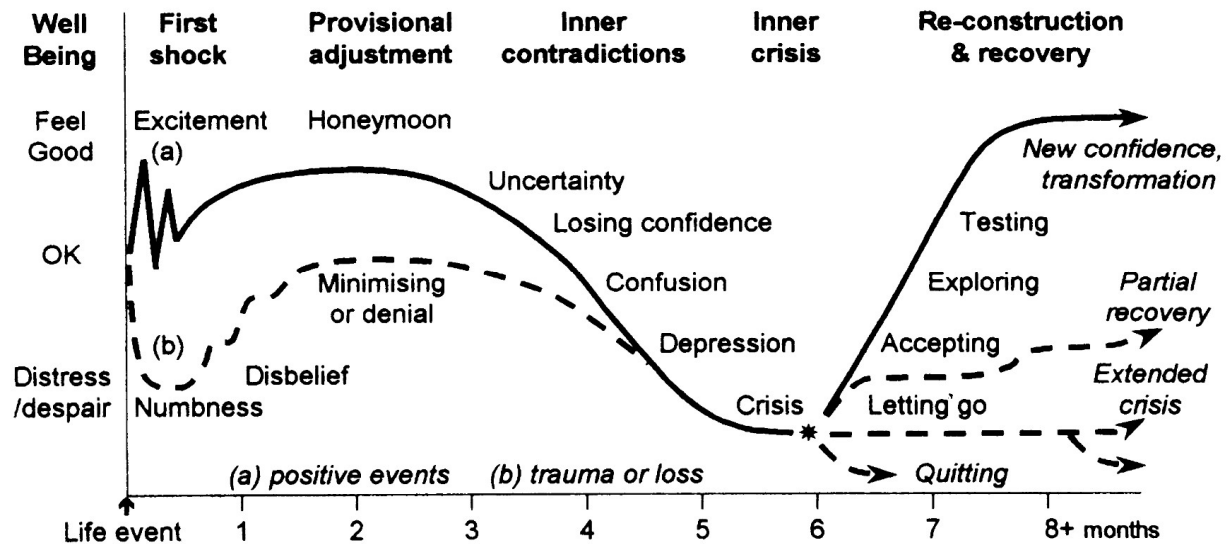
The establishment and settling in your new “state” announces the new beginning phase.



**Figure 5: Bridges transition model. (Bridges, 2013)**

From these principles various trains of thought have spurted. The ADKAR Prosci model describes what is needed at individual level to have successful transition management psychologically (Prosci Inc, 2017). Case studies with the necessary data shows what has happened, what worked and what didn't in previous situations where new managers have been promoted (Gabarro, 2007). Various lists are available of what should be focussed on first to make sure that the transition flows smoothly (Watkins, 2007). The process of change is further divided and the psychology of change management can be investigated to name just a few.

A popular model of the transition process that can be seen as an accurate reflection accounting for positive and negative happenings can be seen in the diagram presented below.



**Figure 6: Transition process (National Institute of Health, 2014).**

This model interprets the change career. We can see the initial feeling of either fear or excitement. These two routes are seen to join up later on as both routes have uncertainty and doubt that influences confidence. The process escalates in crises from which the process develops to the new confidence level (National Institute of Health, 2014). The key from this is to take the next step and moving through the crises. To understand this we need to understand the difficulties in a transition.

## 2.14 PROBLEMS IN THE TRANSITION PHASE

The environment that businesses find themselves in has changed drastically and globalisation accompanied by global competitiveness has created the need for engineers to not only be technically sound but also to understand and be able to apply basic business concepts, in-depth management skills, communicate effectively and understand financial and social implications (Wilde, 2009).

As stated earlier, engineers strive towards career success through the developing of technical skill. This in itself is not enough but it does contribute to the reason why engineers experience difficulty in transitioning to managerial positions. It can readily be seen that successful engineers in managerial positions have some other form of soft skills that are seen by other experts as necessary (Hissey, 2000) as at some point in the engineering career path he/she will find themselves in a manager role. In the past companies could take the time to mentor and develop such engineers but the speed of change and the need for competitiveness has made this more difficult.

Another difficulty in the career transition to management could be rooted in the differences in the roles. To create deeper understanding the roles need to be better defined. Firstly, the roles of an engineer will be noted. They are as follows (Shrestha, 2015) to:

- Understand the need posed in a problem;
- propose solution looking at financial, technical, safety and environmental implications;
- be an active role player in decision process;
- optimise design/solution;
- setup specification for implementation;
- execute solution or oversee manufacture;
- monitor and improve; and
- train and develop personnel to perform or implement a solution.

From this it can be seen that engineers are highly logical in their thinking and follow a systems based approach to solution generation. The fine detail is investigated and process flow is used throughout. Although the needs and practical capability of the people are considered, little time is spent on the actual human influences on daily tasks. It can also be surmised that engineers focus on what can be achieved within a certain rule set and timeframe according to reason but not all people orientated tasks follow reason.

The role of a manager is different in nature. The roles of a manager are stated below for comparison. They are sub-divided into three divisions and are seen as (Zartler, 2016):

#### **2.14.1 Interpersonal roles**

- Figurehead – Welcoming of visitors and signing of documents. Routine tasks such as communication and less important decisions critical in the efficiency of organisation.
- Leader – Organising of tasks and works of others. This includes hiring, training, motivating and disciplining.
- Liaison – Talking, co-ordinating and motivating with other managers and serve as representative of the organisation.

#### **2.14.2 Informational roles**

- Disseminator – Dealing in information and manages privileged information. Making sure that the people who need the info get it.
- Monitor – Monitors surroundings for required information such as market changes toward understanding the role within the current environment.
- Spokesman – Speaking on behalf of his organisation, their culture and policies toward the outside world as well as representative of his division to his superiors.

#### **2.14.3 Decisional roles**

- Entrepreneur – Serves as creator and innovation seeker. Improving the organisation, its functionality and the ability to serve the environment.
- Disturbance handler – Correcting unforeseen problems and dealing with the accompanied pressures.
- Resource allocator – The allocation of monetary, physical and mental resources while setting time frames for approval or completion.
- Negotiator – Negotiations with internal and external parties to gain benefit for his organisation.

The differences and difficulties that an engineer might experience can be seen from the onslaught. Engineers thrive on change and development and routine tasks could see boredom develop (Krasadakis, 2018). Further, engineers are self-motivating personalities with completion being a major drive. They could see troubles develop when the need to motivate or manage others arise (GrahamJones, 2016). Other worldly issues that are learned and understood in such ways as reading of economic articles and discussions on the topics with others could be seen to not trigger the intrigue of engineers and leave a gap in the planning or adapting in the management role. The change to the managerial role and the needs thereof will be noted and considered in the data processing process.

## **2.15 ETHICAL CONSIDERATIONS REVIEW**

These principles are divided in to three areas of consideration with their underlying terms. The three areas are (Brink, 2017):

- Professional standards
- Researcher – Respondent
- Respondent – respondent

Each of these areas will be discussed with their application to this study:

### **Professional standards**

In the area of professional standards, the following items were identified as role players in this study. Each will be stated and their importance stated where required. (Brink, 2017)

- Objectivity – The researcher must keep his own feelings out of the equation and focus on being objective towards respondents
- Professional integrity – The integrity of the study is reliant on the integrity of the researcher
- Accurate methods in terms of collection and analysis
- Relevant research methodology
- Interpretation and reporting should be verified and ensured

- Fabrication of data (data never collected) will lead to the integrity failing completely
- Avoid false data (changing content of findings) to suit an outcome

### **Researcher – Respondent**

The responsibilities of the researcher towards the respondents for this study will be (Brink, 2017):

- Clear information must be given to respondents for them to understand
- Free and informed consent must be ensured
- Right to confidentiality for all respondents to ensure accurate data and honest feedback
- No harm shall be done to respondent (physical/mental or legal)
- No deception towards the respondents
- Anonymity will be guaranteed
- Privacy of data shared will not be shared

### **Respondent – respondent**

As respondents will not come in contact with each other, there will be no applicable responsibilities in this study for this application.

The data collected will be referred to under respondent numbers so that no link can be made to any organisation or person.

### **Future review and complaints**

For the purpose of future review and checking of data all recordings will be saved on an internet based drive and transcribed notes will be added to final report. The backup recording will be kept for 5 years to ensure traceability.

For the lodging of complaints or breaking of any conduct measures all complaints will be guided through the ethics complaints department of the NWU. These details below will be added to the document giving consent to the interview for easy reference.

In completing the literature review in depth interviews needed to be performed to gain perspective on the actual view of the engineers that transitioned to managerial roles.

## **2.16 CONCLUSION**

In comparing the literature of engineering responsibilities and managerial responsibilities, it was identified that the skills required for the managerial context might be lacking from engineering development. The studies and literature reviewed also showed that due to this lack of development prior to the transition to management engineers experience hardships in this transition. This study will seek to identify the factors that influenced this transition as perceived by engineers that have performed this transition successfully. The factors contributing to their success will also be investigated.

Through performing the literature review an insight was gained into the theoretical influences and expectations of the managerial responsibilities. Through performing interviews with engineers that successfully transitioned to managerial roles practical information will be gained comparable to theory.

## **2.17 CHAPTER SUMMARY**

This chapter started by giving an overview of the formal training required to become an engineer. This was done through a brief overview of the routes that an individual could take to progress to a certified engineer. The training from this point vastly differs as each engineer will determine a unique development going forward and is typically position based.

The literature reviews then looked at the typical career paths for engineers as well as how it has changed. This enabled us to see the typical on the job training that an engineer would receive through experience.

Investigating the literature for managerial positions and what is expected, we identified the different skill requirements through gaining insight into the managerial responsibilities. Through this it is possible to interpret data gathered with respect to managerial roles as well as justify through the data collection phase.

Literature on transitions was then analysed to gain insight into what happens during a transition and what the psychological impact thereof could be. Building on this we identified common influencing factors in the various phases to enable us to identify a start for the investigation into factors influencing engineers in their career transition.

With the literature review concluded it was seen that the psychological as well as physical influences could play a role and all of these variables would need to be considered in the interviews and data gathering. The background of engineers is all technical in nature as technical soundness is what is expected until the transition to management and therefore we need to identify short-comings, perception and possible improvements in development to improve the efficiency of the career transition from engineer to management.

### **3 EMPIRICAL INVESTIGATION**

#### **3.1 INTRODUCTION**

With the completion of the literature review the empirical investigation was completed. The empirical investigation serves as means to achieve the objectives set out in this study. The main purpose of this study is to identify the factors that influenced the career transition from engineer to management. In principle the identification of factors that play a role could see preparation to address these difficulties be better addressed in the future. This study will seek to identify the commonality between different experiences through various industries, genders and age groups by identifying a diverse population sample. The questions were structured around the understanding of managerial responsibilities and the traits that combine in a good manager as identified through literature.

The questionnaires have 2 sub-sections covering different factors that were identified through literature review. The interviews were started through an introduction and a summary of the study and what the outcomes were. A brief discussion around the basic process was discussed to ensure that the respondents understood and felt at ease. The informed consent forms were also discussed. The respondent's job title, sector, qualifications, age and sex were also used as demographics for possible further interpretation. Section A consisted of these details to get the relevant data from all participating parties. Section B consisted of the open ended questions covering the identification of factors and allowing each respondent to state their experiences on these matters. The questions are open ended in nature, but will aim to also guide the respondents to avoid any misunderstanding.

Data was gathered through interviews and transcribed to enable the analysis thereof. These analyses were performed using software systems such as MaxQDA and assistance was given by the statistics department of the NWU.

This chapter will focus on the collection of the data, the interpretation thereof and accurate and effective representation.

### **3.2 RESEARCH METHODOLOGY**

This study is Qualitative in nature and the questions are divided into two subsections to address Managerial traits, Leadership traits and Development/Personal traits. The questions are open-ended to ensure coverage of unidentified factors and unique inputs from respondents. In conclusion a summary and recommendations can then be made on common influencing factors.

The interviewees were all identified according to their careers using a convenience sampling methodology. All of the respondents needed to have an engineering background and transitioned to a managerial level position. Through having semi-structured interviews with these respondents the primary data was gathered and reworked to accurately identify corresponding themes and factors to make recommendations.

Each interview was started with a brief introduction to the study. It was stated that the outcome was to identify the different factors that influence the various transitions experienced by engineers in practice. It was also stated what the desired outcomes were and that participation was completely voluntary. An informed consent form was signed by each participant stating the terms and that they understand what is expected of them.

The question guide was piloted with two people within the industry and was found to be adequate in the desired application. The question guide can be seen in Appendix B. The average time per interview was scheduled to be 30 minutes, but ranged between 15 minutes and 60 minutes.

#### **Interview guide description**

The structure of the interview guide was divided into 2 sections. The first section separated demographics, although they may not be determinants in this study, further study could refer to the data obtained. The second section is focused on perceptions of

factors that influenced their transitions to management focusing on managerial, leadership and administration factors. The perception of important factors, as seen, the respondents are also tested in this section to widen the net and compare to mentioned factors.

- Section A - This section identified the respondent's age, gender, highest level of qualification, job title and the sector in which they operate.
- Section B – This section sought to identify the experiences of the respondents and as a result the key determining factors that played a role in their transition. This was achieved through identifying the aspects that were seen to cause the least amount to the most discomfort in their transitions.

### **Population identification**

The population that was targeted was sought to have engineering background or completed engineering studies. They will also be expected to have made the transition to a managerial role that will be indicated by them still being in a managerial role or retired from one. Due to the constraints of this study we will also only be looking at engineers in South Africa. These determinants were put in place to ensure that the correlating target group is used. The respondents were identified through convenience sampling and interviews were held with 12 individuals that matched these criteria.

### **Interviews**

Interviews were held with 12 individuals and saturation was confirmed after no new inputs arose after 5 consecutive interviews. A trend could thus clearly be seen to form and the saturation was assumed. As all the targeted respondents fitted the criteria as determined, all the interviews were used as data for analysis. As 15 respondents were contacted for interviews and only 12 responded affirmatively, the response rate for this study was 80%.

The interviews were in a semi-structured format guided through guiding questions to ensure that all bias is removed from the interview process. The data was noted through

recording of the discussions with notes being taken to further increase interactivity and attention to responses. As the topic is not of a sensitive nature it was sought to encourage openness.

In the approach to the interviews four steps were identified to ensure accurate and reflective information.

### **Step 1: Preparation**

The questions were setup to reflect what factors influenced the transitions of the various individuals through an analysis of the problem combined with a literature review. The questions were then constructed to guide the individual's response but also allow enough open-endedness to the discussion. The literature review also serves to ensure that collected data is understood and assisted in the construction of the questions. The piloting of these questions was done in a pilot study.

### **Step 2: Pre-interview**

Structuring and asking the questions is imperative in assuring that the data collected is indicative and an accurate reflection of the individual responses. Other influencing factors also needs to be considered and prepared to ensure smooth and unhindered data collection through ensuring that recording mechanisms are ready and charged and that the interview takes place in a quite secluded location.

### **Step 3: The interview**

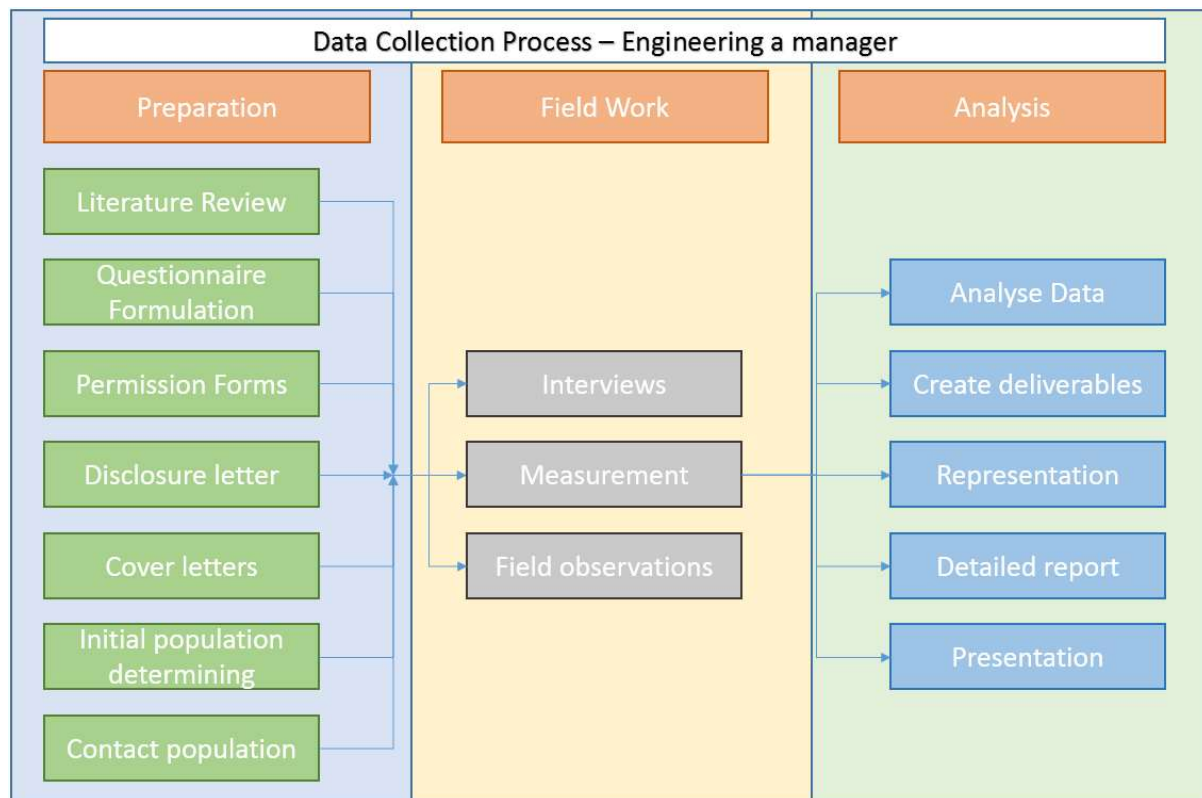
In the interview it is firstly critical to introduce what the study aims to achieve and to remove any concerns that the respondent may have as to ensure complete openness and orientate the responses. Language used needs to ensure that respondents understand the questions asked and should be applied with good manners. Interruption

to the respondents should be minimised. Ensuring that the interview takes place in the allotted time is the responsibility of the interviewer.

#### Step 4: Post Interview

After the interviews are completed, an objective interpretation of the data needs to be performed to accurately reflect what was said throughout the interview. The anonymity of the participants was guaranteed from the start and so all their responses will be referred to by numbers instead of any identifiable attribute.

The questions used in this study were constructed specifically for this study based on literature analysis. These questions were structured to allow open-endedness but not to be leading in any way. It is however still important to ensure non-bias interpretation upon completion.



**Figure 7: Study process flow.**

## **Data Analysis**

The study follows a qualitative structure as the study is exploratory in nature. We seek to understand the underlying opinions of the interviewees that could be interpreted to gain insight (DeFranzo, 2011). The qualitative data was collected through re-writing the recorded interviews with the field notes made. The field notes served as refresher notes that were made when certain noteworthy happenings took place during the interviews. By combining these two documenting tools an accurate write-up of the interviews could be made.

The write-up could then be analysed through reading and editing the text while considering pauses, repetitions and emphasis placed (Kruger, 2017). The simplification to a write-up makes comparison through tools such as MaxQDA possible and allows for better representations and identification of themes. As the theme identification in qualitative research is critical, the themes should be identified throughout the research. Attention should be given during literature review, in the interviews and upon data analysis.

The analysis of these notes can be done through the application of different approaches or even combining them. Typical methods of analysis are seen to be (NoMore2020, 2016):

- Identification of recurring words – Observing words that are repeated throughout the interview, terms used to describe and key words in context we can understand what the respondents are talking about by looking at the words they use.
- Identification of indigenous categories – Looking at unfamiliar words or unfamiliar uses of words can also be used to identify themes.
- Comparing different answers and their contrasts – Themes could also be indicated in the way that texts are the same or differ from each other.
- Social science queries – In the identification of themes the experience of informants, information left out and unmarked text needs also to be considered.

- Secondary analysis – The comparison of data to secondary sources for informed insights can also show new themes.

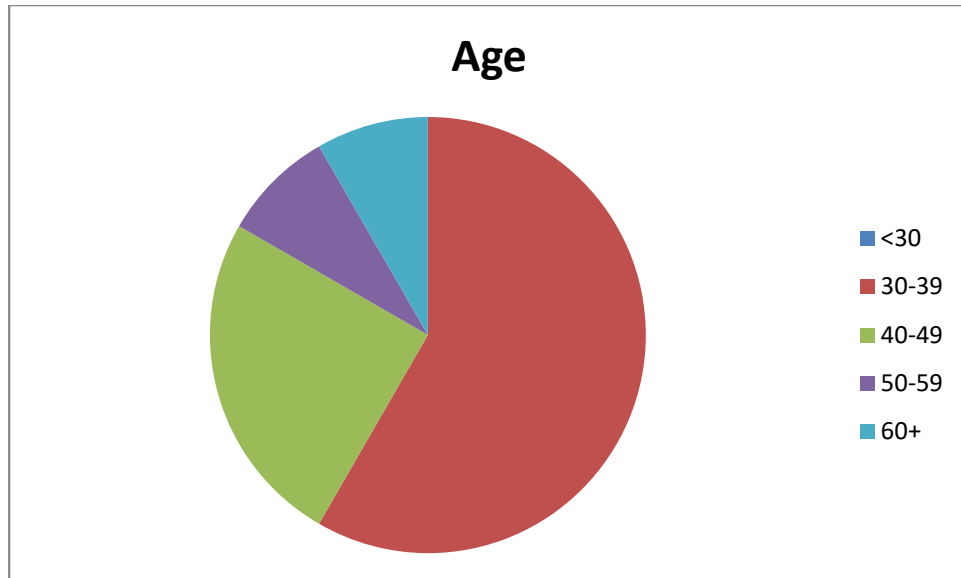
To reflect the analysis of the data collected, it was needed to rework the data to manageable text. The reflections on the various questions by the respondents need to be translated into code to remove the influence of meanings on interpretations. The coding was done through MaxQDA and refers to the coupling of words to numbers, symbols and tags.

### **3.3 DEMOGRAPHIC DESCRIPTION**

To indicate the range of the demographic population, selected certain information about the respondents was captured and will be reflected upon. This information could also be used to show trends amongst the different indicators and will also be considered in the identification of themes. All of this information was confined to section one and representations of these factors will follow.

#### **Age**

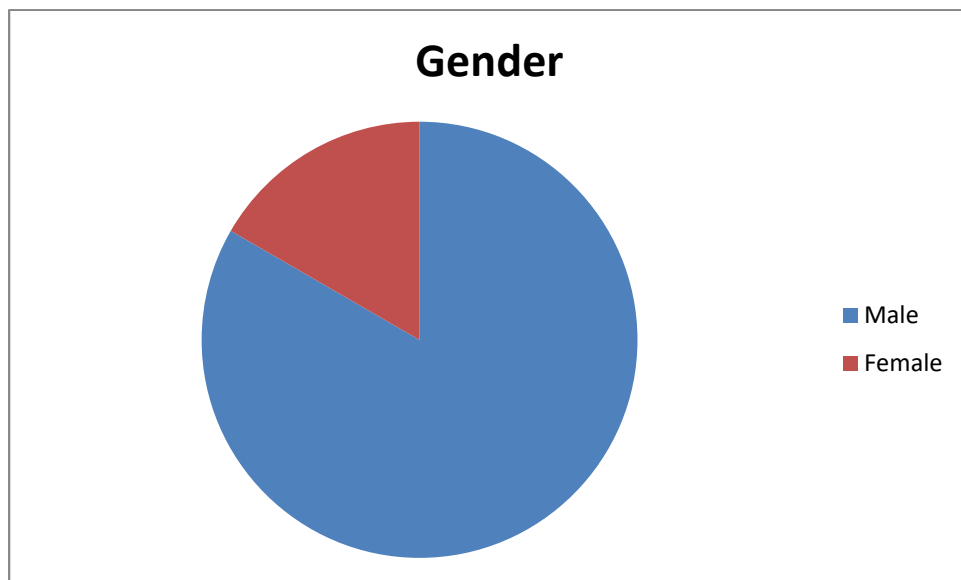
The ages of the respondents vary greatly with the youngest respondents being 31 years (4 off) to the oldest being 75 years. The largest division in the population can be seen as the age group of between thirty and forty that makes up 58.33%. 25% can be seen to fall between forty and fifty while the older respondents account for 16.66%. The distribution by range can be seen illustrated in figure 6. This shows that the ages for managerial duties is wide ranging. The average age of the population is calculated as 41 years of age. Although the majority of the group falls into the thirty to thirty-nine ranges the presence of the top ranges will guarantee that different generations are represented.



**Figure 8: Age distribution of population sample.**

### **Gender**

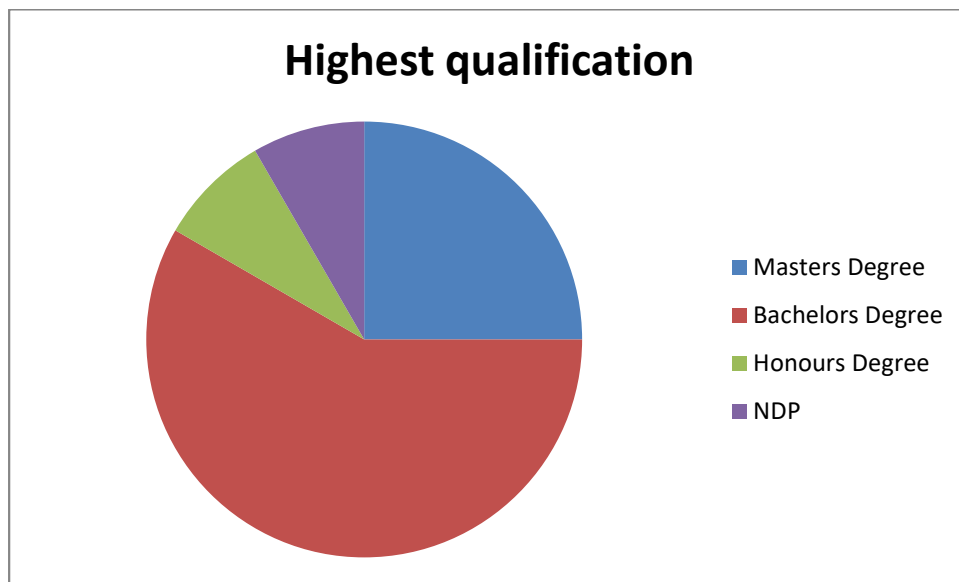
The population of this study consisted of a majority of men. This was based on convenience sampling and thus the relevance is not indicative to this study. The percentages of participants can be seen in figure 7. As there were twelve respondents 16.67% (two) were female and 83.33% (ten) were male.



**Figure 9: Gender distribution of the population sample.**

## Level of qualifications

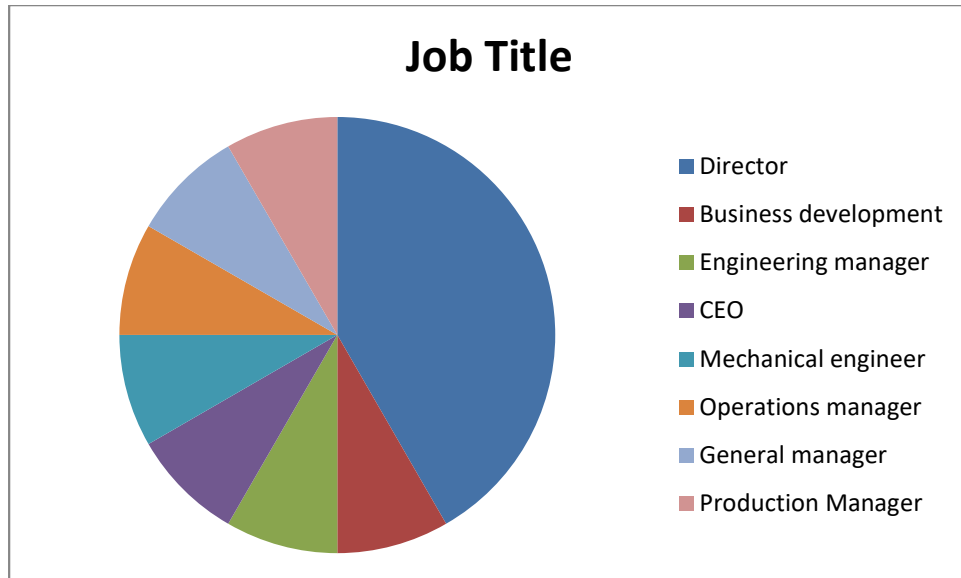
The population sample has a wide ranging degree of highest education. This field ranged from national diploma to multiple master's degrees. In practice the level of education will be used to reflect how education affects the perception of new managers in the transition. The population is distributed as 8.33% having a National Diploma, 8.33% having an additional honours degree, 25% have completed a post graduate degree and 58.33% having a bachelor's degree in engineering.



**Figure 10: Level of education distribution of population sample.**

## Job Title

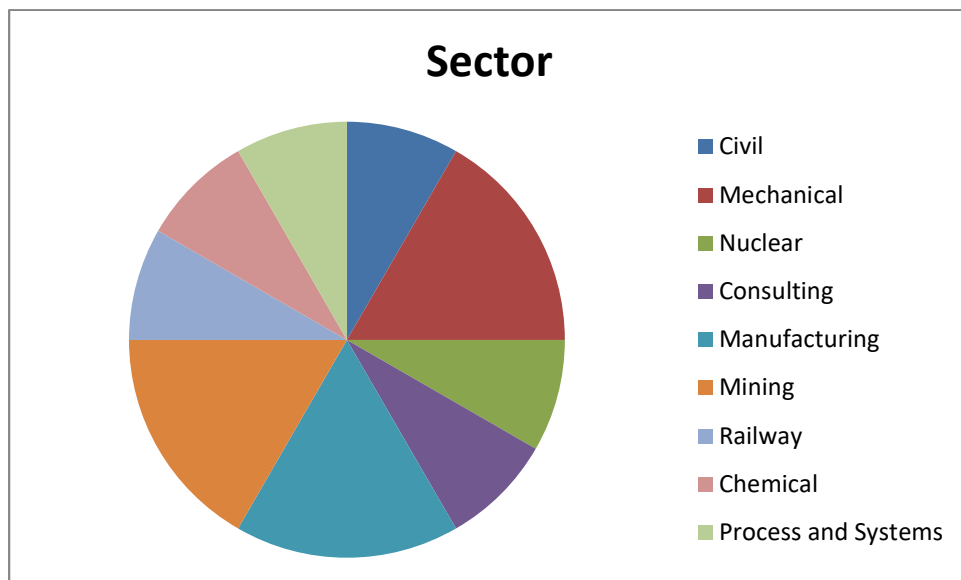
The managerial applications are established through the job title statement and serve as verification that the selected population does in fact conform to the requirements. This also serves to show different levels that engineers can function at during their careers. The titles range from company engineer to the CEO of the organisation all of whom have managerial responsibilities. The population has unique representation for most of the positions with the level of director that encompasses different technical, engineering and contractual seen as 41.67%.



**Figure11: Job title of the selected population sample.**

## Sector

The different sectors are well represented in that most of the respondents are a unique representative of their industry. By achieving this we can make assumptions that shared experiences are the same across all industries. All of the sectors account for 8.33% while mechanical and mining each contribute 16.67% to the population.



**Figure 82: Sector distribution of the population sample.**

## Summary of population

In the interviews some indicator information was asked of the respondents. This information could give clarity in some matters as well as showing population distribution. A summary of the selected respondents can be seen below. The summary gives more detail about specifics of each respondent but overall the sample was very widely spread over the engineering industry and was accepted as a very good reflection. Ideally more female respondents would have been interviewed. This however was not possible within the time constraints for this study. The rest of the demographic indicators such as age, qualifications, job title and sector are more than adequately distributed for an accurate reflection of the industry. Although the demographic did not focus on physical location it was also very well distributed throughout Southern Africa. Lastly the organisation size of the different respondents were not a demographic category but were also reflected satisfactorily.

**Table 5: Population sample profile.**

Identification	Age	Gender	Highest qualification	Job title	Sector
Respondent 1	48	Male	Masters degree	Director	Civil
Respondent 2	44	Female	Bachelors degree	Director	Mechanical
Respondent 3	31	Male	Masters degree	Business development	Nuclear
Respondent 4	35	Male	Honours degree	Director	Consulting
Respondent 5	31	Male	Bachelors degree	Engineering manager	Manufacturing
Respondent 6	55	Male	NDP	Director	Mining
Respondent 7	45	Male	Bachelors degree	Director	Mechanical
Respondent 8	75	Male	Bachelors degree	CEO	Railway
Respondent 9	31	Male	Bachelors degree	Mechanical Engineer	Mining
Respondent 10	34	Female	Bachelors degree	Operations Manager	Chemical
Respondent 11	32	Male	Masters degree	General Manager	Process and Systems
Respondent 12	31	Male	Bachelors degree	Production Manager	Manufacturing

Having collected and represented the demographic information of the target population Section Offered insights to their perceptions through their transition to management.

### 3.4 THE EXPERIENCES OF SUCCESSFUL MANAGERS FROM ENGINEERING BACKGROUND

The next section of the interview guide focused on recalling the personal experiences of the respondents focusing on factors that influenced their transitions. The questions were formulated around creating discussion. As all of the respondents were chosen to match the requirements of this study, all the data collected was used.

#### Transition difficulty factor identification

The majority of the respondents identified the most difficult factors affecting their transition as people related. The items that were mentioned were management, evaluation, supervision, time management, different personalities, different generations and different cultures. These encompassed difficulties in dealing with people and also their perceptions of how people treated them. To accurately analyse the meanings of these statements we look at the situational implication and explanations offered by the respondents.

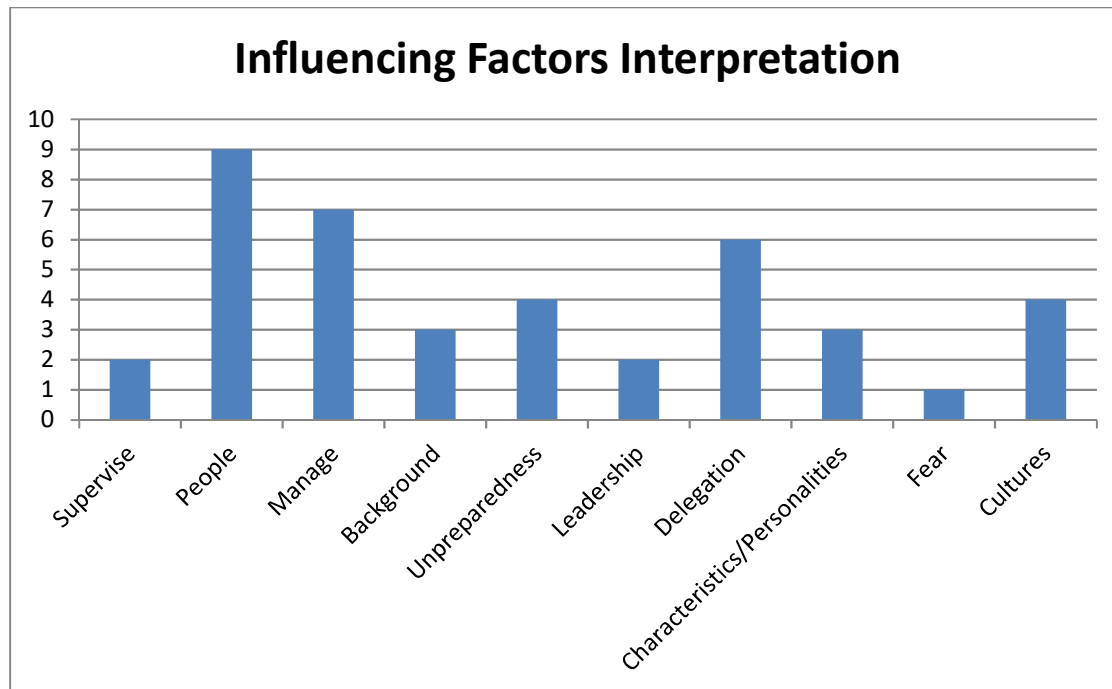
The first question was structured to identify the most difficult factor in their personal transition. Respondents 1, 2 and 5 recall the difficulty from coming from a technical background and managing people. *“The management of people without the training on how to manage people. We have to rely on leadership and as it is mostly a self-taught leadership, coming from a technical background we are not taught this”* (Respondent 2, 2018). Respondent 3 referred to the added management of others’ time, their application and efficiency as something that was difficult to grasp as their time management now became your responsibility and Respondent 12 stated that working with older generations and applying authority to manage them did not come easily.

Interestingly Respondent 7 was seen to say that his biggest influencing factor was the development leading up to his managerial shift that caused uncertainty and fear about making mistakes. *“The way I was managed to a point of uncertainty and left unprepared”* (Respondent 7, 2018). Respondent 6 and 11 saw the letting go of their previous role as a difficulty. It was explained as letting someone else do what they have been doing and trusting them to do it correctly. *“Delegation didn’t come naturally as I wanted to do everything myself”* (Respondent 6, 2018).

The second question was targeted at the opportunity for the respondents to raise any and all influencing factors that they could remember outside of the most difficult as identified in question one. Upon asking this question the greatest impacting factor was seen to be preparation activities for the new managerial role. 66.67% of the respondents said that some form of training for the activities of their new role was lacking. Respondents 1, 2 and 8 all specifically referred to a lack of understanding of financial principles. "...the unknowns and things that I did not have prior training in such as finances etc." (Respondent 8, 2018). Respondent 6 and Respondent 7 did not specifically refer to financial aspects but also stated that their lack of training in non-technical aspects made their transition more difficult, while Respondent 10 only stated "I believe that there was not adequate training you just needed to apply yourself practically."

One aspect that was noteworthy was the situational aspects where engineers were promoted to oversee peers of the previous roles. In these situations, the difficulties were described as managing the others happiness, involvements and expectations. "*Managing others that I now had oversight over and keeping them involved and happy*" (Respondent 11, 2018). This created uncertainty and fear in resistance. "*I went from subordinate to the boss of most in the organisation and managing this transition was worrisome as people did not react the way I thought they would*" (Respondent 4, 2018). Respondent 12 stated that he had to apply authority to older personnel while applying the needed respect.

The rest of the factors mentioned overlapped with the ones stated by other respondents in the first question to a point where saturation was reached. The factors range across all three subsets namely managerial, leadership and personal that combine into being a good manager. Managerial applications were seen to be mentioned 7 times, delegation mentioned 6 times and cultural differences mentioned 4 times. A summary of the stated factors can be seen in figure 11.



**Figure 93: Interpretation of mentioned aspects**

The constructs that were most notably identified were seen as dealing with people as well as their preparation for their new role as a manager. The reason for this could vary depending on their personal experiences and their ability to deal with their new subordinates could also be influenced by their lack of preparation. This will be discussed further upon completion of further analysis of the other questions.

### **Critical success factor identification**

In the transition to the managerial position the factors experienced as easy or less difficult could indicate areas of better understanding or indicate a higher level of preparedness for this specific factor. Understanding these different factors and how they influenced the transitions will help identify the success factors for the respondents.

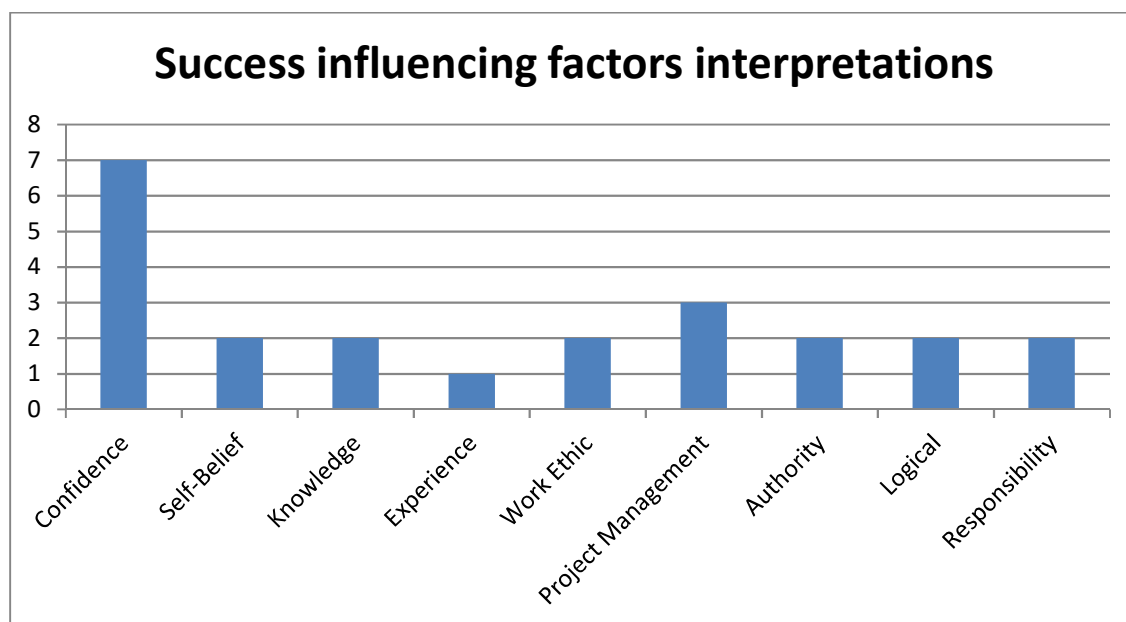
The respondents replied to being asked this question with an overall feeling of natural tendency towards enjoying responsibility and authority. It can also be seen that their knowledge in technical understanding make them more confident in this new role. *“Because I grew in the field I had some confidence that eased and made the transition easier. I knew I was knowledgeable and that carried over to others”* (Respondent 3,

2018). 75% of the respondents stated that their confidence in their ability, their knowledge and confidence in themselves in some way positively affected their transition.

A logical view combined with objectiveness and time management skills were also mentioned by the respondents. *“My ability to do the work or figure it out was one of the easier parts. I had a strong work ethic and I maintained that”* (Respondent 4, 2018). The combination of these skills can be seen to correlate to managerial responsibilities through ensuring projects are approached correctly and delivered on time. Three respondents specifically referred to their project management skills. As respondent 10 stated, *“The skills were there so doing the work wasn't difficult. You had the knowledge and planning capability and thus you saw the results.”*

The respondents also stated that they were driven and hardworking throughout the transition with two respondents saying that their continued hard work made the hard work of being a manager easier. *“...I always kept working towards my ambitions”* (Respondent 9, 2018).

Respondent 12 stated that he worked well with his team as he had created relationships with them prior to his transition. *“To work with the people, I was connected on a friendship relationship level with most of them”* (Respondent 12, 2018).



**Figure 104: Success factor contributors.**

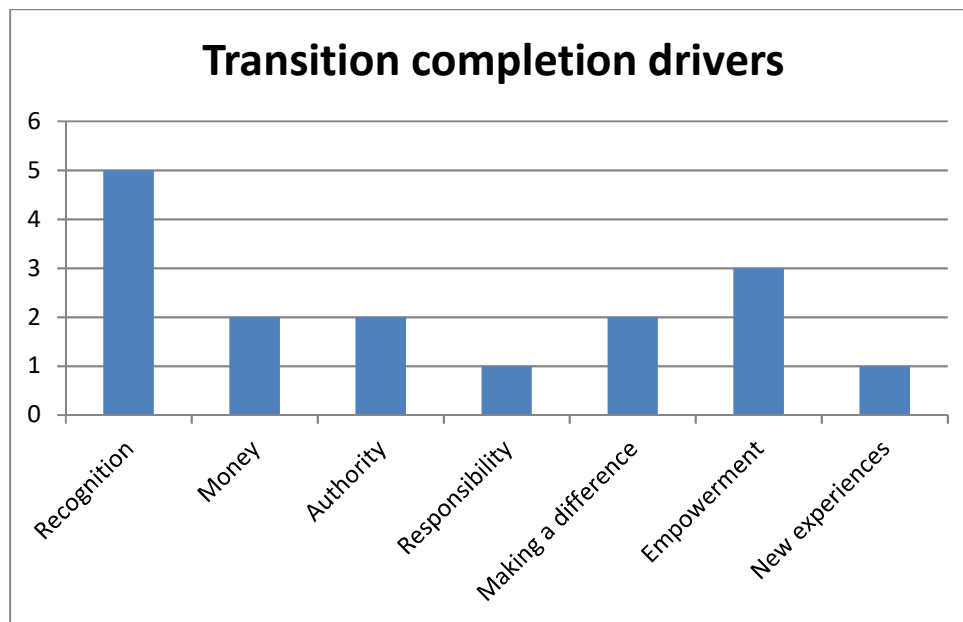
## Positive reinforcement throughout the transition

The question was structured to see what positives drove the respondents to be successful and complete their transition. The presence of positives and joyful aspects keeps us moving forward. We can endure any hardship if there are instances of joy present. As Thich Nhat Hanh said: “If we believe tomorrow will be better, we can bear a hardship today.” These positive feelings could be seen as a factor to the success.

The respondents had an overall fond recollection of what it meant to transition to a managerial role. Five of the respondents saw the change as a form of recognition. *“I saw it as a form of recognition and I enjoyed that thoroughly”* (Respondent 4, 2018). One respondent stated that it was a form of achievement and that it was a *“...feeling of going somewhere”* (Respondent 6, 2018). Respondent 3 stated that he was proud of this form of recognition. *“At my early age giving me authority was seen as recognition”* (Respondent 12, 2018).

Another big factor was the sense of empowerment. Being in control of your own time, being responsible for what you do and how you do it. Being trusted to make your own decisions and not being required to ask permission. *“The fact that I had my own time and was allowed to manage my own time and don't need to report to anyone”* (Respondent 8, 2018). The wording of respondent 2 stated that responsibility was one of her drivers but the correlation to empowerment should not be neglected.

The last factors that were identified were money, authority and the ability to make a difference. Two respondents (16.67%) stated that money was a factor while authority and ability to make a change carried an equal weighting (8.33%). *“Money. The main attraction to management is the money. The responsibility grows and you feel you make a difference but money makes life easier”* was said by respondent 2. On authority it was seen to reflect a higher regard that went with the new position as stated by respondent 10. Lastly it was stated that the new experiences also factored in as stated by respondent 7.



**Figure 115: Transition completion contributors.**

### **Negative external influences on the transition**

The ability of an individual to step in to a role can be influenced by negative perceptions and influences. Organisations don't necessarily create the environment to allow successful transitioning and the responsibility shifts towards the person that has been introduced to the new role. These factors could influence the successful transition so it is necessary to investigate scenarios as perceived by the respondents.

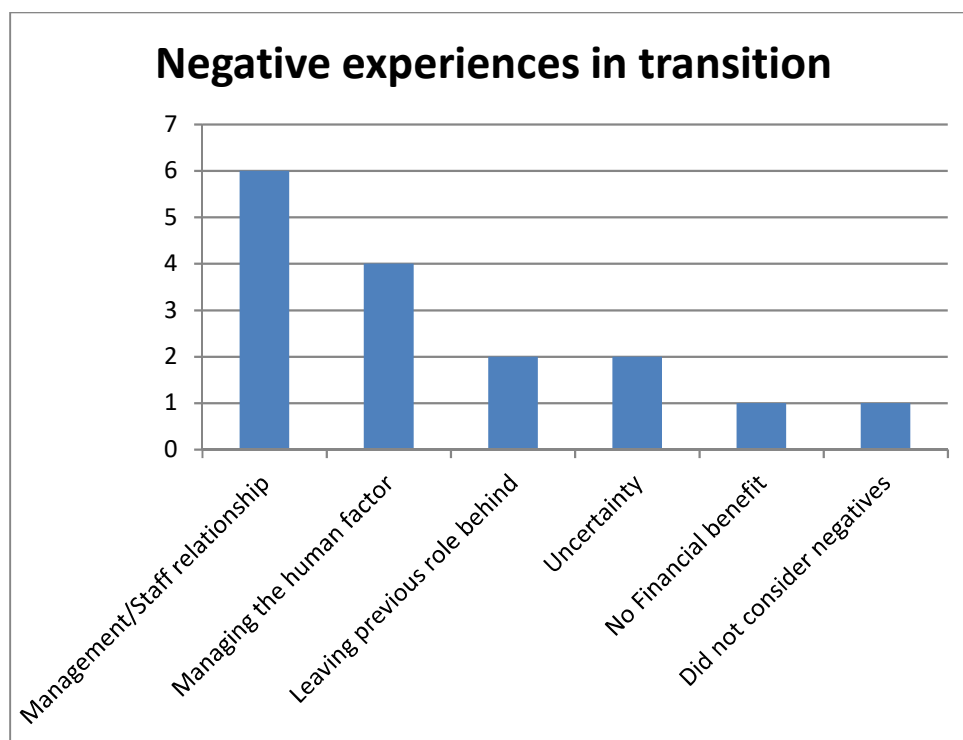
The influence of the newly formed management and staff relationship shows the biggest concern to the respondents. This covers managing the separation from staff to management, the management of the decisions that staff don't approve, managing the new relationship and managing of their reactions. This is a definite factor and the changes can be subtle or drastic. *"The change from employee to manager came with a definite division. One day we were having coffee and sharing stories and the next I was seen as part of management"* (Respondent 8, 2018).

The management of the human factor relates to the ergonomics, physical and psychological behaviour. The respondents noted that the management of lies, feelings and responsibilities of staff formed a negative connection to the transition to management.

*“Managing people and their lies coming from an analytical perspective we are not accustomed to that”* (Respondent 2, 2018).

Leaving behind your previous role and focusing on managerial functions was said to also affect some of the respondents negatively. This goes hand in hand with uncertainty and unpreparedness in terms of what the new role will and should entail. “I would have liked to have more training prior to going into the transition because I was treated differently and due to a lack of certainty I did not always act immediately or with trust” (Respondent 4, 2018).

Two single unique factors were also identified in the form of respondent 9 saying that he did not allow himself to look at anything as a negative and respondent 7 said that his financial benefit was only brought in at a later stage.



**Figure 126: Negative affecting factors.**

### **Retrospective advice**

By looking at our past and present we can see how things we’ve done affected our current situation and only by reflecting on it can we see how we could or should have handled things different. The question was structured with a two-fold purpose. The first being to

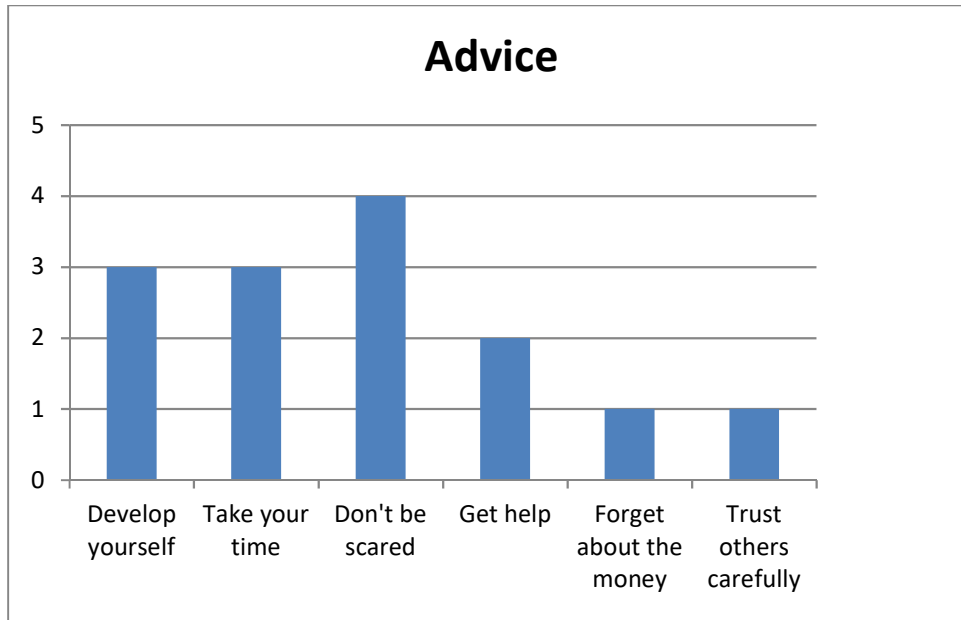
reinforce the respondent's feelings towards any experiences throughout their transition and secondly to serve as advice for anyone else who goes through a similar transition.

Developing into your role is advised pertinently in retrospect. *"I would tell myself to do more training especially finance to be more prepared"* (Respondent 1, 2018). The training to prepare for a role based on what is expected of a role is stated by respondent 1, 6 and 10. This correlates directly to what respondents 2, 10 and 12 stated in taking your time and not rushing through this or neglecting to grow adequately before making the change to management or trying to change to fast.

The most stated advice encompasses not being scared. The advice encompasses not being scared to make mistakes, to ask your questions, say what you want to, to trust your gut and to trust others and delegate work. *"Don't be scared to take the lead and make mistakes because those who follow you will also learn from it"* (Respondent 5, 2018).

Getting help in terms of mentoring or insight in to situations was recommended by respondent 4 and 8. Respondent 8 said: *"Someone to help with my management style. Someone to help with the soft sciences and how to approach certain personality types. I would have done that earlier."*

There were two unique advice statements. These were to leave money outside your consideration. Money will come and there is time to make money but you can't get more time (Respondent 5, 2018). Lastly, respondent 9 had a bad experience in trusting others and advised about placing your trust selectively.



**Figure 137: Retrospective advice for possible future engineers in transition by engineers who have been successful in their transition to management.**

### **Mistakes made throughout the transition**

The guiding question was structured to serve a dual purpose. The first is that of a rephrased question 1 and 2. The rephrasing of a question is sometimes a method of awaking a new point of view. By identifying what the respondents did wrong, their difficulty in addressing certain managerial aspects were sought to be noted. The second purpose is one of reflection and advice towards future engineers in transition.

Respondent 1 stated that the biggest mistake that can be recalled is not getting to all his employees and building individual relationships and respondent 12 stated that he could have bettered the relationships with others. Four respondents saw trusting others in some way as their biggest mistake. This included their honesty and believing the things they said they have done or will do as stated by respondent 5 and 9. Respondents 2 and 8 said that trusting others to do their work and what was expected of them was considered their biggest mistake. *"I misplaced my trust in people that took advantage of that"* (Respondent 9, 2018).

Respondent 3, 11 and 12 answered this question by stating that they were over eager in trying to make their mark by changing many things in a short period of time. This also included doing things themselves and not taking the time to settle in. *“In the first couple of weeks I tried making my mark and I tried doing everything myself.”* (Respondent 11, 2018).

Corresponding to the previous statement, respondent 4 stated that he did not ask for the help of others. *“I did not always consult those that would be influenced in my decisions as I wanted to show I am confident.”*

Not preparing for the transition through obtaining the required training or courses or moving too soon was also raised as mistakes by respondents 6, 7 and 10 respectively.



**Figure 148: Mistakes made through transitions.**

### **Breakthroughs throughout the transition**

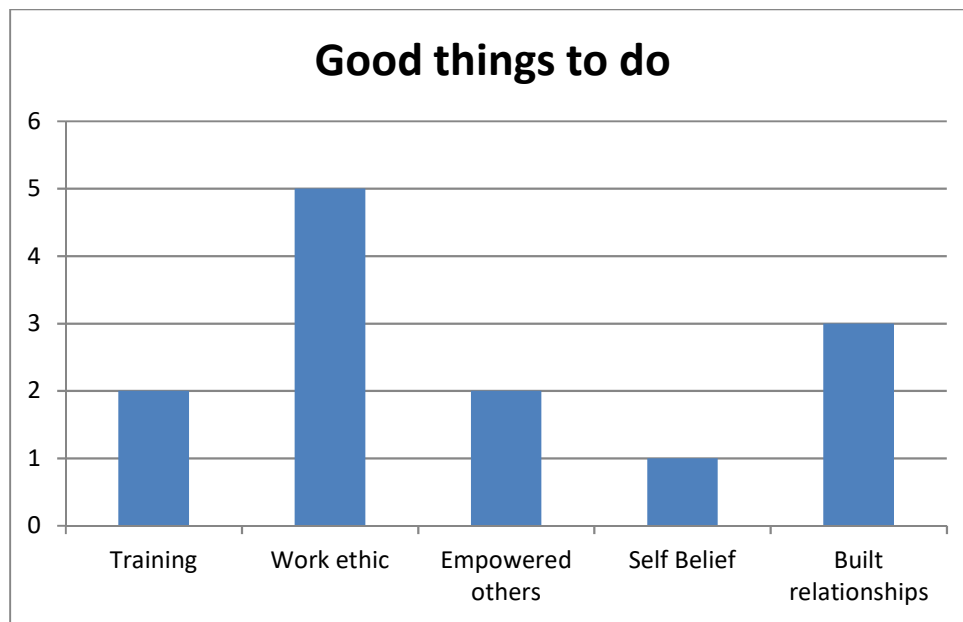
In the transition to management the more positives you take from it or the better the perception is the easier it will seem. It was decided to monitor the factors that were identified as pivotal in the success of successful managers through asking what the best thing was that they did through the transition.

Respondent 2 and respondent 8 saw their training and preparations towards settling in management as their biggest single contributor to their success. As respondent 2 stated *"I also did managerial courses so I prepared well for the transition"* and respondent 8 said *"I qualified myself to a point where I was the highest qualified person and was the logical choice and understood most of the dealings."*

The biggest single common answer was seen to be a maintained work ethic throughout the transition with 41.67% of respondents noting this factor. *"I kept my drive and ambition through all the disappointments and was always looking for more"* (Respondent 11, 2018). It was also said that consistency in other regards also served them well. Two examples are respondent 6 that stated that he maintained work ethic and stayed the same person in terms of how he treated others. *"I stayed the same person with the same work ethic"* (Respondent 6, 2018). Respondent 12 stated: *"I maintained my focus on the end product and where I was going and that leads you."*

Respondents 5 and 11 both said their contribution to the empowerment of others as their best thing they did through their transition. *"I committed myself to others and stepped up into their needs and defended them in times of trouble"* (Respondent 5, 2018). Three others correlated strongly with this perspective in that they saw their building of relationships as their biggest achievement. *"I built good relationships and treated everyone with respect."* (Respondent 10, 2018).

Lastly, one respondent saw his self-belief to perform his duties as his greatest success. *"Accepting the responsibility and performing the tasks set before me. I trusted myself and believed in my capability"* (Respondent 7, 2018). This also correlates with maintained work ethic.



**Figure 19: Personal positively influencing factors from successful transitions.**

### **What are organisations looking for in managers?**

In the assessment of personal perceptions it was also important to note that the managers of organisations influence the decision when appointing a new manager and their insights in this regard could be valuable. It could also be seen as to what they find important correlates to what it is they expect of new managers.

The first item raised by the respondents was seen to be technically sound in the field of appointment. Respondents 1, 3, 5, 7 and 8 stated that being sound in the technical applications required is very important. *“Technical background must be sound or willing to step up and learn and ask questions and tell me when he doesn't know what to do.”* (Respondent 5, 2018).

Respondent 1 stated that the handling of administrative tasks is also important and included that project management accompanies this. *“Technical sound, administratively good and a good supervisor and project manager is important”*. (Respondent 1, 2018).

One of the most mentioned factors was fitting in to the organisational culture. Respondents 2, 4, 6, 7, 8, 11 and 12 stated that fitting in to their organisational culture is

important. *“He must fit into the company culture and work well with people both employees and customers.”* (Respondent 6, 2018).

Being a team player and working well in groups correlates to previous points but was mentioned separately by respondents 3, 4, 6 and 11. *“A team player that fits into the culture and is willing to learn instead of trying to change everything”* (Respondent 5, 2018).

The willingness and capability to learn factor was mentioned by 6 respondents. This was seen in both a technical and a managerial perspective. *“Fit into the culture, knowledgeable in what he does and be willing to learn and ask if he doesn’t know he should ask.”* (Respondent 8, 2018).

The diplomatic factor was a combination of constructs that attribute to a single factor. The constructs were seen to be respectful, care for others, be able to trust with clients, humble, have good emotional intelligence and inspire others. These factors were stated by respondents 3, 6, 7, 9, 10 and 11. *“A candidate must be self-confident, diplomatic, put others first and must be ambitious.”* (Respondent 9, 2018).

Ambition was also mentioned in the forms of self-confident, self-driven, results driven, proactive, think for themselves, ask questions and be excited. Respondents 2, 3, 5, 7, 8 and 9 stated these contributing constructs. Respondents 1 and 6 stated that being a good supervisor is also a factor and lastly respondent 2 stated that loyalty as a result of their environment also is a consideration in a managerial appointment as the organisation is investing in them. *“They must think for themselves, fit into the culture of the organisation, excited by their environment and thus stay longer.”* (Respondent 2, 2018).



**Figure 20: The core competencies and skills managers look for in appointing new managers.**

The completion of the questionnaire leads to alternative analysis and interpretation methodologies. In the next section a word-frequency was performed

### **Frequency analysis**

In the assessment of data collected from the respondents the transcribed data is assessed further through word frequency. The repetitive presence of a word could also be indicative of an underlying theme or enforce the themes identified through coding. A word cloud is used to show the frequency of the words used. The single word used most often is not as indicative as the respondents were asked to reflect personal experiences. Filtering the words to indicative terms the most used words were I, you, people, others, technical and management.



### **3.5 CHAPTER SUMMARY**

This chapter focussed around the collection of data through the qualitative approach and describing the method used. The semi-structured interview process was described and the justification for the use of this method was achieved through the nature of this study that was exploratory in nature.

The research methodology was described in this chapter together with the sample selection and interview tool justification. The data collected was analysed objectively by making use of themes and by making sure that the opinions of the interviewees are correctly represented. To further ensure this some of the respondents were quoted directly in this chapter reducing the risk of biased interpretations.

In the interpretation the demographic indicators were discussed to show the population distribution according to different variables. It was determined that the population adequately reflects the chosen segment and comply with the requirements as determined. The next section sought to identify influencing factors of the career transition to management and identify the outcomes that would be beneficial. The different finding and interpretations will be discussed in the following chapter.

## **4 CHAPTER 4**

### **4.1 INTRODUCTION**

This main aim of this study was to identify the key contributing factors affecting the transition from engineer to manager. This chapter will see the study come to a close through the discussion of the results from the empirical investigation and literature comparison. In conclusion to this we will be able to make recommendations regarding the factors that influenced this transition as well as recommendations for further study in this regard.

### **4.2 DISCUSSION OF FINDINGS**

The analysis of the data collected in this chapter will be based on the data stated in chapter 3. The demographic information will be discussed in correlation where the influence could be seen to affect the answers and then the general answers and underlying theme of each question.

#### **4.2.1 Demographic overview**

The first section of the interview guide consisted of general demographic identifiers such as age, gender, job title, qualification level and sector of practice. The following findings were made regarding the population.

- The first identifier divided the population in groups of ten year intervals. The majority (58.33%) were divided in to the 30 to 39 years of age group. The second largest group is aged 40 to 49 with 25% and then 50 to 59 and above 75 years each making up 8.33%.
- The gender demographic was divided to male and female of which this population was made up of 83.33% male and 16.67% female. Although the genders are not evenly distributed, this was deemed acceptable for this study. No assumptions were made around this weighting as the population was chosen by convenience sampling.
- The highest level of qualification varied between bachelor degree (58.33%), Master's Degrees (25%) and National Higher Diploma (8.33%) and Honours

degree (8.33%). They all have engineering background and currently serve in a managerial role.

- The current positions of the respondents were wide spread. The titles in the respective roles were Production manager (8.33%), Mechanical engineer (8.33%), Operations manager (8.33%), Chief executive officer (8.33%), Engineering manager (8.33%), Business development manager (8.33%) and Director making up the largest portion (41.67%).
- The sector distribution was well distributed over Process Engineering (8.33%), Civil Engineering (8.33%), Mechanical (16.67%), Nuclear (8.33%), Consulting (8.33%), Manufacturing (16.67%), Mining (16.67%) and Railway Engineering (8.33%). The sectors cover a wide variety and are concluded to give a good profession coverage.

Of the 15 respondents contacted 12 were willing to participate. As the population cover a wide range it is concluded that the sector was satisfactorily covered in the population. Saturation was assumed and thus the responses show that the opinions raised reach across the different demographic identifiers. The demographic information does not contribute to the opinions of this study.

#### **4.2.2 Critical transition factor identification**

The second section focussed on the review of the respondents' experiences, perceptions and initial thoughts on their transitions to management. The section consisted of 9 open-ended questions. All of the respondents were chosen for their engineering background and having moved to a managerial position. This section of the interview guide focussed on identifying the factors that influenced their transition to management and their perceptions towards these factors.

##### **4.3.2.1 Difficulty themes in the transition**

The majority perception of the engineers that transitioned to management was that their newly found authority over people caused them uncertainty and discomfort. The first two questions combine to identify overlapping themes of difficulty perceived by the

respondents. They all mentioned factors that correlated to the management of people in either of the two questions.

The difficulty in management of people plays a major role in the establishment of a new manager. The perceptions of others towards the individual going through the transition, skills to manage these perceptions and the skills to efficiently take over the new responsibilities as a manager is perceived to have been a definite factor in their transition.

Other themes that were noted are of feeling of lacking the management training to be able to perform the tasks required prior to their transition and letting go of their previous role. The training shortage was aimed at making financial interpretations from statements on a managerial level and just the general perception of not knowing when financial indicators were manipulated to suit the needs of those presenting them.

Letting go of their previous roles showed fear of uncertainty intrinsic to humans (Mobbs, 2015) of what is known and trusting others to perform the tasks to the same quality level. The situations described by the respondents was described as depending on others and giving up the certainty of the technical calculations and control.

These factors indicate that people and preparedness for the new role are the main themes causing difficulty in the transition. These themes encompass the human component of managing. It is summarised as: “The management of people without the training on how to manage people. We have to rely on leadership and is mostly a self-taught leadership. Coming from a technical background we are not taught this.” (Respondent 2, 2018).

#### **4.3.2.2 Success factors in the transition**

The theme that showed most prominent in this question was one of overall comfort towards the responsibility and authority. This could be seen as a taught skill as they were responsible for engineering applications and needed to convey their ideas with justification from a technical view. Transferring this to managerial applications they are comfortable with the responsibility that comes with it. It was worded as confidence in their abilities and in themselves as worded by 75% of the respondents.

Other themes that were mentioned were mostly in support of this main theme. Each of the other themes mentioned could be seen as reasons why they had confidence. The

themes identified were knowledge, experience, project management and logical. “The skills were there so doing the work wasn't difficult. You had the knowledge and planning capability and thus you saw the results.” (Respondent 5, 2018).

#### **4.3.2.3 *Drivers towards successful transition***

The drive to complete the transition successfully is focussed on in this question. The aim was to identify what aspect within the transition gave the respondents the will to be successful in this career transition.

The theme identified by the most respondents was that they experienced the transition to a managerial role as a form of recognition. The respondents had fond remembrances due to the fact that they identified the transition as a statement of the belief in them and their capabilities. Due to their perception of receiving recognition their will to continue delivering and reach the goals set for them. “I saw it as a form of recognition and I enjoyed that thoroughly.” (Respondent 4, 2018).

The next theme was the empowerment given to the respondents. The trust given to the respondents to manage their own time. This theme correlated to the first theme in that the authority given can also be seen as recognition that they are capable of managing their own time and are trustworthy in managing others without supervision. “The fact that I had my own time and was allowed to manage my own time and don't need to report to anyone.” (Respondent 8, 2018). The driver for respondent 2 was the responsibility that was assigned. Two respondents stated that the authority as perceived by others in their new position drove them to maintain the perception and to not disappoint. These themes could also be seen as related to the recognition and empowerment themes and thus showing a strong driver as the perception of recognition and conforming to the expectations set by themselves and others.

The last two themes identified were Money and Making a difference. These factors were stated by 2 respondents each. These themes were stated in conjunction with other themes but are still seen as drivers. “Money. The main attraction to management is the money. The responsibility grows and you feel you make a difference but money makes life easier.” was said by respondent 2.

#### **4.3.2.4 *Negative influences during transition***

The negative experiences during the transition periods are indicative of overall uncertainty. The perceived negativities identified by respondents were in correlation with difficulties to indicate themes of influencing factors towards the success of the transition. In alternate wording of the questions it is sought to stimulate a different line of thought and trigger memories.

The theme of managing the relationships in the new role was mentioned by six of respondents. The authority and responsibility of the new role were seen to cause difficulties and definitely played a role in the transition. The respondents perceived a definite division in the relationships between themselves and the other staff. There was also a perception that they were treated differently and perceived differently and this needed to be managed. The responsibility to manage the lies, effectiveness and feelings of their subordinates and others that they work with, forms part of a managerial role and as the responsibility shifted to the manager a theme of uncertainty in dealing with this also became apparent.

A theme of uncertainty regarding what is expected in the new role and how to manage the new responsibilities was identified. This theme aligned with a theme of letting go of the previous roles duties. If there are uncertainties individuals tend to hold on to something we known to build confidence and to steady ourselves. It needs to be noted that in this theme no reference was made to trusting others to perform the old duties, merely that it was perceived as difficult to delegate these activities.

Two unique responses were also stated. Respondent 9 stated he never allowed himself to perceive anything as a negative while respondent 7 said that his negative experience was the delay in his financial benefit in the time. This could be seen as a removal of a driver for success that is also worth noting.

#### **4.3.2.5 *Retrospective view***

In the process of retrospective inspection, it is required to look at the past and learn from it. As George Santayana said: "Those who fail to learn from history are condemned to repeat it." The theme "developing in to your role" was identified. The respondents saw

the preparation for a role and the training required to perform the role with more certainty as things they would have done differently in hindsight. The two themes of “Take your time” and “Get help” identified separately, also aligns with this theme in that the respondents believed you should allow yourself the time to be ready for the new role through getting the needed assistance from mentors or external sources.

The theme identified through most of the correspondence is “Don’t be scared.” This theme verifies that the respondents experienced fear during this transition. Secondly, the interpretation of the responses showed that they were scared to ask questions or get training etc. The uncertainty of the effects of choices seemed to be the main driver and considering this in transition environments could be constructive.

A theme of leaving the money out of consideration when deciding to make the transition to management and trusting others with care was also noted.

#### **4.3.2.6 *Mistakes throughout transition***

Delving deeper in to the perceptions of the respondents to identify difficulties and to propose advice to future generations the first theme noted was one of failure to create relationships with everyone. This is significant as management is dependent on others to do their work. The most noted theme was one of trust. Four respondents stated that their blind belief in those that they oversaw to have completed or will complete work tasks saw their responsibility quickly come into perspective.

Two co-dependent themes were identified in trying to change everything and did not consult others. These themes were noted in statements of showing confidence by changing things and trying to do things without help. These were seen as eagerness to perform and coming across competent in the new role. These themes could also be interpreted as relating to the last theme identified which consisted of not getting the necessary training or transitioning to a new role before being ready. These themes can all be seen to have an underlying tone of uncertainty with regards to what is expected in the new role. The understanding of what a managerial role entails and how to be ready for the transition can be seen throughout the mistakes made. As learned in the literature review, the transition to a managerial position can be seen as a change in career path.

#### **4.3.2.7    *Key breakthroughs in the transitions***

The pivotal moments in the transitions of the respondents were identified to identify the breakthroughs made. Identifying what was done right is as important as not repeating mistakes.

The respondents that obtained training, saw this as their biggest contributing factor to success. Those who did not receive training, saw their continued work ethic as the foundation of the successful transition. This theme was the most noted followed by the building of relationships to support them throughout this time. This is supported by a theme of empowering others stated by other respondents. These two themes show the importance in management in terms of dependency on others and the role management plays in the development of others. While one respondent raised the theme of self-belief, the complete statement also mentioned a continuous reaching of targets as in the work ethic theme powered by the capability received through preparation.

#### **4.3.2.8    *What managers look for in managers***

The identification of qualities that managers look for when they appoint new managers, contributes on various levels. The first being to identify outcomes in personal development through knowing what would be expected once a managerial role is obtained. The second can be seen to show engineers what can be expected in a managerial role and the last being a guide towards being perceived as a successful manager.

It needs to be noted at this stage that during the interviews, although the respondents were hesitant or needed to think about other answers, most of them knew exactly what they expected of candidates for a managerial role.

The most noted themes were seen to be fit in to the organisational culture and be diplomatic. The word diplomatic was used to describe traits such as humble, care for others, good with clients, good emotional intelligence and inspire others. The second highest noted themes were being technically sound and a willingness to learn. Being technically sound and having a willingness to learn coming from an engineering background, is very important but it is needs to be noted that this theme was noted less

than culture and diplomatic. The theme of good supervisor also speaks to these traits but was stated separately to ensure attention to the fact.

The next most noted theme is being a team player. The ability to work as part of a team forms a large part of managerial responsibilities as you are entrenched in creating as well as maintaining flow and culture. The theme of ambition was noted as a capturing of traits such as self-driven, result driven, think for themselves, take initiative, excited by environment and self-confident. This theme is interpreted as to encompasses the ability to work unmonitored and to keep driving forward to advantage of the organisation.

The themes of Project Management capabilities, administratively strong and loyal, were also noted. These were less prominent but should still receive the needed attention.

#### **4.2.3 Summary findings**

In summary a shortlist of the various factors identified was constructed. The different topics consist of Factors contributing to difficulty, Strength factors, Drivers, Mistakes to avoid, Things to do and Organisational wants. These are tabled below.

The first table shows the summary of the identified difficulty factors as identified through the interviews with the respondents with a brief description. The purpose behind the identification of the factors causing difficulty, is to prepare for them as an individual or as an organisation mitigating the effects.

**Table 6: Factors contributing to difficulty of transition.**

<b>Factors causing difficulty in the transition</b>		
1	Fear	General fear of doing wrong and the effects thereof
2	Leadership	Understanding the role of leadership, how to lead and leadership theories
3	Uncertainty	Uncertainty in what deliverables are of the new role, what is allowed and what not and no experience in certain aspects
4	Background	Changing from a technical background to a managerial frame of mind
5	Managing the human factor	Dealing with the lies, feelings and motivation of subordinates. Also the dealing with personalities, different generations and different cultures.
6	Unpreparedness	The allowing for time and training to adequately develop in to role and communicating what the new role entails
7	Management of relationships	The management of how relationships changes, how the perception changes and how to build constructively on these relationships
8	Being the boss	Telling others what to do and finding the balance between telling them how to do it and allowing empowerment. When to enforce and when to let go.
9	Delegation	Letting go of a previous role going for the unknown, trusting others to perform their work to a good quality
10	Managerial aspects	The management of people, the evaluation, supervision, time management,

The strengths identified by the engineers that successfully made the transition are listed in with a short description. In identifying the strengths, they can to leverage them to against the difficulties to reduce the effect and optimise the transition through working to the strengths.

**Table 7: Factors improving the transition to management.**

<u>Strength Factors</u>		
1	Confidence in abilities	Maintained confidence in abilities to learn and adapt
2	Experiences	Experience in project management and applications
3	Responsibility	Accepted responsibility easily and thrived on it
4	Logical	Being able to logically analyse problems towards solutions
5	Strong work ethic	Work hard towards goals and targets

To successfully complete the transition, the drivers as experienced by the respondents were identified. Enduring the hardships is made easier by experiencing positives. To increase future transitions, it is valuable to note which drivers influenced the candidates and to incorporate these drivers as a method of enhancing success from an organisational perspective.

**Table 8: Drivers of successful transitions.**

<u>Drivers for successful transition</u>		
1	Responsibility	The added responsibility and the want to maintain authority
2	New experiences	The new experiences such as travel and being part of something new
3	Money	The extra money is a driver to ensure a successful transition
4	Authority	The authority of the new role drives to not disappoint
5	Making a difference	To make difference in others as well as the organisation
6	Empowerment	Empowering those you can and being empowered to make your own decisions
7	Recognition	The transition is a form of recognition that drives to get more

Learning from past experiences is critical and sharing experiences helps us move forward and increase future efficiency. Through the recollection of their own experiences the

respondents offered advice that they would have given themselves if they knew what they knew now. These pieces of advice sorted by theme and summarised below.

**Table 9: Retrospective advice.**

<u>Advice for transition</u>	
1	Forget about the money There will be money to be made later, don't let money be your main influence
2	Trust others carefully Trust is earned. Trust those who show you that they can be trusted
3	Take your time Don't rush yourself and don't be rushed in to taking the next step
4	Get help Talk to people in the organisation and externally to assist with difficulties
5	Develop yourself Get training, grow in experience and develop into the new role
6	Don't be scared We are all scared in the transition, but you were chosen for a reason. Believe in yourself.

Similar to the case of advice, a mistake shared with others is less likely to be repeated. Mistakes made by the respondents in their own transition period were categorised and overlapping instances removed to offer a summary of mistakes to avoid during a transition to management.

**Table 10: Mistakes that should be guarded against in a transition to management.**

<u>Mistakes to avoid</u>	
1	Build relationships Management is very dependent on people. Build strong relationships with everyone
2	Consult others It is not a sin to ask. Ask questions and consult others before making decisions
3	Don't Change everything Don't try to change everything too fast. Some things worked for a reason.
4	Preparation in key Prepare yourself for your new role. Train, experience and grow
5	Trusting others Don't trust people to keep their word or perform their work until they have proven themselves.

Being able to identify what to do sets the base for a successful transition. The respondents identified what they perceived, was the single biggest thing that contributed

to their successful transition to management. In applying these principles, it is hoped to increase the success of transition as well as increase the overall perception.

**Table 11: Critical success factors summary.**

<u>Things to do</u>		
1	Self-Belief	Beieve in yourself. You were chosen for a reason.
2	Training	Get as much training and experience as possible
3	Empower others	Empower those you can to achieve all they can
4	Built relationships	Build strng relationships
5	Work ethic	Keep working hard.

In theory we can see various aspects of what people look for when a new manager is appointed. The respondents were asked to lift their views of what traits they look for in a managerial candidate. These factors could be seen as possible interview helpers or even career development guidelines if some individual wishes to pursue a career in management. The stated list could however be specific to engineering sectors but comparison can be drawn to different fields of study.

**Table 12: What managers want from managers they appoint.**

<b><u>What companies want in a manager</u></b>		
1	Admin	Be administratively strong, up to date and neat.
2	Project management	Have the ability to manage a project and the deadlines involved.
3	Loyal	Be loyal to the organisation. Be truthfull and speak your mind.
4	Good supervisor	Be able to supervise those you have to in a possitive and consistent manner.
5	Ambitious	Be self-driven and innovative in your actions. Think for yourself and apply yourself.
6	Team player	Be able to work as part of a team towards the good of the team.
7	Technically sound	Be technically sound in what it is you need to do.
8	Learn	If you aren't sound in something, ake a point of learning it.
9	Culture	Fit in to the organisational culture and promote a positive culture
10	Diplomatic	Be humble, care for others, good with clients, good emotional intelligence and inspire others.

### **4.3 EVALUATION OF THE ACHIEVEMENT OF STUDY OBJECTIVES**

This study was validated firstly through piloting the interview guide against two engineers in managerial positions. Their feedback was considered in the finalised structure. Due to the open ended nature of the questions the interviews were determined to be between 15 – 30 minutes depending on each individual. The data was collected through using the guide in a semi-structured interview. The interview was recorded to cause as little as possible disruption but hand-notes were made of items that were noticed. These interviews were transcribed afterwards and analysed using MaxQDA built in coding functions. Due to the anonymity promised in this study the respondent data is not attached but available upon request. Lastly, the document was language and technically edited by a qualified editor. The letter of proof can be seen in Annexure C.

### **4.4 ACHIEVEMENT OF STUDY OBJECTIVES**

The assessment of the study success is based on the achievement of the goals set out in Chapter 1. The discussion on these topics are set out in this section.

#### **4.4.1 Primary objective**

The primary objective of this study was to identify the factors that affected engineers that have successfully made this career transition to managerial level so that critical factors of successful transitions can be identified. Chapter 2 was based on the understanding of applicable theoretical background and focussed on the perception of the respondents of the study. At the completion of this study the main objective was achieved fully through the completion of the secondary objectives.

#### **4.4.2 Secondary objectives**

To achieve the main objective, the following secondary objectives needs to be satisfied. Each of the secondary objectives will briefly be discussed and assessed in this section.

- Conduct an in-depth literature review to enable us to make insights to help profile success cases and data interpretation.

In Chapter 2 it was seen that the theoretical basis was set through research of contributing theories and applications. This included defining various terms and principles used within the study.

- The defining of an accurate measurement tool for data collection in the form of a semi-structured interview.

A measurement tool was constructed based on research and piloted against a smaller sample to ensure accuracy. The measurement tool was defined as an interview guide consisting of nine open-ended questions that aimed to allow discussion around topics of interest.

- A structured assessment of individual transition factors to identify is most important for their success.

The assessment was structured throughout the analysis. Firstly, saturation was reached on the basis of having five interviews as benchmark and then assuming saturation upon completion of five interviews with no new data brought forward. The data of the qualitative empirical research is captured in Chapter 4. Analysis was performed with no bias from the researcher and data was represented accurately.

- Final proposal and review of critical factors influencing the transition from engineer to manager.

This document serves as the final proposal and as seen in Chapter 4, a review of identified factors influencing the transition from engineer to management have been stated and reviewed.

Through the completion of the secondary objectives as stated, this study has been assessed as successfully reaching the preset goals.

#### **4.5 RECOMMENDATIONS FOR FURTHER RESEARCH**

The main objective of the study was the identification of the factors influencing the transition from engineer to manager. The study was performed by interviewing 11 engineers that successfully made the transition to manager. Ideally this study would be completed with a larger population to ensure that all factors are identified. Correspondingly all findings in this study should be considered with caution considering the population size.

Throughout the study the following were identified to merit future study:

- Different factors influencing men and woman in the South African context.
- Proposing a transition friendly management plan for engineers transitioning to management.
- Creating a culture for managerial transitions.
- The effect of leadership studies on engineers in management.
- Training successful engineers in management have undertaken.

There are limitless options and variations to consider and hopefully this study will contribute positively to this field of study and if it can positively affect one life it would have achieved more than was thought in the beginning of this endeavour.

## 4.6 CONCLUSION

At the time of study engineers were seen to progress to managerial positions regularly with twenty-four of the top one hundred CEO's in the world having an engineering degree and 33% of the S&P 500 CEO's having engineering degrees. Coming from such a technical background the change to management can be seen as a different career and the transition to this new role plays a critical role in the success of such a candidate. This study looked at the transition from engineer to manager and in specific the perceived factors that influenced the individuals going through this transition. From the research performed the following conclusion could be made:

- The engineers in this transition experienced the most difficult factor affecting them as the management of people related aspects. These aspects included the management of others' time, supervising them, evaluating their performance and managing their time. It was also noted that managing the different personalities, cultures and generations played a role in conjunction with managing the newly formed relationships. The general theme of fear was also present due to unpreparedness, uncertainty and failure.
- The managers that came from engineering backgrounds identified the easiest part of the transition as their possession of a strong work ethic, applying logical thinking, accepting the new responsibility and their confidence in their capabilities due to their experience in managing themselves and projects.
- The drivers of their success were seen to be the perception of receiving recognition. They also felt empowered through their authority and ability to make a difference. The new experiences, money and added responsibility were also identified as factors that drove them to be successful.
- In retrospect it was identified that an ethic to hard work, the building of relationships, empowering others, training and self-belief were seen as the biggest contributors to their mutual success in the transition to management.
- The biggest mistakes that were made throughout their transitions, were trusting others on matters of belief and work quality.

- In the assessment of what a viable managerial candidate should encompass being diplomatic and a fit for the organisational culture was identified as most prominent. Being technically sound and possessing a willingness to learn were also mentioned very highly. A manager should be seen as a team player, ambitious and a good supervisor. These could assist in career development planning and interview tips.

The findings of this study are focussed in different engineering sectors but the factors identified could overcome educational backgrounds. The stigma around engineering personalities could however be plausible in that their perceptions of difficulties include people related aspects but this is merely an observation.

The findings of this study are significant for organisations and individuals as they form an insight into what is experienced by individuals going through the transition from engineer to manager. The findings of this study enable companies to prepare a more transition friendly environment and assist in areas that are not catered for. An individual can use the findings to learn from prior experience and prepare adequately for their transition into a managerial position.

The findings of this study warrant further study especially in terms of further demographic categories such as country boundaries and male and female perspective. The factors however seem to be similar over all sectors, companies and age groups showing that little is done to improve the influencing factors for the engineer to manager transition.

## **4.7 SUMMARY**

Chapter 4 reflected the findings as well as conclusions of the empirical research performed (Chapter 3). The findings and conclusions were analysed using the information gathered from the literature review and the two sections of the interview guide. An assessment of the overall study was performed using primary and secondary objectives. The four secondary objectives were influential in reaching the primary objective of the study and in showed the successful outcome of this study. Finally, suggestions for further research were provided.

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## 6 ANNEXURE A

### INFORMED CONSENT STATEMENT

**MBA STUDY: ENGINEERING A MANAGER: ASSESSING THE FACTORS AFFECTING THE CAREER  
TRANSITION FROM ENGINEER TO MANAGER**

**SOUTH AFRICA**

**FIELD OF STUDY: MANAGERIAL SCIENCES**

**NORTH-WEST UNIVERSITY**

**RESEARCHER: MR. MC MAREE**

**TEL: 082 3838 362**

**[MAREE.CASSIE@GMAIL.COM](mailto:MAREE.CASSIE@GMAIL.COM)**

Dear respondent,

This form serves to confirm the following regarding the study as stated above.

1. The main purpose of this study is to identify the various contributing factors in the transition from engineer to manager and the weighting of each of these factors.
2. This study follows a mixed based approach as guided and open ended questions will be incorporated in to interviews. Basic information about the respondents won't be required, but basic timeframes etc. may be required. A short background of the study will be given and all interviews will be recorded for correct typing later. If a respondent feels that the tape recorder be switched off at any stage, the interviewer will do so.
3. The interviews will vary in length, but an estimated time of 45mins is to be set out.
4. Respondents may at any time stop their participation in the study or ask for a break if any discomfort or uncertainty is felt.
5. The participation is completely voluntary and with no coercion.
6. Complete anonymity, privacy and confidentiality are ensured by the interviewer. If any information is wished to be kept private and not published, the researcher will adhere to this.
7. Questions could be made available beforehand for insight to be gained on the questions that will be asked.
8. If the respondent so wishes, a final copy of the dissertation will be made available.

I, \_\_\_\_\_ (Name & Surname) on this date \_\_\_\_\_ hereby agree that I have read and understand the above information and give my consent for my information to be used in this study.

## 7 ANNEXURE B

### Section A -

#### Demographic

- 1 Demographic Questions
- 1.1 Age?
- 1.2 Male/Female?
- 1.3 Highest Level of Education?
- 1.4 Job Title?
- 1.5 Sector?

### Section B -

#### Open Ended

- 1 What about management did you perceive to be a difficulty in your transition to management?  
Planning tasks, Organizing and implementation, Developing others, Monitoring and evaluation and other
- 2 What about leadership did you perceive to be a difficulty in your transition to management?  
Honesty, Motivation, Communication, Confidence and consistency
- 3 Where there personal traits that influenced your transition?  
Unpreparedness, Uncertainty, Fear, Managing others, letting go of previous role
- 4 What was the most difficult thing influencing your transition?
- 5 Where there any other factors you could think of?
- 6 What was not difficult about the transition?
- 7 What did you like about the transition?
- 8 What didn't you like about the transition?
- 9 What advice would you of today, give to yourself then?
- 10 What do you feel was your biggest mistake in your transition?
- 11 What was the best thing you did in the transition phase?
- 12 What do you look for in a manager?

8 ANNEXURE C

***STEPHANUS POSTMA***

TRANSLATOR / EDITER  
BA UED  
REGISTERED AT SATI  
(NR 1001334)

Tel 018 4687680  
Cell 083 4096252  
[faniepostma@gmail.com](mailto:faniepostma@gmail.com)

16 November 2018

24 VILLA HEIDE  
FLIMIEDA  
KLERKSDORP  
2570

P O BOX 6716  
FLAMWOOD  
2572

**I confirm that I did a language edit of MC Maree's  
mini dissertation**

**Engineering a manager: Assessing the factors  
affecting the career transition from engineer to  
manager**

I am registered at SATI (South African  
Translation Institute) Nr 1001334.



S Postma

South African Translators' Institute  
SATI — Bridging Language Barriers



## CERTIFICATE of MEMBERSHIP

This certifies that

**Fanie Postma**

is an individual member in good standing and adheres to the following code of ethics:

- To endeavour constantly to achieve the highest possible quality in respect of accuracy of rendering, terminological correctness, language and style
- To accept full responsibility for their translations and to bring unresolved problems to the attention of their clients/employers
- To accept no work that is beyond them (with regard to deadline and knowledge of source language, target language and subject), except with the knowledge of their clients/employers, and to keep to agreed deadlines and forms of delivery
- Constantly to pursue self-improvement in order to improve the quality of their work
- To share their professional knowledge with other members, but to maintain a relationship of trust with their clients/employers and to treat all information that comes to their attention in the course of their work as confidential
- Not to accept any work that, in their opinion, is intended for unlawful or dishonest purposes or is contrary to the public interest
- To be guided in negotiating remuneration by the principle of equitability, and in particular to refrain from charging excessive rates
- To respect all rights of the author and the client/employer, and specifically copyright
- Always to uphold the highest ethical and moral standards in their dealings with their clients/employers and in the practice of their occupation as translator
- To take part in the activities of the Institute and always to conduct themselves in such a way that their conduct and the quality of their work will be to the credit of the Institute and translation as an occupation

Membership number: 1001334

Membership validity period: 01 January to 31 December 2018

Accreditation status: Not accredited

Further comments: N/A

Theresa Bender  
SATI Registrar

☎ 082 874 8654

☎ 086 511 4971

✉ office@translators.org.za

@ www.translators.org.za

📍 PO Box 31360, Bloemfontein, 9317