

https://dspace.org/

Factors influencing the development of management skills in South African civil engineers

Reddy, Premanathan

2011-06-08
http://hdl.handle.net/10539/10043

Downloaded from a DSpace repository. https://dspace.org/

Factors influencing the development of management skills in South African civil engineers

Premanathan Reddy

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg, 2010

ABSTRACT

The objective of this research was to identify the factors, both the barriers and facilitators, influencing the development of management skills in South African civil engineers.

There were 2 research propositions set up from the literature review. The research method adopted was quantitative factor analysis to test the two propositions. Data was collected through a survey conducted at a case site Grinaker-LTA. A 7-point Likert scale was used as the measuring instrument.

The research findings concluded that the factors which are barriers in the development of management skills in civil engineers included the lack of training, the lack of management skills in engineers and job dissatisfaction. The facilitating factors included the use of coaching, management related training, the use of employee feedback systems and the self development of the engineer. The second research proposition produced two new factors which were the learning organisation and the effects of cultural diversity on the management development process of engineers.

The key recommendations include that human resource managers in construction firms should use the factors from the research in order to improve the processes within the organisation in order to assist in the development of engineers into managers.

DECLARATION

I, Premanathan Reddy, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Premanathan Reddy

Signed at ……

On the …….. day of …… 2010

DEDICATION

This report is dedicated to my late niece Saloshnie Nadas. Thank you for your love and precious memories.

ACKNOWLEDGEMENTS

I would like to express my thanks to the following people:

Professor Terri Carmichael: Thank you for your patience and ongoing encouragement during this research.

Mr Matondo Lusembo : Thank you for the assistance with the factor analysis.

Doctor Anthony Stacey: Thank you for conducting the factor analysis.

Miss Vivienne Rowland: Thank you for proof reading the document.

Merusha Govender: Thank you for your understanding throughout this journey of the MBA.

Neron Nadas: Thank you for your support during the MBA.

TABLE OF CONTENTS

DECLARATION III

DEDICATION IV

ACKNOWLEDGEMENTS V

LIST OF TABLES IX

LIST OF FIGURES IX

CHAPTER 1: INTRODUCTION 1

1.1 PURPOSE OF THE STUDY 1
1.2 CONTEXT OF THE STUDY 1
1.3 PROBLEM STATEMENT 2
1.3.1 MAIN PROBLEM 2
1.4 SIGNIFICANCE OF THE STUDY 3
1.5 DELIMITATIONS OF THE STUDY 4
1.6 ASSUMPTIONS 4

CHAPTER 2: LITERATURE REVIEW 5

2.1. INTRODUCTION 5
2.2. MANAGEMENT DEVELOPMENT 6
2.3. WHAT IS MANAGEMENT 7
2.4. GENERAL MANAGEMENT SKILLS AND COMPETENCIES 8
2.4.1 SOFT SKILLS 9
2.4.2 COMPETENCIES 10
2.5. MANAGEMENT SKILLS REQUIRED IN CONSTRUCTION 10
2.5.1 BUSINESS MANAGEMENT SKILLS 10
2.5.2 PROJECT MANAGEMENT SKILLS 11
2.6. JOB DISSATISFACTION 12
2.7. TRAINING 14
2.7.1 CHOICE OF TRAINING METHODS 15
2.8. FEEDBACK SYSTEMS 16
2.9. MANAGEMENT EDUCATION 17
2.10. COACHING 18
2.10.1 CRITICISMS OF COACHING 20
2.11 SELF–DEVELOPMENT 21
2.12 CONCLUSION OF LITERATURE REVIEW 23
2.12.1 PROPOSITION 1 24

2.12.2 PROPOSITION 2 24

CHAPTER 3: RESEARCH METHODOLOGY 26

3.1 RESEARCH METHODOLOGY 26
3.2 RESEARCH DESIGN 26
3.3 POPULATION AND SAMPLE 27
3.3.1 POPULATION 27
3.3.2 SAMPLE AND SAMPLING METHOD 28
3.4 THE RESEARCH INSTRUMENT 29
3.5 PROCEDURE FOR DATA COLLECTION 30
3.6 DATA ANALYSIS AND INTERPRETATION 30
3.7 LIMITATIONS OF THE STUDY 31
3.8 VALIDITY AND RELIABILITY 31
3.8.1 EXTERNAL VALIDITY 32
3.8.2 INTERNAL VALIDITY 32
3.8.3 RELIABILITY 33

CHAPTER 4: PRESENTATION OF RESULTS 35

4.1 INTRODUCTION 35
4.2 DEMOGRAPHIC PROFILE OF RESPONDENTS 35
4.3 RESULTS PERTAINING TO PROPOSITION 1 35
4.4 RESULTS PERTAINING TO PROPOSITION 2 37
4.5 SUMMARY OF THE RESULTS 39

CHAPTER 5: DISCUSSION OF THE RESULTS 40

5.1 INTRODUCTION 40
5.2 DEMOGRAPHIC PROFILE OF RESPONDENTS 40
5.3 DISCUSSION PERTAINING TO PROPOSITION 1 41
5.3.1 DISCUSSION OF FACTOR ANALYSIS 41
5.3.2 OPEN –ENDED RESPONSES RELATING TO PROPOSITION 1 45
5.3.3 CONCLUSION 48
5.4 DISCUSSION PERTAINING TO PROPOSITION 2 49
5.4.1 OPEN-ENDED RESPONSES RELATING TO PROPOSITION 2 50
5.5 CONCLUSION 57

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS 58

6.1 INTRODUCTION 58
6.2 CONCLUSIONS OF THE STUDY 58
6.3 LIMITATIONS 59
6.4 RECOMMENDATIONS 60
6.5 SUGGESTIONS FOR FURTHER RESEARCH 61

REFERENCES 62

APPENDIX A 71

ACTUAL RESEARCH INSTRUMENT 72

APPENDIX B 75

APPENDIX C: FACTOR ANALYSIS REPORT 78

LIST OF TABLES

Table 1: Key References Supporting Research Propositions 24

Table 2: Profile of Population 27

Table 3: Profile of Respondents 28

Table 4: Eigen Values after Varimax Rotation 36

Table 5: Factor Loadings after Varimax Rotation 37

Table 6: Eigen Values after Varimax Rotation 37

Table 7: Factor Loadings after Varimax Rotation 38

Table 8: Racial Profile of Respondents 41

Table 9: Comparison of Literature Review and Analysis 49

Table 10: Comparison of Literature Review and Analysis 56

LIST OF FIGURES

Figure 1: Literature Review Topics..... 5

CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this study is threefold: a) to identify the factors affecting the development of management skills in civil engineers, b) to identify possible methods of overcoming these factors, c) to offer recommendations to construction firms in order to assist in the process of developing engineers into managers.

1.2 Context of the study

Construction is a project-based industry and each project is unique (Turner and Lingard 2009). A construction project is constrained by time and cost factors (Charoenngam and Maqsood 2001; Turner and Lingard 2009). The construction and engineering industry is composed of civil engineering companies and large-scaled contractors, but excludes companies involved in home building (Lawless 2005; Datamonitor 2007). The end product of the construction process is a building or a structure (Robinson, Anumba and Carrillo 2005). The industry focuses on infrastructure works such as the construction of roads, bridges, tunnels, reservoirs and buildings (Lowitt 2007). Construction projects require a number of different companies to work together in order to design and build the planned infrastructure (Alty 1993; Dave and Koskela 2009). The major drivers of growth in the industry include the Gross Domestic Product (GDP), interest rates, inflation rates, access to investment financing and public sector spending (Lowitt 2007). The construction sector have historically varied in tandem with the business cycle in South Africa (Lowitt 2007).

Construction industries in most countries are characterised by a pyramid structure which consists of a large number of small firms and a few large firms. The main construction firms in South Africa are Grinaker-Lta, Murray and Roberts, WBHO and Group Five and Concor (Datamonitor 2007; Lowitt 2007). There are many management problems in the industry and fierce competition

exists among the companies as a result of large number of players within the industry (Sheath, Woolley, Cooper, Hinks and Aouad 1996; McCord 2003). Most construction projects are granted to firms through competitive tendering, which provides buyers with a high degree of power over the construction companies (Chan and Tham 2000; Datamonitor 2007). The owners of these projects include government agencies and major private sector customers (Datamonitor 2007).

The contracting industry entails work which include painting, bricklaying, plastering, tiling and general building work (Lawless 2005; Thwala 2008). The industry employs skilled tradesmen such as carpenters, shutterhands, concrete hands and general labourers. A civil engineer working in contracting is part of a professional team which are made up of engineers, quantity surveyors, estimators, planners, Quality Assurance managers and architects (Lawless 2007). A civil engineer is responsible for a section of a construction project and manages a team of skilled artisans and reports to a site manager (Farrell and Gale 1999; Serpell and Ferrada 2007). A site manager is responsible for managing the whole project (Charoenngam and Maqsood 2001; Odusami, Oyediran and Oseni 2007). Most building firms have different titles for site manager which include site agent, project manager, site supervisor (Odusami et al. 2007). The business problem that the research investigates is the challenge of developing civil engineers into effective managers.

1.3 Problem statement

1.3.1 *Main problem*

The research problem is to identify factors, both the barriers and facilitators, influencing the development of management skills in South African civil engineers and to suggest methods in which engineers can be developed into effective managers.

1.4 Significance of the study

A common problem is that engineers struggle to think like managers (Gosling and Mintzberg 2003). Effective management development results in increased knowledge and skills for the employee and improved productivity and reduced costs for the firm (Myers 2004; Longenecker and Fink 2006). This study is of significance since by developing engineers into managers, construction projects can be managed more effectively which will result cost reduction of projects and higher profitability for construction companies. The South African construction industry faces a great challenge in attracting, recruiting and retaining the staff needed to design, manage and deliver infrastructure due to the major skills shortage and skills gap (Lawless 2005, 2007). A survey conducted by the South African Federation of Civil Engineering Contractors indicated that 65% of contractors failed in their businesses and reasons cited was lack of management skills to operate the business (Lawless 2007). The study is also significant as there is a lack of published information on the factors influencing the development of management skills in South African civil engineers.

This research report is intended to be of value to the following persons:

- Human resource managers of construction companies will be able to use the findings of the report to assist them in the planning and execution of management development programs for civil engineers.

- Academics in the civil engineering departments could use the findings of the report in order to review and enhance their curriculum in order to teach ore relevant management courses which could result in graduates being better prepared for industry.

- Practising civil engineers could use the information of the report in order to self-manage their careers more effectively.

- Managers of construction companies could use findings to manage their civil engineers more effectively.

- Construction training providers could use information from the study in order to design more job specific courses.

1.5 Delimitations of the study

- The study focuses on private sector companies and does not consider the public sector. The public sectors has additional problems in terms of developing their civil engineers into competent managers in South Africa (Lawless 2007).

- Consultants are involved with design activities while contractors are involved with the actual activity of constructing the structure (Lawless 2005; Robinson et al. 2005). This study focuses on the contracting part of the industry and excludes the consulting aspect of civil engineering. Contractors and consultants operate in sufficiently different manners and in different markets (Scott, Ponniah and Saud 1997).

- The study focuses on male civil engineers and excludes female engineers. Women are under-represented in construction (Gale and Cartwright 1995; Lawless 2005, 2007) and women have additional challenges with respect to management development than men (Human 1991; Serpell and Ferrada 2007).

1.6 Assumptions

- The sample in the research is a true representation of the population.

- Most engineers feel the need for management skills in order to be promoted in the construction industry.

- The actual factors affecting the development of management skills in South African civil engineers does not change during the course of the research. Further, these factors change over time and this study may not be applicable in another context such as a different country, industry and time setting.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The research will firstly take a broad view of the challenges affecting the development of management skills in professionals in general, which will include South Africa and abroad. The study will then be narrowed in scope to focus on civil engineers in the South African construction industry. This chapter explores the literature base associated with the research topic and the following topics are reviewed: general management skills, management skills in construction, job dissatisfaction, management training, feedback systems, coaching and self-development. The details of the subheadings within these categories may be viewed graphically in Figure 1 in the form of a mind map. A mind map gives a visual representation of the "big picture" of the literature review and it allows the flexibility when synthesising the various different concepts into a coherent whole (Hyerle 2000; Brinkmann 2003; Carmichael 2003). The mind maps used in this document were created by MindMapper 2009 software from the SimTech-Systems.

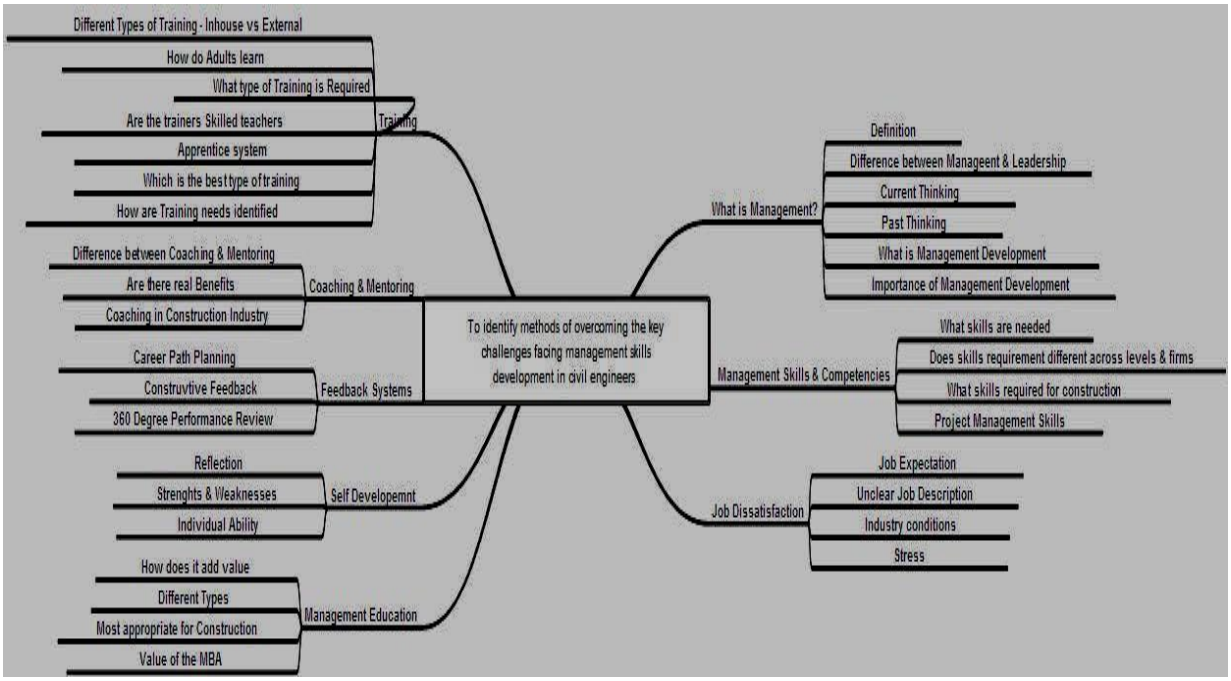


Figure 1 - Literature review topics

2.2. Management Development

The managers of an organisation are the most important resource available (McBeath 1994; Mabey and Ramirez 2004). Effective management brings a degree of stability and consistency to key dimensions of the firm (Mintzberg 1975; Kotter 2001). Ineffective management threatens the existence of firms (Drucker 1988; Kotter 2001).Management development refers to developing employee skills and abilities to supervise and manage staff (D'Netto, Bakas and Bordia 2008). Organisations striving for organisational excellence place strong emphasis on the development and support of their management staff (Newton and Wilkinson 1995; Kotter 2001).

The factors affecting the development of managers must be understood so that the appropriate training and education can be given in order to develop employees (Human 1991; Caudron 1999). The ideal management development programme should be designed so that it meets both the needs of the employee and the organisation (Bunning 1994). Management development is multi-faceted and there is no best approach and characteristics of how a particular industry affect the management development processes (Watson 2008). The only competitive advantage a firm of the future will have is its managers ability to learn faster than their competitors (Senge, Smith, Kleiner, Roberts, Ross and Roth 1999; Johnson 2005). Most Human Resources managers in Europe agree that the top three methods of developing managers are internal skills training programmes, followed by external public courses, seminars and conferences and thirdly the use of coaching and mentoring (Mabey and Ramirez 2004). Other effective methods of management development include seeking constructive performance feedback, critical self-reflection, becoming a mentor or a coach (Longenecker and Fink 2006). Systems and practices which facilitate management development include appraisals, career planning, fast-tracking and evaluation (Mabey and Ramirez 2004).

Management development needs to be identified and managed as a strategic issue within organisations (Human 1991; Chiu and Stembridge 1998; Mabey

and Ramirez 2004). Leadership is different from management, however both roles are necessary for organisational success (Zaleznik 1989; Kotter 2001). Each has its own functions and characteristic activities and the challenge for firms is to have both strong leadership and management (Mintzberg 1975; Kotter 2001). Leadership is about dealing with change and this is an important function as the business world has become more volatile and competitive (Kotter 2001; Peters 2001). On the other hand Gosling and Mintzberg (2003) state it is dangerous for an organisation to separate management and leadership. Both management and leadership are interconnected and both are important for organisational effectiveness (Gosling and Mintzberg 2003).

2.3. What is Management

To manage entails making decisions and allocating the resources (Mintzberg 1975; Gosling and Mintzberg 2003). Management is about getting things done through employees (McBeath 1994; Drucker 1998; Gosling and Mintzberg 2003). It is important to understand peoples strengths, weaknesses and their preferred ways of working in order to manage them effectively (Drucker 1999b). Managers are responsible for the work in their section (Mintzberg 1975). Managers solve problems by making decisions (Zaleznik 1989), which can be rational or irrational decisions depending on the situation (Simon 1987). Management decides what needs to be done, creates networks of people and relationships (Gosling and Mintzberg 2003) that can achieve the task in the best way and then try to ensure that those people get the job done (Zaleznik 1989; Drucker 1999b).

A managerial culture emphasises rationality and control (Zaleznik 1989; Mintzberg 1999). Management has its own tools and techniques but the essence of management is not the tools and techniques (Drucker 1998). Managers plan implicitly in the context of their daily actions and not in some formal planning process (Mintzberg 1975). Management ensures the plan is achieved by controlling and problem solving (Kotter 2001; Galer, Powers and Seltzer 2001). Monitoring of results can be achieved by the use of tools such as

reports and meetings (Kotter 2001). New managers who have been promoted for their good performance usually find delegating challenging because they have had success by doing things by themselves (Johnson 2007). Managers delegate effectively by giving tasks to the appropriate people who have required the skills (Johnson 2007). A common failure of most managers is the postponement of difficult decisions and this is due to all the alternatives having undesired consequences (Simon 1987; Johnson 2006). When a manager encounters poor performance, how the manager responds determines whether the organisation learns from such issues and or whether a pattern of repeated failure occurs (Johnson 2006).

2.4. General Management Skills and Competencies

Traditionally management is defined as organising, planning, directing and controlling the work of sub-ordinates (Mintzberg 1975; London 1985; Galer et al. 2001; Gosling and Mintzberg 2003). Leadership skills requirements vary across different management levels within an organisation (Collins 2005; Mumford, Campion and Morgeson 2007). The different categories of leadership skill requirements include cognitive skills, interpersonal skills, business and strategic skills. Cognitive skills are the most fundamental skills for leadership and include oral and written communication, active listening, active learning skills and critical thinking skills (Mintzberg 1999; Mumford et al. 2007). Managers must be effective oral and written communicators, capable of delivering information up and down the chain of command (Mintzberg 1975; Cullen 1999; Drucker 1999b). Processing and sharing information is a key part of a managers job (Mintzberg 1975). Managers should master the interpersonal skills of active listening, conflict resolution and providing constructive feedback (Stone and Sachs 1995; Cullen 1999; Mumford et al. 2007). Engaging managers listen more than they talk (Gosling and Mintzberg 2003). Interpersonal skills include social skills such as interacting and influencing others, negotiations and persuasion skills (Mintzberg 1975; Mumford et al. 2007).

Managerial skills are required to manage change over time (McBeath 1994; Stone and Sachs 1995). Managers need to empower their employees more than just delegating tasks to them (Stone and Sachs 1995). Empowerment refers to giving employees decision making authority and areas of responsibility to deal with situations that arise daily (Stone and Sachs 1995). On the other hand effective managers do not empower employees, they inspire them and build trust towards the employees (Mintzberg 1999). Managers must be both self-motivating and able to motivate others in the workplace (Cullen 1999). They must be able to lead themselves and have the ability to teach leadership skills to others (Cullen 1999). Working well with people is a significant prerequisite to leading and motivating others as a manager (Cullen 1999; Gosling and Mintzberg 2003).

The precise nature of management is to a certain degree dependent on the environment within which it is practiced (Robotham and Jubb 1995). Behaviours that are regarded as being effective in one industry may be less appropriate in another industry (Robotham and Jubb 1995). One needs to identify which are the critical managerial skills required for a particular organisation and these skills can be identified by interviewing managers within organisation (McBeath 1994; Stone and Sachs 1995).

2.4.1 Soft Skills

There is a distinction between hard and soft skills for management development (Myers 2004). Managers need a balance of both soft and hard skills in order to be effective (Caudron 1999). The development of soft skills in employees has a positive effect of the organisation's overall performance (Caudron 1999). Soft skills include general communication skills or creative thinking skills, emotional attachment, integrity, trust, self-control, influence and networking skills play a very important role in the ability of young people to adapt to a professional working environment (Caudron 1999; Myers 2004; Pauw, Oosthuizen and Van der Westhuizen 2008). Some companies train employees on the "hard" or

technical skills and have in the past neglected the development of soft skills in their employees (Caudron 1999).

2.4.2 Competencies

Developing competencies is the key to management development (Collins 2005; Johnson 2005; Frahm and Brown 2006) Competence is an achievable behaviour (Fournier and Ineson 2009). Competencies mean qualities, innate abilities and personal strengths of an employee (McBeath 1994; Serpell and Ferrada 2007). Competences are being used widely in the sphere of management development as a method for measuring individual performance (Robotham and Jubb 1995). Managers need to have numerous competencies which include (McBeath 1994) analytical skills, decisiveness, creativity, effective communication skills, being a team player and having a powerful influence. The concept of competence has different meanings and is one of the most diffused terms in management development literature (McBeath 1994; Robotham and Jubb 1995; Serpell and Ferrada 2007). One of the key weaknesses of using competencies is to clearly identify what aspect is being measured (Robotham and Jubb 1995).

2.5. Management skills required in construction

2.5.1 Business Management Skills

Construction managers spend most of their time on the traditional management functions of planning, coordinating, monitoring and controlling and managing conflict (Hassan, Griffith and Stephenson 2005; Odusami et al. 2007). Monitoring and controlling are key management functions of engineers during the execution of a construction project (Charoenngam and Maqsood 2001). Construction managers need to work through other people in order to get work done (Love, Haynes, Sohal, Chan and Tam 2002; Hassan et al. 2005). Construction employers want graduates who can work in teams, exhibit good interpersonal skills, have specialist technical skills, have a hands-on approach,

communicate well, have problem solving skills and who have a good understanding of the work culture (Davies, Csete and Poon 1999). On a building site there is generally a poor level of communication between the site manager and the site supervisors (Serpell and Ferrada 2007). Civil engineering graduates are usually placed in positions of responsibility very early on and they have relatively little or no experience of managing (Scott et al. 1997). Valuable time and money is at stake when an inexperienced manager is expected to make decisions (Scott et al. 1997). Construction management has two interdependent dimensions which are project management and business management (Love et al. 2002). In order for project oriented organisations to be successful they need a balance and blend of employees that have the hard skills such as planning, organising, directing and controlling and the softer skills such as influencing, persuading and team working (Smith and Dodds 1997). The essential personal attributes that are required by employers in the construction industry include flexibility, intelligence, adaptiveness and the ability to deal with uncertainty and change (Davies et al. 1999; Senge et al. 1999; Love and Haynes 2001).

2.5.2 Project Management Skills

Effective project management action by the project team is one of the strongest drivers of quality on a construction project (Chan and Tham 2000). Project management employs a system which includes tools such as Gantt charts, critical path methods and programme evaluations (Smith and Dodds 1997). Knowledge on construction project management is a key issue in the construction industry (Teixeira, Minasowicz, Zavadskas, Ustinovichius, Migilinskas and Armitiana 2006). Most civil engineering programmes mainly cover a variety of design courses and little attention is paid to management subjects which are essential for conducting construction projects (Teixeira et al. 2006). The core competencies required for South African project managers are planning and control, problem solving, personal influence, team leadership, goal focus and project team development (Birkhead, Sutherland and Maxwell 2000). Professional competency in project management is actually obtained by a

combination of knowledge acquired during training and skills developed through work experience and the application of acquired knowledge (Teixeira et al. 2006). Graduates need to be familiar with the various tools and techniques used for planning, scheduling and controlling construction operations (Love et al. 2002). They need to be able to build relationships with people and maintain it in order to work harmoniously with other people often in very strained and trying circumstances (Love et al. 2002).

2.6. Job Dissatisfaction

An organisation can gain a sustainable competitive advantage by treating their employees as its most valuable resource (Pfeffer 2001). The way a firm manages its people has a direct impact on its financial success (Pfeffer 2001; Kincaid and Gordick 2003). Numerous studies have proved that worker productivity is directly linked to worker motivation (Lam and Tang 2003; Ng, Skitmore, Lam and Poon 2004). There are short and long term motivation schemes that can be used to keep employees motivated within an organisation (Lam and Tang 2003). These authors state short term schemes include job security, safety needs and being part of a team while long term schemes include proper job design, open door communication, effective reward systems, effective leadership styles and empowering and valuing employees.

Construction firms are carefully managing their construction teams in order to achieve the project goals (Lam and Tang 2003). Workers on civil engineering projects are frequently confronted with problems that could lead to demotivation which reduces productivity (Ng et al. 2004). Demotivation is caused by the existence of certain situations that cause dissatisfaction and discourage individuals from pursuing desired goals (Ng et al. 2004). The industry is inherently uncertain and complex (Love et al. 2002; Turner and Lingard 2009). Site managers in the construction industry perceive their employment as a harsh deal due to the many job responsibilities, position of poor status, inadequate remuneration, long working hours and poor work conditions (Farrell and Gale 1999; Love et al. 2002; Ng et al. 2004; Styhre 2007; Turner and

Lingard 2009). Employee demotivation factors need to be mitigated in the construction projects through the recognition of basic human needs such as giving praise, providing adequate management support, etc (Ng et al. 2004). Research has shown construction managers often fail to realise the total effects that their smallest action has on workers attitudes and motivation (Ng et al. 2004). The goal of an organisation should be to create a work environment that is fun, challenging and empowering to its employees (Pauw et al. 2008).

The majority of final year engineering undergraduates have little interest and enthusiasm for activities related to the management of people (Keenan and Newton 1986). Many graduates have high job expectations as they expect their qualifications to open doors for them into middle and senior positions (Pauw et al. 2008). Graduate engineers do not possess a high degree of communication, project management, teamwork and leadership skills (Russell, Yao, Farr, Walesh and Bishop 1996; Davies et al. 1999). Many civil engineering graduates who leave their engineering jobs were dissatisfied with their future careers (Gyasi 2007). Most graduates are not adequately prepared for entry into the labour force, which is due to educational institutions not adequately preparing them for industry (Abdullah, Zaharim, Harris, Omar, Basri and Momahmed 2007; Pauw et al. 2008). Construction graduates are expected by the construction industry to have a great understanding of the practical construction methods and techniques used on site (Love and Haynes 2001). Surveys done in the construction industry in the UK reveal that graduates lack practical building knowledge, time management, interpersonal skills and the ability of exercising professional judgement (Love and Haynes 2001). These skills can be gained through experience and experimental learning (Love and Haynes 2001).

Site management work differs considerable across different types of construction firms and hence the skills and competencies required by construction site managers vary depending on the construction firm (Farrell and Gale 1999). This means that new employees to a construction firm could be unfamiliar with certain type of work tasks they are expected to undertake (Farrell and Gale 1999).

2.7. Training

Training is critical for an industry to remain competitive (Odusami et al. 2007). The greatest cause of leadership failure is due to talented employees having inadequate training (Blanchard and Miller 2007). The fundamental skills of leadership can be taught and many companies around the world are teaching their talented employees these skills (Blanchard and Miller 2007; D'Netto et al. 2008). One key issue in terms of training people is to understand how they learn (Liu 2006). Many organisations have invested large sums of money into management training which did not yield positive results due to organisations failing to consider how their employees learn (London 1985; Quick 1991; Bunning 1994).

Training refers to the acquiring of skills needed to do a particular job and to move into new jobs (London 1985; McBeath 1994). A skill is an ability that can be acquired through training (Fournier and Ineson 2009). Young managers need to know their strengths and weaknesses in order to choose training that will bring the most benefits to them (London 1985; Klagge 1998; Drucker 1999b). Training needs analysis needs to be done in order to determine the performance or competency gaps of an individual (London 1985; McBeath 1994; Caudron 1999; Hassan et al. 2005; Odusami et al. 2007). Training has long been identified and recognised as one of the fundamental methods in assisting organisations meeting the challenges of the construction industry (Hassan et al. 2005; Odusami et al. 2007). Training courses for contractors should be based on factors that contribute to the success in the construction industry.

Training does increase the financial performance of an organisation (Pfeffer 1998; Bassi, Ludwig, McMurrer and Van Buren 2002). Training investments are usually difficult to measure and there is little information about the actual effects of such investments (Bassi et al. 2002). These authors state that training plays a vital role in the creation of intellectual property which is a source of substantial wealth creation for a growing number of companies.

2.7.1 Choice of Training Methods

Employees skills can be upgraded by either formal or informal training methods (Bassi et al. 2002; Myers 2004). Most US companies typically spend about 2% of their payroll on formal training (Bassi et al. 2002). South African organisations generally differentiate between three types of training provisions which are external, in-house training by external trainers and in-house training conducted by company staff (Badroodien 2005).

Training programs need to be carefully designed and delivered in order for the training to yield on-the-job benefits (Quick 1991; Johnson 2005). There should be more company specific training courses in order for professionals to develop more effectively (Handy 2001). Employees need to practice under live conditions what they have been taught in order for the training to add value to the employee (Quick 1991; McBeath 1994; Senge et al. 1999; Handy 2001; Johnson 2005; Lawless 2007; D'Netto et al. 2008). Human are taught skills through practice and feedback in a real or simulated environment (Mintzberg 1975). There has been many cases in the past where there has been a disconnection between education and the experience (Handy 2001; Johnson 2005). The best method of professional development is a mixture of classroom teaching combined with practical training (Handy 2001). If trainees do not have an opportunity to apply their new knowledge they begin to lose it (Quick 1991; Bunning 1994). The use of functional managers as trainers to train their sub-ordinates has been used widely in US-based organisations and has been successful (Quick 1991). This type of training creates more relevance, authenticity and credibility for the training programmes.

Formal training is often perceived as the easy way out for most organisations who do not enjoy training employees internally (Human 1991). However, there is little control over the training content and teaching styles when management development programmes takes place outside the organisation (D'Netto et al. 2008). There is usually a weak relationship between what happens in practice and the training provided in the classroom (Quick 1991). Management

development programmes need to be designed in order to build the required skill sets required for the particular job (Mumford et al. 2007).

2.8. Feedback Systems

Managers need performance feedback in order to become more effective managers (Mintzberg 1975; Galer et al. 2001; Sherman and Freas 2004; Longenecker and Fink 2006). Research has shown that managers work at high pace and they are strongly oriented to action and they dislike reflective activities (Mintzberg 1975). It is a challenge for managers to find people within the firm who feel comfortable enough to provide honest feedback (Longenecker and Fink 2006). Feedback analysis can be used in order for a person to identify their strengths and weaknesses and people should also spend time building up skills in their strengths and spend less time building skills in their areas of weaknesses (Drucker 1999b). Feedback analysis can be used to identify in which ways does an employee work best, for example they may process information better by listening than reading (Drucker 1999b). Managers need to seek personal feedback in order to improve their decision-making ability and for adjusting their work styles (Galer et al. 2001). Most supervisors of all ranks generally do not provide adequate feedback to subordinates (Sherman and Freas 2004). Feedback systems also allow employees with good ideas to be heard and implemented where possible (Fey and Bjorkman 2001). Managers need to be able to take feedback about themselves without being defensive (Cavanagh 2006).

A performance appraisal is one element of feedback systems and it is used to test employs and put in plans to develop employees (Davis 1995). This author goes on to state that most managers do not enjoy performing appraisals, it is a time-consuming process and creates employee dissatisfaction and possibly a higher staff turnover (Davis 1995). A 360-degree performance review process gives additional feedback to employees and gives new and different feedback to the employee being reviewed (Klagge 1998; Galer et al. 2001; Sherman and Freas 2004; Mumford et al. 2007). The feedback data comes from people who

work closely with a particular individual. The 360-degree surveys measure both leadership and personality factors (Sherman and Freas 2004; Ross 2005) and the surveys assist an emerging manager to grow in self-awareness (Galer et al. 2001).

2.9. Management Education

As part of the management development process, managers continue attending formal education programs, workshops and seminars (Longenecker and Fink 2006). Management education contributes to the learning process (Hay and Hodgkinson 2008). These education programs are used to acquire information and knowledge in new areas and in some cases serves as refresher courses (Longenecker and Fink 2006). Many business schools aim to prepare highly skilled operations management students for positions after graduation (Gabric, Ernst and McFadden 2001). Due to changes in the environment most organisations of the future will be knowledge-based and there will be a strong need for experienced business people to go to school to prepare them for high level positions (Drucker 1988).

Management education in SA needs to be relevant and effective so that it allows managers to become better at managing. A gap exists between the perception of industry and academic community regarding the importance of various skills necessary for employment (Gabric et al. 2001). It is important to match program outcomes with the industry needs (Fournier and Ineson 2009). Management education is most effective if the management student has had adequate experience in managing (Mintzberg 2004). Construction management undergraduates courses do not provide certain key skills to graduates which is required in the construction industry (Love and Haynes 2001). Research done indicate that there is a disconnection between current education models used in university business schools and the actual skills demand of competent managers in today's business world (Mintzberg 1975, 2004; Liu 2006; Hay and Hodgkinson 2008). Many business schools claim they develop future business leaders however, classroom study alone is not adequate enough to develop

leaders (Handy 2001; Mintzberg 2004). Most business schools continually examine their curriculum in order to enhance and improve the educational experience which is achieved by developing close ties with industry (Gabric et al. 2001). Further the problem with many business schools is there is too much conventional analysis (Gosling and Mintzberg 2003).

Due to the complex nature of the construction industry there is a need for highly educated and competent construction management graduates (Love et al. 2002). An MBA is one type of management education. An MBA education has some disadvantages which include the structure of the MBA divides the management world into discrete business functions which results in students learning in silos (Gosling and Mintzberg 2003; Mintzberg 2004). Existing managers can significantly improve their practice in a thoughtful classroom that makes use of those experiences (Mintzberg 2004). Management schools needs to identify skills managers need and put students into situations where these skills can be practised and developed (Mintzberg 1975). This author states that business schools teach students in the wrong method as they do no use the experiences of managers in the classroom. On the other hand since the 1980's management education especially MBA's has been modified significantly in order to be more relevant to the practice of management (Hay and Hodgkinson 2008). Further there is an urgent need for business schools to reform the MBA to keep it connected to the real world of management (Hay and Hodgkinson 2008).

2.10. Coaching

Coaching is an effective technique used for developing managers within organisations (Wales 2001; Sherman and Freas 2004; O'Flaherty and Everson 2005; Longenecker and Fink 2006; Webb 2006; Styhre 2007; Witthuhn 2009). Coaching is a tested method for human learning (Leach 2000). Coaching helps people understand themselves better and they can contribute more richly (Sherman and Freas 2004; O'Flaherty and Everson 2005; Longenecker and Fink 2006; Clutterbuck 2008). There are two types of coaching: individual and

team coaching (Sherman and Freas 2004; Ross 2005). Individual coaching is where a coach helps an employee one-on-one to develop new skills or adjust behaviours (Kincaid and Gordick 2003; Webb 2006; Styhre and Josephson 2007; Witthuhn 2009) while a team coach works with the whole group to improve its collective performance and this is done by building on team members strengths and by building trust, honesty and openness amongst the group members (Sherman and Freas 2004; Hackman and Wageman 2005; Ross 2005).

One-on-one coaching benefits both the individuals and the organisation. Coaching has several benefits which include allowing personal development of employees, motivates employees, improves self-confidence and self-awareness, teaches stress management, work/life balance and improves staff retention and developments management skills in employees (Kotter 2001; Wales 2001; Sherman and Freas 2004; Collins 2005; Witthuhn 2009). The essentially human nature of coaching is what makes it so effective as it allows people to work in a customized way (Sherman and Freas 2004). Feedback is important for coaching as it helps the individual being coached identify goals and changes, track progress and adjust behaviours (Cavanagh 2006; Webb 2006). In order for coaching to be effective, the individual being coached must be willing and ready to be coached.

Coaching is not for all individuals as some cannot overcome the discomfort of personal inquiry (Lee 1968; Sherman and Freas 2004). Coaching is a form of active learning that transfers the essential communication and relationship skills (Sherman and Freas 2004). There are many successful people who repeatedly highlight the importance of great teachers in their lives who have contributed to their success (Zaleznik 1989). Employees, managers and leaders face numerous barriers to learning in the workplace and these barriers include lack of or absence of coaching in the company (Johnson 2005). The role of the coach is to provide a learning context in which the coaches explore new distinctions that expand how they observe the world, enabling them to become more effective and powerful (O'Flaherty and Everson 2005). Companies have

realised that talented employees require a range of development opportunities and are using coaches in order to develop these employees (Bloch 1995; Witthuhn 2009).

Research done in the Swedish construction industry indicate that site managers participating in coaching programmes developed skills for reflecting on their work situations, more effective communication, became better equipped for seeing a broader range of perspectives in their work (Styhre and Josephson 2007). Coaching programmes result in new discussions concerning the construction projects which benefited the construction project (Styhre and Josephson 2007). Managers need coaching skills in order to improve the work environment for their subordinates (Sherman and Freas 2004).

2.10.1 Criticisms of Coaching

Finding an effective coach can be a difficult process (Longenecker and Fink 2006). There are many debates by authors in the field of coaching whether team coaching really exists in organisations, rather when studied in detail they are more team building efforts.

There is little published literature on the subject of management coaching and most coaching literature is written by coaches who aim to sell their services (Sherman and Freas 2004; Styhre 2007; Styhre and Josephson 2007; Clutterbuck 2008, 2009; Witthuhn 2009). Many writers state that coaching differs substantially in time and space and that there is a variety of methods and tools which could be used for coaching (Styhre and Josephson 2007). Critics argue that there are negative aspects to coaching which include employees' problems being ignored or dealt with ineffectively by the coaches (Styhre and Josephson 2007). Many practicing coaches do not understand the industry in which they coach people (Sherman and Freas 2004).

Another problem with coaching is the existence of ineffective and inexperienced coaches who exploit vulnerable professionals and these coaches operate in the marketplace due to the coaching industry not being regulated and the existence

of low barriers to entry (Sherman and Freas 2004; Witthuhn 2009). Organisations need to be rigorous in the selection process in order to ensure the selected coaches will add value to the individual being coached (Sherman and Freas 2004; Witthuhn 2009). Coaching is not a solution for all kinds of employee problems and coaching should be carefully designed, executed, monitored and evaluated to accomplish the objectives of coaching (Styhre and Josephson 2007; Witthuhn 2009). An effective coach helps the individual being coached achieve agreed upon goals, while transferring the knowledge and skills needed to sustain ongoing performance (Sherman and Freas 2004; Clutterbuck and Megginson 2009).

2.11 Self–Development

Most management development programmes do not teach managers self reflection (Gosling and Mintzberg 2003). Effective management development process ensure managers spend time on self reflection (Longenecker and Fink 2006). A common and agreed concept of reflection does not exist (Hoyrup 2004). There are different forms and levels of reflection that exist (Hoyrup 2004). Managers need to stop and think and reflect thoughtfully on their experiences (Gosling and Mintzberg 2003; Longenecker and Fink 2006). In order to succeed one needs to have a deep understanding of oneself, they need to know their most valuable strengths, most dangerous weaknesses, how one learn best and their preferred working styles (Drucker 1999b; Galer et al. 2001; Galer 2004). Self reflection allows a person to address their limitations (Drucker 1999a; Sherman and Freas 2004; Longenecker and Fink 2006).

The practice of management involves managing oneself which can be achieved through the reflection process (Drucker 1999b; Gosling and Mintzberg 2003). Only when people operate from a combination of their strengths and self knowledge can one achieve lasting excellence (Drucker 1999b). Many smart and highly motivated individuals rarely pause and contemplate their own behaviours (Sherman and Freas 2004). Experiences only result once the individual has thoughtfully reflected upon the event (Gosling and Mintzberg

2003). Individuals should not try and change themselves as they are likely to fail, rather they should work to improve the way they perform (Drucker 1999b). Development processes which build self awareness are effective processes (Clutterbuck and Abbott 2003). Reflection needs to be followed by action in order to enrich the process of learning and developing (Gosling and Mintzberg 2003).

The new economic environment of rapid change and increasing competition requires high personal standards from individuals, a strong desire to win and a willingness to continue to learn over an entire lifetime (Kotter 1995). Surveys done on MBA graduates show that the most successful graduates were able to turn terrible events in their lives into growth experiences and this made them stronger and more able (Kotter 1995). By reflecting on tough times and their experiences these people grew, which helped them to succeed (Kotter 1995). The employees who most benefit from experiential learning are the people within the company who are the most dedicated to this process and these employees reap the biggest benefits (Johnson 2005).

Managers need to reflect on their work and need to take the appropriate approach in order to develop effectively (Galer et al. 2001; Myers 2004). Employees need training and practice in order to reflect on their work experiences correctly and learn from the reflection (Johnson 2005). Most people do not see the value of workplace reflection as contributing to the learning process (Johnson 2005).

Another aspect of self development is to be self driven. Self-driven people have systematically developed into strong competitors, from the early stages of their life they develop personal assets needed to compete effectively (Kotter 1995). This includes a healthy body, good mind, a solid education, useful role models, a track record of achievements, many potentially helpful friends and self-confidence (Kotter 1995). Self driven people practice lifelong learning which allow them to improve and become more effective over time (Kotter 2001).

2.12 Conclusion of Literature Review

Training is a facilitator in the management development process. There is a strong argument that on-the-job training is more beneficial than-off-the-job training. The literature review highlighted the importance of considering the way people learn, the ability of trainers and the effectiveness of training programmes and their design. A lack of management skills was identified as a barrier in the management development process. There are various management skills that are required in the workplace. Managers need to posses both hard and soft skills. One needs to identify which are the critical managerial skills required to be successful for an organisation. Job dissatisfaction was identified as a barrier affecting the management development process. Motivation is interconnected to job satisfaction. There are many factors in the construction industry that leads to employee de-motivation. It was found that recent graduates are not passionate about managing people in the engineering industry. Many civil engineering graduates leave their engineering jobs as they were dissatisfied with their careers.

Feedback systems and self reflection were identified as facilitators in the management development process. Feedback analysis and self reflection can be used in order to identify a persons strengths and weakness. Employees need to build up their strengths rather than building skills in their areas of weaknesses. Performance appraisals and 360-degree reviews are tools for assisting with employee feedback. Management education is a facilitator for management development. Managers need to be taught the required skills and competencies and the education needs to be relevant and effective so that it adds value. There is a strong argument from some authors that employees need work experience prior to gaining a management education. Coaching is an effective technique used for developing managers. Two types of coaching exist: individual and team coaching. Coaching has several benefits which include allowing personal development of employees, motivates employees, improves self-confidence and self-awareness, teaches stress management, work-life

balance and improves staff retention and developments management skills in employees.

2.12.1 Proposition 1

The barriers of management skill development in South African civil engineers include a lack of training, lack of management skills and job dissatisfaction.

2.12.2 Proposition 2

The facilitators of management skill development in South African civil engineers include coaching, training, management education, feedback systems and self development.

The key references driving the propositions of this research as listed below:

Table 1: Key References Supporting Research Propositions

Proposition 1	**Proposition 2**
Drucker (199b)	Gosling and Mintzberg (2003)
Farrell and Gale (1999)	Kotter (1995 and 2001)
Handy (2001)	Mintzberg (1975)
Love and Haynes (2001)	Sherman and Freas (2004)
Ng, Skitmore, Lam and Poon (2004)	Styhre and Josephson (2007)
Pfeffer (2001)	Longenecker and Fink (2006)

Proposition 1	**Proposition 2**
London (1985)	
Quick (1991)	

CHAPTER 3: RESEARCH METHODOLOGY

This section describes the methodology followed in order to test the propositions discussed at the end of the literature review. The section starts off with a description and explanation of the choice of research paradigm and also covers the implications that the chosen method has on the research. Then the research design will be discussed followed by discussions of the research population, the sample sizes and the sampling methods. This will be followed by a discussion of the research instruments and the analysis methodology that was used to determine the factualness of the stated propositions. The section will be concluded with a discussion on the validity and reliability implications for the research.

3.1 Research methodology

Research can be done in three approaches; quantitative, qualitative and mixed methods research but there needs to be a match between the research problem and the research approach (Creswell 2003). The author states a quantitative approach is most appropriate when the research problem requires investigation into the key factors affecting an outcome. On the other hand the author states a qualitative approach is best suited when a phenomenon needs to be understood because little research has been done on the topic. The research problem for this study is to identify factors influencing management skills development in South African civil engineers. Hence a quantitative approach is best suited to identify the factors.

3.2 Research Design

The research design will take a case study approach. The case site will be the construction company Grinaker-Lta. The advantages of this type of approach are convenience in terms of ease of data collection which affects both time and cost. The disadvantage of this type of approach is that the findings are limited to

one construction company and the results may not be relevant to other construction companies.

3.3 Population and sample

3.3.1 Population

The population for the research is Grinaker-Lta. From the literature, it appears that there are few major parties that need to be investigated in order to identify the factors influencing the development of management skills in civil engineers. These vary from site managers to construction supervisors. Table 2 below shows a list of the population of the different workgroups in Grinaker-Lta.

Table 2: Profile of Population

Job Title	Ethnic Group	Male	Female
Construction Supervisor	Black	2	0
	Coloured	1	0
	Indian	1	0
	White	3	0
Contracts Directors	Black	1	0
	Coloured	1	0
	Indian	1	0
	White	24	0
Contracts Managers	Black	4	0
	Coloured	3	0
	Indian	7	0
	White	51	1
Engineers	Black	46	11
	Coloured	4	0
	Indian	7	3
	White	55	2
Foreman	Black	151	0
	Coloured	147	0
	Indian	46	0
	White	170	0

Job Title	Ethnic Group	Male	Female
Site Manager	Black	2	0
	Coloured	6	0
	Indian	2	0
	White	46	1

3.3.2 Sample and sampling method

An ideal sample for this research would be to have a sample consisting of employees from all major construction companies in South Africa. However due to cost and time constraints, only people from Grinaker-Lta were used in the sample. Convenience sampling was used for this study. Convenience sampling does not control bias and does not ensure that a representative sample from the population is used (Leedy and Ormrod 2005).

The questionnaires were emailed to the relevant employees within Grinaker-LTA. 150 questionnaires were given out and assuming a 70% response rate, approximately 105 responses was planned to be received. The profile of respondents sown in Table 3 below was planned prior to the sending out of the questionnaire.

Table 3: Profile of Respondents

Description of respondent type	Number to be sampled
Civil engineers	60
Site Managers	30
Contract Managers	30
Senior Foreman	30

3.4 The research instrument

A 7-point Likert scale questionnaire consisting of 25 close-ended statements and 2 open-ended statements was designed and was sent out to a sample from the population. The questionnaire was developed using the guidelines suggested by Kalaf, Dan and Dietz (2008). A copy of the questionnaire is attached in Appendix A. The Likert scale has a fairly robust character which has proved to be reliable over a wide variety of forms (Cummins and Gullone 2000). The objective of the questionnaire design was to compare the information gained from the literature review and from the respondents in order to test the research propositions and then resolve the research problem (Brunjes 1996). A 7-point Likert scale was used and thus the data can be assumed to behave in an interval manner (Dabengwa 1992).

Attitude scales such as the Likert scale in widely used by researchers to measure people's attitude towards a variety of stimuli (Cummins and Gullone 2000; McCall 2001; Friedman, Herskovitz and Pollack 2003). The Likert scale is easy to use and requires a respondent to indicate their extent of agreement or disagreement with several statements (Cummins and Gullone 2000; Friedman et al. 2003). One advantage of questionnaires is that it asks the same questions, in the same order and provides more validity to the data collection method. Another advantage of using questionnaires is that there is effective communication between the interviewer and the interviewee. A disadvantage of questionnaires is that the non-verbal communication of the respondents is not captured. One major decision when designing the Likert scale is the relative number of favourable Likert items and unfavourable items (Friedman et al. 2003). Some research (Friedman et al. 2003) has found the existence of a bias towards the response category that is stated first. These authors also show that Likert scales with the response categories ordered from strongly agree to strongly disagree will produce different results than a scale with the same items but with the response categories reversed (Friedman et al. 2003). When using a Likert scale there is an assumption that the word scale can be treated as an interval scale (McCall 2001).

The results from the questionnaire was analysed quantitatively in order to answer the research problem.

3.5 Procedure for data collection

The questionnaire was sent out via email across the various construction sites and the head office. The respondents replied via email within 3 working days.

3.6 Data analysis and interpretation

Exploratory factor analysis was used to process the data from the questionnaire. Factor analysis is an interdependent technique whereby the entire set of interdependent relationships are examined (Malhotra 1996). Factor analysis can be used to take complex data and reduce it to a more manageable form (Dabengwa 1992; Malhotra 1996). Factor analysis is a method used to examine the correlations between a number of variables and to identify clusters of highly interrelated variables which reflect factors from the data (Leedy and Ormrod 2005). The aim of factor analysis is to reveal any latent variables that causes the manifest variables in the data to covary (Costello and Osborne 2005). Factor analysis entails the examination of the whole set of interdependent relationships between variables in order to identify underlying dimensions or factors (Malhotra 1996). There are two types of approaches to factor analysis that exist: principal components analysis and common factor analysis (Malhotra 1996). The principal components analysis approach was used for this research report. Principal components analysis considers the total variance in the data (Malhotra 1996).

Data was processed using the Number Cruncher Statistical System (NCSS). A prerequisite for factor analysis is that the data should be correlated (Siso 2008). Factor analysis allows the researcher to explore the data. Exploratory factor analysis will be used in this study. Exploratory factor analysis is most appropriate for use when the data needs to be explored (Costello and Osborne 2005). From the factor analysis, the most important factors were identified.

When conducting factor analysis, the sample size should be approximately 4 to 5 times the number of variables (Malhotra 1996). For this research there are 25 variables and the sample size was 140 which is appropriate. The statements with the highest loadings were identified and then used in order to identify the factors (Siso 2008). The research propositions were then either accepted or rejected based on the factors obtained from the analysis.

3.7 Limitations of the study

- The study does not consider all the factors affecting the development of management skills in South African civil engineers.

- Language will be a limitation as the entire questionnaire and research was designed in English. There are a large number of Afrikaans respondents who will be approached for their input in this research.

- Bias is introduced into this study as the sample was taken from a single organisation and the survey was done in the Gauteng area. A single case study can be criticised for a lack of a general overview of the industry (Frahm and Brown 2006). In different geographical areas and different organisations the factors affecting the development of management skills in civil engineers may vary.

3.8 Validity and reliability

Validity of a measuring instrument is the extent to which the particular instrument measures what it is supposed to be measuring (Leedy and Ormrod 2005). Reliability on the other hand is the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed (Leedy and Ormrod 2005). Reliability is a necessary but insufficient condition for validity (Leedy and Ormrod 2005).

3.8.1 External validity

The external validity of a research study is the extent to which the results apply to situations outside the scope of the study i.e. the extent to which the conclusions drawn can be generalized.

Since convenience sampling methods was used in this study, the opinions and experiences of the respondents cannot be generalised across the population. Further the research method was a case study approach and the findings cannot be generalised for all South African construction companies.

3.8.2 Internal validity

The internal validity of the study is the extent to which its design and the data it yields, allows one to draw accurate conclusions about cause and effect relationships from the data (Leedy and Ormrod 2005). For this research report the content validity was essential which was achieved by ensuring the research topic was fully covered. This is to ensure that the research topic is adequately covered through the use of the measuring instrument. Further the construct validity was ensured by cross-checking the questionnaire statements with the research propositions, in order to ensure research propositions were directly linked to the literature review.

The study aims to increase the internal validity of the research through the following:

- The number of scale points on the Likert scale has an effect on the validity of the scale (Cummins and Gullone 2000). Increasing the number of scale points on the Likert scale increases the scale sensitivity (Cummins and Gullone 2000). The questionnaire to be used in the research will be 7-point Likert Scale.

- A representative sample of the population will be used for the questionnaire and the interviews.

- The same procedure will be followed by the writer when communicating with participating potential interviewees.

- The questionnaires will be completely structured to ensure the same questions are asked each time in the same order.

- The questionnaire will be tested by the use of a pilot study. Five questionnaires will be given to interviewees in order to assess the relevance and ease of use of the questionnaire (Kalaf et al. 2008).

- The questions in the Likert scale questionnaire will be worded in a neutral form and leading questions will be avoided.

- Participants in the completion of the questionnaires will be chosen who have different views from the research reporter.

3.8.3 Reliability

Reliability is the consistency with which research of a similar nature conducted at some time in the future will provide similar findings (Leedy and Ormrod 2005). When using the Likert scale, reliability is a major criterion in determining the number of scale points (Cummins and Gullone 2000). Scale reliability increases from 2 to 5 points, but that no further gains were beyond this point (Cummins and Gullone 2000). The questionnaire used in this study will be a 7-point scale and reliability will be increased. The reliability of the study was enhanced by piloting the survey questionnaire before implementation (Krosnick 1999). The pilot testing on 5 respondents was conducted in order to remove any statement ambiguities in order to ensure the statements in the questionnaires were clear, concise and precise. All issues raised from the pilot testing were used to modify the questionnaire. Respondents were requested to justify their comments and give details on their understanding of the statements in the questionnaire. Further this pilot testing increased the validity and reliability of the questionnaire.

The research is limited in its reliability as the analysis method is factor analysis. With factor analysis the data can be interpreted in more than one way which can lead to a different number of factors being identified, depending on the interpretation.

CHAPTER 4: PRESENTATION OF RESULTS

This chapter presents and describes the results of the data analysis. There is no explanation of the results in this chapter – those are included in Chapter five, Discussion.

4.1 Introduction

A summary of the results obtained from the research analysis is presented in this chapter. The chapter begins with a description of the demographic profile of the respondents, then the results for each proposition is presented. Finally the chapter concludes with a summary of the results for this research report.

4.2 Demographic profile of respondents

The planned number of respondents was 105. However since the questionnaire was emailed, 150 questionnaires were completed. 10 of these questionnaires were filled in incorrectly and had to be discarded.

Most of the respondents were from middle and top management from the organisation. Respondents belonged to the various business units within the organisation. Business units included Grinaker-LTA Building, Civil Engineering, Mining, Kareena Africa and DSE. Hence the respondents were construction professionals from a wide range of fields within the construction industry.

4.3 Results pertaining to Proposition 1

Factor Analysis was used to analyse the data. Factor Analysis is more concerned with explaining the correlation structure among the measured variables. A basic objective of factor analysis is to derive, create, and to invent a new set of uncorrelated variables, called factors, with the hope that these new variables will give a better understanding of the data being analysed. A factor is an underlying dimension that explains the correlations among a set of variables.

Factor Analysis demands that variables to be analysed must be correlated. The Bartlett's test was used to check for correlation. From the Bartlett's test, the probability is 0,000 which indicates that the null hypothesis is rejected. The alternate hypothesis is accepted which indicates there is a significant finding and that the variables are correlated. This test also confirms that factor analysis is an appropriate method for the analysis.

The data was analysed using the principal components analysis. The Eigen values were used in order to determine the number of factors. The Eigen value represents the total variance explained by each factor (Malhotra 1996). Table 4 below shows the Eigen values after Varimax rotation. The rotation of the factors was done in order to assist with the interpretation of the factors. The varimax procedure was used for the rotation of the factors.

Table 4: Eigen Values after Varimax Rotation

		Individual	Cumulative	
No.	**Eigenvalue**	**Percent**	**Percent**	**Scree Plot**
1	1.140252	56.94	56.94	|||||||||||
2	0.878866	43.89	100.84	||||||||
3	0.225664	11.27	112.11	|||
4	0.07919	3.95	116.06	|
5	-0.027062	-1.35	114.71	|
6	-0.094865	-4.74	109.97	|
7	-0.19966	-9.97	100	||

Table 5 indicates the factor loadings for each of the variables. The variables with a high loading under each factor were chosen and used in order to name a factor.

Table 5: Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C1	-0.347658	0.112039
C3	-0.006255	0.182458
C4	-0.117281	0.741269
C6	-0.274051	0.489444
C7	-0.796892	-0.025182
C10	-0.222783	0.03479
C12	-0.4958	0.20529

4.4 Results pertaining to Proposition 2

The complete Factor Analysis Report is attached in Appendix C. Factor Analysis demands that variables to be analysed must be correlated. The Bartlett's test was used to check for correlation. From the Bartlett's test, the probability is 0,000 which indicates that the null hypothesis is rejected. The alternate hypothesis is accepted which indicates there is a significant finding and that the variables are correlated. This test also confirms that factor analysis is an appropriate method for the analysis.

The Eigen values were used in order to determine the number of factors. Table 6 below shows the Eigen values after Varimax rotation.

Table 6: Eigen Values after Varimax Rotation

		Individual	Cumulative	
No.	**Eigenvalue**	**Percent**	**Percent**	**Scree Plot**
1	2.164164	49.29	49.29	|||||||||
2	2.065861	47.05	96.35	|||||||||
3	0.798554	18.19	114.54	||||
4	0.630496	14.36	128.9	|||
5	0.470532	10.72	139.61	|||

		Individual	Cumulative	
No.	**Eigenvalue**	**Percent**	**Percent**	**Scree Plot**
6	0.347088	7.91	147.52	||
7	0.227642	5.19	152.7	||
8	0.13594	3.1	155.8	|
9	0.04475	1.02	156.82	|
10	-0.004794	-0.11	156.71	|
11	-0.144043	-3.28	153.43	|
12	-0.193327	-4.4	149.03	|
13	-0.228011	-5.19	143.83	||
14	-0.292897	-6.67	137.16	||
15	-0.323677	-7.37	129.79	||
16	-0.368579	-8.4	121.39	||
17	-0.446228	-10.16	111.23	|||
18	-0.493075	-11.23	100	|||

Table 7 below indicates the factor loadings. The variables with a high loading under each factor were chosen and used in order to name a factor.

Table 7: Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C2	-0.122863	0.563193
C5	0.098488	0.528579
C8	-0.659287	-0.061057
C9	-0.116191	0.371304
C11	-0.584916	0.098084
C13	-0.516441	0.117044
C14	-0.560231	0.134951
C15	0.46788	-0.020341
C16	0.112985	0.070189
C17	0.19484	0.351312

	Factors	
Variables	**Factor1**	**Factor2**
C18	0.54033	0.033607
C19	-0.249472	0.261695
C20	0.089184	0.352527
C21	-0.095202	0.349137
C22	-0.025571	0.330541
C23	-0.311372	0.339869
C24	-0.167773	0.459894
C25	0.043693	0.636661

4.5 Summary of the results

Factor analysis was performed on the explanatory variables. The principal components method was used with the varimax rotation. For both propositions 1 and 2 there were 2 factors identified from the analysis.

CHAPTER 5: DISCUSSION OF THE RESULTS

In this chapter the results obtained are discussed and explained in terms of the stated propositions put forward from the literature review.

5.1 Introduction

The chapter starts with the discussion and explanation of the demographic profile of the respondents of this research study. This is followed by a detailed discussion and explanation of the findings from both the literature review and the factor analysis for each of the research propositions. This section discusses the differences and similarities in findings from the literature review and the factor analysis. The chapter ends with a conclusion being drawn about the study.

5.2 Demographic profile of respondents

As stated in section 4.2 the construction foreman did not complete the questionnaire. An engineer on a construction site manages a team made up of a construction foreman and a number of skilled artisans and unskilled labourers. The engineer is in daily contact with this construction team. Since the construction foremen have not completed the questionnaire, there is a certain amount of information that has not been identified from the survey. The main reasons for not achieving the planned number of questionnaires to be completed by foreman was that foreman do not have access to email, as most construction of foreman are not compute literate. It should be noted that the sampling method was one of convenience due to time constraints.

There was a well balanced mix of respondents in terms of race. The distribution of respondents based on race is shown in Table 8 below:

Table 8: Racial Profile of Respondents

Race	Number of Respondents
White	76
Black	44
Asias	12
Coloured	8

The racial identity of the respondents is similar to the racial identity of the population within the organisation.

Further the respondents had various job titles which indicates the information gather from the survey represent different views and opinions about the engineer. Varied opinions and views enrich the research data.

5.3 Discussion pertaining to Proposition 1

5.3.1 Discussion of Factor Analysis

Factor analysis combines two or more variables into a single factor and in this way reduces the data. The Eigen value represents the total variance explained by each factor (Malhotra 1996). From the analysis, 2 factors with Eigen value greater than one were identified. The second factor had an Eigen value of 0.88 and was also chosen as a factor since it had a high loading and was close to 1. These 2 factors cumulatively accounted for 100 % of the variation in the variables. The remaining 23 dimensions of the data explain a small amount of the total variation. Hence the analysis revealed a strong 2 factor solution. If a factor has a low Eigen value, then that factor is contributing little to the explanation of variances in the variable. A scree plot was used to support the decision on the number of factors to be retained. A scree plot is a plot of Eigen values against the number of factors in the order of the extraction (Malhotra

1996). The shape of the scree plot was also used to determine the number of factors. From the scree plot there is a distinct change in the gradient of the scree plot after the second variable which furthers justifies the selection and use of the first 2 factors to be retained. Hence the researcher chose 2 factors from the Factor Analysis. These factors are discussed.

Factor 1: Employee Job Satisfaction

There were 2 variables that contributed to the naming of this factor. This factor brought up dimensions from the questionnaire that dealt with the employee's feedback and the employee's training needs.

Mathematically factor 1 can be explained as Factor 1 = 0.729 C7 + 0.495 C12

Variable C7, the feedback systems factor from the literature review, explains the largest portion of the total variance of the factor "employee job satisfaction." Variable C12, the employee training factor from the literature review, explains the second largest amount of variation in the data. In this research a high factor loading is taken as a value above 0.7 and a low value is below 0.4. These are typical factor loading cut off values.

The analysis reveals that the factor employee job satisfaction has an effect on the process of the development of management skills in civil engineers. A possible reason for this relationship is could be explained by the literature review conducted for this research. The literature review findings indicate that there is a high level of job dissatisfaction within the construction industry. The reasons for the job dissatisfaction include site managers in the construction industry perceive their employment as a harsh deal due to the many job responsibilities, position of poor status, inadequate remuneration, long working hours and poor work conditions (Farrell and Gale 1999; Love et al. 2002; Ng et al. 2004; Styhre 2007; Turner and Lingard 2009). Further dissatisfaction with working conditions results in the demotivation of the engineer. Once an employee becomes de-motivated at the workplace their ability and willingness to learn new things and develop certain skills are hampered.

The findings of the literature review further state that when employees are motivated at their workplace they will also be satisfied with their jobs to a certain extent (Lam and Tang 2003; Ng, Skitmore, Lam and Poon 2004). Numerous studies have proved that worker productivity is directly linked to worker motivation (Lam and Tang 2003; Ng, Skitmore, Lam and Poon 2004). The findings from the literature review indicates that some of the motivational schemes used by firms include open door communication, effective reward systems, effective leadership styles and empowering and valuing employees(Lam and Tang 2003; Ng, Skitmore, Lam and Poon 2004). To summarise if an organisation has poor human resource systems which include employee feedback systems, employee development programs then it is most probable that the employee will become de-motivated and dissatisfied with their job. This will result in the slow process of developing management skills in engineers as they are dissatisfied with their jobs.

For the factor employee job satisfaction there is similar findings in both the literature review and the data analysis, that this factor will affect the management development process of engineers at Grinaker-LTA.

Factor 2: Type of Employee Training

In this factor 2 variables with high loadings were selected. The variables contributing to the variance of this factor spoke of the type of training that employees within the organisation undertake. Another dimension of the research questionnaire spoke of the type of training that employees preferred.

Mathematically factor 2 is explained as Factor 2 = 0.741 C4 + 0.489 C6

Variable C4, the training factor, explains the largest portion of the total variance of the factor “the type of employee training” Variable C6, the training factor from the literature review, explains the second largest amount of variation in the data.

The analysis indicates that the type of employee training has an effect on the process of developing management skills in civil engineers. The literature review conducted for this research report indicates that employee training does

have an effect on how the employee develops in their careers. One possible reason would be that if an engineer is not trained in management, they would not know the best management practices, they would not be able to evaluate their management style and there will be little room for improvement on their current management practices due to the lack of subject related matter.

The literature review identified the following key issues concerning employee training:

- Training programs need to be carefully designed and delivered in order for the training to yield on-the-job benefits (Quick 1991; Johnson 2005). There should be more company specific training courses in order for professionals to develop more effectively (Handy 2001).

- Another key finding related to training is understanding how employees learn (Liu 2006). Many organisations do not have a financial measure for their return on the training their employees receive and there have been cases where firms have invested huge amounts of money which did not yield positive results due to organisations failing to consider how their employees learn (London 1985; Quick 1991; Bunning 1994).

- Training needs analysis needs to be done in order to determine the performance or competency gaps of an individual (London 1985; McBeath 1994; Caudron 1999; Hassan et al. 2005; Odusami et al. 2007).

There are some common issues related to employee training that have been both identified both in the literature review and the analysis. These common issues include the training needs analysis which is being practised by Grinaker-LTA. Further the organisation is sending their employees on training course which indicate they believe that engineers can acquire the necessary skills by attending the training courses.

There are some issues that are covered in the literature review but in not covered in the analysis. These include understanding the method of how employees learn and ensuring that employees do develop the skills that the

training course intends to teach them. From the respondents statements training courses are provided by outside training providers and all the training are formal classroom training. In the industry of construction where most of the work is actually achieved by doing physical things, it could be more effective to conduct training for engineers on construction sites. This could be done in the form of live case studies. The learning experience will be more real and easier to understand. The literature review states that employees need to practice under live conditions what they have been taught in order for the training to add value (Quick 1991; McBeath 1994; Senge et al. 1999; Handy 2001; Johnson 2005; Lawless 2007; D'Netto et al. 2008). Human are taught skills through practice and feedback in a real or simulated environment (Mintzberg 1975).

Another training issue covered by both the analysis and the literature review is ensuring that employees actually practice the skills taught in these training courses. From the comments in the open ended questions, there were many respondents stating that certain employees are sent for training, in order to learn about work related issues, but these employees are not in those positions where the skills can be practised on a regular basis. Hence the training needs analysis for the engineer needs to be conducted correctly so that the engineer receives the appropriate training at the appropriate times in their developmental process of becoming a manager. The literature review findings state that if trainees do not have an opportunity to apply their new knowledge they begin to lose it (Quick 1991; Bunning 1994).

5.3.2 Open –ended responses relating to Proposition 1

The survey questionnaire also consisted of two open ended questions. This allowed the respondents to state what they thought were additional issues concerning the barriers and facilitators in the development of management skills in South African civil engineers. The relevant information extracted from the open ended questions was:

- Engineers Lacking Practical Experience

Feedback from the open ended questions highlighted that most of the engineers within the organisation lack experience. The technical degrees that the engineers have obtained have not adequately prepared them for the construction industry. Hence there is the issue of a certain level of mismatch between the type of undergraduate training that the engineer receives and the skills required for the construction industry. The feedback from the respondents clearly stated that the engineers lack the practical experience of working on a construction site. Many respondents stated that engineers needs to work under a skilled construction foreman for a reasonable period of time in order to obtain practical building experience. Many respondents stated that engineers who enter the organisation are given management functions in order to accomplish certain construction related tasks, but these engineers lack the work experience and do not know how to conduct these tasks, so they end up being poor managers. The literature review findings supports the findings from the open-ended questions in that construction management undergraduates courses do not provide certain key skills to graduates which is required in the construction industry (Love and Haynes 2001).

- Critical Skills required by Engineers

Many respondents commented on the skills that engineers lack in the construction industry. These skills include effective communication skills, listening skills, working as part of a team, working with various types of people some of whom who are educated and others who are uneducated. Many respondents commented that civil engineers fail to convey instructions to their subordinates effectively. Effective communication on construction projects is critical to the success of the project and ensuring the tasks gets completed on time. There were various respondents commenting on the issue of listening. Many respondents stated that engineers are poor listeners and they talk more than they listen. According to the feedback from the respondents engineers generally are poor listeners and this poor listening ability prevents them from

learning and gaining that vital practical experience that they require in order to become good managers.

These findings from the survey reinforce the findings of the literature review for this research report. The findings of the literature review highlighted issues such as:

- Managers must be effective oral and written communicators, capable of delivering information up and down the chain of command (Mintzberg 1975; Cullen 1999; Drucker 1999b). Processing and sharing information is a key part of a managers job (Mintzberg 1975). Managers should master the interpersonal skills of active listening, conflict resolution and providing constructive feedback (Stone and Sachs 1995; Cullen 1999; Mumford et al. 2007). An engaging managers listens more than they talk (Gosling and Mintzberg 2003). Interpersonal skills include social skills such as interacting and influencing others, negotiations and persuasion skills (Mintzberg 1975; Mumford et al. 2007). On a building site there is generally a poor level of communication between the site manager and the site supervisors (Serpell and Ferrada 2007). Civil engineering graduates are usually placed in positions of responsibility very early on and they have relatively little or no experience of managing (Scott et al. 1997). Valuable time and money is at stake when an inexperienced manager is expected to make decisions (Scott et al. 1997).

- Managers need a balance of both soft and hard skills in order to be effective (Caudron 1999). Soft skills include general communication skills or creative thinking skills, emotional attachment, integrity, trust, self-control, influence and networking skills play a very important role in the ability of young people to adapt to a professional working environment (Caudron 1999; Myers 2004; Pauw, Oosthuizen and Van der Westhuizen 2008). In order for project oriented organisations to be successful they need a balance and blend of employees that have the hard skills such as planning, organising, directing and controlling and the softer skills

such as influencing, persuading and team working (Smith and Dodds 1997).

- Construction managers spend most of their time on the traditional management functions of planning, coordinating, monitoring and controlling and managing conflict (Hassan, Griffith and Stephenson 2005; Odusami et al. 2007). Monitoring and controlling are key management functions of engineers during the execution of a construction project (Charoenngam and Maqsood 2001). Construction managers need to work through other people in order to get work done (Love, Haynes, Sohal, Chan and Tam 2002; Hassan et al. 2005). Construction employers want graduates who can work in teams, exhibit good interpersonal skills, have specialist technical skills, have a hands on approach, communicate well, have problem solving skills and who have a good understanding of the work culture (Davies, Csete and Poon 1999).

The findings from the analysis confirm what the literature review says about the skills required by engineers working on a construction. From the above findings it is clear that there are certain critical skills that engineers need to develop. The organisation needs to train their engineers and assist them develop these critical skills.

5.3.3 Conclusion

The literature review identified 3 factors which served as barriers in the management skill development in South African civil engineers, while the factor analysis identified 2 factors. The third factor from the literature review was found in the open ended questions section. This factor was the critical management skills required by engineers in the construction industry. Table 9 below shows the comparisons of the factors identified by the literature review and the factor analysis.

Thus proposition 1 is accepted.

Table 9: Comparison of Literature Review and Analysis

Literature Review	Research Results	Found / Not Found
Training	Type of Employee Training	YES
Management Skills	Critical Skills Required	YES
Job Dissatisfaction	Employee Job Satisfaction	YES

5.4 Discussion pertaining to Proposition 2

The Eigen values were used in order to determine the number of factors. Table 6 shows the Eigen values after Varimax rotation. From the analysis, 2 factors with Eigen values greater than one were identified. These factors cumulatively accounted for 96.35 % of the variation in the variables. A scree plot was used to support the decision on the number of factors to be retained. From the scree plot there is a distinct change in the gradient of the scree plot after the second variable which shows that 2 factors can be drawn. 2 factors were chosen from the analysis. The Factor Analysis revealed a strong 2 factor solution.

- **Factor 1: Understanding and Managing Oneself**

The 6 variables highlighted in red in Table 7 were used in the naming of this factor. This factor brought up all statements that dealt with the importance of the employee's role in terms of understanding and managing oneself. This factor strongly supports the literature review, as the literature review covered topics such as management development training, the use of coaches, the use of constructive feedback in order to assist employees in their growth.

The 6 variables for this factor spoke of:

C8: Understanding ones self in terms of their strengths and weakness.

C11: The importance of management development related to improve financial position of the organisation.

C13: The management of oneself in terms of their career.

C14: The benefits of using a coach to assist in acquiring management skills and becoming a more effective manager.

C15: The use of self reflection in order to understand oneself.

C18: The use of coaching to acquire the necessary management skills

Mathematically factor 1 is explained as Factor 1 = 0.659 C8 + 0.584 C11 + 0.516 C13 + 0.560 C14 + 0.467 C15 + 0.540 C18

Variable C8 explains the largest portion of the total variance of the factor "Understanding and managing oneself." Variable C11 explains the second largest amount of variation in the data.

5.4.1 Open-ended responses relating to Proposition 2

The relevant information extracted from the open ended questions can be categorised as follows:

- Self Development of the Engineer

Many respondents commented on the need for engineers within the organisation to be responsible for their own management development. There was strong feedback from the respondents stating that it is common for engineers to hold the organisation accountable for their own management development and the engineers themselves do not put adequate effort in order to manage their own development. It should be noted however that most of the respondents to this questionnaire were senior managers within Grinaker-LTA

and that there is biases in their feedback. Further respondents stated the engineers need to learn from outside the workplace also. This type of learning could result form the engineer belonging to professional engineering bodies, attending seminars and construction company presentations.

- Racial and Cultural Differences

Some respondents stated that engineers fail to consider racial and cultural differences in the workplace. It was stated by understanding people and their cultures, the manager will understand the employee better, which will make work easier.

The literature review also covered some of the issues covered in the analysis concerning the employee's responsibility of developing themselves.

- One related issue to this factor was the employee obtaining management education, as this contributes to the learning process (Hay and Hodgkinson 2008). These education programs are used to acquire information and knowledge in new areas and in some cases serves as refresher courses (Longenecker and Fink 2006). Management education is most effective if the management student has had adequate experience in managing (Mintzberg 2004). Due to the complex nature of the construction industry there is a need for highly educated and competent construction management graduates (Love et al. 2002).

- The literature review covered the subject of self reflection. There are benefits of self reflection in order to understand oneself and develop. Self reflection allows the engineer to have a deep understanding of oneself. They need to know their most valuable strengths, most dangerous weaknesses, how one learn best and their preferred working styles. Self reflection allows a person to address their limitations.

-

- Another aspect of self development is to be self driven. Self-driven people have systematically developed into strong competitors, from the early stages of their life they develop personal assets needed to compete effectively (Kotter 1995). This includes a healthy body, good mind, a solid education, useful role models, a track record of achievements, many potentially helpful friends and self-confidence (Kotter 1995). Self driven people practice lifelong learning which allows them to improve and become more effective over time (Kotter 2001).

The issues of self reflection, self learning and being self driven were highlighted in both the literature review and the analysis. One factor identified in the analysis but not covered in the literature review was that of the effect of culture on the management development process. There is a large amount of published literature on this subject, however due to time constraints, the researched decided not to consider the effects of cultural diversity of the management development process of engineers.

- **Factor 2: The Role of the Organisation in Developing the Engineer**

In this factor 3 variables with a high loading were selected. These variables are highlighted in yellow. This factor brought up statements that dealt with the role of the organisation in developing the engineer. The 3 variables each spoke of;

C2: The role of the organisation plays in allowing engineers to undergo management related training courses.

C5: The use of coaching methods within the organisation in order to develop engineers.

C25: The promotion of management education for engineers within the firm.

Mathematically factor 2 is explained as Factor 2 = 0.563 C2 + 0.529 C5 + 0.637 C25

Variable C2 explains the largest portion of the total variance of this factor while variable C25 explains the second largest amount of variation in the data.

5.4.3 Open ended responses relating to Factor 2 of Proposition 2

The following factors were identified from the respondents comments stated in the open ended questions section of the questionnaire:

- The Role of Senior Managers within the Organisation

A number of respondents commented that the senior managers within the organisation generally lack the skills which are required in order to train and mentor civil engineers. There were various respondents that that many senior managers are good at conducting certain tasks as managers but they lack skills which are required in order to empower and motivate engineers in order to develop management skills in the engineers effectively. Some respondents stated that their managers do not display a visible leadership style. They are usually not available for assistance and to advise employees. There was a strong agreement that many managers within the organisation do not encourage the development of their staff and that the dominant management style on construction sites is more of a dictatorial nature than of a participative style of management. A possible reason for this style of dictatorial management is that most senior managers lack management training and they themselves have been working as engineers under this type of management style. The literature review findings indicate that site managers in the construction industry perceive their employment as a harsh deal due to the many job responsibilities, position of poor status, inadequate remuneration, long working hours and poor work conditions (Farrell and Gale 1999; Love et al. 2002; Ng et al. 2004; Styhre 2007; Turner and Lingard 2009). Since some of the managers within construction are possibly dissatisfied with their jobs, they adopt a more command and control style of management on their employees. Research has shown construction managers often fail to realise the total effects that their smallest action has on workers attitudes and motivation (Ng et al. 2004). The literature review findings further stated the importance of managers empowering their employees in order to making their own decisions and take responsibility (Stone and Sachs 1995). Managers must be both self-motivating and able to motivate others in the workplace (Cullen 1999).

- Feedback Systems

Respondents stated that the feedback to employees within the organisation is more of a personal attack on the employee, rather than to assist the employee to identify areas of weaknesses. Respondents also stated that there was generally a lack of formalised feedback from the managers to the employees. From the analysis it was highlighted that managers tend to only give negative feedback where the employee is criticised for lack of performance and managers within the organisation generally do not give positive feedback.

The findings from the literature review covered issues on feedback systems and how employees and the organisation can use feedback in order to develop employees. The literature reviewed mentioned the difficulties managers face when giving feedback to an employee. The reason for the lack of feedback is due to managers not being comfortable about providing honest feedback to employees (Longenecker and Fink 2006). Most supervisors of all ranks generally don't provide adequate feedback to subordinates (Sherman and Freas 2004).

For this factor on employee feedback, the findings of the literature review support the findings from the survey done for the particular organisation. These findings indicate that there is a lack of formalised feedback procedures within the organisation. Since giving feedback to employees is a delicate matter, both the manager and the employee should be given some training on how to deal with the issuing and accepting of feedback, in order to ensure the feedback system adds value to both the employee and the organisation.

- Coaching

Respondents strongly stated that there is a serious lack of formalised coaching within the organisation. It was further stated that when the relationship between the manager and the employee has problems, the coaching process stops.

The literature review covered coaching and how the presence of coaching can act as a facilitator in the management development process. As highlighted in the literature review there are certain skills that a coach needs to posses in order to be an effective coach. Currently there is no formalised coaching within Grinaker-LTA, as indicated by various respondents.

- Organisational Learning

Some of the respondents stated that there is a lack of sharing within the organisation. This sharing includes experiences amongst employees working on different construction sites, best construction practices, success stories on certain construction projects. Some respondents also stated that the organisation punished employees who made mistakes in the past and this prevented employees from admitting to mistakes, which prevented others from learning and not repeating these mistakes. Some respondents commented that there was a lack of job rotation within the organisation. These respondents felt in order to develop better management skills, an engineer needs to be exposed to the various business functions within the organisation In summary, there respondents stated there was a lack of learning from the organisation.

This concept of the learning organisation was not covered in the literature review and thus is a new factor that has been identified from the analysis.

Table 10 below indicates the findings for both the factor analysis and the literature review.

Table 10: Comparison of Literature Review and Analysis

Literature Review	Research Results	Found/Not Found
Self Development	Self Development	YES
Management Education		YES
Coaching	Coaching	YES
Training	Training	YES
Feedback Systems	Feedback Systems	YES
	Cultural Diversity	NO
	Organisational Learning	NO

Proposition 2 : The facilitators of management skills development in South African civil engineers include:

- Coaching
- Training
- Management Education
- Feedback Systems
- Self Development

Proposition 2 may be accepted

5.5 Conclusion

From the analysis it was seen that the 3 factors which act as barriers in the process of developing management skills in civil engineers were identified both in the literature review and the factor analysis. These factors are lack of training, lack of management skills and job dissatisfaction. The comparison of the literature review and the data analysis also revealed that the factors that are facilitators in the management skills development process of civil engineers include engineer self development , coaching, feedback systems, training, employee feedback systems, cultural diversity and organisational learning.

By studying the findings from both the literature review and the data analysis outcomes propositions 1 and 2 have been accepted. From proposition 2 there were 2 new factors that were identified from the analysis. These factors were the organisational learning factor and the cultural diversity factor.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter summarises the findings of the research and puts forwards recommendations to the particular company on how the management development process of engineers can be improved.

6.2 Conclusions of the study

The research was undertaken in order to identify the factors, both the barriers and facilitators, influencing the development of management skills in South African civil engineers. The aim of the research was also to make recommendations to the organisation on how the process of developing management skills in engineers can be improved.

The literature review identified factors which act as barriers in the process of development management skills in civil engineers. These factors were a lack of training, lack of management skills and job dissatisfaction. The study also found that the factors which act as facilitators in the process of developing management skills in engineers include coaching, management education, feedback systems and self development. The 2 new factors found from the analysis which also acts as facilitating factors were organisational learning and the cultural diversity. From the factor analysis a strong 2 factor solution resulted for each of the research propositions.

6.3 Limitations

- The questionnaire was the only measuring instrument in this report. Important non verbal input from respondents could not be captured. Some respondents felt strongly about certain issues and wrote notes at the end of the questionnaire.

- The survey was conducted in a particular time context i.e. 2009/2010. At a different time setting these factors identified in the research may not be applicable to the same research problem, due to changes in the environment.

- The survey was conducted in South Africa and within the construction company Grinaker-Lta. The factors identified which influence the development of management skills in engineers could be different in other countries as well as other construction companies within South Africa.

- All the factors influencing the development of management skills in South Africa have not been investigated due to time constraints. Hence there are other factors that exist.

- Exploratory factor analysis is an error prone procedure even with large sample sizes.

6.4 Recommendations

This research report was directed at the following stakeholders:

- Human resource managers of construction companies

The findings of the research can be used in order improve the process of developing management skills in civil engineers. The role of the organisation in the development process of an engineer is critical. The company can introduce coaching in order to develop engineers. Currently there is no formal coaching that is being done within the company, rather there in informal coaching being done at irregular times. Further appropriate training courses in management education can be designed for engineers. The findings from the analysis reveal that there are certain critical skills required by civil engineers and training courses should be designed in order to build these skills in engineers. Presently within Grinaker-LTA there is a lack of constructive feedback to employees. Human resource managers can create a formalised system of employee feedback.

- Academics in the civil engineering departments

Most graduate civil engineers enter the workplace with technical skills and generally lack the required management skills. When engineers start working for Grinaker-LTA they perform more like a manager than a specialist engineer. The findings from this research report will assist civil engineering academics in that some of the final year engineering courses can be management related in order to introduce basic management concepts and principles to engineers.

- Practising civil engineers and engineering managers

The findings from this research highlight some of the barriers and facilitators in the management development process. Persons wanting to become managers

and directors can use the factors mentioned in this study in order to effectively manage their development. Some of the key factors that would be of benefit to such an individual would be the use of coaching, engaging in self reflection, attending management courses, understanding oneself and managing oneself.

6.5 Suggestions for further research

- Investigate the factors influencing the development of management skills in South African civil consulting engineers.
- Investigate the effects of cultural diversity on how the management development process of engineers is affected, both the barriers and the facilitators.
- Investigate the appropriate management style required by engineers in the South African construction industry.
- Investigate the appropriateness of transforming a construction firm into a learning organisation.
- Investigate the critical management skills required in the South African construction industry.

REFERENCES

Abdullah, S., Zaharim, A., Harris, S., Omar, M., Basri, H. and Momahmed, N. (2007), 'Engineering Education: Using Technical Attributes to Analyse the Employers' Expectation of Future Engineering Graduates in Malaysia', In *4th WSEAS/IASME International Conference of Engineering Education*, Greece, pp. 191-195.

Alty, J. (1993) Information technology and the construction industry: another tower of babel, *Management of Information Technology for Construction*, pp. 3-15.

Badroodien, A. (2005) Enterprose training in post-apartheid South Africa, *Journal of Education and work,* 18(1), pp. 85-110.

Bassi, L., Ludwig, J., McMurrer, D. and Van Buren, M. (2002) Profiting from learning: firm level effects of training investments and market implications, *Singapore Management Review,* 24(3), pp. 61-76.

Birkhead, M., Sutherland, M. and Maxwell, T. (2000) Core competencies required of project managers, *South African Journal of Business Management,* 31, p. 99.

Blanchard, K. and Miller, M. (2007) The higher plane of leadership, *Leader to Leader,* 2007(46), p. 25.

Bloch, S. (1995) Coaching tomorrow's top managers, *Executive Development,* 8(5), pp. 20-22.

Brinkmann, A. (2003) Graphical knowledge display–Mind mapping and concept mapping as efficient tools in mathematics education, *Mathematics Education Review,* 16, pp. 35–48.

Brunjes, W. J. (1996) *Positioning Competency-Based Training of Civil Engineering Candidates. Unpublished MBA Thesis*. Univesity of Witwatersrand, Johannesburg.

Bunning, R. L. (1994) Action Learning, *Executive Development,* 7(4), pp. 3-6.

Carmichael, T. (2003) *The Perceived Return on Investment of an MBA Unpublished MBA Thesis.* University of the Witwatersrand, Johannesburg.

Caudron, S. (1999) The hard case for soft skills, *Workforce,* 78(7), pp. 60-66.

Cavanagh, M. J. (2006) Coaching from a Systemic Perspective: A Complex Adaptive Conversation, *Evidence Based Coaching Handbook: Putting Best Practice to Work for Your Clients*, pp. 313-354,

Chan, A. P. C. and Tham, C. M. (2000) Factors affecting the quality of building projects in Hong Kong, *International Journal of Quality & Reliability Management,* 17(4/5), pp. 423-441.

Charoenngam, C. and Maqsood, T. (2001) 'A qualitative approach in problem solving process tracing of construction site engineers', In *17th Annual Arcom Conference*, University of Salford, Association of Researchers in Construction Management, pp. 475-485.

Chiu, R. K. and Stembridge, A. (1998) Exploring managerial success factors of Chinese managers: a comparsion between mainland and Hong Kong Chinese males, *Career Development International,* 3(2), pp. 67-74.

Clutterbuck, D. (2008) Feature articles What's happening in coaching and mentoring? And what is the difference between them?, *Development and Learning in Organisations,* 22(4), pp. 8-10.

Clutterbuck, D. (2009) Techniques for coaching teams, *Further Techniques for Coaching and Mentoring*, p. 116.

Clutterbuck, D. and Abbott, P. (2003) Mentoring as an empowerment tool, *People Dynamics,* 21(4), pp. 24-25.

Clutterbuck, D. and Megginson, D. (2009) Process focused techniques, *Further Techniques for Coaching and Mentoring*, p. 218.

Collins, J. (2005) Best of HBR 2001. Level 5 Leadership: The Triumph of Humility and Fierce Resolve, *Harvard Business Review* 83(7/8), pp. 30-39.

Costello, A. B. and Osborne, J. W. (2005) Best Practice in Exploratory Factor Analysis:Four Recommendations for Getting the Most From Your Analysis, *Practical Assessment,Research & Evaluation*, Vol. 10, pp. 1-9,

Creswell, J. W. (2003) *Research Design 2nd Edition*, SAGE Publications.

Cullen, D. (1999) Developing Managers, *Fleet Owner,* 94(4), p. 53.

Cummins, R. A. and Gullone, E. (2000) 'Why we should not use 5-point Likert scales: The case for subjective quality of life measurement', In *2nd International Conference on quality of life in Cities*, Singapore, National University of Singapore, pp. 74-93.

D'Netto, B., Bakas, F. and Bordia, P. (2008) Predictors of management development effectiveness: an Australian perspective, *International Journal of Training & Development,* 12, pp. 2-23.

Dabengwa, R. S. (1992) *Determinants of Relationship Quality in the Consulting Engineering Profession.* University of Witwatersrand, Johannesburg.

Datamonitor (2007) *Construction & Engineering Industry Profile: South Africa,* (last accessed 27 October, 2009), from http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=buh&AN=25766527&loginpage=Login.asp&site=ehost-live.

Dave, B. and Koskela, L. (2009) Collaborative knowledge management-A construction case study, *Automation in Construction,* 18(7), pp. 894-902.

Davies, H., Csete, J. and Poon, L. (1999) Employer's Expectations of the Performance of Construction Graduates, *International Journal of Engineering Education,* 15(3), pp. 191-198.

Davis, R. (1995) New Principles for Management Development, *Management Development Review,* 8(6), pp. 5-8.

Drucker (1998) 'Management's new paradigms', *Forbes* p. 98.

Drucker, P. (1999a) Knowledge-worker productivity: The biggest challenge, *California Management Review,* 41(2), pp. 97-95.

Drucker, P. (1999b) Managing oneself, *Harvard Business Review,* 77(5), pp. 64-75.

Farrell, P. and Gale, A. (1999) *The Need to Remove Ambiguity from the Role of Construction Site Managers,* (last accessed 27 October, 2009), from http://www.rics.org/site/download_feed.aspx?fileID=2750&fileExtension=PDF.

Fey, C. and Bjorkman, I. (2001) The effect of human resource management practices on MNC subsidiary performance in Russia, *Journal of International Business Studies,* 32(1).

Fournier, H. and Ineson, E. M. (2009) 'Closing the Gap between Education and Industry: Skills and competencies requirements for food service internships in Switzerland',*International CHRIE Conference*, Massachusetts, p. 11.

Frahm, J. and Brown, K. (2006) Developing communicative competencies for a learning organization, *Journal of Management Development,* 25(3), pp. 201-212.

Friedman, H., Herskovitz, P. and Pollack, S. (2003) The biasing effects of scale-checking styles on response to a Likert scale, *Proceedings of survey research methods section, American Statistical Association, http://www. amstat. org/sections/srms/Proceedings/y1993. html, accessed on 9th May*.

Gabric, D., Ernst, C. G. and McFadden, Y. K. L. (2001) Student and employer perceptions of desirable entry-level operations management skills, *Mid American Journal of Business,* 16(1), p. 51.

Gale, A. and Cartwright, S. (1995) Women in Project Management: entry into a male domain, *Leadership & Organization Development Journal,* 16(2), pp. 3-8.

Galer, J. (2004) Developing Managers who Lead, *The Manager,* 10(3), pp. 1-20.

Galer, J., Powers, M. and Seltzer, J. (2001) Management Sciences for Health-Developing Managers Who Lead, *The Manager,* 10(3), pp. 1-20.

Gosling, J. and Mintzberg, H. (2003) The five minds of a manager, *Harvard Business Review,* 81(11), pp. 54-63.

Gyasi, A. O. (2007) *First Job Expectations of Civil Engineering Students.* University of Witwatersrand, Johannesburg.

Hackman, J. and Wageman, R. (2005) A theory of team coaching, *Academy of Management Review,* 30(2), pp. 269-287.

Handy, C. (2001) A world of fleas and elephants, *The Future of Leadership Today's Top Leadership Thinkers Speak to Tomorrow's Leaders, Jossey-Bass, San Francisco, CA*, pp. 29-40.

Hassan, P. F., Griffith, A. and Stephenson, P. (2005) An Empirical study of the training needs of site managers within the UK construction Industry, *21st Annual ARCOM Conference*, Vol. 1, pp. 95-104, University of London, London.

Hay, A. and Hodgkinson, M. (2008) More Success than Meets the Eye- A Challenge to Critiques of the MBA, *Management Learning,* 39(1), pp. 21-40.

Hoyrup, S. (2004) Reflection as a core process in organisational learning, *Workplace Learning,* 16(8), pp. 442-454.

Human, L. (1991) *Educating & Developing managers for a changing South Africa*, Juta and Co, Cape Town.

Hyerle, D. (2000) Thinking Maps: Visual Tools for Activating Habits of Mind, *Activating and engaging habits of mind*, pp. 46-58.

Johnson, L. K. (2005) Real-Time Learning: How the Best Companies and Leaders Make It Happen, *Harvard Management Update,* 10(1), pp. 3-5.

Johnson, L. K. (2006) Telling the Hard Truth About Poor Performance, *Harvard Management Update,* 11(7), pp. 3-4.

Johnson, L. K. (2007) Are You Delegating So It Sticks?, *Harvard Management Update,* 12(9), pp. 3-5.

Kalaf, L., Dan, A. and Dietz, T. (2008) *Essentials of Social Research*, Open University Press, Berkshire.

Keenan, A. and Newton, T. J. (1986) Work Aspirations and Experiences of Young Graduate Engineers, *Journal of Management Studies,* 23(2), pp. 224-237.

Kincaid, S. and Gordick, D. (2003) The return on investment of leadership development: Differentiating our discipline, *Consulting Psychology Journal: Practice and Research,* 55(1), pp. 47-57.

Klagge, J. (1998) Self-perceived development needs of todays middle managers, *Journal of Management,* 17(7), pp. 481-491.

Kotter, J. (2001) What leaders really do, *Harvard Business Review,* 79(11), p. 12.

Kotter, J. (1995) *The New Rules: How to Succeed in Today's Post-Corporate World*, Free Press, New York.

Krosnick, J. (1999) Survey research, *Annual review of psychology,* 50(1), pp. 537-567.

Lam, S. and Tang, C. (2003) Motivation of Survey Employees in Construction Projects, *Journal of Geospatial Engineering,* 5(1), pp. 61-66.

Lawless, A. (2005) *Numbers & Needs: Addressing imbalances in the civil engineering profession,* First edition ed., South African Institute of Civil Engineering, Midrand.

Lawless, A. (2007) *Numbers & Needs in Local Government: Addressing civil engineering-the critical profession for service delivery,* 1st ed., South African Institution of Civil Engineering, Midrand.

Leach, M. F. (2000) Engineering Coaching and Mentoring Programs, *Organizational Engineering Institute,* 1(3), p. 9.

Lee, J. A. (1968) Developing managers in developing countries, *Harvard Business Review,* 46(6), pp. 55-65.

Leedy, P. D. and Ormrod, J. E. (2005) *Practical Research: Planning and Design,* 8th Edition ed., Pearson Merill Prentice Hall, New Jersey.

Liu, S. (2006) Developing China's future managers:learning from the west?, *Education & Training,* 48(1), pp. 6-14.

London, M. (1985) *Developing Managers*, Jossey-Bass Inc, San Francisco.

Longenecker, O. C. and Fink, S. L. (2006) How top level managers develop: a field study, *Development and Learning in Organisations,* 20(5), pp. 18-20.

Love, P. E. D. and Haynes, N. S. (2001) Construction managers' expectations and observations of graduates, *Journal of Managerial Psychology,* 16(8), pp. 579-593.

Love, P. E. D., Haynes, N. S., Sohal, A. S., Chan, A. P. C. and Tam, C. M. (2002) *Key Construction Management Skills for Future Success*, No. Working Paper 49/02, Monash University.

Lowitt, S. (2007) *Construction Future Growth Opportunities: The potential of the Civil Engineering and Construction Works Sector,* Research Report 20498, Human Sciences Research Council, Pretoria.

Mabey, C. and Ramirez, M. (2004) *Developing managers: A European perspective*, Chartered Management Insitute London.

Malhotra, N. K. (1996) 'Chapter 19:Factor Analysis', In 2nd (ed.), *Marketing Research: An Applied Orientation,* 2 ed., Prentice Hall, Upper Saddle River, pp. 643-669.

McBeath, G. (1994) *Practical Managemen Development: Strategies for management resourcing and development in the 1990's*, Blackwell, Oxford.

McCall, C. (2001) 'An empirical examination of the Likert scale: some assumptions, development, and cautions', pp. 15-16.

McCord, A. (2003) 'An overview of the performance and potential of public works programmes in South Africa', pp. 8–10.09.

Mintzberg, H. (1975) The Managers Job:Folklore and Fact, *Harvard Business Review,* 53(4), pp. 163-176.

Mintzberg, H. (1999) Managing quietly, *Leader to Leader,* 12, pp. 24-30.

Mintzberg, H. (2004) *Managers not MBA: A hard look at the soft pratice of managing and management development*, Berret-Koehler, San Franscisco.

Mumford, T., Campion, M. and Morgeson, F. (2007) The leadership skills strataplex: Leadership skill requirements across organizational levels, *The Leadership Quarterly,* 18(2), pp. 154-166.

Myers, J. (2004) Developing managers: a view from the non-profit sector, *Journal of European Industrial Training,* 28(8/9), pp. 639-656.

Newton, R. and Wilkinson, M. (1995) Critical Success in Management Development, *Management Development Review,* 8(1), pp. 16-24.

Ng, S. T., Skitmore, R. M., Lam, K. C. and Poon, A. W. C. (2004) Demotivating factors influencing the productivity of civil engineering projects, *International Journal of Project Management,* 22(2), pp. 139-146.

O'Flaherty, C. and Everson, J. (2005) 'Coaching in Leadership Development', In *Brain-Based Executive Education.* Knowres Publishing, Cape Town, pp. 1-13.

Odusami, K., Oyediran, O. and Oseni, A. (2007) Training needs of construction site managers, *Emirates Journal for Engineering Research,* 12(1), pp. 73-81.

Pauw, K., Oosthuizen, M. and Van der Westhuizen, C. (2008) Graduate unemployment in the face of skills shortages: A labour market paradox, *South African Journal of Economics,* 76(1), pp. 45-57.

Peters, T. (2001) Rule# 3: Leadership is confusing as hell, *Fast Company,* 44, p. 124.

Pfeffer, J. (1998) The human equation, *Journal Business,* 13(2), p. 55.

Pfeffer, J. (2001) Fighting the war for talent is hazardous to your organization's health, *Organizational Dynamics,* 29(4), pp. 248-259.

Quick, T. L. (1991) *Training managers so they can really manage*, Jossey-Bass Limited.

Robinson, H. S., Anumba, C. J. and Carrillo, P. M. (2005) Insights from research: business perforamance measurement practices in construction engineering organistions, *Measuring Business Excellence,* 9(1), pp. 13-22.

Robotham, D. and Jubb, R. (1995) Competences:measuring the unmeasurable, *Management Development Review,* 9(5), pp. 25-29.

Ross, J. A. (2005) How to Be the Best Coach for Your Team, *Harvard Management Update,* 10(11), pp. 3-5.

Russell, J., Yao, J., Farr, J., Walesh, S. and Bishop, J. (1996) Consensus! Engineering students need more management education, *Journal of Management in Engineering,* 12(6), pp. 17-29.

Scott, N., Ponniah, D. and Saud, B. (1997) A window on management training within the construction industry, *Industrial and Commercial Training,* 29(5), p. 148.

Senge, P., Smith, B., Kleiner, A., Roberts, C., Ross, R. and Roth, G. (1999) The Challenges of Profound Change, *Prism-Cambridge Massachusettes,* 2, pp. 5-22.

Serpell, A. and Ferrada, X. (2007) A Competency-based model for construction supervisors in developing countries, *Personal Review,* 36(4), pp. 585-602.

Sheath, D., Woolley, H., Cooper, R., Hinks, J. and Aouad, G. (1996) 'A process for change-the development of a generic design and construction process protocol for the UK construction industry', Institution of Engineers, Australia, pp. 85-90.

Sherman, S. and Freas, A. (2004) The wild west of executive coaching, *Harvard Business Review,* 82(11), pp. 82-93.

Simon, H. (1987) Making management decisions: The role of intuition and emotion, *The Academy of Management Executive (1987-1989)*, pp. 57-64.

Siso, L. (2008) *Corporate Brand Management in South Africa.* Unpublished MBA Thesis, University of Witwatersrand, Johannesburg.

Smith, B. and Dodds, B. (1997) Developing managers in the project-oriented organistion, *Journal of European Industrial Training,* 21(5), pp. 165-170.

Stone, M. F. and Sachs, T. R. (1995) *The high value manager: developing core competencies your organization demands*, Amacom, New York.

Styhre, A. (2007) Coaching as second order observations:learning from site managers in the construction industry, *Leadership & Organization Development Journal,* 29(3), pp. 275-290.

Styhre, A. and Josephson, P. E. (2007) Coaching the site manager: effects on learning and managerial practice, *Construction Management and Economics,* 25(12), pp. 1295-1304.

Teixeira, J., Minasowicz, A., Zavadskas, E., Ustinovichius, L., Migilinskas, D. and Armitiana, E. (2006) Training needs in construction project management: a survey of 4 countries of the EU, *Journal of Civil Engineering and Management,* 12(3), pp. 237-245.

Thwala, W. D. (2008) Skills development in South Africa: Group Five's social investment project, *Development in Practice,* 18, pp. 446-449.

Thys, J. J. (1995) *The Role of Established Contractors in the Management of labour-Intensive Construction Projects.* Unpublished MBA Thesis, University of Witwatersrand, Johannesburg.

Turner, M. and Lingard, H. (2009) Work-Life balance: an exploratory study of supports and barriers ina construction project, *Internation Journal of Managing Projects in Business,* 2(1), pp. 94-111.

Wales, S. (2001) Why coaching?, *Journal of Change Management,* 3(3), pp. 275-282.

Watson, S. (2008) Where are we now? A review of management development issues in the hosptality and tourism sector, *International Journal of Contempoary Hospitality Management,* 20(7), pp. 758-780.

Webb, P. (2006) *The Impact of Executive Coaching on Leadership Effectiveness,* (last accessed 27 October, 2009), from http://www.sophia-associates.com/Impact_of_Executive_Coaching_on_Leadership_Effectiveness.pdf.

Witthuhn, N. (2009) Executive Coaches- What should you ask when selecting a coach?, *HR Review*.

Zaleznik, A. (1989) Managers and leaders: are they different?, *Harvard Business Review,* 82(1), p. 64.

APPENDIX A

Letter to Respondents

Dear Respondent

My name is Terence Reddy and I am an employee of Grinaker-Lta Building. I am currently doing my MBA at Wits University and as part of my research I am studying ways in order to improve an engineer's ability to manage their construction projects more effectively. By learning to manage projects more effectively it will lead to cost reduction, quality improvements and financial performance improvement for the construction project.

I am currently carrying out a survey in order to determine the actual problems within our organisation. By you completing this survey, you are assisting in terms of diagnosing the right problems and designing the appropriate solutions. Please be totally honest in your responses. Hence I would greatly appreciate it if you could kindly complete the questionnaire.

Your responses are anonymous. Any information obtained in connection with this study that can be identified with you will remain confidential. In written reports or publications no one will be identified. You are free to withdraw your participation at any time. If you have any questions about the research please contact me Mr Terence Reddy (072 241 9686) or treddy@grinaker-lta.co.za.

Thank you for your cooperation.

Yours sincerely,

Terence Reddy

University of Witwatersrand

Actual Research Instrument

Please give the following information about yourself by marking the appropriate box:

Gender:

Male	
Female	

Job Description:

Foreman	
General Foreman	
Engineer	
Site Manager	
Contract manager	
Director	

Race:

Black	
White	
Indian	
Coloured	

Nationality (please specify):

Please indicate by marking the appropriate box to what extent you agree or disagree with each of the following statements:

Statement	*Strongly disagree*	*Disagree*	*Tend to disagree*	*Neutral*	*Tend to agree*	*Agree*	*Strongly agree*
1. I enjoy working on a construction site							
2. My company encourages employees to participate in management related courses							
3. My last training course was on management development							
4. I prefer on-the-job training compared to off-the-job training							
5. Coaches are used in my company to develop employees							
6. Engineers are given opportunities at the workplace to practice new skills learnt.							

Statement	*Strongly disagree*	*Disagree*	*Tend to disagree*	*Neutral*	*Tend to agree*	*Agree*	*Strongly agree*
7. I am happy with the process of how performance appraisals are conducted at G-LTA							
8. Knowing an individual's strengths and weaknesses assists people in their workplace development							
9. My superiors give me regular feedback about my performance							
10. Working long hours on a construction site gives me a sense of achievement							
11. Management development of engineers will improve site productivity							
12. My training needs are diagnosed correctly by my manager							
13. I need to be able to manage myself in order to become an effective manager							
14. I am aware of the benefits of having a coach to assist me							
15. Self-reflection is not a useful tool for engineers in the construction industry							
16. Management education is too theoretical and does not assist in becoming an effective manager							
17. I prefer learning about management through work experience instead of studying management.							
18. Coaching will not assist me to improve my management skills							
19. I know what my weaknesses are, related to my job							
20. I focus on developing my weaknesses more than I focus on developing my strengths							
21. I regularly engage in self reflection related to my work experiences							
22. I am comfortable about hearing harsh feedback related to my work performance							
23. Regular feedback will facilitate my management development process							
24. I enjoy my job working on a construction site							
25. Management education is promoted in my workplace							

Please list **any othe**r factors not mentioned in this questionnaire, which you feel contribute to the development of management skills in engineers.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Please list **any other** methods which you feel can assist engineers in becoming better managers

_____

_____

_____

_____

_____

_____

_____

_____

_____

Thank you for participating in this survey!

APPENDIX B

Research problem: To identify the factors influencing the development of management skills in South African civil engineers					
Main problem	**Literature Review**	**Propositions**	**Source of data**	**Type of data**	**Analysis**
To identify factors influencing the development of management skills in South African civil engineers	DNetto, Bakas and Bordia (2008) Drucker (1999) Farrel and Gale (1999) Gosling and Mintzberg (2003) Johnson (2005) Kotter (2001) Lawless (2005) and (2007) Longenecker and Fink (2006) Love, Haynes, Sohal, Chan and Tam (2002) Lowitt (2007) Mintzberg (1975) and (2004) Ng, Skitmore, Lam and Poon (2004) Robotham and Jubb (1995) Scott, Ponniah and Saud (1997) Sherman and Freas (2004) Styhre and Josephson (2007)	Proposition 1: The barriers of management skills development in South African civil engineers include lack of training, management skills and job dissatisfaction. Proposition 2: The facilitators of management skill development in South African civil engineers include coaching, training, management education, feedback systems and self development.	Respondents will provide the data through the use of a 7 point Likert scale questionnaire. Proposition 1 statement numbers : 1,3,4,6,7,10,12 Proposition 2 statement numbers : 2,5,8,9,11,13,14,15,16,17, 18,19,20,21,22,23,24,25	Quantitative data	Factor Analysis Draw Findings Conclusions

APPENDIX C: FACTOR ANALYSIS REPORT

Results pertaining to Proposition 1

Descriptive Statistics Section

Variables	Count	Mean	Standard Deviation	Communality
C1	100	5.92	1.368329	0.133419
C3	100	4.74	2.033159	0.033330
C4	100	5.16	1.548672	0.563234
C6	100	4.87	1.508595	0.314659
C7	100	4.01	1.872151	0.635672
C10	100	3.98	1.645195	0.050843
C12	100	4.39	1.607401	0.287962

Correlation Section

	Variables				
Variables	**C1**	**C3**	**C4**	**C6**	**C7**
C1	1.000000	0.086849	0.087135	0.185750	0.252671
C3	0.086849	1.000000	0.167329	0.021801	-0.004617
C4	0.087135	0.167329	1.000000	0.406752	0.076088
C6	0.185750	0.021801	0.406752	1.000000	0.190016
C7	0.252671	-0.004617	0.076088	0.190016	1.000000
C10	0.205685	-0.068006	0.052807	0.121036	0.173879
C12	0.161289	0.068430	0.230316	0.212732	0.438406

Phi=0.190892 Log(Det|R|)=-0.695623 Bartlett Test=66.66 DF=21 Prob=0.000001

	Variables	
Variables	**C10**	**C12**
C1	0.205685	0.161289
C3	-0.068006	0.068430
C4	0.052807	0.230316
C6	0.121036	0.212732
C7	0.173879	0.438406
C10	1.000000	0.010619

C12 0.010619 1.000000

Phi=0.190892 Log(Det|R|)=-0.695623 Bartlett Test=66.66 DF=21 Prob=0.000001

Eigenvalues after Varimax Rotation

		Individual	Cumulative	
No.	**Eigenvalue**	**Percent**	**Percent**	**Scree Plot**
1	1.140252	56.94	56.94	|||||||||||
2	0.878866	43.89	100.84	||||||||
3	0.225664	11.27	112.11	|||
4	0.079190	3.95	116.06	|
5	-0.027062	-1.35	114.71	|
6	-0.094865	-4.74	109.97	|
7	-0.199660	-9.97	100.00	||

Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C1	-0.347658	0.112039
C3	-0.006255	0.182458
C4	-0.117281	0.741269
C6	-0.274051	0.489444
C7	-0.796892	-0.025182
C10	-0.222783	0.034790
C12	-0.495800	0.205290

Bar Chart of Absolute Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C1	|||||||	|||
C3	|	||||
C4	|||	||||||||||||
C6	||||||	|||||||||
C7	||||||||||||||	|
C10	|||||	|
C12	|||||||||	|||||

Communalities after Varimax Rotation

	Factors		
Variables	**Factor1**	**Factor2**	**Communality**
C1	0.120866	0.012553	0.133419
C3	0.000039	0.033291	0.033330
C4	0.013755	0.549479	0.563234
C6	0.075104	0.239555	0.314659
C7	0.635037	0.000634	0.635672
C10	0.049632	0.001210	0.050843
C12	0.245818	0.042144	0.287962

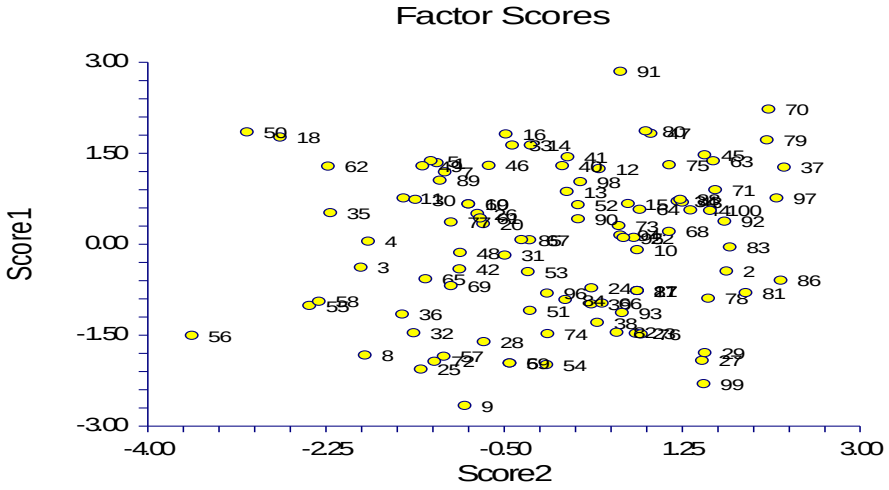
Bar Chart of Communalities after Varimax Rotation

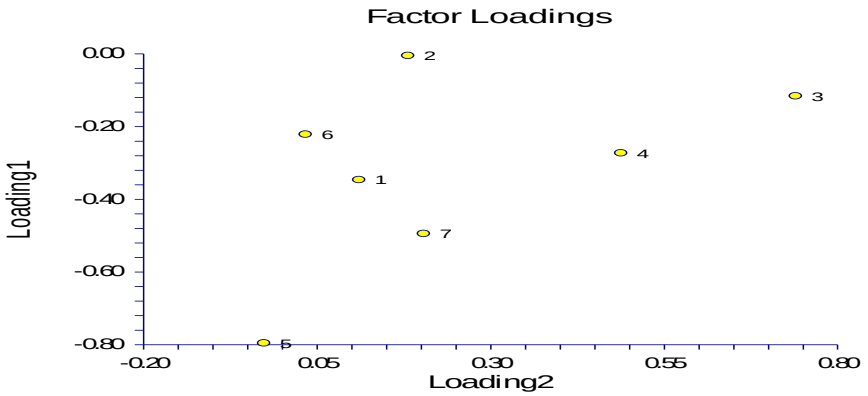
	Factors		
Variables	**Factor1**	**Factor2**	**Communality**
C1	|||	|||
C3				
C4			||||||||||	||||||||||
C6	||	|||||	|||||||
C7	||||||||||||		||||||||||||
C10				||
C12	|||||		||||||

Factor Structure Summary after Varimax Rotation

	Factors
Factor1	**Factor2**
C7	C4
C12	C6

Plots Section





Results pertaining to Proposition 2

Descriptive Statistics Section

Variables	Count	Mean	Standard Deviation	Communality
C2	99	5.030303	1.593703	0.332281
C5	99	4.494949	1.716509	0.289095
C8	99	6.131313	1.183617	0.438387
C9	99	4.060606	1.67099	0.151367
C11	99	5.787879	1.319189	0.351747
C13	99	6.181818	1.003704	0.280411
C14	99	5.434343	1.598224	0.332070
C15	99	2.959596	1.889386	0.219325
C16	99	3.171717	1.525567	0.017692
C17	99	4.222222	1.575032	0.161383
C18	99	2.515152	1.480235	0.293086
C19	99	5.232323	1.243992	0.130721
C20	99	4.414141	1.456933	0.132229
C21	99	4.969697	1.328299	0.130960
C22	99	4.757576	1.696881	0.109911
C23	99	5.909091	0.9803259	0.212463
C24	99	5.787879	1.311431	0.239650
C25	99	4.484848	1.599513	0.407246

Correlation Section

	Variables				
Variables	**C2**	**C5**	**C8**	**C9**	**C11**
C2	1.000000	0.367471	0.041145	0.279018	0.090453
C5	0.367471	1.000000	-0.067474	0.384326	-0.124401
C8	0.041145	-0.067474	1.000000	0.119758	0.462412
C9	0.279018	0.384326	0.119758	1.000000	0.163280
C11	0.090453	-0.124401	0.462412	0.163280	1.000000
C13	0.181515	0.041998	0.340448	0.066372	0.222089
C14	0.243162	0.132852	0.471201	0.169624	0.411971
C15	-0.108031	0.084888	-0.216623	0.036336	-0.167233
C16	-0.157450	0.056837	-0.136939	0.103953	-0.169318
C17	0.139570	0.170264	-0.207389	-0.098221	-0.114592
C18	-0.011010	0.099427	-0.231201	0.049130	-0.277907
C19	-0.060204	0.131970	0.180045	0.209148	0.185786
C20	0.245036	0.096731	-0.162038	0.014733	0.051483
C21	0.087203	0.073776	-0.003934	-0.012956	0.159347
C22	0.112168	-0.017941	-0.014472	0.174375	0.077079
C23	0.191187	0.093716	0.115922	0.071918	0.079621
C24	0.339983	0.174038	0.057571	0.206154	0.268637
C25	0.406480	0.417155	-0.012413	0.221779	0.058910

Phi=0.183159 Log(Det|R|)=-4.234215 Bartlett Test=386.02 DF=153 Prob=0.000000

Correlation Section

	Variables				
Variables	**C13**	**C14**	**C15**	**C16**	**C17**
C2	0.181515	0.243162	-0.108031	-0.157450	0.139570
C5	0.041998	0.132852	0.084888	0.056837	0.170264
C8	0.340448	0.471201	-0.216623	-0.136939	-0.207389
C9	0.066372	0.169624	0.036336	0.103953	-0.098221
C11	0.222089	0.411971	-0.167233	-0.169318	-0.114592
C13	1.000000	0.249239	-0.383505	0.072699	-0.103276
C14	0.249239	1.000000	-0.234053	-0.064383	0.030177
C15	-0.383505	-0.234053	1.000000	-0.025890	0.027051
C16	0.072699	-0.064383	-0.025890	1.000000	0.081631
C17	-0.103276	0.030177	0.027051	0.081631	1.000000
C18	-0.304070	-0.276702	0.361430	0.082432	0.103584
C19	0.137445	0.082170	-0.074112	0.204590	-0.042242
C20	0.073586	0.018370	0.109935	-0.050686	0.181824
C21	0.111327	0.087976	-0.053350	0.153661	0.193470
C22	0.086056	-0.051080	-0.139944	0.130556	0.180717
C23	0.317713	0.168740	-0.255423	-0.071331	0.145391
C24	-0.024666	0.068748	-0.065267	-0.098915	0.205839
C25	0.027157	-0.015362	0.030184	0.057530	0.216021

Phi=0.183159 Log(Det|R|)=-4.234215 Bartlett Test=386.02 DF=153 Prob=0.000000

Correlation Section

	Variables				
Variables	**C18**	**C19**	**C20**	**C21**	**C22**
C2	-0.011010	-0.060204	0.245036	0.087203	0.112168
C5	0.099427	0.131970	0.096731	0.073776	-0.017941
C8	-0.231201	0.180045	-0.162038	-0.003934	-0.014472
C9	0.049130	0.209148	0.014733	-0.012956	0.174375
C11	-0.277907	0.185786	0.051483	0.159347	0.077079
C13	-0.304070	0.137445	0.073586	0.111327	0.086056
C14	-0.276702	0.082170	0.018370	0.087976	-0.051080
C15	0.361430	-0.074112	0.109935	-0.053350	-0.139944
C16	0.082432	0.204590	-0.050686	0.153661	0.130556
C17	0.103584	-0.042242	0.181824	0.193470	0.180717
C18	1.000000	-0.209737	0.103521	-0.023118	0.127414
C19	-0.209737	1.000000	-0.042368	0.263668	0.244482
C20	0.103521	-0.042368	1.000000	0.370372	0.119446
C21	-0.023118	0.263668	0.370372	1.000000	0.114414
C22	0.127414	0.244482	0.119446	0.114414	1.000000
C23	-0.220546	0.193209	0.126650	0.264295	0.256518
C24	-0.200703	0.180630	0.169280	0.148574	0.050023
C25	0.005485	0.224866	0.131892	0.165477	0.288117

Phi=0.183159 Log(Det|R|)=-4.234215 Bartlett Test=386.02 DF=153 Prob=0.000000

Correlation Section

	Variables		
Variables	**C23**	**C24**	**C25**
C2	0.191187	0.339983	0.406480
C5	0.093716	0.174038	0.417155
C8	0.115922	0.057571	-0.012413
C9	0.071918	0.206154	0.221779
C11	0.079621	0.268637	0.058910
C13	0.317713	-0.024666	0.027157
C14	0.168740	0.068748	-0.015362
C15	-0.255423	-0.065267	0.030184
C16	-0.071331	-0.098915	0.057530
C17	0.145391	0.205839	0.216021
C18	-0.220546	-0.200703	0.005485
C19	0.193209	0.180630	0.224866
C20	0.126650	0.169280	0.131892
C21	0.264295	0.148574	0.165477
C22	0.256518	0.050023	0.288117
C23	1.000000	0.238832	0.106487
C24	0.238832	1.000000	0.297621
C25	0.106487	0.297621	1.000000

Phi=0.183159 Log(Det|R|)=-4.234215 Bartlett Test=386.02 DF=153 Prob=0.000000

Eigenvalues after Varimax Rotation

No.	Eigenvalue	Individual Percent	Cumulative Percent	Scree Plot
1	2.164164	49.29	49.29	|||||||||
2	2.065861	47.05	96.35	|||||||||
3	0.798554	18.19	114.54	||||
4	0.630496	14.36	128.90	|||
5	0.470532	10.72	139.61	|||
6	0.347088	7.91	147.52	||
7	0.227642	5.19	152.70	||
8	0.135940	3.10	155.80	|
9	0.044750	1.02	156.82	|
10	-0.004794	-0.11	156.71	|
11	-0.144043	-3.28	153.43	|
12	-0.193327	-4.40	149.03	|
13	-0.228011	-5.19	143.83	||
14	-0.292897	-6.67	137.16	||
15	-0.323677	-7.37	129.79	||
16	-0.368579	-8.40	121.39	||
17	-0.446228	-10.16	111.23	|||
18	-0.493075	-11.23	100.00	|||

Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C2	-0.122863	0.563193
C5	0.098488	0.528579
C8	-0.659287	-0.061057
C9	-0.116191	0.371304
C11	-0.584916	0.098084
C13	-0.516441	0.117044
C14	-0.560231	0.134951
C15	0.467880	-0.020341
C16	0.112985	0.070189
C17	0.194840	0.351312
C18	0.540330	0.033607
C19	-0.249472	0.261695
C20	0.089184	0.352527
C21	-0.095202	0.349137
C22	-0.025571	0.330541
C23	-0.311372	0.339869
C24	-0.167773	0.459894
C25	0.043693	0.636661

Bar Chart of Absolute Factor Loadings after Varimax Rotation

	Factors	
Variables	**Factor1**	**Factor2**
C2	|||											
C5	||	||||||||||
C8	||||||||||||||	||
C9	|||	||||||||
C11	||||||||||||	||
C13	||||||||||	|||
C14	||||||||||||	|||
C15												
C16	|||	||
C17	||||	||||||||
C18													
C19	|||||	||||||
C20	||	||||||||
C21	||	|||||||
C22										
C23	|||||||	|||||||
C24	||||	|||||||||
C25															

Communalities after Varimax Rotation

	Factors		
Variables	**Factor1**	**Factor2**	**Communality**
C2	0.015095	0.317186	0.332281
C5	0.009700	0.279395	0.289095
C8	0.434659	0.003728	0.438387
C9	0.013500	0.137867	0.151367
C11	0.342127	0.009620	0.351747
C13	0.266711	0.013699	0.280411
C14	0.313858	0.018212	0.332070
C15	0.218911	0.000414	0.219325
C16	0.012766	0.004926	0.017692
C17	0.037963	0.123420	0.161383
C18	0.291956	0.001129	0.293086
C19	0.062236	0.068484	0.130721
C20	0.007954	0.124275	0.132229
C21	0.009063	0.121896	0.130960
C22	0.000654	0.109257	0.109911
C23	0.096953	0.115511	0.212463
C24	0.028148	0.211502	0.239650
C25	0.001909	0.405337	0.407246

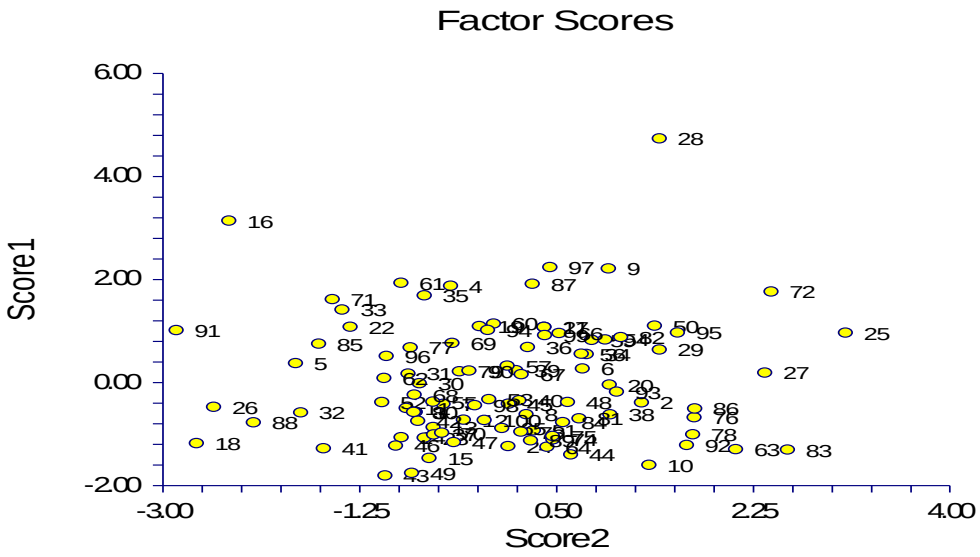
Bar Chart of Communalities after Varimax Rotation

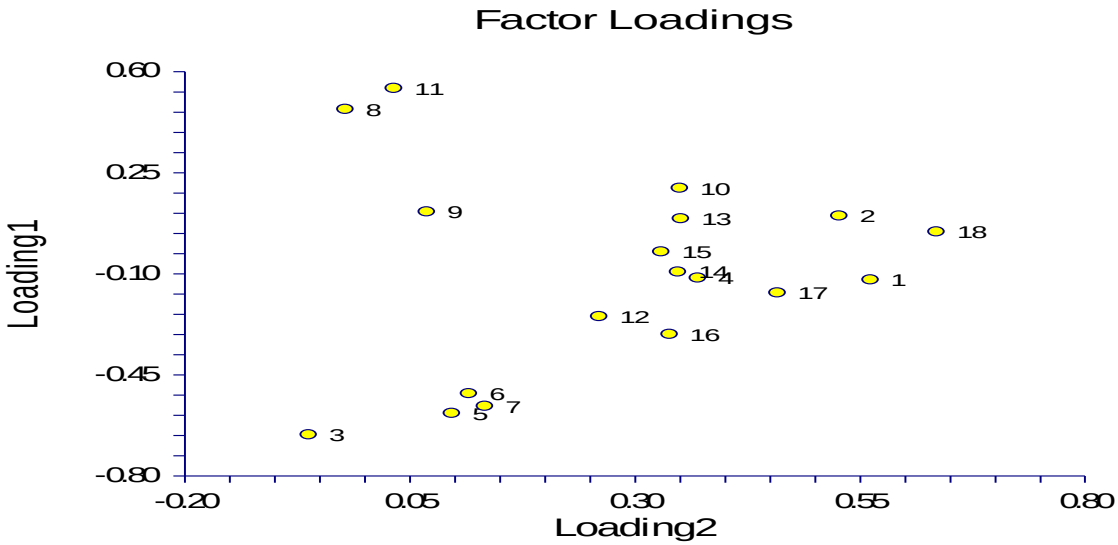
	Factors		
Variables	**Factor1**	**Factor2**	**Communality**
C2	|	||||||	||||||
C5	|	|||||	|||||
C8	||||||||	|	||||||||
C9	|	|||	||||
C11	||||||	|	|||||||
C13	||||||	|	||||||
C14	||||||	|	||||||
C15	|||||	|	|||||
C16	|	|	|
C17	|	|||	||||
C18	|||||	|	|||||
C19	||	||	|||
C20	|	|||	|||
C21	|	|||	|||
C22	|	|||	|||
C23	||	|||	|||||
C24	|	|||||	|||||
C25	|	||||||||	||||||||

Factor Structure Summary after Varimax Rotation

	Factors
Factor1	**Factor2**
C8	C25
C11	C2
C14	C5
C18	C24
C13	
C15	

Plots Section




Factor Loadings
Loading1
Loading2
0.60
0.25
-0.10
-0.45
-0.80
-0.20
0.05
0.30
0.55
0.80
11
8
9
10
13
15
14
4
12
16
17
2
18
1
6
7
5
3