

# **THE ROLE OF KNOWLEDGE MANAGEMENT IN ORGANISATIONAL PERFORMANCE**

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## **Abstract**

An organisation's success to a great extent depends on its capability to leverage knowledge and produce value from its knowledge resources. However, shifting workforce demographics are causing challenges to organisations in this regard. A significant number of experienced employees are retiring, changing to part-time or moving from their employment. This leads to corporate memory loss. Catalysts of the problem include cost saving calls that have left companies struggling to maintain the current productive labour force in the face of dwindling labour pools due to streamlining of operations. The recent economic recession caused retrenchments across many organisations and thus loss of knowledge. The increased mobility of the younger generation of employees is not helping either. The consequences of this management challenge range from loss in efficiency, loss in time, lack of capacity to reach strategic goals, decrease in employee and customer satisfaction levels, costly expenditures of trying to recoup lost knowledge pieces ultimately resulting in the potential compromise of the company's performance.

It is therefore the objective of this study to establish if there is a relationship between knowledge management and organisational performance. As part of the study, knowledge management was thought to comprise the key constructs of knowledge dissemination (KDI), knowledge acquisition (KAC), responsiveness to knowledge (RTK) and knowledge management practices (KMP) as identified in prior studies. Interestingly, results point to the inability of respondents to clearly distinguish between KDI, KAC and RTK constructs. It would therefore seem that the understanding that previous researches, predominantly undertaken in developed societies, relied upon to create the three constructs does not exist in the construction and engineering industry in South Africa. The three constructs were thereafter collapsed into a distinct construct called knowledge process capability (KPC).

Using a respondent population of employees from companies in the construction and engineering industry in South Africa, results revealed the existence of



relationships between the component-constructs of KPC and KMP with organisational performance. A similar association was depicted on the constructs of interest, being knowledge management and organisational performance. Academically, the results enrich the body of literature as it pertains to knowledge management specifically in South Africa and more so in the engineering and construction industry. Practically, the empirical evidence provides necessary impetus for greater attention and investment on the part of companies in the area, buoyed by the realisation that it contributes to the goal of better organisational performance.

## TABLE OF CONTENTS

Acknowledgements.....	iii
Abbreviations.....	xviii
Abstract.....	iv
Appendices.....	xv
Glossary of terms.....	xvi
List of figures.....	xi
List of tables.....	xiii
CHAPTER 1 .....	1
INTRODUCTION.....	1
1.1    BACKGROUND .....	1
1.2    PROBLEM STATEMENT .....	2
1.3    RESEARCH QUESTIONS .....	7
1.4    AIM AND OBJECTIVES OF THE STUDY.....	8
1.5    RELEVANCE OF KNOWLEDGE MANAGEMENT TO THE CONSTRUCTION AND ENGINEERING SECTOR IN SOUTH AFRICA.....	9
1.6    SIGNIFICANCE OF THE STUDY .....	11
1.7    DELIMITATIONS.....	13
1.8    ASSUMPTIONS .....	13
1.9    OVERVIEW OF CHAPTERS .....	14
CHAPTER 2 .....	18
LITERATURE REVIEW OF KNOWLEDGE MANAGEMENT .....	18
2.1    INTRODUCTION TO KNOWLEDGE .....	18
2.1.1    Workforce demographics .....	19
2.1.2    Facets and categories of knowledge.....	22
2.2    KNOWLEDGE MANAGEMENT .....	25

2.2.1	Organisational perspective of knowledge management.....	28
2.2.2	The social perspective of knowledge management .....	37
2.2.3	The South African context: Knowledge Management landscape .....	43
2.3	DEVELOPING A MEASURE FOR KNOWLEDGE MANAGEMENT PRACTICES.....	48
2.4	KNOWLEDGE MANAGEMENT FACTORS .....	50
2.5	CONTRASTING THE RESOURCE-BASED PERSPECTIVE AND THE KNOWLEDGE-BASED VIEW .....	53
2.5.1	Limitations of the Resource Based Theory (RBT).....	55
2.5.2	The knowledge-based view (KBV) of a firm .....	60
2.5.3	Knowledge-based view: the problem-solving perspective.....	63
2.6	KNOWLEDGE MANAGEMENT AS A STRATEGY .....	65
2.7	KNOWLEDGE RESOURCES AND CAPABILITIES.....	68
2.7.1	Role of knowledge resources and capabilities .....	71
2.8	COMPETENCIES .....	73
2.8.1	Defining competencies.....	73
2.8.2	Types of employee competencies.....	77
2.8.3	Frameworks for developing employee competencies .....	79
2.8.4	Organisational learning and competence development .....	83
2.9	INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT.....	90
2.10	CHAPTER SUMMARY.....	93
CHAPTER 3 .....		97
LITERATURE REVIEW OF ORGANISATIONAL PERFORMANCE .....		97
3.1	THE NATURE OF ORGANISATIONAL PERFORMANCE.....	97
3.2	ELEMENTS OF ORGANISATIONAL PERFORMANCE .....	98
3.3	PERFORMANCE MANAGEMENT.....	104

3.4	KNOWLEDGE MANAGEMENT AND ORGANISATIONAL PERFORMANCE .....	110
3.5	KNOWLEDGE MANAGEMENT AND ORGANISATIONAL PERFORMANCE IN SOUTH AFRICA .....	114
3.6	CHAPTER SUMMARY .....	116
CHAPTER 4 .....		119
RESEARCH DESIGN AND METHODOLOGY .....		119
4.1	INTRODUCTION.....	119
4.2	RESEARCH PARADIGM .....	122
4.3	DESCRIPTION OF THE STRATEGY OF INQUIRY .....	124
4.4	TARGET POPULATION .....	132
4.5	SAMPLING .....	143
4.6	DATA COLLECTION.....	147
4.7	DATA ANALYSIS .....	152
4.7.1	Factor Analysis .....	152
4.7.2	Steps in Factor Analysis .....	153
4.7.3	Principal components.....	155
4.7.4	Grouped t - tests .....	155
4.7.5	The General Linear Model Procedure/Analysis of Variance (ANOVA).....	156
4.7.6	Qualitative analysis .....	157
4.8	ASSESSING AND DEMONSTRATING THE QUALITY AND RIGOUR OF THE PROPOSED RESEARCH DESIGN.....	157
4.10	CHAPTER SUMMARY.....	161
CHAPTER 5 .....		166
PRESENTATION OF RESULTS .....		166
5.1	INTRODUCTION .....	166
5.2	PERSONAL PROFILE .....	168

5.3	VALIDATION OF KNOWLEDGE MANAGEMENT SCALES.....	173
5.4	SCALE DEVELOPMENT AND DISCUSSION.....	174
5.4.1	Knowledge management practices (KMP).....	174
5.4.2	Knowledge acquisition (KAC).....	184
5.4.3	Knowledge dissemination (KDI).....	192
5.4.4	Responsiveness to knowledge (RTK).....	198
5.4.5	Organisational performance (OP).....	204
5.5	SCALES RELATIONSHIPS.....	207
5.6	FACTOR ANALYSIS.....	210
5.6.1	Principal components procedure.....	212
5.6.2	The General Linear Model Procedure – OP and KM.....	221
5.7	ASSESSMENT OF THE STRENGTH OF CONSTRUCT RELATIONSHIPS.....	228
5.7.1	The relationship between knowledge management and organisational performance.....	228
5.7.2	The relationship between knowledge process capability, knowledge management practices and organisational performance.....	230
5.8	CHAPTER SUMMARY.....	230
CHAPTER 6.....		234
FINDINGS AND DISCUSSION.....		234
6.1	INTRODUCTION.....	234
6.2	PERSONAL PROFILE OF RESPONDENTS.....	235
6.3	KNOWLEDGE MANAGEMENT.....	236
6.3.1	Knowledge management practices.....	236
6.3.2	Knowledge process capability.....	240
6.3.3	Organisational performance.....	247
6.3.4	The knowledge management and organisational performance nexus.....	251

CHAPTER 7 .....	255
CONCLUSION AND RECOMMENDATIONS.....	255
7.1    INTRODUCTION.....	255
7.2    RESEARCH QUESTIONS AND OBJECTIVES .....	256
7.2.1    Research question 1/ Objective 1 .....	256
7.2.2    Research question 2/ Objective 2 .....	258
7.2.3    Research question 3/ Objective 3 .....	261
7.2.4    Research question 4/ Objective 4 .....	262
7.3    CONCLUSION .....	263
7.4    PRACTICAL IMPLICATIONS OF RESULTS .....	266
7.5    RECOMMENDATIONS REGARDING FURTHER RESEARCH .....	269
8    LIST OF REFERENCES .....	271

## LIST OF FIGURES

Figure 1.1: An overview of chapters.....	14
Figure 2.1: Organisational knowledge infrastructure.....	29
Figure 2.2: The research model.....	52
Figure 2.3: Strategic resources, capabilities & organisational performance.....	68
Figure 2.4: Link between employee & firm competencies for competitiveness.....	77
Figure 2.5: Kolb's learning cycle.....	88
Figure 2.6: The Scandia intellectual capital value scheme.....	93
Figure 3.1: The McKinsey 7-S framework.....	99
Figure 3.2: Framework for organisational performance.....	101
Figure 3.3: Performance management model.....	106
Figure 3.4: Knowledge management benefits.....	112
Figure 4.1: The research process mapping.....	120
Figure 4.2: Relationships between core research terms used.....	121
Figure 4.3: The interrelationships between ontology, epistemology, methodology, methods and data sources.....	122
Figure 5.1: Level of education per company.....	170
Figure 5.2: Number of years in the construction & engineering industry.....	171
Figure 5.3: Management level of the respondents.....	172
Figure 5.4: Individual question score.....	176
Figure 5.5: Average score per question.....	176
Figure 5.6: KMP score.....	176
Figure 5.7: KAC score.....	185
Figure 5.8: KDI score.....	192
Figure 5.9: RTK score.....	199
Figure 5.10: OP score.....	204
Figure 5.11: The research model.....	211
Figure 5.12: Scree plot of principal components - KM questions.....	215
Figure 5.13: Scree plot of principal components - OP.....	221
Figure 5.14: Box and Whisker plot.....	224

Figure 5.15: The strength of relationships .....231  
Figure 6.1: The correlational model .....253



## LIST OF TABLES

Table 2.1: Profile of national population by race & gender .....	44
Table 2.2: Industry sector profile of population distribution at top management by race & gender .....	45
Table 2.3: Profile distribution at professional qualified level by race & gender ...	46
Table 2.4: Competency identification approaches .....	80
Table 2.5: Distinctions between organisational learning and the learning organisation .....	85
Table 4.1: JSE Construction and Engineering companies details .....	146
Table 5.1: Respondents dispersion per company .....	169
Table 5.1.1: Personal profile qualitative findings .....	172
Table 5.2: Results of reliability analysis .....	173
Table 5.3: Table for presenting qualitative results .....	177
Table 5.4: KMP score .....	178
Table 5.5: Percentage rates on the KMP scale .....	182
Table 5.6: KMP qualitative findings .....	183
Table 5.7: KAC scale scores .....	186
Table 5.8: KAC percentage scores .....	189
Table 5.9: KAC qualitative findings .....	191
Table 5.10: KDI scale scores .....	193
Table 5.11: KDI qualitative findings .....	197
Table 5.12: RTK scale scores .....	199
Table 5.13: OP scale scores .....	205
Table 5.14: Summary company ratings .....	207
Table 5.15: KM compared to actual performance .....	209
Table 5.16: Cross tabulation of KM and OP .....	210
Table 5.17: Principal components - all KM questions .....	213

Table 5.18: Sorted principal components - KPC and KMP .....	216
Table 5.19: Principal components - subjective organisational performance .....	220
Table 5.20: t-Test (LSD) for OP .....	222
Table 5.21: t - Grouping .....	223
Table 5.22: Anova - dependant variable : OP .....	225
Table 5.23: Assessing the strength of relationship .....	226
Table 5.24: Interaction .....	227
Table 5.25: Strength of relationship between KM components and OP .....	229
Table 6.1: KM compared to actual performance .....	249
Table 7.1: Knowledge management maturity model .....	267

## APPENDICES

APPENDIX A: Data collection instrument – questionnaire .....	309
APPENDIX B: Combined letter of introduction and Informed consent.....	317
APPENDIX C: Rating System Capturing Sheet.....	320
APPENDIX D: Semi-structured interview schedule .....	327
APPENDIX E: Summary of methodologies and key findings .....	328
APPENDIX F: Published results for construction companies .....	331

## GLOSSARY OF TERMS USED IN THE STUDY

**Capability:** “A bundle of assets or resources used to perform a business process that is made up of individual activities” (Barney & Hesterly, 2008:74).

**Competencies:** Skills and abilities by which resources are deployed effectively through an organisation’s activities and processes (Johnson, Scholes & Whittington, 2008:103).

**Intellectual Capital:** Refers to “intellectual material that has been formalised, captured and leveraged to produce a higher valued asset” (Kok, 2007:184) .

**Knowledge:** Organised information with a high proportion of human value added to include insight, interpretation, context, experience and wisdom (Davenport & Völpel 2001:10).

**Knowledge Management:** Refers to the process of enhancing company performance by designing and implementing tools, processes, systems, structures and cultures to improve the creation, sharing and use of knowledge (Gephart, Marsick, Van Buren & Spiro, 1996:71).

**Knowledge-Based View (KBV):** Competitive success is governed by the capability of organisations to develop new knowledge-based assets that create core competencies (Pemberton and Stonehouse, 2000:186).

**Organisational Performance:** The actual results achieved by a firm as measured against its intended outputs, goals or objectives (Kosilov, 2010:4).

**Resource-Based Theory (RBT):** A model of an organisation's performance that focuses on the resources and capabilities that are controlled by the organisation as a source of competitive advantage (Barney & Hesterly, 2008:352).

**Strategic Management:** "The field of study that deals with the major intended and emergent initiatives taken by managers on behalf of owners, involving utilization of resources, to enhance performance of firms in their external environments" (Nag, Hambrick, & Chen, 2007:944).

## **ABBREVIATIONS**

CIDB – Construction Industry Development Board

EFQM - European Foundation for Quality Management

JSE – Johannesburg Stock Exchange

KM – Knowledge management

KMP – Knowledge management practices

KAC – Knowledge acquisition

KDI – Knowledge dissemination

RTK – Responsiveness to knowledge

KPC – Knowledge process capability

OP – Organisational performance

KBV – Knowledge-based view

RBT – Resource-based theory

VRIO – Value, Rarity, Imitability, Organisation

# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND

In today's workplace, the nature of jobs is changing as they become more fluid and more broadly defined in response to the competitive business environment and globalisation (Wang, Noe & Wang, 2014). In a fast moving and changing business environment that has a knock-on effect on organisational performance, organisations are aware of the need to establish a strategic source of competitive advantage. Many organisations are invariably turning to knowledge management for leverage so as to derive competitive edge (Stevens, 2010). This suggests that many corporations have started to recognise knowledge management's strategic potential in coping with the turbulence of the current corporate environment. Davenport and Prusak (1998:17) posit that a "knowledge advantage is a sustainable advantage." Similarly, Eftekharzadeh (2008) suggests that effective knowledge management heralds an organisation's ability to remain competitive in the long run. It would therefore seem imperative for organisations to focus on managing their knowledge assets in order to create a sustainable advantage and value.

In organisations with a culture of recognising the significance of knowledge, variables such as accessibility of information, information sharing, information flow, personnel networking, communication atmosphere, leadership, systems thinking, problem solving and many other such factors can be supportive to successful learning (Warne, Ali & Pascoe, 2003). Knowing and understanding better the factors that play a role in the mobilisation of knowledge so as to

institutionalise knowledge management from a strategic managerial perspective can aid formulation of appropriate strategies to solve the numerous knowledge and learning challenges faced by organisations (Wong & Aspinwall, 2005:65).

Haggie and Kingston (2003) observe that what was clear is the term knowledge management has been applied to a very broad spectrum of activities within organisations intended to manage, exchange and enhance the intellectual assets in the firm but there is no general consensus on what knowledge management actually is.

## 1.2 PROBLEM STATEMENT

- *Organisations are faced with increasing mobility of their workforce; the consequence of which is a clear erosion of institutional knowledge in the workplace which in itself might be a critical pre-requisite for organizational success. In light of this, it has become necessary for organisations to pay higher levels of attention to the management of knowledge. For construction companies, the situation may be more interesting given that most employees are retained on a non-permanent employment contract basis. Further the benefits of investing in knowledge management in the construction and engineering sector of South Africa, particularly as it relates to organisational performance remains to be empirically established. This could to some extent dilute the motivation of organisations to invest ample effort and resources in it; and that is a problem.*

Learning and transferring knowledge within an organisation can be considered as being essential for the future success of the organisation. As such, it has become imperative for managers to enhance organisational competence in the development of knowledge, the capture of knowledge and the transfer of knowledge (Kipley, Lewis & Helm, 2008). Eftekharzadeh (2008) concurs by arguing that an organisation's success to a great extent depends on its



capability to leverage knowledge and produce value from its knowledge resources.

Shifting workforce demographics appear to be causing challenges to organisations and their history, which might place the organisation at a competitive disadvantage. There is an increase in aging workforce in many countries (Dwyer, 2009). Due to this, there is an expectation that there will be a significant number of experienced employees that will be retiring, changing to part-time, or moving from their employment (Lahaie, 2005). This warrants succession planning, and its execution through the next decade will be an indicator of whether companies are taking cognisance of the age-demography of their present workforce and reflect some degree of effort in knowledge management.

Martin (2000) notes that experienced executives hold important know-how, and if this information were to be lost it would be costly for the organisation to recover the information, if at all. Lahaie (2005) describe this loss of knowledge as a progression of corporate memory loss presented by an aging workforce. The situation is exacerbated by the fact that new managers must have those prior experiences and processes conveyed to them in a way that is clear and understandable, as a necessary precursor for satisfactory work performance.

The progressively aging workforce is a reflection of declining birth rates and the greying of the Baby-Boomer generation. Organisations employ diverse strata of individuals representing various generational cohorts. The classifications and number of active generations in the labour market is a matter of argument. Some argue that there are five generational cohorts (Kennedy, 2002; Novkovic, 2007) while others propose that there are four (Codrington & Grant-Marshall, 2004).

However, the following generational categories seem to be commonly found in literature (Codrington & Grant-Marshall, 2004; Howe & Strauss, 2007; Gursoy, Maier & Chi, 2007; Sayers, 2007; Stevens, 2010):

- Traditionalists also referred to as Silent Generation,
- Baby-Boomers,
- Generation X,
- Generation Y.

The Traditionalists were born between 1900 and 1945 (Kyles, 2009). These were shaped, mostly by the Great Depression and World War II, into conforming, consistent and loyal employees comfortable with a top-down management style.

The Baby-Boomers were born between 1946 and 1964. This is one of the largest cohorts in history and it impacted society, business and the economy in a significant way as they are reservoirs of much knowledge and now in the twilight of their careers (Westerman & Yamamura, 2007; Stevens, 2010). Born post-World War II, the Baby-Boomer generation was focused on work and was rewarded for their commitment and loyalty and to values such as relationship building (Cennamo & Gardener, 2009; Stevens, 2010). These values are part of the knowledge that has to be preserved for future generations.

Generation X is the next cohort to enter the work environment. Members of this group were and were born between 1965 and 1979. These are described as 'independent' compared to the Baby Boomers. The Generation X group witnessed the rise of technology, social insecurity and job insecurity. Therefore, Generation X is known for being committed to their own careers rather than to their organisations as they value skill development and productivity greatly (Cennamo & Gardener, 2009; Stevens, 2010). Kyles (2009) considered them to be disloyal due to their independence and autonomy. Consequently, they suffered from corporate lay-offs and recession and so they care little about relationship-building with top management. Managing their knowledge and experiences would help the organisation to preserve their experiences being kept as knowledge.

Generation X was succeeded by Generation Y. Members of the Generation Y cohort were born between 1980 and 1999. They experienced economic recessions starting off with the one in 1981. The Generation Y group is characterised by growth in internet and technology; and are concerned with careers that better the world (Kyles, 2009; Stevens, 2010). With specific reference to knowledge management, this generation also has its experiences and values also worth preserving for passing on to the generations following.

Franco and Filson (2006) observe a growing trend in which Baby-Boomers are leaving to start their own companies. This occurrence can be seen more frequently in highly technical industries, but it also occurs in non-technical industries. These incidences of unwanted exits from organisations can become problematic and can result in a number of challenges.

There are some environmental factors that have acted as catalysts to the problem. These include cost-saving calls that have left companies struggling to maintain a productive labour force in the face of dwindling labour pools due to streamlining of operations. This presents more challenges in sharing knowledge within multigenerational workforce demographics. The recent economic recession brought with it retrenchments across many countries and thus the loss of knowledge. The increased mobility of the younger generation of employees (Generation Y trend) is not helping either.

All of this is taking place against the background of an ultra-competitive business environment leading to an increase in the quest to acquire and retain knowledge among competing firms. The preservation of the knowledge of long serving employees is an increasing challenge to be confronted by companies in all industrial sectors (Lesser, 2009). The challenge of retiring employees followed by endeavours to replace them is a vital domain of activity companies need to devote resources and time to. Indeed, it is important to capture the already existing knowledge within the organisation otherwise organisations may never be able to recoup these pieces of knowledge.

The consequences of the problem of loss of knowledge range from loss in efficiency, loss in time, failure to reach strategic goals, decrease in customer satisfaction levels, decrease in employee satisfaction and costly expenditure in trying to recoup lost knowledge pieces - ultimately resulting in the potential compromising of the company's performance (Martin, 2000; Davidson, Lepeak & Newman, 2007; Stevens, 2010). Experienced employees are custodians of important knowledge, experiences and processes that must be conveyed to others in the organisation, in a way that is clear and comprehensible.

A study by McQuade, Sjoer, Fabian, Nascimento and Schroeder (2007) established that knowledge management is supposed to reduce the following knowledge losses:

- loss of expert employees with knowledge of the products and processes of the company (including explicit knowledge that could be prone to misinterpretation)
- loss of customer and supplier contacts, (relationships and established trust)
- loss of understanding of the informal personnel networks (who to go to so as to get things done)
- the additional knowledge loss of specific practices involved in internal processes.

Stevens (2010) argues that industries, as diverse as electric utilities, oil and gas producers, healthcare and the public sector, are clearly feeling the effects of employee retirements and the difficulty in sourcing the knowledge. Industries that rely heavily on knowledge can be severely damaged if a proper transfer strategy is not in place.

With knowledge taking on a vital strategic role, many organisations have embarked on enterprise-wide knowledge management initiatives with the aim of leveraging as well as transforming organisational knowledge assets into

core competencies to enhance organisational performance (Eftekharzadeh, 2008).

In South Africa knowledge management has been the focus of a number of research projects, with South African researchers having looked at subjects such as surveying, measuring and valuing knowledge management practices (Botha 2004; Botha & Fouché, 2002; Kruger & Snyman, 2005a; Tobin & Volavsek, 2006); the role and influence of corporate culture (Davel & Snyman, 2005; Ndlela & Du Toit, 2000); knowledge management in SA law firms (Du Plessis & Du Toit, 2005); leadership issues (Kok, 2003); organisational maturity and world-class performance in relation to knowledge management (Kruger & Snyman, 2005b; Tobin & Snyman, 2004); strategic perspectives (Snyman & Kruger, 2004); knowledge management and organisational structure (Gichuru & Tobin 2004; Tobin & Franze, 2005); communities of practice (Van den Berg & Snyman, 2003); and knowledge management and the use of enterprise intranets (Van der Walt, Van Brakel & Kok, 2004).

Other research into knowledge management shows that several approaches, sets of tools, and techniques and processes to knowledge management have been explored (Probst, Raub, & Romhardt, 2000; Bontis, 2001; Nic kerson & Zenger, 2004; Franco & Filson, 2006; Kok, 2007; Theriou, Aggelidis & Theriou, 2009). However, none of these authors has specifically focused their research on investigating knowledge management's association with measures that reflect the overall performance of an organisation.

### **1.3 RESEARCH QUESTIONS**

The proposed research will be guided by the following research questions:

1. Is there a relationship between knowledge management and organisational performance?

2. What particular factors enable knowledge management in an organisation?
3. What are the relationships, if any, between the identified factors and organisational performance indicators like earnings per share, revenue growth and share-price growth?
4. What systems are in place for South African construction and engineering organisations that support knowledge management?

#### **1.4 AIM AND OBJECTIVES OF THE STUDY**

The study aims to determine the relationship, if any, between the levels of practice of knowledge management and the performance of the organisation. In essence the work seeks to establish whether organisations that manage knowledge better actually reap the benefits by out-performing organisations that display lower levels of knowledge management.

Consequently, the prime objectives of the research are to, in the South African construction and engineering sector;

- Determine knowledge management's role in organisational performance by investigating knowledge management's association with measures that reflect the overall performance of an organisation.
- Determine the factors that enable/inhibit knowledge management in firms.
- Investigate how South African construction and engineering organisations support knowledge management.

## 1.5 RELEVANCE OF KNOWLEDGE MANAGEMENT TO THE CONSTRUCTION AND ENGINEERING SECTOR IN SOUTH AFRICA

The study will focus on the construction and engineering sector as it plays a vital role to the South African economy, deducing from its contributions (Creamer Media Engineering News, 2015). The total income for the South African construction and engineering sector was estimated at around R100,4 billion, with an industry-wide net profit before tax of R3,9 billion (Tobin & Magenuka, 2007). The construction and engineering sector also employs diverse skills and knowledge workers and this seemed to present a fertile area for investigation (Stats SA, 2014).

However, there are a number of challenges that the sector is facing. Specifically, the industry is faced with a demanding legislative environment in which there are calls for compliance with the Broad-Based Black Economic Empowerment Act and a general shortage of key skills (Stats SA, 2014). “Affirmative action has the potential of empowering one group over the sanctioning of another which influences job security and consequently leads to an unwillingness of people to share knowledge” (Kruger & Johnson, 2013:3). This comes from the historical imbalances of the country’s past and juggling these two challenges at the same time makes knowledge management of particular importance in the construction and engineering sector in South Africa.

Another barrier to knowledge management in the South African context is the issue of language (Stats SA, 2014). People would be reluctant to share knowledge in circumstances where they cannot understand concepts or find it difficult to convey their message. Language problems in South Africa are amplified by “nine ethnicities, each with its own communities, cultural languages and parlance” (Kruger & Johnson, 2013:3).

The construction and engineering sector in South Africa had also been regarded as an industry with low productivity and poor performance, partly due

to the shortage of skills/knowledge (Creamer Media Engineering News, 2015). In addition, the project-based nature of the sector makes it particularly important to acquire and transfer knowledge from one project to another (MacGregor, 2008). Construction companies nowadays also require new solutions to meet the growing demand for new types of buildings and structures (Tobin & Magenuka, 2007).

Some of the lessons that have been learnt in the South African construction and engineering projects include the fact that they are not well organized and are overwhelmed with details (CIDB, 2004). This renders the gathering and dissemination of valuable knowledge to other projects a difficult mission (Kruger & Johnson, 2013). The fragmentation of the construction and engineering sector has also been cited as a contributor to poor performance due to the lack of efficient communication amongst the involved parties in a project team working together on construction projects (MacGregor, 2008). Knowledge management could therefore be brought in as the panacea for collecting, disseminating and use of the project-generated knowledge for the benefit of the entire organization.

It is particularly useful to undertake a study of the construction and engineering environment in South Africa, not only because of the immense infrastructural developments in the country but more so because in projects, knowledge acquired by project team members only really becomes useful to the entire organisation when such knowledge is shared before the team is disbanded (Creamer Media Engineering News, 2015). For project-related knowledge that is necessary in the construction and engineering organisations, Tobin and Magenuka (2007) outline three knowledge bases that contain knowledge that is created and then used in the execution of a project. These are the:

- organizational knowledge base - which contains the information specific to the organization and wider environment in which the project is being executed,



- project management knowledge base - comprising knowledge of the theory and application of project management. This is organisation specific and is the knowledge capital of the company, and
- project-specific knowledge base - that is project specific knowledge acquired from the user at the beginning and developed over the project life cycle.

Project management knowledge base consists of knowledge about personal skills, project experience of the employees and broadly organizational knowledge (MacGregor, 2008).

## **1.6 SIGNIFICANCE OF THE STUDY**

In as much as knowledge management is highly valued in research and practice, it appears to be somewhat scattered and diffused into divergent perspectives, disciplines and concepts. Grover and Davenport (2001) note that research in knowledge management seems to be fragmented. In effect, more work still has to be done towards extending, refining, and validating its models and developing its theories and concepts. The outcome of this present research is beneficial to the body of knowledge and to industry particularly in the South African context as organisations will be better able to appreciate how knowledge management can be effectively implemented through the understanding of the factors that guide the institutionalisation of knowledge management from a strategic perspective.

By drawing from the existing theories and concepts of knowledge management, this study complements and contributes to the body of knowledge management research and theory from a South African perspective. It also provides valuable insight into how South African construction and engineering organisations are managing knowledge. It is only by developing the theories and concepts of knowledge management across locations and contexts that the knowledge management field can be understood better.

This should bring added conceptual coherence and lucidity to the field of knowledge management and organisational performance, resulting in effective knowledge creation and sharing. Ultimately, the study will arm organisations to:

- Understand better the role knowledge plays in companies as a strategic resource as enabled by knowledge management.
- Determine and better understand the factors that lend themselves to effective knowledge management in South Africa.
- Be guided on firm strategy and future plans when responding to retiring or exiting workers.

Most studies in knowledge management emphasise technological initiatives. Although technology has been instrumental in the recent resurgence of interest in the subject, knowledge management is not all about technology. Lang (2001) remark that there is no correlation between information technology expenditures and company performance because of management's ignorance of the rich interactivity and learning that is inherent in personal dialogue through the social processes of collaborating, sharing and building on each other's ideas. Only 25% of information technology investments properly integrate business and technology objectives (Warne, Ali, & Pascoe, 2003).

It is against this background that this study draws from the multiple perspectives of knowledge management i.e. personal, organisational and business perspectives so as to gauge the strength of the relationship between knowledge management and organisational performance. Perhaps the most fundamental constituent for organisations to comprehend is that knowledge management is not a single set of skills or use of technologies, but rather it is a collection of ideas and experiences only to be passed on by those who lived and understood it (Aaronson & McCarthy, 2004). Rather unfortunately, while many executives and managers understand this theoretically, at times, there is a disconnect between organisational beliefs and behaviours (Warne, Ali, & Pascoe, 2003).

## 1.7 DELIMITATIONS

The proposed study has the following delimitations that have to be taken into account.

- Knowledge management is scattered into divergent perspectives and disciplines. This research study only addresses a few of the many different approaches to knowledge management by drawing on knowledge management literature leading and related to knowledge management enablers.
- The study is confined to South African construction and engineering organisations.
- The unit of analysis for this study is the organisation and the contributing individual. Data sources include the overseers of various departments within the selected organisations and those considered to be the thought-leaders. The respondent population also comprises workers in the respective construction and engineering organisations that have been targeted.

## 1.8 ASSUMPTIONS

The major assumption in the background of this research is that no single approach will cover all the vital aspects involved. Therefore, all methods and models proposed in this research are only tools to explore the power of knowledge and knowledge management for organisational performance. Moreover, it is assumed that the factors that will be proposed and analysed will simplify the understanding of the interdependent character of knowledge, knowledge management and organisational competitiveness, among others. Insight of the underlying factors that guide the successful institutionalisation of knowledge management will therefore guide the establishment of sound

knowledge management practices that can allow business managers to formulate effective knowledge management policies and practices.

## 1.9 OVERVIEW OF CHAPTERS



**Figure 1.1: An overview of chapters**

As depicted in Figure 1.1, Chapter 1 gives the background of the study and then defines the problem. This is followed by the research questions and the objectives that guide the study. The intended contribution of the proposed study is also spelt out.

Chapter 2 focuses on knowledge management concepts and theories. It starts off by contextualising knowledge as a strategic resource and knowledge management as a competency. Workforce demographics are explored and then the facets and categories of knowledge. The perspectives of the construct of knowledge management are discussed, having been split into organisational perspectives and social perspectives.

A discussion on the development of a measure for knowledge management practices is also undertaken in this chapter, concluding with the exploring of knowledge management factors.

Organisational performance is covered in Chapter 3. The nature of organisational performance, together with the inherent elements of the performance of an organisation, is explored in this discussion. The performance management model which is comprised of three activities, namely; planning performance, managing performance and analysing and measuring performance is presented. Chapter 3 also provides insights and some basis of exploring the nature and importance of the relationship between knowledge management and organisational performance.

In Chapter 4, the research design and methodology is presented. The chapter establishes the methodological framework for this investigation. It begins with discussions on the philosophical underpinnings governing the different research methods. This is followed by a consideration of the different research methods and research design chosen for this study.

Chapter 4 identifies the target population, discusses the data collection instrument, validity and reliability issues, ethical considerations and the pilot study. The chapter ends with techniques of analysis and validation of the empirical data to determine knowledge management in construction and engineering companies in South Africa.

The purpose of Chapter 5 is to present the empirical data that would have been collected from the questionnaires. The presentation consists of descriptive statistics used for each question. These descriptive statistics involve arranging, summarising and presenting the data in such a way that the essential meaning of the data can be extracted so as to be easily interpreted.

The statistics that will be used consists of two parts - the first part being concerned with establishing the basic statistical measures of the response variables for every question covering aspects that pertain to knowledge management. The second part is concerned with the testing of relationships between certain model variables. To uphold anonymity and confidentiality, the names of the participating organisations are not shown but are represented by alphabetical letters ranging from A to J. The alphabet assigned to each company is of no significance in itself.

Chapter 6 provides a general discussion and reflection on the research findings. The chapter is divided into three parts: reflections on the personal profile of the respondents, knowledge management feedback and organisational performance outcomes received. A discussion and reflection on the findings from each section is presented in this chapter. Findings from the statistical analysis and the qualitative excerpts are also discussed.

Connections will also be made between the results obtained in chapter 5 and the literature reviewed in earlier chapters relating to broader areas of strategic management, knowledge management and organisational performance.

Chapter 7 presents the conclusions through the comparison of the actual research outcomes with the objectives and research questions set out at the beginning of the research. Recommendations are also made on the effective implementation of knowledge management in the construction and engineering sector as well as identifying certain limitations and possible areas for further research. This final chapter also gives a summary of all the chapters presented, with an aim of summarising facts, arguments and conclusions presented in this thesis so as to give responses to the arguments presented.

## CHAPTER 2

# LITERATURE REVIEW OF KNOWLEDGE MANAGEMENT

### 2.1 INTRODUCTION TO KNOWLEDGE

The concept of knowledge and wisdom is generally very appealing to many, as evidenced by the proliferation of the literature on the topic. The most common feature of intelligent organisations in the twenty-first century is the emphasis on knowledge and information (Meihami & Meihami, 2014). Having emerged in the nineties as an academic field, organisations world-wide develop and implement knowledge management initiatives to improve efficiency of business processes, increase productivity and quality of services as well as in finding new solutions and products for their customers (Donate & Sanchez de Pablo, 2015; Nguyen & Mohamed, 2011).

Meihami and Meihami (2014) acknowledge knowledge's recognition as the most valuable asset in an organisation. Murray (2000) contends that it is the uniqueness and the quality of knowledge that makes it one of the organisation's valuable assets. The practice of knowledge management came to being so as to address challenges in knowledge intensive organisations (Sveiby, 2001). Kruger (2009:66) states that organisations that can manage their knowledge are capable of coordinating and combining their resources and capabilities in new and distinctive ways so as to provide more value for their customers.

Tiwana (2002) concurred and added that neither technology, market share nor product could provide a sustainable competitive advantage as they can be copied whilst knowledge is difficult to copy. At the beginning, the challenge was to manage the functional areas by placing knowledge into categories and



making it obtainable. As a social process, knowledge entails the interaction of people.

Through learning, people gain knowledge. The knowledge is then translated to the corporate's daily routines and organisational culture. There is a multiplicity of definition offerings and arguments in this exploding field of knowledge management. Before turning attention to this, it is important to understand the concept of workforce demographics as it affects knowledge and its management.

### **2.1.1 Workforce demographics**

In many countries, there is an increase in aging workforce because the population is aging including international and national academic professionals (Kruger & Johnson, 2013; Wilder, 1996:385; Lancaster & Stillman, 2002; Sayers, 2006; Hallam & Lee, 2008:15; Dwyer, 2009). According to Stats SA (2007), 11.84% of the South African population is projected to be over 50 years of age. The proportion of the world's biggest economy's (U.S.A.) workforce within the ages of 55 to 64 is increasing faster than any other age groups (Strack, Baier & Fahlander, 2008).

This implies that the American government may be faced with a real workforce predicament with so many knowledgeable employees on the verge of retirement. MacGregor (2008) warns of a looming crisis in South Africa's scholarly workforce that requires urgent intervention as half of most senior academics (knowledge workforce) in South African universities will be retiring in the coming decade.

In the post-apartheid era, universities need to confront the challenge of producing and retaining a new generation of scholars who have to be trained and equipped to carry out the responsibility of conducting research and

publishing so that the knowledge needs of South Africa are effectively met (MacGregor, 2008) .

These figures do present quite a key challenge. This warrants succession planning and its execution all through the next decade to encourage companies to take cognation of the age demography of their present workforce so as to develop and implement succession planning policies as guided by knowledge management (Kruger & Johnson, 2013).

The preservation of talents and experiences of the long serving employees is an increasing hurdle to be confronted by companies in all industrial sectors (Lesser, 2009). The challenge of retiring employees followed by endeavours to replace them is a vital domain of activity companies need to devote resources and time to, so as to capture the already existing knowledge within the corporation. Otherwise companies may not be able to ever recoup these pieces of knowledge (Appolloni, Mavisu & Ozeren, 2014).

Martin (2000) notes that experienced executives hold important know-how and if this information were to be lost, it would result in a costly undertaking for the organisation to recover that information. Similarly, new managers must have the prior experiences and processes conveyed to them in a way that is clear and understandable.

Collecting the best available knowledge is not always easy as organisations must understand who holds key knowledge otherwise knowledge management loses its significance (Kim, Lee, Chun and Benbasat, 2014). Firms seem to be losing this battle in that quite often workers who need this knowledge never access it chiefly because they do not know that these people even exist within their organisation or department (Nevo, Benbasat & Wand, 2009).

Certainly, a growing concern of organisations is the enormous wealth of knowledge and experience built by Baby-Boomers walking out of the door (Paton, 2008). Research by McQuade, Sjoer, Fabian, Nascimento and

Schroeder (2007) found that retired workers as well as those retiring listed the top most four knowledge losses as:

- loss of an expert employee with knowledge of the products and processes of the company (including explicit knowledge that could be left to misinterpretation)
- loss of customer and supplier contacts, (relationships and established trust)
- loss of understanding of the informal personnel networks (who to go to get things done).
- the additional knowledge loss of specific practices involved in internal processes.

In addition, present knowledge-loss does not only occur in experienced workers but in newcomers as well. Younger workers have the likeliness to be more mobile in changing jobs, taking their technology savvy methods and any knowledge they have gained with them (Piktials & Greenes, 2008).

The progressively aging workforce is a manifestation of declining birth rates and the greying of the Baby Boomer generation. Increasingly, Baby-Boomers are leaving in order to establish their own companies, and such actions are seen more often in highly technical industries even though they also occur in non-technical industries (Franco & Filson, 2006).

Against this background, it is possible that the labour pool will have shrunk nearly 60% by 2016 (Stevens, 2010). Due to these shifts in workforce demographics, many organisations are looking to solve a number of important knowledge and learning related challenges (Schoenherr, Griffith & Chandra, 2014). Industries, as diverse as electric utilities, oil and gas producers, healthcare and the public sector are clearly feeling the effects of employee retirements and the difficulty in sourcing new-talent (Franco & Filson, 2006). Therefore, industries that are heavily dependent on knowledge could be severely damaged if the appropriate transfer strategy is not in place.

Slagter (2007) acknowledges that effective knowledge management is crucial to a company's ability to safeguard knowledge as well as distribute it. Kreitz (2008) list the advantages of managing workforce demographics as an increase in productivity, workforce cohesion, effective recruitment and volunteering programmes, and improved leadership and succession planning policies.

### **2.1.2 Facets and categories of knowledge**

Nowadays, new productivity and economic paradigms indicate that knowledge is becoming more important than any other resource (Apolloni, Mavisu & Ozeren, 2014). Knowledge has been defined in various ways by different scholars: a flowing mix of framed experiences (Meihami & Meihami, 2014; Remenyi, 2005:40); justified true belief (Meihami & Meihami, 2014; Mingers, 2008; Nonaka, Konno & Toyama, 2000); organised information with a high proportion of human value added to include insight, interpretation, context, experience, wisdom (Davenport & Völpel 2001); the art of knowing (Minbaeva, 2007; Mitchell & Boyle, 2010); and a product of human reflection and experience (Roth, 2003).

Knowledge is often confused with information. In as much as there is a relationship between data, information and knowledge, the three concepts are different (Nonaka *et al*, 2000). One can consider the observations made by Jashapara (2011:19) as a basis of thought:

- a collection of data is not information.
- a collection of information is not knowledge.
- a collection of knowledge is not wisdom
- a collection of wisdom is not truth.

The concept is that information, knowledge and wisdom are actually more than just collections. Rather, the whole represents more than the sum of its parts with implications of synergy at play (Haggie & Kingston, 2003). The following associations are made by Jashapara (2011:16-19) concerning the abovementioned fundamentals:

- *Data* is raw and consists of symbols that represent objects, events and/or their properties
- *Information* relates to descriptions, definition or perspective, i.e. what, who, when, where.
- *Knowledge* comprises strategy, practice, method or approach i.e. how.
- *Wisdom* embodies principle, insight, moral or archetype i.e. why.

Various individuals derive different understandings of knowledge management from the basis of their perspective of what knowledge is. Quite a number of perspectives on knowledge are obtainable from Alavi and Leidner (2001) who construe it as:

- 1) a state of mind
- 2) an object
- 3) a process
- 4) a condition of having access to information
- 5) a capability.

The first view about knowledge as 'a state of mind' places the emphasis on individuals, affording them the occasion to further their individual knowledge so as to apply it to the organisation's requirements. Calo's view (2008) that individuals know more than they can tell postulates knowledge as 'an object'. Therefore, knowledge can be portrayed as an item that can be warehoused or transformed. Viewed from this standpoint, knowledge management would put emphasis on the construction and management of data (Meihami & Meihami, 2014).

Alavi and Leidner (2001) describe the 'process' standpoint as focusing on the application of know-how/expertise. They further argue that if knowledge is a process, then knowledge management centres on the practices of forming, mobilising, sharing, and dispensing of knowledge (Alavi & Leidner, 2001). The fourth standpoint entails corporate knowledge being well organised so as to simplify access to information. Lastly, knowledge can also be regarded as 'a capability' most preferably unique enough to potentially influence future action.

Knowledge has become conceptually accepted as being divided into two categories (Calo, 2008:409). These are tacit and explicit knowledge. Explicit or codified knowledge is objective, clear with regards to its archetype, traceable, and unambiguous (Schoenherr, Griffith & Chandra, 2014). It is obtainable in the form of documents, databases, policy manuals and standard procedure brochures - such that explicit knowledge would be 'readily transferable within an organisation or between individuals without the loss of meaning' (Calo, 2008: 410).

Explicit knowledge refers to manuals, formulas, and specifications that are described in formal and systematic language (Calo, 2008: 410). Therefore, explicit knowledge is easier to capture and distribute because of its capability to be distributed in the form of tangible material (Schoenherr, *et al*, 2014). Although it is easier to transfer explicit knowledge, there still exist certain obstacles elsewhere in the chain of transfer of this category of knowledge. One major issue is that though explicit knowledge is available, it must be left to the understanding of the individual who would be using the material (Parise, Cross & Davenport, 2006).

Tacit knowledge tends to be difficult to express in a formal way that conveys meaning; it is hard to define, and not easily transferable because it exists in the minds and know-hows of the personnel (Calo, 2008). Tacit knowledge relates to knowledge that is difficult to capture. This is because it is personal knowledge. In the same vein, it is also synonymously referred to as a person's 'know how, informal and hard-to-pin-down skills' (Calo, 2008: 410). Tacit

knowledge has a personal quality, it is deeply entrenched in the manner the individual uses it, involves both cognitive and technical components and is non-transferable without personal contact (Schoenherr *et al*, 2014; Nonaka *et al*, 2000).

Noe (2008) also notes that tacit knowledge is personal knowledge premised on individual experiences and is influenced by individual perceptions and values; the communication of tacit knowledge requires personal communications through discussion and demonstrations. Tacit knowledge is generally acquired on the job or in a specific situation and is often taken to be a competitive advantage within companies because it presents a challenge when others try to imitate thus making it even more difficult to store and transfer (Schoenherr *et al*, 2014; Ambrosini & Bowman, 2008).

Kay (1999:13) concurs in this regard and adds that 'tacit knowledge can take many forms, is unique to a firm and therefore cannot be copied'. That is how Calo came to encapsulate the meaning of tacit knowledge with the phrase 'We know more than we can tell' (Calo, 2008: 410). The benefits of such tacit knowledge can only be enjoyed if there is a culture of trust and knowledge sharing. It is this tacit knowledge that is used to create explicit knowledge (Schoenherr, *et al*, 2014).

Knowledge is a valuable resource for organisations and yet the effective management of knowledge is one of the biggest issues that managers have to face (Appolloni *et al*, 2014). Organisations can increase their operations effectiveness and efficiency, and decrease the efforts of their managers with well distributed and organised knowledge (Meihami & Meihami, 2014).

## **2.2 KNOWLEDGE MANAGEMENT**

There are various on-going debates regarding the concepts involved and how to properly convey knowledge management in a universal fashion (Slagter,

2007). Sveiby (2001) is of the opinion that knowledge cannot be managed and that it follows then that knowledge management is a poor term. Sveiby (2001) offers knowledge focus or knowledge creation as better terms and argues that these describe a frame of mind in which knowledge is an activity and not an object (Sveiby, 2001).

Knowledge management is defined in different sources by different experts but with minor differences (Appolloni *et al*, 2014). Knowledge management is defined by Magnier-Watanabe and Senoo (2008) as the process of acquiring, storing, diffusing and implementing both tacit and explicit knowledge within the organisation's borders with the intention to accomplish corporate objectives in the most proficient manner. A more extensive definition was given by Gephart, Marsick, Van Buren, and Spiro (1996:71) who posit that "knowledge management refers to the process of enhancing company performance by designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing and use of knowledge."

To concur, Allee (2003) goes on to characterise knowledge management as the institution of coordinated processes that lead to the creation, sharing, transfer and renewal of organisational knowledge so as to improve performance, and create added value generated by their intellectual and knowledge centred assets.

Often, generating value from these assets would involve sharing among personnel, divisions and other organisations in an endeavour to derive best practices. Therefore, managers would have to establish the ideal conditions within the given context to propel and optimise the organisation's use of knowledge management practices and initiatives (Donate & Sanchez de Pablo, 2015). In all the given definitions, there seems to be some convergence on the process of creating, sharing, acquiring, transfer and storage of knowledge so as to meet corporate objectives in a resourceful manner.



Technology is quite conspicuous by its absence from the above definition and yet the management of knowledge is frequently facilitated by technology. Santusos and Surmacz (2010) argue that technology by itself is not knowledge management. While other definitions stress system processes with an IT focal point, Rastogi (2000) is of the opinion that human involvement beyond those processes is indispensable. Spender and Scherer's argument (2007) is that regardless of the school of thought, core components of knowledge management include people, structure and technology depending on the specific perspective. Gold, Malhotra and Segars (2001) assert that despite the competitive pressures for firms to be knowledge based, managers find it difficult to transform their organisation through knowledge management programmes.

Academic debates in this field can nonetheless be largely categorised along the following perspectives:

- *Organisational perspectives* that focus on how an organisation can be designed so as to facilitate knowledge processes best (Rastogi, 2000; Spender & Scherer, 2007; Jashapara, 2011).
- *Ecological perspectives* that focus on the interaction of people, knowledge, identity and environmental factors to do with adaptation and can be likened to the natural ecosystem (Rastogi, 2000; Spender & Scherer, 2007).
- *Technological perspectives* that focus specifically on technology, especially that which enhances knowledge sharing and storage (Spender & Scherer, 2007; Santusos & Surmacz, 2010).

Attention will now be turned to the issue of how to effectively manage knowledge under the organisational and ecological perspectives since the technological perspective is beyond the scope of this research.

### 2.2.1 Organisational perspective of knowledge management

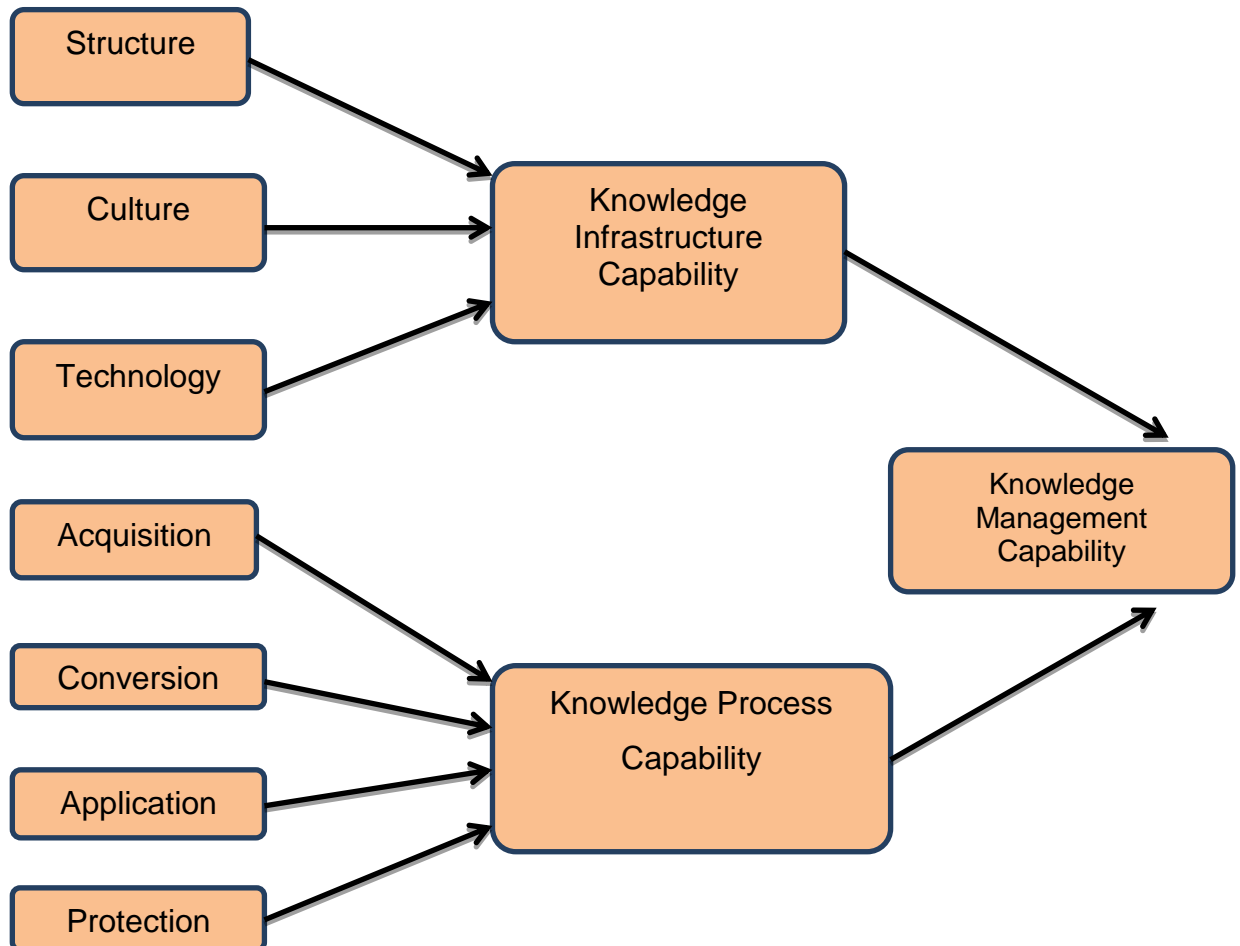
“Employees in the organisation can store, allocate, create and apply knowledge in an environment that knowledge management has established” (Appolloni *et al*, 2014:172). The organisational perspective of knowledge management proposes that a knowledge infrastructure made up of structure, culture and technology together with a knowledge process architecture comprising acquisition, conversion, application and protection are vital organisational competencies or pre-conditions for effective knowledge management. The structural infrastructure entails the presence of norms and trust mechanisms whilst the cultural aspect is comprised of shared contexts (Schoenherr *et al*, 2014).

In order to acquire, convert, apply, store and protect organisational knowledge and leverage the infrastructure, knowledge management processes must be available. These processes would empower the firm to proceed with knowledge management activities in an effective and efficient manner. Gold *et al* (2001) argue that the more frequently an organisation carries out its knowledge management processes, the more routine the norms become and the more efficient also the integration process becomes.

In contrast, the more variable the knowledge management processes are, the less the efficiency of knowledge integration efforts. Due to this, the company will find itself in a position where it would have to deal with more knowledge integration exceptions (Kim *et al*, 2014). The main objective of an organisation’s use of knowledge management is to “gain an awareness of its knowledge, individually and collectively, and to shape itself in a way that enables the most effective and efficient use of the knowledge the firm has or is able to obtain” (Donate & Sanchez de Pablo, 2015: 361).

An analysis of these variables would provide a basis for understanding the competitive pre-disposition of an organisation as it embarks on a programme

of knowledge management. Figure 2.1 describes the relationships of the organisational perspective of knowledge management.



**Figure 2.1: Organisational Knowledge Infrastructure**

(Adapted from Gold, Malhotra and Segars, 2001:193)

### 2.2.1.1 Structure

The intention of an organisational structure is to rationalise individual functions or units in an organisation; but structural elements have often resulted in the unintended repercussion of inhibiting collaboration and sharing of knowledge across the organisation's functions (Gold et al, 2001). The knowledge

management structure of an organisation is multi-dimensional. On the one hand, organisational structures are supposed to encourage rather than inhibit interactions among employees, which are critical for the effective management of knowledge (Kim *et al*, 2014). On the other hand, the structures are supposed to be flexible enough so as to allow the organisation to adapt to the ever changing environmental landscapes. Many organisations are using knowledge management structures to facilitate knowledge sharing (Wang, Noe & Wang, 2014).

Knowledge management initiatives would be inhibited by structures that promote individualistic behaviour in functions where the hoarding of information is rewarded (Gold *et al*, 2001; McDermott & O'Dell, 2001). Some structures may encourage the sharing of knowledge within a functional area but inhibit knowledge sharing across the organisation. Alternatively, knowledge sharing may be optimised at functional level whilst being sub-optimised across the supply chain. Therefore, it is important that organisational structures are designed to be flexible, encouraging sharing and collaboration across organisational boundaries and also across the supply chain (Schoenherr *et al*, 2014).

### **2.2.1.2 Culture**

Culture is regarded as being the most significant hurdle to organisational effectiveness in the management of knowledge. King (2008) notes that the relationship between knowledge management and culture or elements of culture, with regards to the practice of knowledge management, is a vital part of the conventional knowledge management wisdom. Lee and Choi (2000) express a similar view that corporate culture is significant in predicting the knowledge management processes. Therefore, shaping culture is core to the organisation's ability in the knowledge management efforts (Kim *et al*, 2014).

Sin *et al* (2009), view culture as the shared values, beliefs and practices of employees in the firm. Culture is reflected in facets of the company like the mission and embraced values and on the deeper level, culture is entrenched in the way people act, their expectations of each other and how they make sense of each other's actions (Schoenherr *et al*, 2014). Culture is difficult to articulate, invisible to company employees and is embedded in the company's core values and assumptions (McDermott & O'Dell, 2001; Sin *et al*, 2009). Lee and Choi (2000) outline the importance of organisational culture to knowledge management, that it should add several components to knowledge management. Broadly, organisational culture is supposed to be supportive and encourage knowledge management related activities. Wong and Aspinwall (2005) sum up the cultural elements supportive of knowledge management as follows:

- A culture that values knowledge seeking and problem-solving.
- High level of trust among employees in sharing knowledge.
- A culture of sharing mistakes openly without the fear of punishment.
- Collaboration among employees.
- Encouraging teamwork among employees.
- Empowerment of employees to explore new possibilities.
- Extent to which employees are encouraged to ask questions.
- Acceptance of knowledge sharing (not hoarding) as a strength.

### **2.2.1.3 Technology**

Technical systems within an organisation define how knowledge travels throughout the company and how knowledge is accessed (Wong & Aspinwall, 2005). According to Yeh *et al* (2006), information technology is the essential building wedge that supports and coordinates knowledge management - including data bases, knowledge platforms, performance evaluation management systems and integrated performance support, among others. Carvalho and Ferreira (2001) suggest that another function of information

technology is to accelerate the speed of knowledge creation and transfer. Therefore, previously disjointed flows of information and knowledge can be cohesive through the linkage of information and communication systems in the company (Kim *et al*, 2014).

Barriers to communication among different parts of the organisation can also be eliminated through such linkages (Kruger & Johnson, 2013). The area of support also includes timing, scope and efficiency of the underlying knowledge management processes encompassing creation, storage, retrieval, transfer and application (Easterby-Smith & Lyles, 2003; Sin *et al*, 2009). Technologies in business intelligence also support knowledge about an organisation's competition and environment. Specific technologies for these purposes are, however, outside the scope of this research. Wong and Aspinwall (2005) sum up the information technology elements as follows:

- Use of an appropriate knowledge management system.
- Application of appropriate technological tools, i.e. collaborative tools, knowledge bases, searching tools, document management systems, intelligent systems, etc.
- Utilisation of the intranet or internet.
- Appropriate knowledge structures for categories for a repository.
- Ease of use of the technology.

#### **2.2.1.4 Process elements**

For effective knowledge management, it is as important for the organisation to manage external knowledge as it is to manage internal knowledge (Kim *et al*, 2014). Managing knowledge entails developing processes and activities for creating new ideas and knowledge, documenting key knowledge and lessons learnt, efficient processes for classifying and storing knowledge, efficient processes for finding the required knowledge, and sharing knowledge using electronic and face to face approaches (Kruger & Johnson, 2013). These

knowledge management processes also result in increased employee efficiency and productivity (Appolloni *et al*, 2014:189).

Under the process element of knowledge management, effective communication among employees and encouragement of continuous learning at all levels are also considered (Meihami & Meihami, 2014). For the organisation's products or services to be reflective of its knowledge, it is imperative to develop processes for applying the best knowledge to it (Schoenherr *et al*, 2014). Ensuring the validity and relevance of knowledge and the protection of knowledge assets from unauthorised exposure or theft comes through a designed process fit for the purpose (Wong & Aspinwall, 2005).

Researchers have identified the various components to this knowledge management process and named them variously:

- capture, transfer and use (Kim *et al*, 2014; Wang, Noe & Wang, 2014; Gold *et al*, 2001; Bartol and Srivastava, 2002)
- acquire, collaborate, integrate, experiment (Kim *et al*, 2014; Wang *et al*, 2014; Gold *et al*, 2001; Beccera-Fernandez, Gonzalez & Sabherwal, 2004)
- create, transfer, assemble, integrate and exploit (Wang, Noe & Wang, 2014; Gold *et al*, 2001; Bishop, Bouchlaghem, Glass & Matsumoto, 2008)

An analysis of these components enables their broad categorisation into processes of knowledge acquisition, knowledge conversion, knowledge application and knowledge protection.

#### **2.2.1.5 Acquisition process**

Acquisition related knowledge management processes are those focused on obtaining knowledge. Various terms are used to describe these processes

namely knowledge creation, generation, collaboration and seeking (Kruger & Johnson, 2013). The underlying theme in all these terms is the accumulation of knowledge. Innovation is an aspect of acquisition in that new knowledge is created from the application of existing knowledge. Nonaka (1994) provides some very important insights into how new knowledge is created in the course of the interplay of tacit and explicit knowledge (Schoenherr *et al*, 2014). Knowledge creation has been defined in so many ways and frequently confused with innovation.

Johnson (2002) views it as the variance of what is already known and what must be known for successful completion of a project. Meihami and Meihami (2014:81) present knowledge creation as innovative products and services brought to the market place. Some view knowledge creation as any major feature that allows for growth in value/cost ratio of a cooperative process (Donate & Sanchez de Pablo, 2015; Wang *et al*, 2014). Yang (2007) is of the opinion that knowledge creation is a procedure that allows insights of individuals to be converted into knowledge that can be used to develop new products and enhance performance.

Bhatt (2001) argues further and presents knowledge creation as a company's ability to develop novel and useful ideas and solutions for the creation of individual and organisational knowledge. While theoretical knowledge presents value to the organisation, the true essence of it lies in its conversion to practical knowledge (Gooderham, 2007; Alavi & Leidner, 2001).

Theriou, Aggelidis and Theriou (2009) argue that the idea of knowledge creation is unnecessary since the knowledge that is required by an organisation for its success is resident within the employees, and instead he argues for knowledge application. A divergent view acknowledges that while knowledge is resident somewhere within the organisation, it does not necessarily mean that the organisation will benefit from that knowledge (Kim *et al*, 2014; Roth, 2003; Bonache, Brewster & Suutari, 2001).



There are indeed numerous proposals from various researchers on the methods and agents of knowledge acquisition in organisations Appolloni *et al*, 2014). Knowledge acquisition can be accomplished in the course of socialisation (Nonaka *et al*, 2000); mentorship and use of teams (Mitchell, Nicholas & Boyle, 2009) open conversations and deliberations using facilitators who are skilled in extracting vital knowledge and speed up the process as catalysts (Fong, Hills & Hayles, 2007); cooperation (Yang, 2007); porous organisational boundaries, and contingent work (Gold *et al*, 2001). One conventional method suggested by Davenport and Prusak (1998) of knowledge generation and development within an organisation is to institute specific units or teams such as research and development departments.

According to Nonaka and Takeuchi (1995), knowledge is created, shared, amplified, enlarged and justified through organisational settings and through social and collaborative processes. Their model recognises a knowledge conversion cycle consisting of four components/stages, namely:

- Socialisation (the conversion of tacit knowledge to tacit knowledge),
- Externalisation (the conversion of tacit to explicit knowledge),
- Combination (the conversion of explicit to explicit knowledge)
- Internalisation (the conversion of explicit to tacit knowledge).

Socialisation involves the transfer of tacit knowledge from one individual to another. This is usually facilitated in an informal and social setting where there is trust amongst those involved (Schoenherr *et al*, 2014). Externalisation is the process of changing tacit knowledge to explicit knowledge in team interactions involving dialogue, and the use of metaphors in the language would be quite evident. Combination is the cycle where individuals add and contribute their own explicit knowledge to that which has already been created within the organisation.

Internalisation consists of converting new explicit knowledge into new tacit knowledge through repeated practice (Meihami & Meihami, 2014). The model

explains how knowledge held by individuals, organisations and societies can be enriched through spiral, interactive amplifications of tacit and explicit knowledge (Nonaka, 1994).

#### **2.2.1.6 Conversion process**

Conversion inclined knowledge management processes are the ones that are oriented towards making existing knowledge useful (Kruger & Johnson, 2013). These knowledge conversion processes are anchored in the company's ability to organise, combine, integrate, structure, coordinate and distribute knowledge (Gold *et al*, 2001). Having a framework for structuring or organising knowledge is critical to the organisation because there would not be any consistency or common dialogue of knowledge without common representation standards and would make the asset very difficult to manage (Wang *et al*, 2014; McDermott & O'Dell, 2001). Combining or integrating knowledge reduces redundancy and thus enabling the firm to replace out-dated knowledge through these processes. The frequently named mechanisms for facilitating integration are routines, sequencing, rules and directives, group problem-solving and decision making (Appolloni *et al*, 2014).

#### **2.2.1.7 Application process**

Application based knowledge management processes are inclined towards actual use of the knowledge. Effective application is presumed or implied once knowledge has been created (Ajmal, Helo & Kekale, 2010). Process elements that are associated with the application of knowledge are to do with storage, retrieval, sharing and contribution.

### **2.2.1.8 Protection process**

Protection processes are security-oriented and designed to safeguard the knowledge in an organisation from unlawful use or theft. For competitive advantage to be sustained, it is critical that knowledge is protected. It is not all knowledge that can be protected through patents, trademarks and copyrights because not all knowledge can be defined in terms of property laws and property rights; this makes it difficult sometimes to protect knowledge (Gold *et al*, 2001). However, measures should be taken to protect competencies such as employee conduct rules, job designs and incentive alignment. Protection measures can be built into the technology infrastructure or measures that govern the conduct and behaviour of employees can be established (Kim *et al*, 2014).

## **2.2.2 The social perspective of knowledge management**

Knowledge management is also interpreted through the social perspective whereby recognition is given to the manifestation of human and social dimensions as its major components, with the leadership style and technology still having a part to play (Donate & Sanchez de Pablo, 2015). Research has paid insufficient attention to knowledge sharing between employees but instead has focused on knowledge creation and transfer at the team level, unit level or at the organisational level (Wang, Noe & Wang, 2014). Thomas, Kellogg and Erickson (2001) propose that knowledge management is deeply social in nature and, therefore, must be approached by taking cognisance of human and social factors. Sometimes referred to as the social ecology of an organisation, emphasis is placed on social discourse such as personal communication, construction of individual knowing and cultures of sharing and trust (Kruger & Johnson, 2013; Martin, 2000; Southon & Todd, 1999). The social ecology defines the social system in which people operate. Therefore, it

defines a company's formal and informal expectations of employees and the type of people who will fit into the firm.

Freedom of individuals to pursue actions without prior approval is also shaped by the social ecology in knowledge management. Also included in the social ecology framework would be how employees interact with parties inside and outside of the firm. These variables would have great implications on the management style and systems, organisational structure in terms of networks, and alliances and communities of practice (Donate & Sanchez de Pablo, 2015).

People are at the centre of this approach and, therefore, the human resources function plays a very important role in the management of knowledge. Grant and Shamsavarani (2004) advocate the consideration of other factors such as the reward system, training system and employee motivation. Social ecology thus points to a social system that is not a random collection of incongruent elements but a comprehensive and wholesome entity where the various elements interact with each other (Wang *et al*, 2014).

Thomas *et al* (2001) echo their belief in a knowledge community as one of the most vital aspects of a knowledge management puzzle: a place in which people discover, use and manipulate knowledge whilst interacting and having encounters with others who are doing the same. The essential characteristic of a knowledge community is the presence of conversation and other forms of narrative, i.e. stories and unguarded discussions among people who know each other, share professional interests and understand the contexts under which the conversation is taking place (Kruger & Johnson, 2013).

Erickson and Kellogg (2000) offer a variety of techniques that could effectively contribute to knowledge management in this regard, such as supporting new forms of group interaction, using metaphors so as to enhance creativity and supporting expressive communication. The incorporation of such techniques into knowledge communities results in organisational opportunities for building

social capital that includes trust and cooperation (Schoenherr *et al*, 2014). It is always challenging for organisations and system designers to have a truly trusted place as a knowledge management environment.

Knowledge sharing/transfer is one of the branches in the three key constituencies of knowledge management that is affected by the organisational social discourse (Davenport & Prusak, 2000). Evaluating and rewarding knowledge sharing is important so as to signal to employees that they are accountable for knowledge sharing and that it is valued by the organisation, which would help in creating a culture and establish norms conducive to knowledge sharing (Wang, Noe & Wang, 2014). The increased complexity of knowledge transfer as compared to the other components is rooted in the facts that:

- knowledge exists in organisational participants, daily tasks, tools and their sub-networks (Meihami & Meihami, 2014; Argote, McEvily & Rogers, 2003)
- a considerable amount of the knowledge in organisations is tacit and, therefore, difficult to articulate (Schoenherr *et al*, 2014; Nonaka & Takeuchi, 1995).

Knowledge transfer is the transmission of information to a recipient followed by the absorption and conversion by the individual or group (Tounkara, 2014; Davenport and Prusak, 2000). The organisation would have to create an enabling environment for knowledge sharing because, as noted by Sveiby (2001), knowledge shared can be an opportunity lost for recognition, extra work or competitiveness from an individual's perspective.

The eventual aim of acquiring and sharing knowledge is to transform all individual know-how and experiences into organisational competencies (Mwila, 2013; Yang, 2007). The strength of organisational competencies and their effectiveness would increase if more of the personal intellectual capital is transmitted to, and converted into, organisational assets. Alhammad, Al Faori

and Suleiman (2009) argue that the appropriate transfer of individual knowledge would result in knowledge appreciation, and consequently, improve the results of organisational learning and organisational effectiveness.

A variety of dimensions of knowledge transfer have been explored and categorised differently by various researcher. Alhammad *et al* (2009) identify four dimensions of knowledge transfer with social connotations and these are:

- Mutual relationships
- Team - sense of togetherness
- Positive feelings about sharing knowledge
- Intention to share knowledge

*Mutual Relationships* – are rooted deeply in a social ecology of togetherness among employees and having a positive feeling about sharing knowledge which seeds future intention to share knowledge. Cooperation and collaboration with other team members is inherent where mutual relationships and an expanded scope of association with members of other teams exist (Kim *et al*, 2014). Building mutual relationships can be considered to be one of the most important methods that encourage knowledge sharing. Knowledge sharing can then occur through:

- discussion groups (Toukara, 2014; Alhammad *et al*, 2009)
- face-to-face interactions and training (Husted & Michailova, 2002; Alhammad *et al*, 2009)
- periodic meetings across teams and work units (Toukara, 2014; Bartol & Srivastava, 2002; Alhammad *et al*, 2009)
- best practices (Kruger & Johnson, 2013; Bartol & Srivastava, 2002; McDermott & O'Dell, 2001; Alhammad *et al*, 2009)

*Team - Sense of Togetherness* - A team is a group of people working together in order to achieve the organisation's objectives. Through the team, knowledge can be shared effectively. Again, there needs to be the existence of trust in

order for team members to respond openly and share their knowledge (Al-Alawi *et al*, 2007). When there is trust, sharing knowledge becomes a habit and it will make the relationships between the members and the managers stronger (Kruger & Johnson, 2013). Teamwork, discussion and collaboration also enhance communication among members (Alhammad *et al*, 2009).

*Positive Feeling About Knowledge Sharing* - Is a measure of the employees' satisfaction about knowledge sharing in the firm. If the employee does not feel threatened after sharing their knowledge, only then can they feel positive about the whole exercise (Wang *et al*, 2014). Also the employees will consider themselves effective members of the organisation. The positive feeling also takes place when the employees see the outcomes of their knowledge sharing (Alhammad *et al*, 2009).

*Intention To Share Knowledge* – Is about the employees' willingness to share knowledge in the present and in the future. Motivation to intentionally share knowledge is also determined by social variables (Alhammad *et al*, 2009).

Joshi and Sarker (2006) studied the social factors associated with knowledge transfer with a particular focus on:

- Team member's capacity to absorb
- Motivation
- Communication amongst members
- Group culture
- Group cohesion.

They found that if the knowledge source perceived the receiver to possess a high absorptive capability, interacts widely with other team members and is part of a syndicate with a high affinity for knowledge transfer, then the individual is able to internalise a substantial quantity of transferred knowledge. In addition, the expectation is that there would be low levels of knowledge sharing in an organisational context with a social perspective and management

practices that encourage but do not reward or hold employees responsible for knowledge sharing (Wang *et al*, 2014).

Li and Zhu's (2009) studies concur with Alhammad *et al* (2009) and Joshi and Sarker (2006) and they suggest that knowledge transfer opportunities, motives and capacity are the conclusive influential factors especially for informal knowledge transfer amongst individuals. They then characterised:

- *Knowledge transfer opportunities* as being concerned with the extent of difficulty for the search of knowledge and the richness of the channels that deliver the prospect of knowledge transfer amongst the people.
- *Knowledge transfer motives* as being concerned with reputation as the knowledge source would also be admired by colleagues.
- *Knowledge transfer capacity* as comprising absorptive capability and imparting capacity.

The four factors that influence knowledge transfer from an organisational dimension are:

- Relational channel (Tounkara, 2014; Hashim & Othman, 2005; Rulke *et al*, 2000) that provides the human-to-human link necessary to support the transfer of tacit knowledge.
- Partner similarity (Tounkara, 2014; Almeida *et al*, 2003; Darr *et al*, 2000) refers to the similarity that exists between the knowledge giver and receiver. People with similar backgrounds, levels and experiences tend to share knowledge.
- Organisational self-knowledge (Hashim & Othman, 2005; Rulke *et al*, 2000) refers to the fact that individuals know what they know and also know what other people know.
- Divergence of interest (Kalid & Mahmood, 2010), the divergence of interest between sender and receiver can inhibit knowledge transfer.



The storage of knowledge represents an important aspect of successful organisational knowledge management (Mwila, 2013). Alavi and Leidner (2001) observe that while organisations create knowledge and learn, they also forget during that time. The storage of organisational knowledge is referred to as organisational memory. Organisational memory can reside in different forms, such as documented organisational procedures, codified human knowledge stored in expert systems, structured information stored in electronic databases and written documentation (Mwila, 2013). Technology plays a big role in the storage of knowledge.

### **2.2.3 The South African context: Knowledge Management landscape**

South Africa is faced with a number of challenges in transforming the racial and gender profile of its overall labour landscape including the knowledge workforce. This has an effect in the way knowledge is managed specifically under the circumstances prevailing in South Africa.

South Africa is differentiated by the existence of different cultural groups that need to be integrated if the business has to compete in the global arena. Kruger and Johnson (2013:3) observe that in contrast to other culturally diverse countries, South Africa aims to “create a unified culture wherein in European, African and Asian cultures are fused.”

Data published by Stats SA (2014) affords insight into the employment landscape in South Africa, broken down by population group.

**Table 2.1: Profile of national population by race and gender (Source: CEE annual report 2009-2010:6)**

Population group	National population distribution (Census 2001)			Economically active (QLFS, September 2009)		
	Male	Female	Total	Male	Female	Total
<b>African</b>	37.7%	41.3%	79.0%	39.2%	34.2%	<b>73.5%</b>
<b>Coloured</b>	4.3%	4.6%	8.9%	6.1%	5.2%	<b>11.3%</b>
<b>Indian</b>	1.2%	1.3%	2.5%	1.9%	1.1%	<b>3.0%</b>
<b>White</b>	4.6%	5.0%	9.6%	6.7%	5.5%	<b>12.2%</b>
<b>Total</b>	<b>47.8%</b>	<b>52.2%</b>	<b>100.0%</b>	<b>54.0%</b>	<b>46.0%</b>	<b>100.0%</b>

The data in Table 2.1 provides a depiction of the national demographics and the economically active population in terms of race and gender. This data provides vital information for setting employment equity numerical goals and targets.

The South African government has been exerting pressure on employers in an effort to transform the social composition of the labour-force to a balance. The broad objective of the transformation is to have an equitable representation of the designated groups in terms of their economically active population in the workforce. South Africa's employment imbalance problems emanated from racism and exclusion that were the main features of its colonial and apartheid past and engraved themselves on all aspects of social life (Kruger & Johnson, 2013).

The workforce profiles in Tables 2.2 and 2.3 provide the population distribution of knowledge employees by race and gender for large employers only.

Table 2.2 provides the population distribution at the top management level by race and gender. It indicates that of the eleven defined sectors, two sectors, i.e. Electricity/Gas/Water and Community/Social/Personal Services are continuing much better when compared to the other sectors. Notwithstanding the fact that all eleven sectors are performing terribly in terms of employment equity, the two worst performing sectors are Retail/Motor/Trade/Repair Service as well as Wholesale Trade/ Commercial Agents/ Allied Services.

**Table 2.2: Industry sector profile of population distribution at Top Management by race and gender (Source: CEE annual report 2009-2010:11)**

Occupational levels	Male				Female				Foreign National		Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	Male	Female	
Agriculture	8.5%	2.4%	0.4%	76.7%	2.1%	0.7%	0.0%	8.5%	0.6%	0.0%	100.0%
Mining and Quarrying	13.6%	1.4%	1.9%	68.5%	3.4%	0.3%	0.0%	6.1%	4.9%	0.0%	100.0%
Manufacturing	6.8%	2.5%	6.2%	64.4%	2.1%	0.9%	1.0%	7.8%	7.8%	0.6%	100.0%
Electricity, Gas and Water	27.7%	4.0%	5.1%	29.3%	16.2%	1.7%	1.2%	3.7%	9.2%	1.7%	100.0%
Construction	10.9%	4.2%	5.0%	69.5%	1.9%	0.6%	0.7%	4.8%	2.1%	0.1%	100.0%
Retail and Motor Trade/Repair Service	4.7%	2.1%	5.9%	69.9%	0.9%	0.5%	1.2%	10.9%	3.4%	0.6%	100.0%
Wholesale Trade/ Commercial Agents/ Allied Services	4.6%	3.5%	7.7%	68.2%	1.9%	1.1%	1.7%	9.2%	2.0%	0.1%	100.0%
Catering/ Accommodation/ other trade	10.1%	1.7%	3.6%	57.2%	3.0%	1.7%	0.8%	18.0%	2.8%	1.1%	100.0%
Transport/ Storage/ Communications	19.5%	4.5%	6.6%	46.9%	6.1%	0.8%	1.6%	8.7%	4.9%	0.4%	100.0%
Finance/Business Services	12.8	3.0%	6.8%	51.5%	6.8%	1.4%	1.9%	12.7%	2.5%	0.6%	100.0%
Community/Social/ Personal Services	28.9	6.5%	4.6%	30.2%	14.7%	2.8%	1.7%	9.6%	0.8%	0.2%	100.0%

Table 2.3 provides the population distribution at the professionally qualified level by race and gender. It indicates that whites dominate across all entities at this level. The most under-represented groups at this level are Africans and Coloured females.

**Table 2.3: Profile distribution at professional qualified level by race and gender (Source: CEE annual report 2009-2010:15)**

Occupational levels	Male				Female				Foreign National		Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	Male	Female	
Agriculture	21.2%	3.4%	1.8%	46.5%	9.3%	1.2%	0.9%	14.3%	1.2%	0.2%	100.0%
Mining and Quarrying	21.5%	2.5%	2.7%	51.3%	6.9%	0.7%	1.2%	11.0%	1.9%	0.3%	100.0%
Manufacturing	11.1%	5.5%	8.8%	46.3%	4.7%	2.6%	3.2%	15.5%	2.0%	0.4%	100.0%
Electricity, Gas and Water	23.9%	4.8%	6.5%	31.0%	16.0%	2.3%	2.8%	9.8%	2.4%	0.5%	100.0%
Construction	17.4%	6.3%	5.4%	51.7%	5.6%	1.2%	1.5%	7.5%	3.1%	0.3%	100.0%
Retail and Motor Trade/Repair Service	15.5%	7.3%	7.0%	27.5%	10.1%	7.4%	4.6%	19.4%	0.7%	0.4%	100.0%
Wholesale Trade/ Commercial Agents/ Allied Services	14.7%	6.6%	7.0%	33.1%	8.4%	5.4%	3.3%	21.0%	0.5%	0.1%	100.0%
Catering/ Accommodation/ other trade	17.2%	4.9%	3.5%	25.3%	15.2%	5.4%	2.4%	24.2%	1.5%	0.5%	100.0%
Transport/ Storage/ Communications	15.1%	5.8%	7.9%	39.8%	7.0%	2.8%	3.0%	17.4%	0.9%	0.3%	100.0%
Finance/Business Services	10.7%	4.8%	7.1%	31.8%	8.7%	4.4%	5.9%	24.5%	1.3%	0.8%	100.0%
Community/Social/ Personal Services	20.6%	8.0%	2.2%	11.6%	27.8%	12.8%	2.1%	13.3%	1.1%	0.5%	100.0%

The presented data shows that the knowledge retaining cohort in the South African economy is largely comprised of white males. The probable concern from the government's perspective is the increase in the unemployment rate of black Africans with tertiary education whilst there is no movement in the access of the designated groups into skilled positions (knowledge positions) being held predominantly by the white males. Such an outcome would have been difficult to predict for the post-apartheid period when access to the labour market should at least have been easier for those with tertiary qualifications after years of racial exclusion.

Ideally, access into the skilled jobs by the designated groups should be followed by rigorous knowledge dissemination by the knowledge retaining groups. For instance, MacGregor (2008) warns of a looming crisis in South Africa's scholarly workforce that requires urgent intervention as half of most senior academics (knowledge workforce) in South African universities will be retiring in the coming decade amid growing academic numbers as higher education expands to achieve a 20% participation rate.

In the post-apartheid era, universities need to confront two challenges - advancing the redress agenda and producing and retaining a new generation of scholars who have to be trained and equipped to carry out the responsibility of conducting research and publishing so that the knowledge needs of South Africa are effectively met (MacGregor, 2008) . This way there would be a harmonious transformation of the social composition of the academic workforce and the overall labour landscape at large.

However, the knowledge transfer is affected by dynamics discussed earlier on, particularly compounded in the South African situation by virtue of the fact that there is enormous additional pressure legally enforced by the government to change the dominant white male knowledge retaining cohort rapidly, often before tacit knowledge and experience can be passed on effectively. South Africa has been challenged to make the transition into the global economy whilst managing the vast diversity of its people (Kruger & Johnson, 2013).

Knowledge sharing and knowledge hoarding may also be a function of the contextual circumstances whereby if there is a perception that by imparting tacit knowledge one becomes liable to making oneself redundant, it will impede or even nullify sharing such knowledge. Therefore, the variables of the intention to share knowledge heavily impact also under these circumstances. The South African scenario can be considered a “benchmark for developing economies characterised by continued change, diversity and even elements of silent intolerance and conflict” (Kruger & Johnson, 2013:8).

### **2.3 DEVELOPING A MEASURE FOR KNOWLEDGE MANAGEMENT PRACTICES**

Darroch’s view (2003) of knowledge management as comprising knowledge acquisition, knowledge dissemination and responsiveness to knowledge also reinforces the knowledge process capability of the organisational perspective of knowledge management. Each component of this knowledge management view is presented as being related to the other components. This is to say knowledge management practices are conceptualised as organisational routines whereby knowledge is acquired and then responded to immediately or disseminated and then responded to (Darroch, 2003). Therefore, organisations with better developed knowledge management practices are said to have a distinctive capability in knowledge management.

It is from the above-described background that a survey instrument (the questionnaire) for knowledge management, originally developed and tested by Darroch (2003, 2005) was adopted for this research. The survey items to probe the knowledge management practices of the organisations in the engineering/construction sector are arranged under knowledge acquisition, knowledge dissemination and responsiveness to knowledge.

Knowledge acquisition has been described in sections above. Broadly, Darroch (2003) characterised it as relating to the location, creation and discovery of knowledge. Thus knowledge could be acquired from employees (reflecting individuals' skills and experiences) or from relationships between the organisation and its customers and suppliers. According to Lyles and Salk (2007) there is a relationship between knowledge acquisition and organisational performance.

Various researchers have used various terms to describe knowledge dissemination. These include transfer (Yang, 2007; Martin, 2000; Argote, McEvily & Riis, 2003); flow (Gupta & Govindarajan, 2000) and sharing (Sparrow, 2006), among others. Knowledge dissemination is the distribution of embodied knowledge throughout a firm or a value chain (Damarest, 1997). It is the transfer of knowledge within and across settings, with the expectation that the knowledge will be used conceptually (as learning, enlightenment or acquisition of new perspectives or attitudes) or instrumentally, in the form of modified or new practices (Dalrymple *et al.*, 2002). Nonaka and Takeuchi (1995) present a structured approach to knowledge dissemination in their knowledge creation spiral in which they identify four categories of knowledge dissemination, namely: socialisation, externalisation, combination and internalisation. This model also has been described in detail in earlier sections.

The actions taken in response to the knowledge gathered and filtered characterises knowledge responsiveness (Alavi & Leidner, 2001). Darroch (2003) defines responsiveness to knowledge as when the firm responds to the various types of knowledge it has access to. Organisational responsiveness is also characterised as the actions taken in response to the knowledge gathered and filtered (Alavi & Leidner, 2001). The timing and quality of the response mirrors the agility of the organisation (Dove, 1999; Darroch, 2003). Ruzevicius (2006) posits that the main activity of the field of knowledge management is the use and development of an organisation's knowledge resources in order to meet the organisational goals.

## 2.4 KNOWLEDGE MANAGEMENT FACTORS

Chong and Choi (2005) argue that if knowledge management plays a critical role in an organisation's performance, then it is vital for any knowledge management initiative to recognise the critical indicators of success to measure its performance. Therefore, a knowledge management agenda has to identify key indicators of success so as to be able to reflect on knowledge management performance (Chong, 2006). Yeh, Lai and Ho (2006) characterised the success factors as knowledge enablers and define them as key factors that are instrumental to the effective execution of knowledge management in an organisation. This is say, in order to ensure the successful institutionalisation of knowledge management, it is vital for the organisation to be able to acquire the key enablers in order to effectively utilise the organisation's limited resources, minimise the use of manpower, materials and time and still be able to achieve the expected results (Yeh *et al*, 2006).

Chauvel and Despres (2002) define knowledge management enablers or barriers as the structural or functional conditions in an organisation that are responsible for the success or failure of a knowledge management initiative. Wong and Aspinwall (2005) observe knowledge management enablers as those activities and practices that need to be attended to in order to ensure successful implementation.

These practices would need to either be nurtured or be developed if they are not available in the organisation. A number of researchers have explored the factors underpinning the accomplishment of knowledge management. Initial studies of these seemed exploratory; to see what early adopters of knowledge management in the form of large corporations were doing to control their knowledge (Wong & Aspinwall, 2005:65).

An extensive literature review shows that, in as much as some of the factors have been labeled differently, a number of factors can be identified using



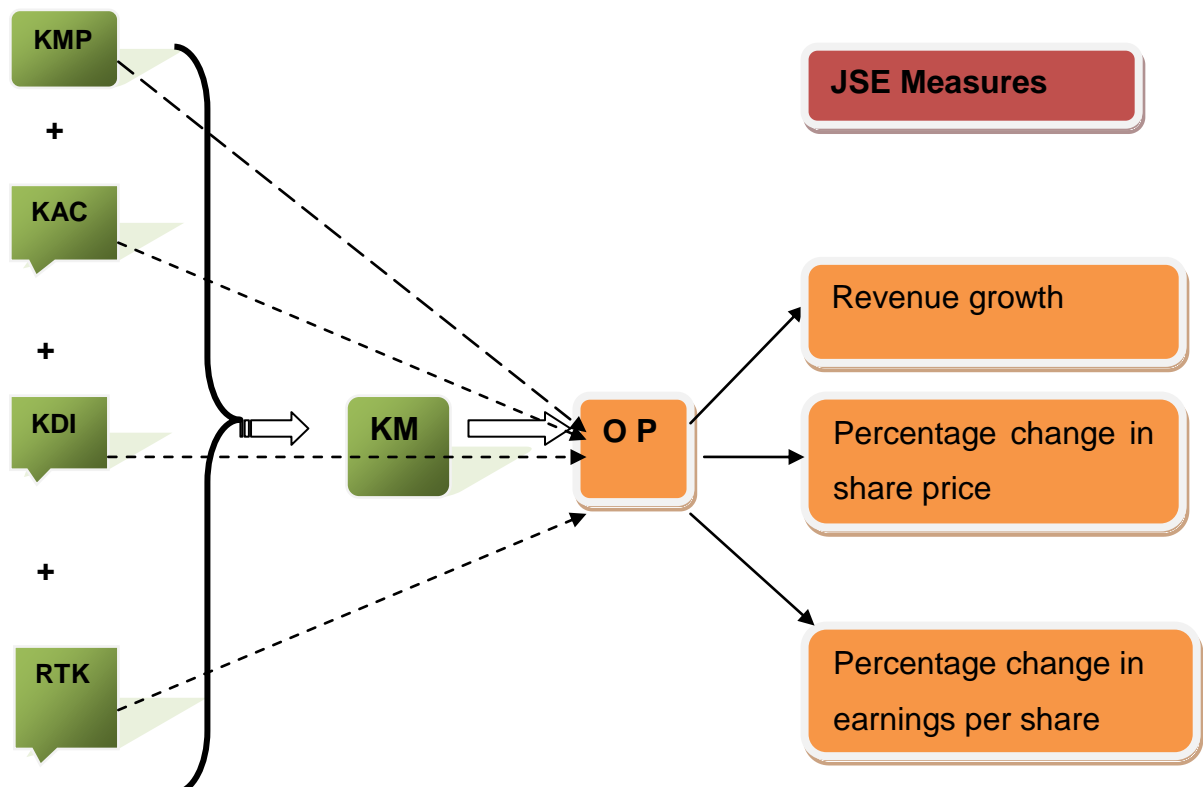
generic terminologies. From the review and analysis in the above sections, about eleven knowledge factors form the foundations of effective knowledge management. These are:

- 1) *Strategy and purpose* (Toukara, 2014; Wong & Aspinwall, 2005; Oltra, 2005; Yeh, Lai & Ho, 2006; Sin, Goh & Eze, 2009; Ajmal, Helo & Kekale, 2010).
- 2) *Management leadership* (Kim *et al*, 2014; Moffett, McAdam & Parkinson, 2003; Connelly & Kelloway, 2003; Chong & Choi, 2005; Yew & Aspinwall, 2005).
- 3) *Organisational culture* (Meihami & Meihami, 2014; Chong 2006; Yeh *et al*, 2006; King, 2008; Bishop, Bouchlaghem, Glass & Matsumoto, 2008; Sin *et al*, 2009;).
- 4) *Information technology* (Mwila, 2013; Okunove Karsten, 2002; Moffet *et al*, 2003; Yew & Aspinwall, 2005; Wong & Aspinwall, 2005; Bishop *et al*, 2008).
- 5) *Performance measurement* (Appolloni *et al*, 2014; Yew & Aspinwall, 2005; Ajmal *et al*, 2010).
- 6) *Corporate infrastructure* (Wang *et al*, 2014; Okunove & Karsten, 2002; Moffet *et al*, 2003; Ajmal *et al*, 2010).
- 7) *Practices and processes* (Kianto *et al*, 2014; Yew & Aspinwall, 2005; Ajmal *et al*, 2010; Sin *et al*, 2009).
- 8) *Employee motivation* (Toukara, 2014; Moffet *et al*, 2003; Yeh *et al*, 2006, Sin *et al*, 2009).
- 9) *Employee training* (Wong & Aspinwall, 2005; Yew & Aspinwall, 2005; Ajmal *et al*, 2010).
- 10) *Human resources management* (Wong & Aspinwall, 2005; Oltra, 2005)
- 11) *Resources* (Kim *et al*, 2014; Moffet *et al*, 2003; Wong & Aspinwall, 2005).

Darroch (2003) is of the view that knowledge management is a multi-dimensional construct and that knowledge acquisition, knowledge dissemination and responsiveness to knowledge, being components of

knowledge management, can also be viewed as knowledge management factors. According to Bagorogoza, de Waal, van den Herik and van de Walle (2011), knowledge acquisition represents the beginning of the organisation's overall knowledge creation process. Knowledge dissemination is the transmission of knowledge to the target receivers for absorption and use (Singh, 2006).

It is the view of this research that good knowledge management behaviours and practices have important associations with the achievement of superior organisational performance and that these knowledge management behaviour practices are also related to the elements that determine organisational performance (Pillania & Rajesh, 2008; Wagner, 2009; Waal, 2008). The presumption is that knowledge management influences the organisational performance factors. In line with these discussions, the knowledge management model in Figure 2.2 is proposed.



**Figure 2.2: The research model**  
(Adapted from Darroch, 2003:42).

Where:

KMP = Knowledge Management Practices

KAC = Knowledge Acquisition

KDI = Knowledge Dissemination

RKT = Responsiveness to Knowledge

OP = Organisational Performance

Having adapted the questionnaire by Darroch (2003) that has three components namely knowledge acquisition, knowledge dissemination and responsiveness to knowledge, modifications were made to include knowledge management practices and organisational performance so as to synchronise the new questionnaire with the purpose of this research.

The organisations to be surveyed were to be drawn from the JSE Stock Exchange and listed under the construction and engineering firms and therefore the performance indicators to be used are; the percentage change in the share price, percentage change in the earnings per share and revenue growth.

It is from these components and linkages described that the model was formulated so as to reflect the relationships. The research will seek to find out if there exist any relationship between knowledge management and organisational performance.

## **2.5 CONTRASTING THE RESOURCE-BASED PERSPECTIVE AND THE KNOWLEDGE-BASED VIEW**

The resource-based theory (RBT) is a model of an organisation's performance that focuses on the resources and capabilities that are controlled by the organisation as a source of competitive advantage (Kim *et al*, 2014). With major contributions on core competency from Prahalad and Hamel (1990b)

and on added value by Kay (1999), the RBT impact on the field of strategic management as well as many other academic disciplines has been enormous as it helps to explain why some organisations succeed in creating competitive advantage and earning superior profits whilst others do not.

The RBT rests on two fundamental assumptions about the resources and capabilities that organisations control (Barney and Hesterly, 2008). Firstly, different organisations may possess different bundles of resources and capabilities even if they are competing in the same industry. This is the assumption of the firm resource heterogeneity that implies that for a given business activity, some firms will be more skilful in accomplishing the activity than other organisations. Consequently, it looks at strategies that can be identified with an individual company as distinct from those that are available to all competitors through an understanding of the industry and markets. Therefore, market opportunities have to be identified and then satiated in an individual and distinct manner (Thompson & Martin, 2010).

The second assumption of the RBT is that some resource and capability differences amongst organisations may be long lasting because it may be very costly for organisations without certain resources and capabilities to develop and acquire them. This is the resource immobility assumption. In other words, as long as there are opportunities that can be identified, it will normally be easier and less risky for the organisation to exploit their existing resources in new ways than to seek to acquire and learn new skills and competencies.

Innovation is crucial in this instance and new methods of exploiting resources need to be found to sustain any competitive advantage (Mwila, 2013). Relative differences that separate a firm from its rivals are very important and thus just having a resource is not enough. For that reason it can be vital if particular strengths are not easily learned and imitated by rivals, and this is the grounding to the key themes of core competency and strategic capability. It is equally from this background that this research inquires on the use of knowledge management as a core competency and distinctive capability.

Ultimately, the resource-based theory is used to explain the differences in performance between and amongst organisations as being dependant on the valuable resources they possess (Curado & Bontis, 2006).

### **2.5.1 Limitations of the Resource Based Theory (RBT)**

The RBT has been extensively recognised as a guiding view in strategy research, as evidenced by its widespread dissemination in academic literature (Hoopes, Madsen & Walker, 2003; Acedo, Barroso & Galan, 2006; Wan, Hoskisson, Short & Yiu, 2010). However, the theory has been subjected to a number of criticisms and the debates on the usefulness of the RBT have steered a healthy conversation amongst RBT scholars like Barney, 2001a; Priem & Butler, 2001b; Foss & Knudsen, 2003; Peteraf & Barney, 2003.

For example, Foss (1998:143) points out how “it is not really the individual resources but rather the way resources are clustered and how they interact that is important for competitive advantage”. Foss (1998) further suggests that the clustering and interplay of the resources suggest that the uniqueness or rarity of a resource may not matter so much as compared to the resource’s ability to fit into the system.

Contemporary research work on resources has sustained an interest in the dynamics of resource use with particular interest in the idea of resource bundles and linkages and how to understand them better (Rouse & Daellenbach, 2002; Lampbell & Shamsie, 2003; Ensign, 2004; Gibbert, 2006). Newbert (2008) contends that an assessment of studies reveal that empirical research exploring the dynamics of resource use is still in its infancy. The limitations largely are to do with the neglect of process issues, the reliance on aggregate findings and the measurement of intangible resources. These will be explored in turn below.

Revisiting the resource based view is a worthwhile effort and the research effort should be refocused towards the managerial processes since resources alone are not a source of competitive advantage: they only become valuable through the actions of managers involved in the business process. This is the context that informs the focus later on in this discussion, on the processes that should accompany knowledge management through which knowledge becomes valuable to the firm (Kianto, Ritala, Spender & Vanhala, 2014).

Cockburn, Henderson and Stern (2000) suggest that resource based view influences on dynamic and process oriented issues have received considerably little attention as the understanding of processes is crucial for process enhancement. Newbert (2008) concurs that in as much as managers are the primary custodians for orchestrating the planned processes that have a potential to generate competitive advantage, most empirical reviews of the RBT have not examined the process issues that are at the centre of building and sustaining competitive advantage.

The RBT requires further development work in areas involving managerial processes in particular (Lynch, 2009). He also further suggests that a reflection of the processes through which resources become valuable is vital and would provide insights into management's role in the conversion of resources to a competitive edge position for the firm. Process research needs to explore the micro activities of managers as profit, and not the devil lies in the detail (Johnson *et al*, 2008).

The use of aggregated findings is another shortcoming for the resource based theory. Research using the RBT has often relied on methods that do not allow a firm level analysis where the managerial processes can best be studied. The RBT suggests that even organisations within the same industry can be reliant on different resources and processes in managing their organisations. It can thus be argued that a firm level analysis would best reveal these idiosyncratic sources of advantage as opposed to an aggregated industry level analysis.

Many RBT research studies have yielded findings that are based on averaging results across the sample (Hall, 1993; Carmeli, 2001). Inherently, the approaches that rely on averaging methods are inconsistent with the main doctrines of the RBT such as resource heterogeneity, which leads researchers to unveil the unique, firm-specific assets that can result in competitive edge as opposed to research that is intended to uncover the case for the average, representative organisation (Aharoni, 1993).

It is appropriate to cluster firms within a single industry before carrying out an in-depth analysis, as it can reflect commonalities between organisations that are otherwise not encapsulated in academic research (Rouse & Daellenbach, 1999). They further argue that the failure to control industry and strategic group commonalities could compound results and confuse efforts to untangle any contextual locus of advantage. The comparison of performance differences amongst organisations within industry clusters is encouraged so as to particularly search those high performing organisations for their sources of competitive advantage.

Therefore, a comparison of performance differences amongst organisations within the same industry will be undertaken with knowledge management being untangled as the contextual locus of advantage (Kim *et al*, 2014). Organisations can display stark differences in their sources of advantage based on their distinct firm characteristics. It is, therefore, imperative to look for sources of competitive advantage at the level of the organisation since it is at that level that managers engage in identifying, developing and leveraging the organisation's sources (Rouse & Daellenbach, 1999).

Ray, Barney and Muhanna (2004) concur and propose that it is only at the level of the organisation that resources are most likely to be strategic assets, especially if these are valuable, rare and inimitable. Knowledge easily fulfils their criteria and that is why this study proposes that its proper management can contribute to organisational performance (Meihami & Meihami, 2014). Cockburn *et al* (2000) are of the view that investigating and questioning the

origins and dynamics of key resources like knowledge is bound to improve the usefulness of the RBT more than studies that investigate differential performance that pervade strategy literature. From the above it is clear that there is some congruence by scholars on the importance of rigorous research on the ex-ante managerial processes that lead to organisational competitiveness.

Johnson *et al* (2003) notes that part of the problem has been a micro focus in research that is remote from what the managerial actors are doing at management level, and the effects and influence of the managerial processes on organisational performance. According to Aaker (1989), a knowledge management strategy can be guided by addressing questions such as '*what*' and '*how*' knowledge skills and knowledge assets have contributed to business success over the time and '*what*' knowledge skills and knowledge assets do businesses with chronically low performance lack. Adding the '*why*' question for consideration as well within the same spectrum would extend the knowledge and boundaries of the RBT.

The final limitation of the RBT is around the measurement of intangible resources, of which knowledge in the organisation is a good example. Much as there has been increased synchronisation of the RBT in strategic management, the RBT has proven to be very difficult to test empirically because of the problems associated with measuring resources that are particularly intangible in nature (Barney & Mackey, 2005). Past studies attempting to measure the strategically important intangible resources have relied on secondary data and course-grained variables as equivalents of intangible resources.

Substitutes such as research and development (R & D) intensity, patents, advertising intensity, human capital leverage and investments amongst others have been used in this regard (Hitt *et al*, 1998). Research using these indicators effectively does show the effects of the resources on performance outcomes but the research potentially leaves the resources in question and the



processes through which they are acquired causally ambiguous or imprecisely identified (Rouse & Daellenbach, 2002).

Considering data problems, Rouse and Daellenbach (2002:964) raise the concern that it might be tempting to use the number of new products launched as a proxy for a firm's resources related to R & D capabilities. However, it may be that|:

- firms measuring identically on launches may have entirely different components of R & D capabilities or
- instead of reflecting R & D capability, launches may indicate management proclivities regarding when a product is deemed ready for the market or luck of the plan in development time.

The other related concern for studies foregoing the use of proxy variables to measure intangible resources is that they have at times resorted to using broad, all inclusive resource categories such as human capital and know-how (Priem & Butler, 2001; Johnson et al, 2003). Newbert (2008) asserts that only a breadth of the resources have been identified across resource based literature, whilst most empirical research has not explored the resources in question by any means of depth.

Hence the inadequate understanding available through the use of proxy measures and broadly constructed resource categories in the RBT begs for the consideration and application of different or non-traditional research designs to include both qualitative and quantitative approaches, as these would enhance the understanding of how resources become valuable; and also provide the insight into which resources managers mostly rely on for performance (Barney & Arian, 2001). The understanding of managerial processes will become handy in this regard.

## 2.5.2 The knowledge-based view (KBV) of a firm

The knowledge-based view (KBV) is an off-shoot of the resource-based theory also having deep roots in strategic management (Mbhalati, 2012). The KBV perceives that “managers can enhance an organisation’s capacity to produce efficiently by updating or advancing knowledge” (Nickerson & Zenger, 2004:1). That is, the knowledge-based view contends that organisational knowledge is the primary resource for creating and sustaining competitive advantage (Kim, Lee, Chun & Benbasat, 2014).

The KBV describes knowledge as a strategic resource that does not depreciate in the manner traditional economic productive factors do as it possesses the capability to generate increasing returns (Wang, He & Mahoney, 2009). This approach reflects organisations as bodies that generate, integrate and distribute knowledge (Miller 2002). Considering this knowledge management strategy, the knowledge-based view of the firm has extended the resource-based view of the firm (Kim, Lee, Chun & Benbasat, 2014). By internalizing valuable knowledge or keeping this knowledge internal, the organisation positions itself to both exploit and protect the knowledge (Nickerson & Zenger, 2004). However, the key knowledge-based question that the manager faces is not how to organize so as to exploit already developed knowledge or capability but rather how to organize to efficiently generate knowledge and capability (Kianto *et al*, 2014; Nickerson & Zenger, 2004).

The capability of the organisation to create value is not based as much upon its physical or financial resources as on its set of intangible knowledge-based capabilities (Theriou, Aggelidis & Theriou, 2009). According to the KBV, competitive success is governed by the capability of organisations to develop new knowledge-based assets that create core competencies (Pemberton and Stonehouse, 2000). The knowledge-based view indicates that conceptualising the type and origin of organisational knowledge is important to simultaneously explain organisational learning (Kim, *et al*, 2014).

Fundamentally, the KBV of the firm assumes that the critical input in production and the principal source of value is knowledge (Patton, 2007). The subgroup of this assumption stresses on the importance of collective knowledge, offering insight into various types of behaviour, inherent limitations of individuals due to “bounded rationality” and the development of organisations’ “knowledge-based activities and routines” (Theriou *et al*, 2009:180). Since knowledge exist at an individual level (Nickerson & Zenger, 2004) it justifies making knowledge integration the essential function of the organisation.

The KBV incorporates human, social and organisational resources in addition to economic and technical resources. The view is that any organisation that possesses organisational knowledge related to value that is characterised as idiosyncratic or uncommon stands a chance of earning high returns that are also sustainable (Raft & Lord, 2002).

Nickerson and Zenger (2004) take this view as seeking to have an explanation of the organisation that is independent of transaction cost logic and its behavioural assumption of opportunism. A common argument they present is that companies as organisational forms exist to economise on the exchange of knowledge rather than to attenuate opportunism, thereby becoming a “creator of a positive” rather than an “avoider of a negative” (Nickerson & Zenger, 2004:1).

There are a number of approaches to the KBV. The one that is most accepted is the accumulation of distinctive capabilities and core competencies by the organisation through the accrual of experience, articulation of knowledge followed by their codification (Zollo & Winter, 2002). Alternatively, this can be done through the knowledge management processes of creating, acquiring, storing, sharing and deploying knowledge (Wang *et al*, 2014; Theriou *et al*, 2009).

There is recognition that knowledge is a vital business asset but organisations are still to understand the full implications of knowledge management (Liebowitz, 2000). Knowledge management is becoming an essential function within organisations and shown that knowledge-based organisations have the ability to manoeuvre with intelligence and creativity (Metaxiotis, Ergazakis and Psarras, 2005). Kruger (2009:66) states that organisations that can manage their knowledge are capable of co-ordinating and combining their resources and capabilities in new and distinctive ways so as to provide more value for their customers. This is the premise upon which the current study hypothesises that;

*H1. There is a positive relationship between knowledge management practices and organisational performance.*

However, knowledge is not directly observable and its existence and properties are manifested in organisational capabilities in action (Mwila, 2013; Liebowitz, 2000). Kaplan, Schenkel, Von Krogh, and Weber (2001) argue that this differentiates knowledge from resources, which can be identified without observable action, since different actions can be ascribed to different capabilities. Therefore, a specific 'constellation of actions' represents a specific set of capabilities within the organisation and implies the existence of specific knowledge that is required to exercise these capabilities (Kianto *et al*, 2014; Kaplan *et al*. 2001). This line of reasoning leads to the consideration of knowledge management processes and practices as building blocks to distinct capabilities and core competencies. In the same way, Zollo and Winter (2002) view knowledge management processes as representing a crucial core competence that can be leveraged to build other strategic capabilities.

Knowledge management initiatives assist the organisation to embed knowledge into organisational processes so that it might continuously improve its practices and behaviours (Meihami & Meihami, 2014). Therefore, it is vital to appreciate the processes through which knowledge becomes valuable for practical reasons of developing and extending knowledge management so as

to inform managers about best practices (Appolloni *et al*, 2014). Against this background, it is proposed that:

*H2. Knowledge process capability leads to improved organisational performance.*

*(Organisational performance will be operationalised along the lines of revenue growth, earnings per share growth and share-price growth).*

### **2.5.3 Knowledge-based view: the problem-solving perspective**

The problem solving perspective of the knowledge-based view assumes that management cannot simply choose the new knowledge to acquire because in most instances the desired knowledge would not be in existence (Nickerson & Zenger, 2004). Instead, management is expected to choose valuable problems that if they are successfully solved, would result in the acquisition of required knowledge, competence or capability. Nickerson and Zenger (2004:2) further argue that the value of a particular problem is determined by two factors;

- The values of the array of possible solutions available and
- The costs of discovering particular valuable knowledge.

Fleming and Sorenson (2000) are of the view that solutions to complex problems represent unique combinations or synthesis of existing knowledge. The matrix of unique combinations of knowledge is sometimes presented as a landscape. Some of the “solution landscapes are rugged, having many high value solutions scattered across the terrain” whilst others are “smooth, having a single high-value or with high-value solutions concentrated in a particular region of the landscape” (Nickerson & Zenger, 2004:2). Problems are different in the optimal form of solution search. Gavetti and Levinthal (2000) describe some as directional search or search based on trial and error leading to a high-value solution and others as search guided by a cognitively developed heuristic of the landscape’s topography.

After a problem has been identified and an assessment of the ideal search has been conducted, management is supposed to decide how to organise the search. Therefore, the organisation's eventual objectives for knowledge creation under the knowledge-based view would dictate the choice of how the company is organised (Kim *et al*, 2014). In essence, the focus is not so much on whether knowledge should be acquired and owned or how the dissemination of knowledge should be facilitated but rather how management should organise individuals and processes to generate the knowledge that the organisation seeks (Reich, Gemino & Sauer, 2014). This call for management to decide on how to access the relevant knowledge, which could either be inside or outside the organisation.

As soon as a problem has been selected, management is then expected to organise for the search of solutions that enhance the likelihood, speed and cost with which valuable solutions are discovered. Nickerson and Zenger (2004:2) present three governance modes namely;

- markets
- authority based hierarchy and
- consensus based hierarchy

and then explore their capacity to support the differing forms of search.

The distinguishing feature among the governance alternatives is the divergent way in which each resolves conflict over the choice of the search path or selection of solution trials. Nickerson and Zenger predict that “efficiency demands that the governance alternatives be matched in a discriminating way to problems based on their associated costs and benefits in governing solution search. It simultaneously treats the boundary choice i.e. internal versus external, and the choice among alternative internal approaches to organising” (Nickerson & Zenger, 2004:3).

Thus, the problem solving perspective of the knowledge-based view explains the advantages of markets and hierarchy and matches these to the preferred types of knowledge formation. It is based on the probability of solution location

whereby the correct alignment of governance with problem complexity is expected to produce superior performance by enhancing the probability of discovering a valuable solution (Kim *et al*, 2014).

## **2.6 KNOWLEDGE MANAGEMENT AS A STRATEGY**

It should be underlined that the knowledge embedded within the organisation can be a source of competitiveness as long as a well-defined knowledge strategy and the right technological tools and techniques are available to achieve knowledge management (Appolloni *et al*, 2014). The field of strategic management deals with the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilisation of resources, in order to enhance long term performance of firms (Nag, Hambrick & Chen, 2007). Therefore, the principal objective of business level strategy is to generate sources of sustainable competitive advantage. This spells out how an organisation can compete in a specific business arena. Successful knowledge management requires an organisation to employ mixed methods strategies in its given situation (Kim, Lee, Chun and Benbasat, 2014). Observations of the South African business environment “indicate a growing awareness and adoption of knowledge-based strategies and knowledge management practices” (Kruger & Johnson, 2013:3).

Faced with several business opportunities, the first step in validating the tentative choice is to determine whether the organisation has the capacity to execute it successfully. This organisational capability is demonstrated by the organisation’s potential and ability to accomplish whatever it sets out to do, against the opposition of circumstances or competition. Since it is prudent in formulating strategy to maximise or extend the potential strengths and contain or minimise the potential weaknesses, it is important to determine what the strengths are and distinguish one from the other. All this is done with surveillance of the changing environment. Part of the business level strategy objectives would also involve developing and nurturing the potentially valuable

capabilities. Knowledge is constructed as a strategic resource and its proper management is pertinent if it is to aid organisational performance. Although prior studies on knowledge management have improved the understanding of knowledge management strategy, its roles and impact are fragmented (Kim *et al*, 2014:398)

A capability is usually considered to be a bundle of assets or resources used to perform a business process that is made up of individual activities. As an example, the product development process involves individual activities like idea generation, conceptualisation, product design, design evaluation, pilot testing, new product launch in production, process debugging, etc. Barney and Hesterly (2008) characterise capabilities as a subset of a firm's resources, and define them as the intangible and tangible assets that enable a firm to take advantage of the other resources it controls. This implies that capabilities by themselves will not enable an organisation to conceive and implement its strategies but will enable the organisation to use other resources to conceive and implement such strategies. Knowledge improves organisations' adaptation, understanding and effective response rates to new demands of consumers for products and services (Appolloni *et al*, 2014).

Writing about the sources of capabilities, Mintzberg, Lampel, Quinn and Ghoshal (2003) contend that the powers of a company constituting a resource for growth and diversification accrue primarily from the experience of making and marketing a product line or providing a service. They further argue that the powers of a company constituting a resource are also inherent in:

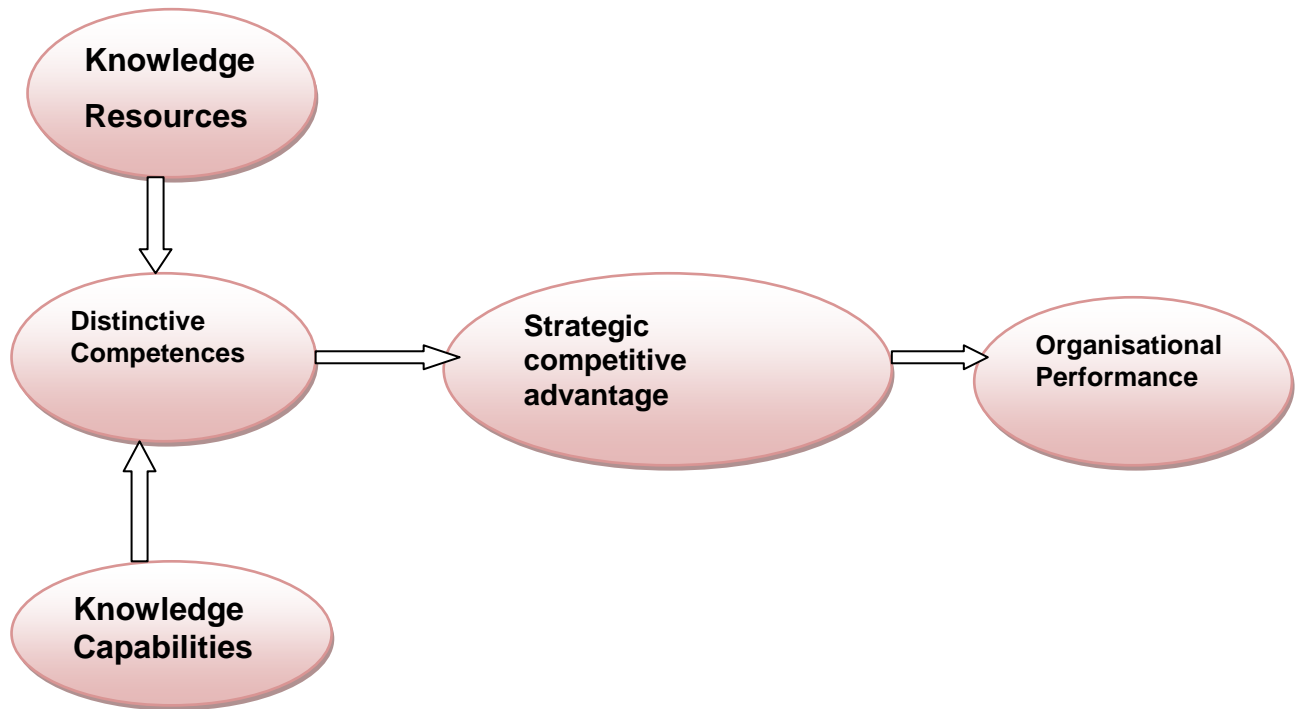
- the developing strengths and weaknesses of the individuals in the organisation,
- the degree to which individual capability is effectively applied to the common task and
- the quality of coordination of individual and group effort (Mintzberg *et al*, 2003:77).



The organisation's most important capabilities are called competencies. Prahalad and Hamel (1990b) argue that for organisations to become successful they must develop core competencies. Johnson, Scholes and Whittington (2008) define competencies as the skills and abilities by which resources are deployed effectively through an organisation's activities and processes. Thompson and Martin (2010) concur and further describe competencies as distinguishing skills that yield competitive advantage and provide access to important market areas and segments, make a significant contribution to the perceived customer benefits of the product or service and prove to be very difficult for competitors to imitate. Adaptation of products and services to customer requirements has been effectively improved by using knowledge management (Appolloni *et al*, 2014).

Research from past studies has also shown that there is considerable correlation between organisational resources, capabilities, systems and organisational performance (Barney, 2001a, 2001b, 2007; Priem & Butler, 2001a, 2001b; King, 2007; Sirmon, Hitt and Ireland, 2007). Knowledge management fits quite well into the above descriptions and definition of a competence. It is being explored as a competence that must be developed by organisations as a distinctive skill that yields competitive advantage. Using knowledge management effectively could increase organisational performance and competitiveness in the market and also organisational awareness (Appolloni *et al*, 2014).

From the above descriptions, a model can be developed that brings a link to the described concepts.



**Figure 2.3: Strategic resources, capabilities & organisational performance:** Adapted from Theriou, Aggelidis and Theriou (2009:184)

The next sections explore the various categories of resources, capabilities and competencies so as to put knowledge management into perspective.

## 2.7 KNOWLEDGE RESOURCES AND CAPABILITIES

Lynch (2009) is of the opinion that resources are difficult to analyse because many of them are vague and difficult to identify with particular reference to organisational skills. However, there are a number of ways that strategic resources may be studied. On the one hand, resources may be separated and divided into three broad categories, namely:

- Tangible – the physical assets of an organisation such as plant and equipment.
- Intangible – resources that have no physical presence but provide benefits such as brand names or knowledge.

- Organisational capabilities – the skills, routines, management and leadership of the organisation.

Lynch (2009)

Many scholars have placed more emphasis and focus on the use of intangible resources instead of the tangible resources as they have increasingly become known to be very crucial strategically (Barney, 2001a; Hall, 1993; Carmelli, 2001). Intangible resources are generally soft resources that are based on knowledge or information, such as product reputation or organisational culture. Knowledge management falls within this category. The RBT advocates that intangible resources are more likely to be strategic assets compared to tangible ones. This is because they are likely to be rare, valuable, imperfectly imitable and do not depreciate with use.

Research studies suggest that quite a number of intangible resources have some impact on organisational performance. Among those identified are customer relationships (Gouthier & Schmid, 2003), organisational culture and firm reputation (Michalim, Kline & Smith, 2000), human capital (Hitt, Bierman, Shimizu & Kochhar, 2001), cooperative capabilities (Tyler, 2001), trust (Barney, 2001b) and information technology (Wong & Aspinwall, 2005).

Although these researches have established that some intangible resources have got an impact on organisational performance, not much attention has been devoted to understanding the managerial processes by which the resources become valuable (Fahy, 2000; Lynch, 2009; Barney, 2001a; Priem & Butler, 2001; Ray, Barney & Muhanna, 2004). In addition, such research has neither explored the extent to which there is some congruence between resources that have been found to be valuable at industry level and other levels of the firm analysis (Gibbert, 2006) nor established the specific resource groups important to certain industry types (Rouse & Daellenbach, 2002). Knowledge is an intangible resource and can deliver strategic competitive advantage (Lynch, 2009). Having noted this, it may be important to distinguish between tacit and explicit knowledge.

- *Tacit knowledge*: is difficult to specify, fuzzy, perhaps complex and often unrecorded. It is more difficult for competitors to copy what remains only partially known (Lynch, 2009).
- *Explicit knowledge*: is carefully analysed, often defined precisely and often written down. It may be exclusive to the organisation, such as a patent (Lynch, 2009).

Firm resources can also be grouped into four other broad categories namely financial resources, physical resources, human resources and organisational resources.

- Financial resources encompass cash from equity holders, bond holders, banks and retained earnings from operations.
- Physical resources include an organisation's plant and equipment, its geographical location and all the physical technology used by the organisation.
- Human resources comprise the training, experience, knowledge, judgement, intelligence, relationships and insight of managers and workers of the organisation.
- Organisational resources, unlike human resources that revolve around the individual attributes, encompass formal reporting structures, planning (formal and informal), coordination systems, organisational culture and reputation as well as informal relationships within a group or those within its operating environment (Barney & Hesterly, 2008).

From the above classifications, it is quite apparent that typical resources are assets (tangible/intangible), capabilities/competencies, processes, attributes, knowledge, abilities, capital (structural and human) and control of resources.

### 2.7.1 Role of knowledge resources and capabilities

Knowledge is in fact the resource, and knowledge management the capability in the background of this discussion. A firm's capabilities define what activities the organisation can carry out within some predictable range of proficiency. Lynch (2009) observes that distinctive capabilities add value and deliver competitive advantage in three areas:

- Architecture – the network of relationships both within and outside the organisation.
- Reputation – the standing of the firm in the operating environment at large.
- Innovative ability – the structures, skills, procedures and rewards that allow some firms to innovate better than others.

In order to determine the competitive potential of a resource or capability to provide an organisation with superior performance, the value, rarity, imitability, organisation (VRIO) framework can be employed and it essentially poses four important questions: question of Value, question of Rarity, question of Imitability and the question of Organisation. Broadly, if an organisation has resources and capabilities that are valuable, rare, costly to imitate and the company is organised to exploit these resources, then the organisation can expect to enjoy a sustainable competitive advantage. The application of the VRIO framework entails subjecting a resource to each question to ascertain the competitive implication of the resource and each question is considered in a comparative sense of the competitive environment.

- Value – theoretically, the question of value probes on the ability of the resources and capabilities in enabling the organisation to exploit an external opportunity or neutralise an external threat. Practically, the resources are only valuable to the extent that they enable the organisation to increase its revenues, lower costs or a combination of both.

- Rarity – if a resource is not rare, then perfect competition dynamics will prevail. Therefore, the absence of competitive advantage would unlikely result in profits. How rare a resource or capability must be in order to have a potential to generate competitive advantage varies from one situation to the other. In general, if the number of organisations in an industry that possess a particular valuable resource or capability is less than the number of organisations needed to generate perfect competition dynamics in an industry, that capability or resource can be considered to be rare and a potential source of competitive advantage.
- Imitability – valuable and rare organisational resources can be sources of sustainable competitive advantage only if firms that do not possess them face a cost disadvantage in obtaining or developing them as compared to the firms that already possess them. Intangible resources are usually more costly to imitate than tangible resources. Sources of costly imitation can emanate from unique historical conditions (first mover advantage and path dependence), causal ambiguity, social complexity (social relationships/ trust/culture) and patents.
- Organisation – to fully realise its potential, a firm must also be organised so as to exploit its capabilities and resources. The organisation's structure and control mechanisms must be aligned so as to give people the ability and incentive to exploit the firm's resources. These structures and control mechanisms complement other organisational resources and taken together, they can assist the firm to achieve sustained competitive advantage (Barney & Hesterly, 2008; Mintzberg *et al*, 2003).

Johnson, Scholes and Whittington (2008) propose a contingency approach to capabilities and resource creation that entails:

- Adding and changing capabilities – so that they become more reinforcing of outcomes that deliver critical success factors.

- Extending capabilities – by identifying strategic capabilities in one business area that are not present in other business units.
- Stretching capabilities – opportunity to build new products or services out of existing capabilities.
- Entrepreneurial bricolage – strategic capabilities may be built by exploiting resources, skills and knowledge that have been ignored or rejected by others.
- Ceasing activities – activities not central to delivery of value to customers are done away with, outsourced or reduced in cost
- External capability developments – by looking externally, e.g. develop or learn new capabilities by acquisition or by entering into alliances and joint ventures (Johnson *et al*, 2008:121).

This study seeks to analyse knowledge management particularly knowledge management practices and processes of the organisations in the construction and engineering sector in South Africa. Knowledge management practices are conceptualised as organisational routines whereby knowledge is acquired and then responded to immediately or disseminated and then responded to (Darroch, 2003). It is the assumption of this research that organisations with better developed knowledge management practices and processes have a distinctive capability.

## **2.8 COMPETENCIES**

### **2.8.1 Defining competencies**

Organisations seem to be aware that organisational performance and competitiveness increase commensurately with individuals' skills,

competencies and knowledge (Appolloni *et al*, 2014). Just like resources and capabilities, competences also have the potential to be a source of competitive advantage if they are aligned to the strategic intent and direction of the firm. In this regard, knowledge management represents a competence. Competencies in firms can broadly be classified into two categories, namely organisational level and employee level competencies. Cardy and Selvarajan (2005) characterise competencies as being central to the two domains of (1) strategy and (2) human resources and further argue that the strategic perspective focuses on competencies at organisational level as a unique combination of resources and capabilities whilst human resources management observes competencies as personal characteristics related to effective job performance.

Hitt, Ireland, and Hoskisson (2005) characterise competencies as a combination of resources and capabilities in an organisation. They further suggest that when the competencies are valuable, rare, difficult to imitate, and difficult to substitute, then they can be classified as core competencies and can be a source of strategic advantage (Hitt, Ireland & Hoskisson, 2005). Competencies can also be functions, processes and routines in a firm (Watson, 2002; Wiscombe, 2002).

Drejer (2000) classify competencies according to two groups; corporate and personal. Corporate competencies belong to the firm and are entrenched in the structures and processes of the firm that are not affected by individual employees resigning from the organisation whilst personal competencies are possessed by individuals and evident in such characteristics as skills, knowledge, experience, abilities and personality. Knowledge management falls into these clarifications and the above descriptions warrants the recognition of the strategic significance of knowledge management in an organisation.

Cardy and Selvarajan (2005:236) define competency as an underlying characteristic of a person that could be a motive, trait, skill, aspect of one's self-image or social role; or a body of knowledge which one uses. A competency can also be a set of behavioural patterns that the incumbent has



to bring to a position in order to execute the duties and tasks with proficiency (Wiscombe, 2002). The foregoing definition sounds simple but contains some very important descriptions. In the first instance, the employee competency should be in the form of observable behaviour. Manufacturing industry organisations appear to show higher benefits through improving their workers skills, competencies, efficiency and productivity by using knowledge management (Appolloni *et al*, 2014:192).

Variables of characteristics such as values, personality traits, motives and abilities underlie behaviour. They have to be revealed in an observable and identifiable pattern of behaviour to qualify to be a competency. In addition, the pattern of behaviour is correlated to the job performance; that effective performance surpasses capability to also include motivation or aspiration to perform and the usual knowledge, skills and abilities are also included (Cardy & Selvarajan, 2005). Therefore, employee competencies should be characteristics related to successful performance and these characteristics are manifest in observable behavioural patterns with a positive impact. Kennedy and Dresser (2005) concur in that competencies are all that employees have or possess that contributes to organisational success. It is the collective competencies that are the focal point of knowledge management as they are the manifestation of an organisation's knowledge.

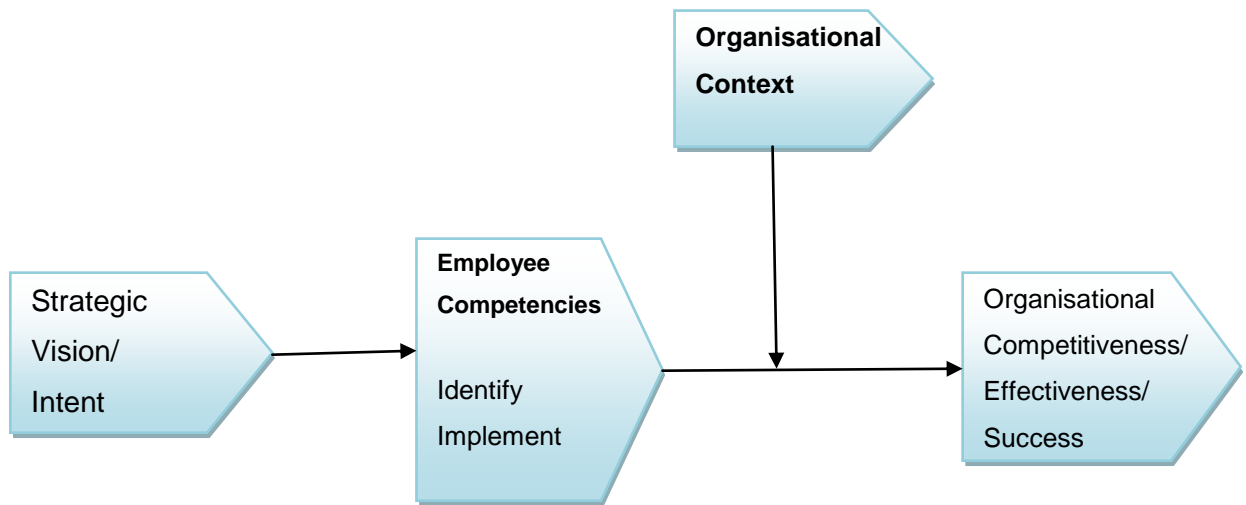
The two categories of corporate and personal competencies are not completely independent. As is observed by Cardy and Selvarajan (2005), a collection of personal competencies can form a way of doing things or a culture that becomes embedded in the organisation whilst corporate characteristics can actually determine the type of personal competencies that will best work or fit in the firm. The institution of knowledge management in an organisation establishes collaborative activities and processes between corporate and personal competencies and when harnessed is envisaged by this study to positively affect organisational performance.

Strategic management literature also has classifications of competencies as core competencies and distinct competencies. Core competence has been defined by Prahalad and Hamel (1990a) as the collective learning in the organisation especially how to coordinate diverse production skills and integrate multiple streams of technologies (Barney & Hesterly, 2008). Mintzberg, Lampbell, Quinn and Ghoshal (2003) have drawn attention to core competencies as the ones that have developed deep within the organisation over its history and explain the comparative and competitive advantage.

These core competencies must be sustained and enhanced as the key to the organisation's future by accumulating experience since the more the organisation produces, the more it engages in learning and so the faster it reduces costs. A core competency is a well performed internal capability that is central, not peripheral, to a firm's strategy, competitiveness and profitability whilst a distinctive competency is a competitively valuable capability that allows a company to perform better than its rivals (Barney & Hesterly, 2008).

Suffice it to mention that for an organisation to achieve its vision and mission, the corporate competencies must match the strategic intent. For the successful implementation of the organisational strategy, required competencies are essential. Without the requisite competencies, well conceptualised strategies with a strategic fit will not be successfully implemented. The relationship or link between the needed competencies and organisational effectiveness is as depicted in Figure 2.4.

Since organisational competencies are embedded in employee-competencies, it is imperative to identify the appropriate employee level competencies before moving onto the organisational level ones.



**Figure 2.4: Link between employee and firm competencies for competitiveness:** Adapted from (Cardy & Selvarajan, 2005:238).

## 2.8.2 Types of employee competencies

A competency model can be viewed as a comprehensive and behaviourally specific depiction of the characteristics that are required by employees to be effective. Thus, a competency model can be the set of competencies associated with a role or job in a company. The basic reasoning behind generic competencies is that it is possible to identify a set of characteristics that are vital for success across the firm settings. What competencies in terms of skills, knowledge and other characteristics do employees require for organisational competitive advantage? These are the sort of questions that need to be asked by organisations that are in the process of aligning employee competencies with their strategic intent. As such, these competencies would then be analysed as a necessary precursor for knowledge management. Knowledge management would be used as a mechanism that enables the systematic organising of the knowledge, which might lead to better use of the competencies (Meihami & Meihami, 2014)

Drejer and Riis (2000) propose a list of top management competencies that entail leadership skills, general management skills, interpersonal skills, communication skills, creativity, dependability and adaptability. Clusters of competencies for middle managers would be categorised as intellectual (analysis and judgement from a strategic perspective), interpersonal, adaptability and initiative. Of note is that characteristics that lead to effectiveness in one organisation may not lead to effectiveness in another organisation. Therefore, a generic model with a one-size – fits - all assumption would have inherent disadvantages. Rather, developing organisationally specific competencies through interviews, surveys, etc. would increase understanding of the competency framework and commitment to it.

The content choice faced when considering competencies of a role parallels the general content choice confronted when considering the performance appraisal criteria of the same role (Cardy & Selvarajan, 2005:238). The three major types of appraisal systems that parallel competencies are traits, behaviours and outcomes. Behaviours have been widely recommended out of the three because they are observable and can be changed (Drejer & Riis 2000; Cardy & Selvarajan, 2005). Thus behavioural competency models maybe useful for training and development as they leave little scope for bias and error.

Outcomes on the other hand are clearly measurable but pose the problem of deducing or inferring causality. Traits are considered as being very ambiguous and to be fixed characteristics of workers. Therefore, the outcome levels of an employee may be influenced by elements that are external or system factors than would traits and outcomes or outcome levels that are due to factors beyond an employee's control. Behaviours are recommended for the development of competency models as they are more directly under the control of the employee.

The implementation of the competencies would entail that they be used as standards for employee evaluation and criteria for employee assessment and

development. Translating competencies into criteria for assessment and development would aid in focussing attention on what is important in the firm and also drive recruitment and selection processes. Thus the criteria that is focussed on can have wide ranging impact from the composition and behaviour of the employees, determination of organisational culture to operationalising the strategic direction and value orientation of the organisation, especially when used as a basis for performance appraisal, compensation levels, promotion and termination.

### **2.8.3 Frameworks for developing employee competencies**

Cardy and Selvarajan (2005) identify four competency identification frameworks that are based on the nature of the competency and the organisational context. There are two traditional approaches and two alternative approaches. The two traditional approaches are job-based and future-based, whilst the alternative framework is made up of the person-based and the value-based approaches. Table 2.4 below gives a summary of the four competency identification approaches.

- *Job-based approach* – is the most common for developing competencies. It starts with the analysis of the requirements of the present job and the resultant findings would direct the competency criteria. The competencies developed categorise skills that mirror what is needed to perform the jobs in the company. The job - based approach has a focus on developing competencies for a single job at a time. Cardy and Selvarajan (2005) offer a multiple job approach that entails developing a broad set of competencies that cut across various jobs in the company. The overall set of competencies developed under the multiple job approach should identify with the target population of jobs.

**Table 2.4: Competency identification approaches** - Adapted from Cardy & Selvarajan (2005:240)

Framework	Traditional Framework		Alternative Framework	
	Job- based	Future- based	Person- based	Value- based
Nature of competencies	Static - focus on what gets done	Directional change – focus on what needs to be done	Broad and emergent	Process – focus on how things are done
Organisational context	Fixed – static and hierarchical	Fixed – future oriented	Innovation – organic and dynamic; empowered	Strong process focussed

- *Future - based approach* - In this instance, competencies are based on the mission and future strategic direction of the organisation. In other words, this is to say that the future strategy of the firm drives the competencies that will be considered core and principal to the interests of the firm. The future strategy drives the competencies, which in turn drive hiring, appraisal, training and development activities (Cardy & Selvarajan, 2005). Consequently, competencies afford a way for organisations to prepare for their future direction. In addition, the competencies provide a linkage to the future strategy of the company with the human resources and thus accord a rational and collective basis to the human resource management function. Inherently, the future-based approach results in competencies that are future-oriented and are founded on what will need to be done in the firm in the future.

This approach calls for a clear vision of the company's projected path and what job responsibilities and tasks will exist.

To summarise the traditional framework of competency development, the job-based approach is most appropriate for organisational environments that are stable and give emphasis to a consistent set of tasks (Mansfield, 1996). The future-based approach is appropriate in situations where change is a planned and coordinated effort. Current organisational climate is marked by dynamic environments that call for flexibility and always present short term change. Therefore, the competencies sought and nurtured under the given circumstances would form the basis on which knowledge is managed.

- *Person - based approach* – calls for the identification of individual attributes that will present the organisation with the utmost potential in its employees. The person based approach focuses on broad people skills and other individual attributes that can result in marketable products or services if an enabling environment is established. Stross (1996) notes that Microsoft managers seek for intelligence above everything else including experience in programming, when hiring employees resulting in its super-smart and highly intelligent workforce.

Competency development based on a person focus may also be suitable for knowledge-based organisations that depend upon creativity and innovativeness of employees for organisational effectiveness (Cardy & Selvarajan, 2005). In their study of competency development for knowledge workers, Lindgren, Stenmark and Ljungberg (2003) establish that the organisation's competency development approach is enhanced when it focuses on employees' interests, those things that excite them and that they are passionate about. The person-based approach is also consistent with the notion underlying skill-based pay. Therefore, having a deep pool of skills translates to innovation, knowledge creation, flexibility and possibility.

Conversely, it may also result in chaotic conditions. It also requires great faith in the potential of the employees' resource to result in marketable products and services. The competencies that are associated with a person-based approach are broad and emergent. The culture related with the person based approach would be innovative and grounded in the bottom-up operations strategy.

The environment in which the person-based approach blossoms is the dynamic one and workers are provided with a flexible and broad range of scope to pursue their ideas. Competencies should be defined in broad terms as general behaviours and attitudes rather than specific outcomes (Vaaler, 2005). This is consistent with Cardy and Selvarajan's assertion that it is obligatory to translate competencies into operational level criteria for effective human resources management (Cardy and Selvarajan, 2005). Dainty, Cheng and Moore (2003) advocate the development of a competency-based performance model for managers, whereby a broad range of behavioural competencies are developed based on extensive interviewing of managers.

- *Value-based approach* – entails identifying the core values the company wants to be known for. Collins and Porras (1994) note that a focus on values can present a steady anchor for a company operating in turbulent environments and that an organisation's competencies established from a value-based approach would focus on the process of work in the company. The values would specify how things should be done rather than what should be done and would help to clearly establish a strong organisational culture of how work should be carried out.

The value-based approach is very effective also when developing ethical competencies since ethical conduct can only be guaranteed when employees share the values that guide that conduct. In the advent of recent scandals such as Enron, WorldCom and Tyco International



due to unethical conduct of business executives in firms, ethical values have become an important issue (Cardy & Selvarajan, 2005).

Dealing ethically with customers, shareholders, employees and other stakeholders is part of any sound strategy and developing ethical competencies is therefore critical for organisations. According to Spurgin (2004), employees' ethical competencies may include knowledge of ethical philosophy, awareness of business ethics issues and the ability to critically evaluate arguments on business ethics issues. Value-based competencies are valuable at the person level for ascertaining how work should be done.

Over and above establishing process requirements, the value-based competencies would provide a means for employees and prospective employees to assess their fit with the organisation. This is consistent with the increasingly popular person organisation strategic fit model for selection. At team level, the value-based competencies provide useful guidelines of how the team should carry out the work at hand. The competencies can then be used as criteria for assessing the effectiveness of the team work process. Again, the competences would then be used as building blocks for the knowledge that is to be managed.

#### **2.8.4 Organisational learning and competence development**

Referring to the complex and dynamic nature of organisational and management processes, Hult, Ketchen and Nichols (2003) argue that such organisational areas represent an area in which learning can create competitive advantages. Precisely, learning is depicted as an intangible resource that is entrenched in the fabric of the organisational and management systems. As an intangible resource, organisational learning is also conceptualised as a construct that derives from four tangible orientations,

namely: team, systems, learning and memory orientations (Hult, Ketchen & Nichols, 2003). This is in tandem with Drejer and Riis (2000) structural viewpoint of a competence as consisting of four elements with relations to technology, people, organisational structure and organisational culture.

In this section, the focus will be on the issue of organisational learning as a starting-point before turning attention to frameworks that will enable the understanding of competence development. Organisational learning would seem to be a natural starting-point because firstly, when a competence is developed it will be related to the people element of that competence. Technology and organisational learning will not learn anything but it is the human beings who will. Secondly, the concept 'competence' is closely related to the progression of learning that people go through as they increasingly become competent.

#### **2.8.4.1 *Organisational Learning defined***

Drejer (2000) characterized organisational learning as a progression of detection and correction of errors. Knowledge acquisition, knowledge sharing, knowledge interpretation and organisational memory are four constructs that are fundamentally linked to organisational learning (Jashapara, 2011). Learning does not have to be conscious or intentional and will not always increase the learner's effectiveness or potential effectiveness. More so, learning does not have to result in observable changes in behaviour but on the behavioural aspect, an entity learns if through its processing of information, the range of its potential behaviours is changed (Jashapara, 2011).

Malhotra (2000) contends that the crucial property of learning is the amalgamation of same stimulus and different responses. This aligns with the view of Drejer (2000) that organisational learning is the process within the organisation by which knowledge about action-outcome relationships and the effect of the environment on these relationships is developed. According to

Malhotra (2000), a radical view would embody individual learning as occurring when people give a different response to the same stimulus whilst organisational learning is thought to have occurred when groups of people give the same response to different stimuli.

**Table 2.5: Distinctions between organisational learning and the learning organisation:** (Adapted from Jashapara (2011:160).

Organisational Learning	Learning Organisation
<ul style="list-style-type: none"> <li>• Means to improved organisational processes</li> </ul>	<ul style="list-style-type: none"> <li>• End state</li> </ul>
<ul style="list-style-type: none"> <li>• Process or activity</li> </ul>	<ul style="list-style-type: none"> <li>• Idealised form</li> </ul>
<ul style="list-style-type: none"> <li>• Attainability</li> </ul>	<ul style="list-style-type: none"> <li>• Easily lost due to changes</li> </ul>
<ul style="list-style-type: none"> <li>• Descriptive research</li> </ul>	<ul style="list-style-type: none"> <li>• Prescriptive research</li> </ul>
<ul style="list-style-type: none"> <li>• Inductive</li> </ul>	<ul style="list-style-type: none"> <li>• Deductive (normative)</li> </ul>
<ul style="list-style-type: none"> <li>• Academic and scholarly orientation</li> </ul>	<ul style="list-style-type: none"> <li>• Practitioner &amp; consultancy orientation</li> </ul>
<ul style="list-style-type: none"> <li>• Predominantly qualitative research</li> </ul>	<ul style="list-style-type: none"> <li>• Predominantly quantitative research (little empirical evidence so far)</li> </ul>
<ul style="list-style-type: none"> <li>• Theoretical orientation</li> </ul>	<ul style="list-style-type: none"> <li>• Action orientation</li> </ul>

There is some confusion between the terms organisational learning and the learning organization, and some authors use the terms interchangeably and synonymously. According to Jashapara (2011:160), “a useful distinction is to consider organisational learning as the processes or activities in an organisation whereas the learning organisation can be considered as the end

state”. However, the definitions given for both constructs contain similar connotations of an organisation with an ingrained philosophy for anticipating, reacting and responding to change, complexity and uncertainty.

Hult, Ketchen, and Nichols (2003) view a learning organisation as the ability of an organisation to gain insight and understanding from experience through experimentation, observation, analysis, and a willingness to examine both successes and failures. From this perspective, a learning organisation is an important way in which the organisation can sustainably improve its utilisation of knowledge (Meihami & Meihami, 2014). The concept of a learning organisation is progressively more relevant given the increasing complication and ambiguity of the organisational environment. As Drejer (2000) remarks, the speed at which organisations learn may become the only sustainable source of organisational performance.

Organisational learning can be divided into two categories namely adaptive learning and generative learning. Organisations are viewed as being adaptive when they are coping with the environment. Being adaptive is only the first stage otherwise organisations have to focus on generative learning or double-loop learning (Hult, Ketchen & Nichols, 2003). Emphasis for generative learning is on continuous experimentation and feedback of the system by which organisations define and solve problems.

Hult *et al*, (2003) postulate that generative learning is about creativity. This requires systemic thinking, shared vision, personal mastery, team learning and creative tension involving the vision and the present reality. In contrast, adaptive learning which is single-loop learning only focuses on solving problems that are current without examining the suitability of current learning behaviours.

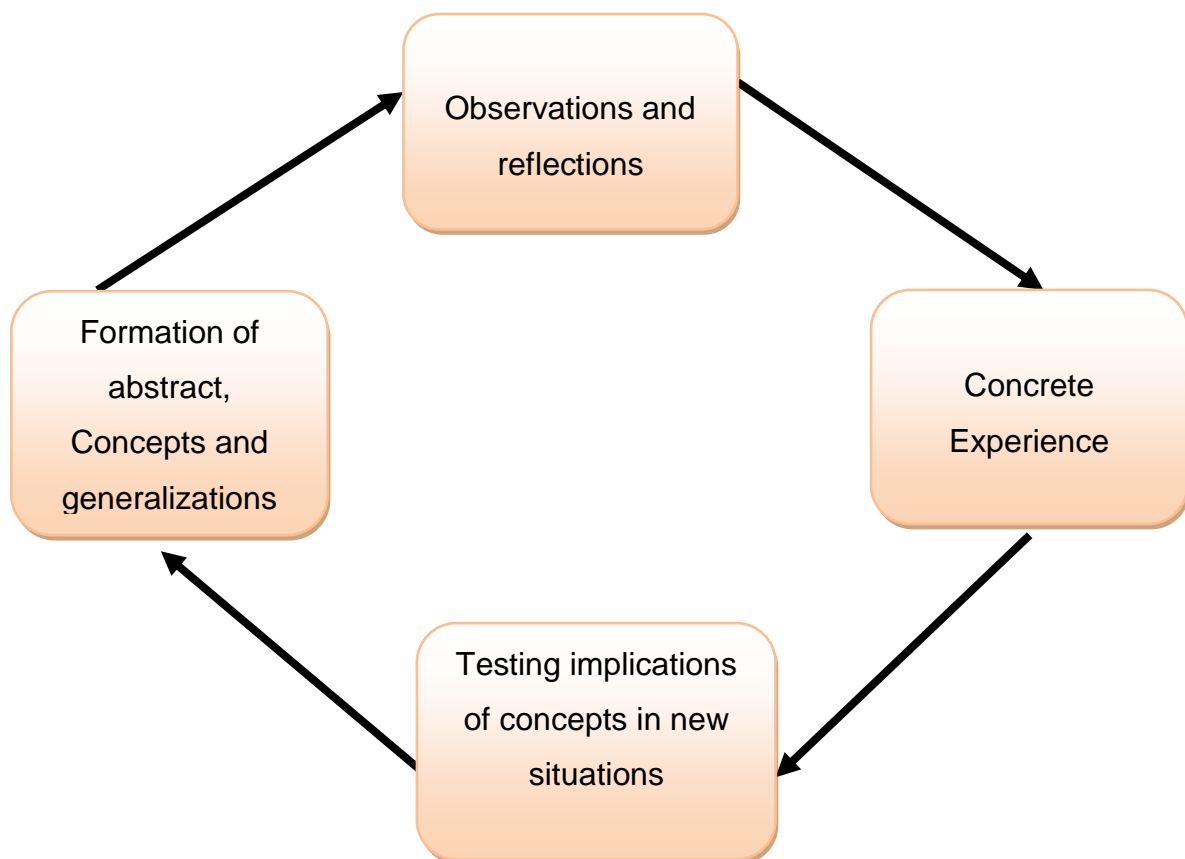
#### **2.8.4.2 Organisational learning perspectives**

Four major types of learning were identified in a model by Hult *et al*, (2003) with each one representative of a specific perspective.

- *The individual behaviour perspective* – entails the informal learning processes of the individual. It captures how individuals react in specific situations and under specific conditions, including personal interactions among employees. The informal, unconscious behaviour of an individual organisational member and the interpersonal interactions among a number of members of an organisation is focussed on (Malhotra, 2000; Drejer, 2000).
- *The decision support perspective* – is focused on the prescribed individual learning processes in an organisation. Of note is how an individual decision-maker learns in problem-solving situations. This would include the use of information technology and decision models to sustain decision making. This perspective is mainly used to study and understand how individual learning is influenced by available information, technology and the institutionalised knowledge (Drejer, 2000).
- *The management systems and organisational structure perspective* – focuses on collective learning processes as steered by the formal organisational structure and by management systems through formal planning and control processes, operating procedures and reward systems (Malhotra, 2000; Drejer, 2000).
- *The corporate culture perspective* - epitomises what an organisation knows, which is neither codified nor formalised in systems (Malhotra,

2000). The focus is on social, informal relations, collective habits, behavioural patterns and attitudes existing in an organisation.

Hult *et al*, (2003) acknowledge the general acceptance of learning as taking place as a result of one's critical reflection of own experiences rather than as an outcome of formal training. Jashapara's, (2011) perspective on learning from experience is perhaps the best-known viewpoint on learning from experience. Jashapara's, (2011) suggestion that people capture and transform their experiences differently resulted in the typology of learning styles and an experiential learning as per Figure 2.5.



**Figure 2.5: Kolb's learning cycle:**  
(Source: Jashapara, 2011:126)

As seen from Figure 2.5, some people learn through concrete experience, while others learn through abstract conceptualisation. In the same vein, some transform through reflective observation while others through active experimentation. These two aspects interact and both result in a typology of learning styles and an experiential learning cycle that moves from observation and reflections to experiencing and testing concepts in new situations leading to the formation of abstract concepts and generalisations. Although the Kolb's learning cycle was developed to explain individual learning, it also has often been applied in the explanation of the learning of groups.

The model's perspective is that for one to have actually learned, they have to go through the full learning cycle of the model that converts one's actions and their outcomes into experiences of what can be learned, followed by the development and planning of new actions that incorporate change if required according to the solutions decided upon. Emphasis is placed on informal and incidental learning, in contrast to formal learning (Chowdhury, 2006).

Both of them are viewed as learning that has taken place outside a formally structured, institutionally underwritten and classroom-defined environment. Informal learning is experiential and non-institutional, whilst incidental learning is unplanned and a by-product of other activities. The major argument of Chowdhury (2006) is that the main part of learning of individuals and organisations is either informal or incidental, and that formal learning is the minor part.

Learning is related very closely to the knowledge process: and knowledge is recognised as being central to the learning process (Bhatt, 2000; Kulkarni, Ravindran and Freeze, 2006; Griffiths, 2011). Bhatt (2000) further argues that poor learning could have a knock-on effect on the knowledge creation process, which implies a relationship between knowledge and learning. Antonacopoulou (2006: 9) observes that 'the recognition of one's own need to learn, the search for new knowledge, the test of that new knowledge in practical action, and the

consolidation of the whole exercise within the memory are all essential to complete learning.’

Chowdhury (2006) views learning as any permanent change in behaviour that comes about as a result of experience that is seen as the transition from just knowledge to knowledge-propelled action (Wenger *et al*, 2002). Sarah and Haslett (2003) stated that learning is a process that changes the state of knowledge of an individual or organisation. Jennex and Olfman (2004) supported it by positing that for knowledge management to positively affect organisational performance, it must lend itself to improved organisational memory. Edward and Rees (2006) concluded that it is apparent that managing behaviour, learning and knowledge cannot be separated from one another.

However, organisations seeking to leverage organisational performance from knowledge and learning need more than a superficial knowledge of these concepts. Chun, Sohn, Arling and Granados (2008) argue that despite the importance of knowledge as an asset, few organisations really understand what it means to be knowledge based and how to manage knowledge so as to attain its goals. Chiva and Alegre (2005) go on to argue that knowledge and its management within organisations is in a state of disorder without a clearly defined design for its application.

## **2.9 INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT**

The conversion of knowledge into a valuable asset has resulted into what is now known as intellectual capital (Kok, 2007). The following terms are part of a lexicon that describes a different form of economic value: knowledge capital, intellectual capital, knowledge organisations, learning organisations, organisational learning and human capital. These terms hint at how knowledge assets have increased in importance within organisations. They describe a paradigm in which organisational performance is coupled with individual employees and organisational knowledge (Bontis, 2001).



Operationally, Kok (2007:184) define intellectual capital as “intellectual material that has been formalised, captured and leveraged to produce a higher valued asset”. Therefore, intellectual capital literature examines the kind of intangible resources in an organisation whilst knowledge management literature addresses the mechanisms by which these resources could be controlled and managed (Kianto *et al*, 2014:362).

Intellectual capital is acknowledged as consisting of three elements namely:

- Human capital – this includes know-how, experience, capabilities and expertise of the employees.
- Structural capital – is made up of systems, networks, policies, culture and intellectual property.
- Relational capital – has to do with customers, and includes the connections, loyalty, market share and similar issues.

(Sveiby, 2001; Kok, 2007).

Therefore, intellectual capital also has to be managed as part of knowledge management. The basic precept of the knowledge-based view of the organisation is that performance differences among organisations accrue due to their differing assets and management mechanisms of knowledge (Kianto *et al*, 2014: 364)

However, various models are available for managing intellectual capital. Some of the well-known models are:

- The Skandia Intellectual Capital Value Scheme (Roos, Roos, Dragonetti & Edvinsson 1997)
- Sullivan’s Model (Van den Berg, 2002)
- Sveiby’s Model (Sveiby, 2001) and

The Skandia Intellectual Capital Value Scheme was orchestrated by Leif Edvinsson, who is widely acknowledged and considered to be one of the leading experts on intellectual capital (Bontis, 2001; Huseman & Goodman,

1999). The Skandia Navigator is a coherent effort at measuring knowledge assets, with its five areas of focus; financial, customer, process, renewal and development and human capital.

This accounting classification sought to identify the anchor of an organisation's value by measuring hidden dynamic factors that underlie the "visible company of buildings and products" (Edvinsson & Malone, 1997:11). The Skandia's model portrays the hidden factors of human and structural capital as being made up of intellectual capital when added together. Hence the equation

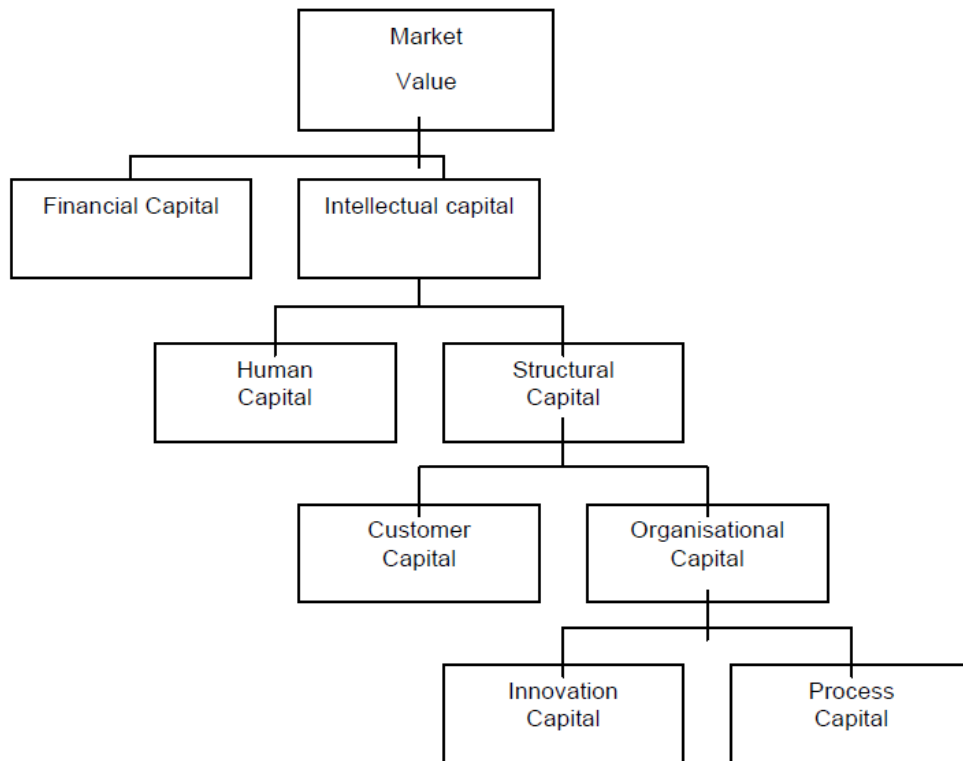
Market value = Book value + Intellectual capital

or

Intellectual capital = Human capital + Structural capital

According to Edvinsson (Roos *et al*, 1997) the dimensions that are left behind when the staff has gone home are called structural capital. The fact that human capital cannot be owned but only rented and that structural capital may be owned or traded from a shareholders perspective is emphasised. The model for categorising the different taxonomies as as per Figure 2.6

Overall, the Skandia value scheme embraces both the financial and non-financial building blocks that when put together would give an estimate of the organisation's value as per Figure 2.6. Edvinsson and Malone (1997) argue that this model unearths and envisions an organisation's intellectual capital, tying the strategic vision to the organisation's core competencies, reflecting knowledge sharing and knowledge assets beyond intellectual property and their market value. This point to the quintessence of the field of knowledge management and its endeavours to develop a systematic method of identifying, obtaining, preserving, developing, measuring and evaluating intellectual capital (Kianto *et al*, 2014).



**Figure 2.6: The Scandia intellectual capital value scheme.**

(Source: Roos, Roos, Dragonetti and Edvinsson, 1997:78)

## 2.10 CHAPTER SUMMARY

This chapter presented discussions on knowledge and showed that organisations that can manage their knowledge are capable of coordinating and combining their resources and capabilities in new and distinctive ways so as to provide more value for their customers. Various definitions of knowledge by different scholars were presented, from a flowing mix of framed experiences, justified true belief, organised information with a high proportion of human value added that includes insight, interpretation, context, experience, wisdom to a product of human reflection and experience.

Knowledge management was also considered as the process of enhancing company performance by designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing and use of knowledge. The discussion in knowledge management was categorised along the following perspectives:

- *Organisational perspectives* that focus on how an organisation can be designed so as to facilitate knowledge processes best
- *Ecological perspectives* that focus on the interaction of people, knowledge, identity and environmental factors to do with adaptation and can be likened to the natural ecosystem.

The South African context of the knowledge management landscape was also presented whereby South Africa is faced with challenges of transforming the racial and gender profile of its overall labour. This has an effect in the way knowledge is managed specifically under the circumstances prevailing in South Africa.

A survey instrument (the questionnaire) for knowledge management, originally developed and tested by Darroch (2003, 2005), was adopted for this research. The survey items to probe the knowledge management practices of the organisations in the engineering/construction sector are arranged under knowledge acquisition, knowledge dissemination and responsiveness to knowledge.

Since it is crucial for a knowledge management agenda to identify key indicators of success so as to be able to reflect on knowledge management performance, the success factors or knowledge enablers were identified from past research. All of these provided the grounds for the development of the research model for the study and also the formulation of some hypothesis to be tested.

The resource-based theory (RBT) was presented as a model of an organisation's performance that focuses on the resources and capabilities that are controlled by the organisation to derive competitive advantage. Knowledge is assumed to be the resource and knowledge management the capability in this instance.

Two fundamental assumptions about the resources and capabilities that organisations control were also presented. While one relates to the fact that;

- different organisations may possess different bundles of resources and capabilities even if they are competing in the same industry, the other points to the reality that;
- some resource and capability differences amongst organisations may be long lasting because they may be very costly to develop or acquire.

The knowledge-based view (KBV) was presented as an off-shoot of the resource-based theory. The KBV represents the capability of the organisation to create value as not based as much upon its physical or financial resources but on its knowledge-based capabilities. Therefore, competitive success is governed by the ability to develop new knowledge-based assets. The fundamental assumption of the KBV is that the critical input in production and the principal source of value is knowledge. The subgroup of this assumption emphasises on the importance of collective knowledge since knowledge exist at an individual level, then justifies making knowledge integration the essential function of the organisation.

The problem solving perspective of the knowledge-based view assumes that management cannot simply choose the new knowledge to acquire but must choose valuable problems that if they are successfully solved, would result in the acquisition of the required knowledge, capabilities or competencies.

It was argued that a firm's capabilities define what activities the organisation can carry out within some predictable range of proficiency and that research

effort should be refocused towards the managerial processes since resources alone are not a source of competitive advantage and they would only become valuable through the actions of managers involved in business processes.

Competencies were also explored and characterised as a combination of resources and capabilities in an organisation. Furthermore, it was considered that when competencies are valuable, rare, difficult to imitate, and difficult to substitute, then they can be classified as core competencies and can be a source of strategic advantage. Competencies can also be functions, processes and routines in a firm. Knowledge management fits very well into the descriptions of a competence. It was seen that competencies in firms can broadly be stratified into two levels namely organisational level and employee level competencies.

The relationship between knowledge management and intellectual capital was also explored. Intellectual capital came about as a result of the conversion of knowledge into a valuable asset. Intellectual capital is acknowledged as consisting of three elements namely human capital, structural capital and relational capital.

The Skandia Intellectual Capital Value Scheme, orchestrated by Leif Edvinsson who is widely acknowledged as one of the leading experts on intellectual capital, was considered. The Skandia Navigator is an articulate instrument used to measure knowledge assets, with its five areas of focus; financial, customer, process, renewal and development and human capital.

## **CHAPTER 3**

### **LITERATURE REVIEW OF ORGANISATIONAL PERFORMANCE**

#### **3.1 THE NATURE OF ORGANISATIONAL PERFORMANCE**

Barney and Hesterly (2008) are of the view that the ultimate objective of the strategic management process is to enable a firm to choose and implement a strategy that enhances organisational performance. Raduan, Jegak, Haslinda and Alimin (2009) concur and add that achieving a competitive advantage position and enhancing firm performance relative to their competitors are the main objectives that business organisations in particular should strive to attain. The common theme of organisational performance in strategy literature is associated with value creation. It is of essence, therefore, to start by exploring what organisational performance is and then explore how a strategy that includes knowledge management can affect organisational performance.

A number of definitions have been offered from varying perspectives but with some convergence on the level to which a goal is achieved. Literature on strategy usually associates organisational performance with the achievement of strategic goals such as sales growth, market share, new products development, quality and customer satisfaction targets, among others. Also in strategy, organisational performance is associated with the achievement of financial goals such as return on assets, return on equity, return on investment etc. (O'Shanassy, 2008).

Mullins (2010:776) concurs by arguing that performance should be related to such factors as increasing profitability, improved service delivery or obtaining

the best results in important areas of organisational activities. Kosilov (2010) characterises organisational performance as comprising the actual results or output of a firm as measured against its intended outputs, goals or objectives. Barney (2002) argues that a company achieves above normal performance when it makes greater than expected value from the employed resources.

The view of Norton and Kaplan (1996) that there are a number of dimensions to company performance outside the financial dimension laid a solid grounding, and suggested further that performance should include the internal perspective, the innovation perspective and the customer perspective. They propose through their balanced score card approach that an understanding of company performance should be balanced across these perspectives, and especially the leading effects of the internal dimension and the innovative dimension in predicting the customer and financial outcome (Norton & Kaplan, 1996).

Newbert (2008) argues that there is a leading and lagging effect in the relationship between organisational performance and competitive advantage. This is to say a strong organisational performance could herald the presence of competitive advantage by a firm. In the same vein, the flipside of this view is that competitive disadvantage for an organisation in a particular industry will be a leading predictor of weak organisational performance (O'Shannassy, 2008).

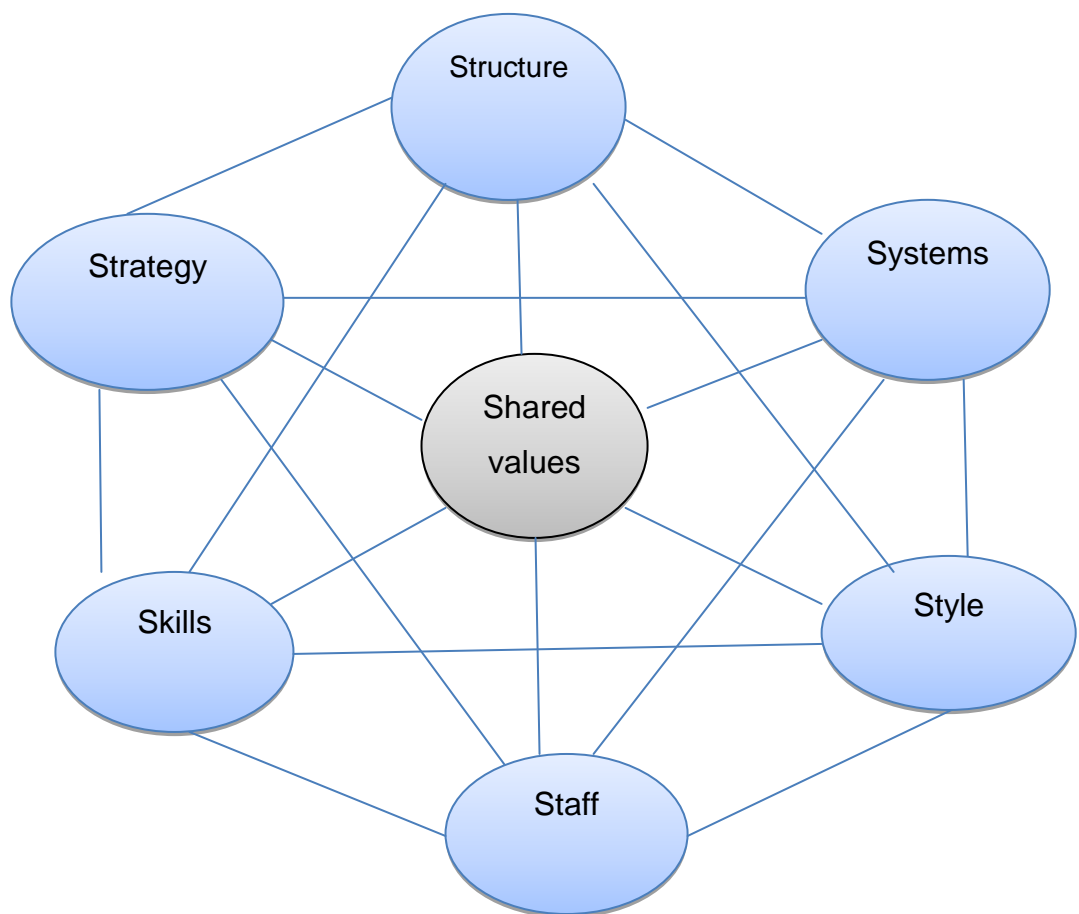
### **3.2 ELEMENTS OF ORGANISATIONAL PERFORMANCE**

The enhancement of organisational performance cannot be achieved either internally or autonomously but through exceeding traditional organisational boundaries and enforcing external relationship systems: a proliferation of networks, partnerships and inter-organisational collaborations (Appolloni *et al*, 2014). Organisational performance is affected by a multiplicity of variables. Through various studies, researchers identified factors that impinge on the performance of a company (Mullins, 2010). From the studies, a number of



models have been formulated to link the various factors so as to explain company performance. A study of sixty two American companies with outstanding performance identifies eight basic attributes of excellence that appear to account for the success recorded. These are a bias for action, being close to the customer, autonomy and entrepreneurship, productivity through people, hands on-value driven, sticking to the knitting, simple form-lean staff and simultaneous loose-tight properties (Mullins, 2010).

This was followed by what became known as the McKinsey 7-S framework, a report that any intelligent approach to organising a company that results in a performing company had to incorporate, and treat as independent, at least seven variables namely structure, strategy, skills, style, systems, staff and shared values i.e. culture (Mullins, 2010) .



**Figure 3.1: The McKinsey 7-S framework**

Source: Mullins (2010:778)

Although many of the original excellent organisations ran into very rough sledding and fell from grace, the formula for their success seemed to have been appropriate and the 7-S model (Figure 3.1) still provides a helpful framework and basis for organisational analysis for performance (Mullins, 2010).

EFQM, originally the European Foundation for Quality Management, came up with a business model that builds on the experience of previous models. The EFQM Excellence model is based on the notion that an organisation will achieve better results by involving all the people in the organisation in the continuous improvement of their processes, providing a focus for integrating all contributors to the organisation's performance.

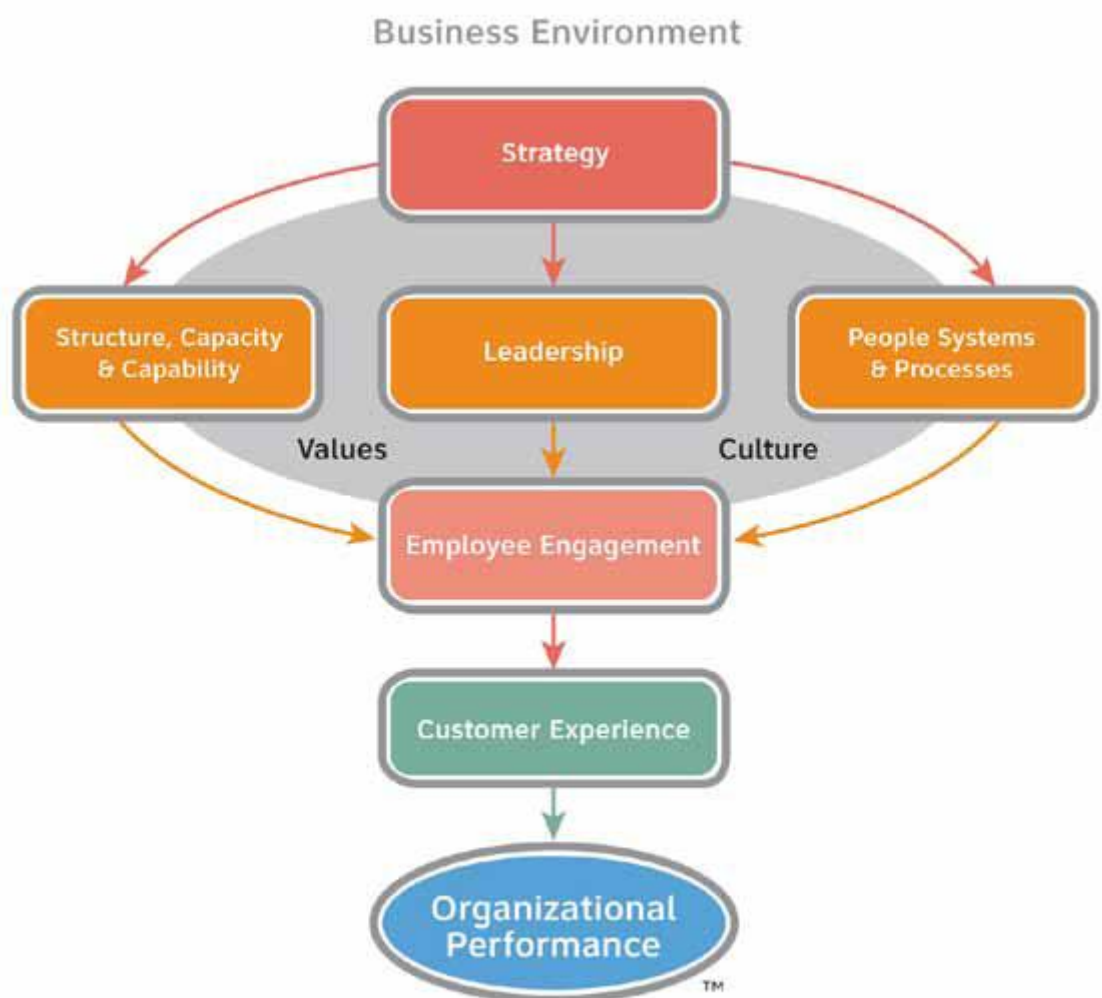
The EFQM model's assumption is that excellent results in terms of Performance, Customers, People and Society (the Results) are achieved through leadership driving Enablers such as Policy and Strategy, People, Partnership and Resources and Processes (Mullins, 2010). Researchers found that when the principles of the model are adopted, organisational performance improves both in the short term and long term, the share value of the company and the overall financial performance seem also to be enhanced.

The challenge to better understand the relationships that exist between the crucial organisational elements as the key to unlock organisational performance drove Right Management to build on the previous performance models to come up with an organisational effectiveness framework. According to Right Management (2010), to achieve organisational performance requires an integrated framework that addresses the following organisational performance elements –

- a fit for purpose structure where employees comprehend what is expected of them and their accountabilities.

- people systems and processes that drive and nurture the right behaviours.
- capable and credible leadership
- a positive work environment

There are some fundamental associations between organisational elements that work together to deliver a well-executed strategy through an engaged workforce, resulting in a great customer experience, profitability and high organisational performance (Right Management, 2010). This is the interplay between strategy, organisational structure and roles, leadership, people systems, employee engagement, organisational culture and values.



**Figure 3.2: Framework for Organisational Performance:**

(Source: Right Management, 2010:7)

Each of the elements featured in this model are described as follows;

*Strategy* – how the organisation formulates and implements its mission through a clear stakeholder strategy that is aided by relevant policies, plans, objectives, targets and processes. This defines the role, purpose and strategic direction of the firm. This research explores how a strategy that incorporates knowledge management can result in a great customer experience, profitability and high organisational performance (Mullins, 2010; Right Management, 2010).

*Leadership* – Leaders are supposed to have the capacity and capability to drive business success that is sustainable. This is reflected by how leaders develop and facilitate the achievement of the mission and vision, values for long term success and implement these through appropriate actions and behaviours. They are also personally involved in ensuring that the company's management systems are developed and implemented (Mullins, 2010; Right Management, 2010). A strong knowledge-oriented leadership position would force the organisation to embark on substantial investment and development initiatives to generate new knowledge (Donate & Sanchez de Pablo, 2015).

*Employee Engagement* – engaged employees are satisfied with the job they currently do. They are also contented with their organisation as their employer and they are committed to the success of their job and their organisation. They would also be proud of the work they do and their company and thus would be willing to portray their organisation and the job they do positively when they talk. All this is determined by how the organisation manages, develops and releases the knowledge and full potential of its people at an individual, team and company-wide level. These activities are planned in order to support the organisation's policy and strategy and the effective operation of its processes (Mullins, 2010; Right Management, 2010).

*People Systems and Processes* – good people systems and processes should be in place in order to support leaders. Their purpose in the company is to send messages, share knowledge and make informed decisions across the business spectrum. Good people systems and processes are determined by how the organisation designs, manages and improves its processes in order to support its policy and strategy. Resultantly, this should fully satisfy and generate increased value for the company's customers and other stakeholders. Moreover, an organisation's systems and processes create an environment of trust and consistency and so are an extension of leadership (Mullins, 2010; Right Management, 2010).

*Structure, Capacity and Capability* – it is about making sure that there is a fit for purpose structure whereby work is done by capable people with clearly defined roles, accountabilities and relationships. However, this has been extensively described in the earlier section on knowledge management (Mullins, 2010; Right Management, 2010).

*Culture and Values* – are a collection of traditions, policies, beliefs and attitudes that constitute a pervasive context for everything thought and done in an organisation. Likened to the personality of an individual, culture must be aligned to the desired culture so as to achieve the business strategy (Mullins, 2010; Right Management, 2010).

*Customer experience* – defines what the organisation is achieving in relation to its external customers. When all of the elements of the performance framework are aligned, this should result in high levels of customer satisfaction delivered by engaged employees operating in a fit for purpose structure (Mullins, 2010).

From the many important relationships, two critical ones emerge, and these are: effective strategy implementation and full employee engagement. Effective strategy implementation is a crucial financial performance driver, and failure to fully engage employees in the business strategy will result in the production of negative, unsustainable business results. Employee engagement impacts the

customer's experience and eventually the overall performance of the company in terms of productivity and profitability (Right Management, 2010).

Leadership in business will face substantial challenges in the endeavour to align and engage employees to their strategy and execute the strategy effectively. Perhaps knowledge management could be critical in an integrated approach that will improve organisational performance.

### **3.3 PERFORMANCE MANAGEMENT**

Robbins and Coulter (2007) propose that performance management is a process of establishing performance standards followed by the evaluation of the performance in order to arrive at objective decisions as well as to provide documentation to support those decisions. Mullins (2010) concurs and views performance management as a practice that brings together many facets of people management and incorporates performance improvement at individual, team, department and organisational levels.

Findings from the Construction Industry Development Board (CIDB) indicate that performance management is about sharing expectations, and establishing a culture in which individuals and groups take responsibility for the accumulated end results of all of the organisation's work processes and activities (CIDB, 2004). Therefore, a comprehensive performance management system can provide a basis for key managerial decisions such as those relating to allocation of duties and responsibilities, empowerment, training and development needs and career progression.

The need to manage and evaluate performance and make changes when necessary applies to all levels of the organisation (Thompson & Martin, 2010). Performance management is a vital process in a company and should aid management and staff in focussing on key issues and company objectives to ensure sustainable performance.

The process of performance management ensures that individual and team effort supports organisational objectives through focussing on key value drivers (O'Callaghan, 2005). Kosilov (2010) proposes a performance management framework with three core principles, namely plan performance, manage performance and measure and analyse performance, as shown in Figure 3.3.

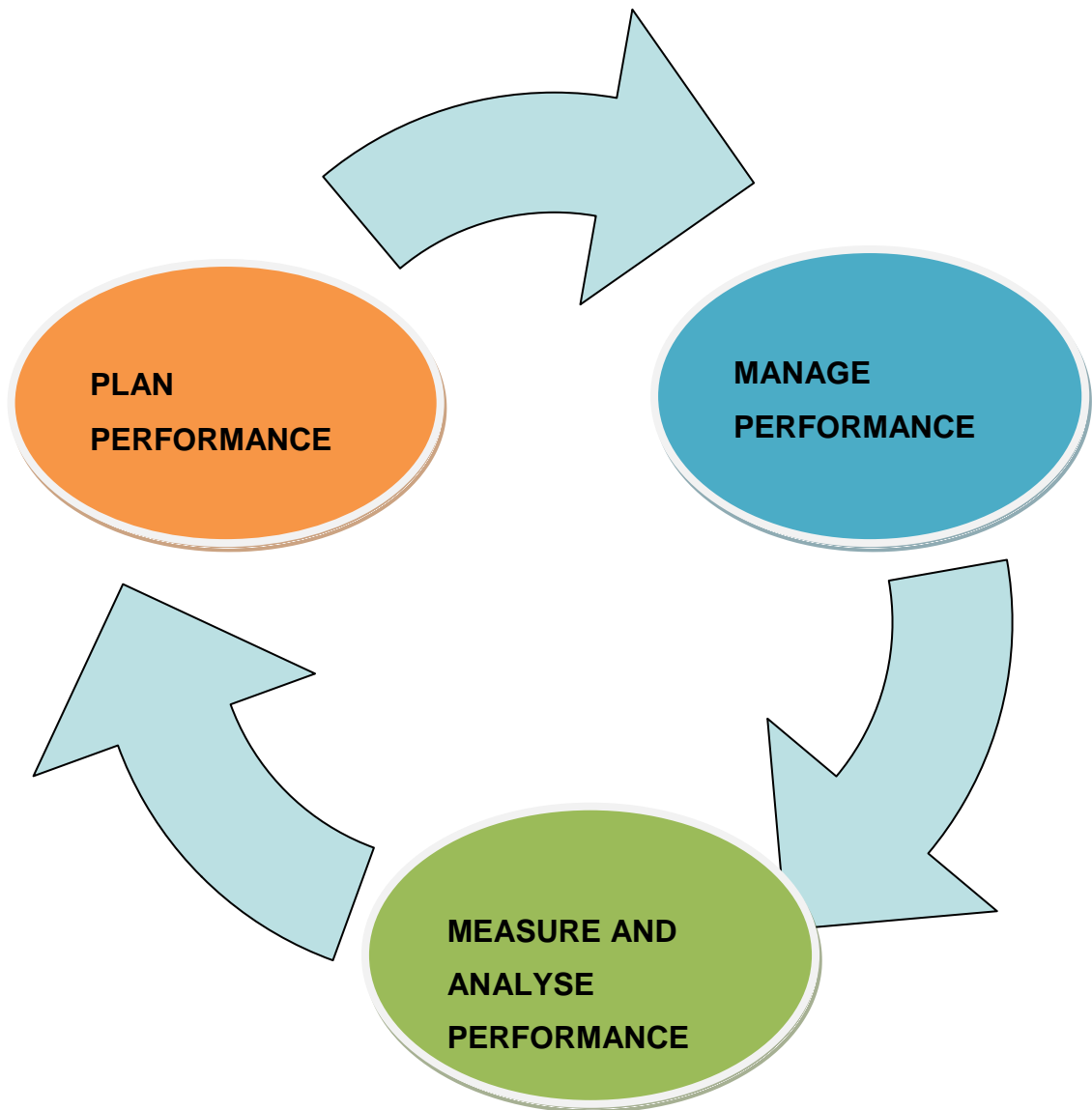
### **3.3.1 Plan Performance**

Planning of performance entails four activities, namely:

- Identifying the organisational strategy
- Defining outputs, indicators and measures
- Developing a measurement system
- Ensuring employee readiness.

The organisational strategy is identified by defining the mission, vision and strategic objectives of the firm. Robbins and Coulter (2003) argue that strategic plans cover an extensive time period, broad issues and include the formulation of objectives. The broad issues are viewed by Mullins (2010) as performance plans that are not only relative to the organisation's objectives, but are also designed to suit the company's culture, customers and stakeholders. Benchmarking with other organisations would yield alternate strategies for success. Therefore, if knowledge management has been adopted for implementation, it would have to be located within the organisational strategy as a component of it and meant to address the challenges of corporate loss of knowledge due to aging, retiring and employees exiting the organisation.

Results, indicators and measures for the planned performance are then defined. Critical scopes for the outputs and outcomes also have to be identified with respect to cost, time, quality and quantity. Measures should also be defined for each of these critical dimensions of output and outcome.



**Figure 3.3: Performance Management Model:**

(Adapted from: Kosilov 2010:3)

This is followed by the development of a measurement system in order to compare the planned performance with actual performance. The development of a measurement system assigns goals to organisational units. Robbins and Coulter (2003) argue that measuring organisational performance leads to better asset management, an increased ability to provide customer value, improved measures of organisational knowledge and ultimately impacting positively on organisational reputation. The development of a data collection



and analysis process is inherent in the development of a measurement system. A data collection and analysis process and procedure also has to be developed.

The final aspect of planning performance is to ensure that employees are ready for the planned performance by defining and communicating specific goals for each employee. It is at this stage that it becomes imperative to ensure that employees have the requisite performance elements to achieve their goals, such as information, tools, competencies, environment and motivation.

### **3.3.2 Manage Performance**

Mullins (2010) views managing performance as the configuration of the various people management policies and how they are integrated to support organisational performance. Kosilov (2010) prescribes a number of activities to be undertaken in managing performance:

- Prioritising challenges
- Developing strategic solutions to address challenges
- Integrating solutions and lessons learnt into organisational processes
- Setting up and implementing mechanisms to maintain successes
- Modifying performance measurements as needed.

### **3.3.3 Performance measurement**

Management practice requires that any considerable effort be justified by linking the expended effort to the bottom-line or other form of results measurement (Hughes & Holbrook, 1998). Standards of performance also need to be verifiable.

There are a number of methods that are used to assess an organisation's overall level of performance. Mullins (2010:796) argues that: 'There are varying measures of organisational performance that can be viewed at different levels, over different time spans and in different ways by competing interest groups. Given the wide range of interrelated variables, it is not possible to establish clear criteria for the measurement of organisational success.'

Conventional measures of organisational performance tend to favour the use of financial information. However, these conventional measures are prone to accounting manipulation, as evidenced by the collapse of the US giant Enron (Jashapara, 2011). Debatable financial engineering techniques are used to massage the accounting figures so as to present a spurious reflection of the organisation's performance (Jashapara, 2011). The financial engineering techniques are applied to such areas as valuation of assets, provisions, capitalisation of costs, depreciation, goodwill, brands and off-balance sheet finance.

Nonetheless, typical performance measures would include:

- Productivity, i.e. output
- Efficiency, i.e. output versus input
- Effectiveness, i.e. benefit, utility
- Quality.

(Kosilov, 2010:5)

The focus of these measures could be on any one of the three levels namely;

1. Individual
2. Team/group/unit
3. Organisation, ultimately.

(Kosilov, 2010:5)

The collection of data, followed by its analysis, should precede measurement and analysis of performance. The relevance, adequacy and timeliness of the information are crucial. In the process of measuring and analysing performance, areas of success have to be identified together with the sources of success within the performance elements. Likewise, sources of challenges have to be identified within the performance elements framework (Kosilov, 2010). Lessons learnt from the challenges have to be identified also in order to establish the needs for information and close the gap.

Performance measures, also known as metrics or key performance indicators, are gauges for assessing the operational performance, resource allocation or the effect of a particular activity (American Productivity Quality Centre, 2002). Shannak (2009) defines a performance indicator as a variable, parameter, measure, statistical measure, a proxy for a measure and a sub-index, among others. As regards knowledge management, the distinguishing characteristic of a performance measure is the ability of the metric to indicate whether knowledge is being shared or used.

Therefore, organisations should measure what matters and the measures should reflect the presence or absence of continuous improvement of the knowledge management activities (American Productivity Quality Centre, 2002). The importance of metrics/measures cannot be underestimated because what gets measured normally gets done. Performance measures are also supposed to be linked to the organisation's strategy.

A number of metrics are available that can be used to measure knowledge management initiatives by organisations. These can broadly be categorised into two distinct groups, namely: hard (dollar savings) and soft (intangible) benefits.

The hard (dollar savings) measures include:

- Increase in revenue and profitability
- Cost reduction or saved costs

- Time saved
- Quality improvements or number of errors avoided
- Increased productivity
- Products successfully launched
- Successful missions.

The soft (intangible) measures are:

- Improved customer satisfaction
- Cost avoidance
- Minimisation of duplication
- Improved employee satisfaction/retention
- Faster problem-solving
- New hires become effective quicker

(Kosilov, 2010).

This research utilised the hard (dollar) measures related to revenue and profitability. These were readily available from the company and the published financial statements. Using soft (intangible) measures would have entailed also visiting the companies' customers to survey them on customer satisfaction and so these were not incorporated because of the time constraints. Only the soft measure on employee satisfaction was included because information about it was readily available at the respective surveyed companies.

### **3.4 KNOWLEDGE MANAGEMENT AND ORGANISATIONAL PERFORMANCE**

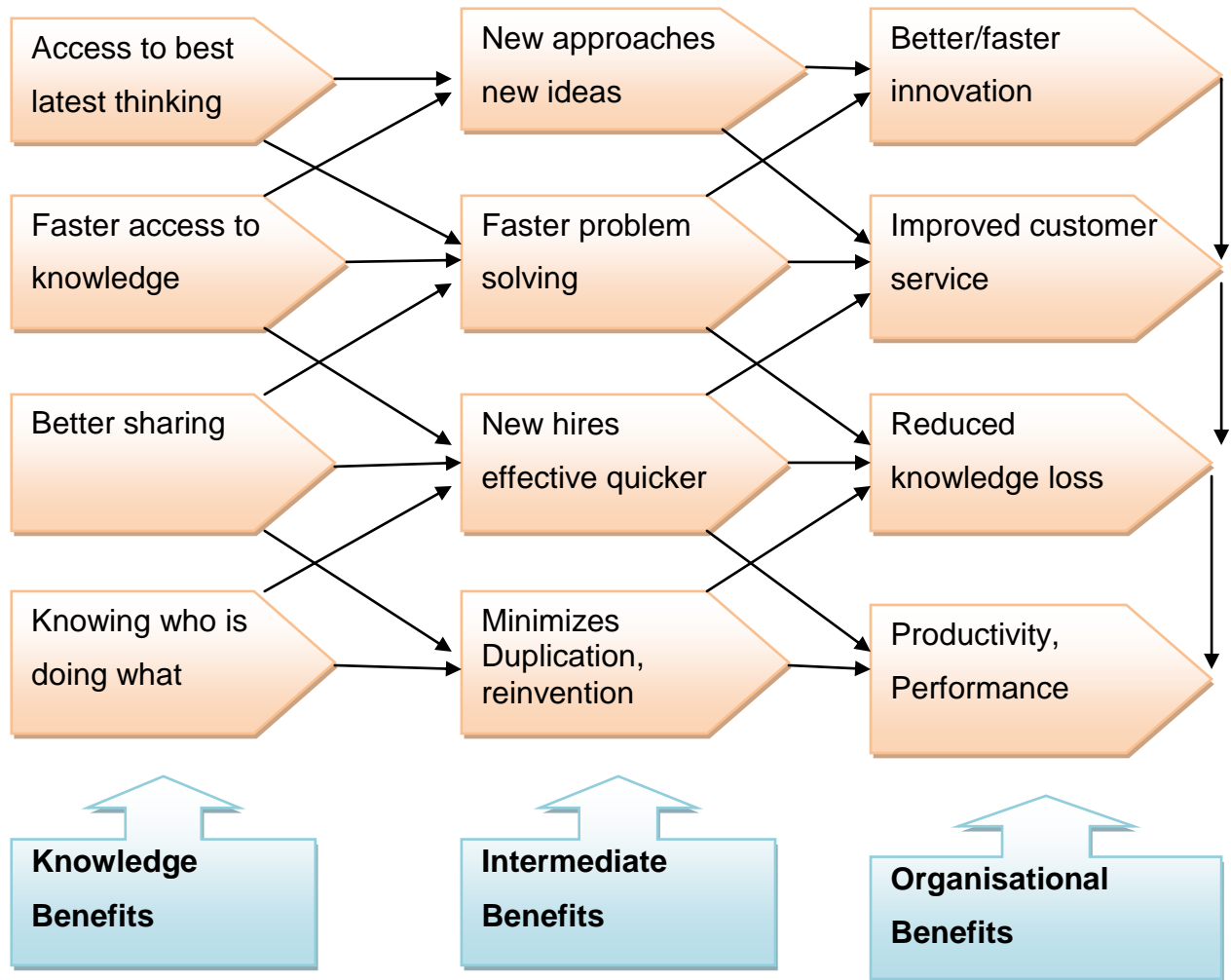
Kearns and Lederer (2003) recognise knowledge as a resource and knowledge management as a dynamic capability and competence that contributes to high organisational performance. A review of knowledge management literature that concentrates on the knowledge-based theory (KBT) (Alavi & Leidner, 2001; Pitelis, 2007) provides insights and a strong

basis to explore the nature and importance of the relationship between knowledge management and organisational performance.

The knowledge-based theory (KBT) suggests that the ability to deploy resources successfully depends on the knowledge residing in the human capital of a firm and the development of interrelated knowledge across organisational structures, with organisational routines and processes as instruments of knowledge integration (Theriou *et al*, 2009). Its proponents argue that because knowledge-based competencies and capabilities are usually difficult to imitate and are socially-complex, they are among the major determinants of sustainable competitive advantage and superior organisational performance (Alavi & Leidner, 2001; Kok, 2007). Therefore, the knowledge-based theory and related literature suggest that:

- good knowledge management practices have important implications for achieving high organisational performance (Pillania, 2005; Wagner, 2009),
- knowledge management practices can affect and can also be positively affected by an organisational performance framework that creates a focus on organisational elements that work together to deliver a well-executed strategy through an engaged workforce, resulting in a great customer experience, profitability and high organisational performance (Waal, 2008; Right Management, 2010).

These positions suggest that knowledge management influences organisational performance. The influence is manifested in benefits, hereafter referred to as knowledge management benefits. These benefits are characterised by Kosilov (2010) as knowledge benefits, intermediate benefits and organisational benefits. Figure 3.4 details the knowledge management benefits in each classification.



**Fig 3.4: Knowledge Management benefits**

(Adapted from Kosilov, 2010:12)

There are various views on the relationship between knowledge management and organisational performance. There are authors who do not perceive any direct link between knowledge and performance, arguing that organisations can acquire knowledge that may not lead to intelligent behaviour and how core rigidities due to deeply embedded knowledge sets may obstruct innovation (McEvily & Chakravarthy, 2002; Vera & Crossan, 2003). Singh, Chan and McKeen (2006) further suggest that there may be tensions among the knowledge management processes; for example, aggressive attempts at

leveraging knowledge could inhibit the accumulation of knowledge because the latter may not offer returns in the short run whereas the former would do.

Likewise, to encourage effective knowledge accumulation may require organisations to shake up existing patterns of behaviour, values, and mind-sets, sacrificing the protection of that knowledge. Therefore, this calls for the maintenance of a delicate balance between the knowledge processes of effective protection, that require segregating and embedding of knowledge and of leverage and that require integration and articulation which if misaligned may actually lead to negative organisational performance (Singh *et al*, 2006).

The knowledge management capability of an organisation is made up of different resources that may be categorised as organisational, social and technological infrastructure (Alavi & Leidner, 2001; Gold *et al.*, 2001). Mills and Smith (2011) suggest that the contribution made by each of these resources to organisational performance is likely to vary across the firm. Since researchers have tended to bundle the dimensions that make up knowledge management capabilities together with the effects, it leaves no space for understanding how particular knowledge resources relate to organisational performance. This view is shared by Vera and Crossan (2003) who argue that the conclusion that more knowledge leads to greater performance is misleading, but that only knowledge that is relevant may have positive effects on organisational performance. Focussing on particular knowledge management enablers and processes may provide some core understanding of an organisation's knowledge management capabilities which would in turn aid management decision making at the resource level (Mills & Smith, 2011).

Consequently, a more detailed evaluation of links between the individual dimensions of knowledge management capabilities and organisational performance can provide the fundamental understanding of the links.

It is expected that this research will provide insights into the relationships between knowledge management practices/processes and organisational

performance. Apart from providing researchers and managers with empirical evidence that helps to define the association between knowledge management and organisational performance, this research will also provide guidance on how organisations can enhance the success of knowledge management institutionalisation through a more targeted and direct approach to knowledge management.

### **3.5 KNOWLEDGE MANAGEMENT AND ORGANISATIONAL PERFORMANCE IN SOUTH AFRICA**

Research focussing broadly on the subject of general organisational performance and knowledge management in South Africa is scant. However, there are articles that focus on performance of certain sectors in South Africa where inferences can then be made of the organisational performance in South Africa.

Creamer Media Engineering News (2015), in their review of the construction sector, argue that the construction industry in South Africa is widely perceived as an industry with low productivity and poor performance despite its importance in the national economy. Since engineering and construction businesses tend to be 'project-driven', knowledge management processes need to be institutionalised to collect, disseminate and use project-generated knowledge, for the benefit of the entire organisation (Tobin & Volavsek, 2006).

This is echoed by the CIDB (2004) who state that the South African construction projects are not organised well and are buried in details which makes it difficult to compile and disseminate useful knowledge to other projects. It is generally accepted that current market dynamics and trends towards specialised and customer-oriented services in the construction industry demand the application of knowledge especially within the project organisations (Orange, Burke & Boam, 2000; Schapke, Menzel & Scherer, 2002; Tobin & Magenuka, 2007; Creamer Media Engineering News, 2015).



In the study of the use of performance management in public administration in South Africa, Fourie (2012) argues that public service organisations are frequently criticised for not being effective and efficient and, therefore, it is not surprising to see that the performance of the public sector is also questioned. The under-performance of the public sector organisations in South Africa is manifested partly in flawed hierarchies in the organisational structures, out-dated processes and procedures, lack of incentives linked to performance and the lack of absolute measures or metrics by which public sector organisations are held to account (Fourie, 2012). Greiling (2005:554) notes that an important goal of performance management is often based on the idea of improving external accountability whilst simultaneously increasing the internal efficiency of the public sector organisations.

It is acknowledged that one of the principal objectives of an organisation should be to optimise the expertise of its knowledge workers in producing new products, services or ways of working in order to sustain competitive advantage for organisational performance (Gold, Malhotra & Segars, 2001; Grandori & Soda, 2006; Massey & Montoya-Weiss, 2006).

However, Ramsey and Barkhuizen (2011) observe that current South African organisational designs do not optimise on the expertise of their knowledge workers. Covey (2004) argues that managers still apply the industrial age control models to knowledge workers that restrict optimising the expertise of the knowledge workers. Ramsey and Barkhuizen (2011) while exploring the organisation design elements and competencies that contribute to optimising the expertise of knowledge workers in a shared services centre, establish that to be sustainable, an organisational design must allow an organisation to recognise, create, transform and distribute knowledge. The findings also reveal that the shared services centre (SSC) in South Africa is not designed to enable its structure, culture and codifying system to optimise the expertise of knowledge workers.

These are the same variables in the organisational performance framework that impinge on the performance level of a company. In addition, the research establishes that because of the organisational design the SSC does not share the knowledge generated with other knowledge workers. Furthermore, it does not use the output of the knowledge workers to improve business processes.

Therefore their research highlights, from a South African perspective, the lack of organisational design optimisation for enhanced organisational performance and the importance of organisational design elements and supportive organisational structures for optimising the expertise of knowledge workers (Ramsey & Barkhuizen, 2011). This may be seen as suggestive of a relationship between knowledge management and organisational performance elements.

### **3.6 CHAPTER SUMMARY**

The nature of organisational performance was explored. It was seen that the objective of the strategic management process is to enable a firm to choose and implement strategies that enhance organisational performance. Therefore, the discussion started by exploring what organisational performance is, and then how a strategy that includes knowledge management can have an impact on organisational performance. A number of organisational performance definitions were offered with varying perspectives but all converged on the level to which a goal is achieved. Literature on strategy associates organisational performance with the achievement of goals such as sales growth, market share, new products development, quality and customer satisfaction targets among others.

A distinction between organisational performance and competitive advantage was also presented through the argument of O'Shannassy (2008) who views competitive advantage as relating to a company maintaining a sustainable edge over its rivals in a particular industry setting and then associates

organisational performance with the achievement of strategic and financial objectives.

The elements of organisational performance were also explored using a number of models that have been formulated to link the various factors so as to explain company performance. McKinsey 7-S framework and the EFQM Excellence Model are based on the notion that an organisation will achieve better results by involving all the people in the organisation in the continuous improvement of their processes and providing a focus for integrating all contributors to the organisation's performance.

Right Management built on these preceding performance models to come up with an organisational effectiveness framework, arguing that there are some fundamental associations between organisational elements that work together to deliver a well-executed strategy through an engaged workforce, resulting in a great customer experience, profitability and high organisational performance (Right Management, 2010). These organisational elements are strategy, organisational structure and roles, leadership, people systems, employee engagement, organisational culture, and values. Each of the elements featured in this model have been described.

Performance management was characterised as a process of establishing performance standards followed by the evaluation of the performance in order to arrive at objective decisions as well as to provide documentation to support those decisions. A further concurring view by Mullins (2010) is presented, that performance management is a practice that brings together many facets of people management and incorporates performance improvement at individual, team, department and organisational levels. Ultimately, performance management is about sharing expectations, establishing a culture in which individuals and groups take responsibility for the accumulated end results of all of the organisation's work processes and activities.

The reviewed knowledge-based theory and literature that refers to organisational performance suggest that:

- good knowledge management practices have important implications for achieving high organisational performance (Pillania, 2005; Wagner, 2009), and
- that these knowledge management practices can affect and also can be positively affected by an organisational performance framework that creates a focus on organisational elements (Waal, 2008; Right Management, 2010).

## CHAPTER 4

# RESEARCH DESIGN AND METHODOLOGY

### 4.1 INTRODUCTION

The overall aim of this study is to investigate the role that knowledge management plays in the performance of an organisation. It was established that there was little, if at all, previously published formal academic research on the role of knowledge management in the performance of the South African construction and engineering sector firms. Given the diverse skills and knowledge workers involved and required in the construction and engineering companies, this seemed to present a fertile area for investigation.

It was decided to focus on construction and engineering companies that are listed on the Johannesburg Stock Exchange (JSE) at the time the research was to be carried out. Therefore, the central objective of the research is to investigate the role of knowledge management in the performance of JSE-listed organisations in the construction and engineering sector in South Africa.

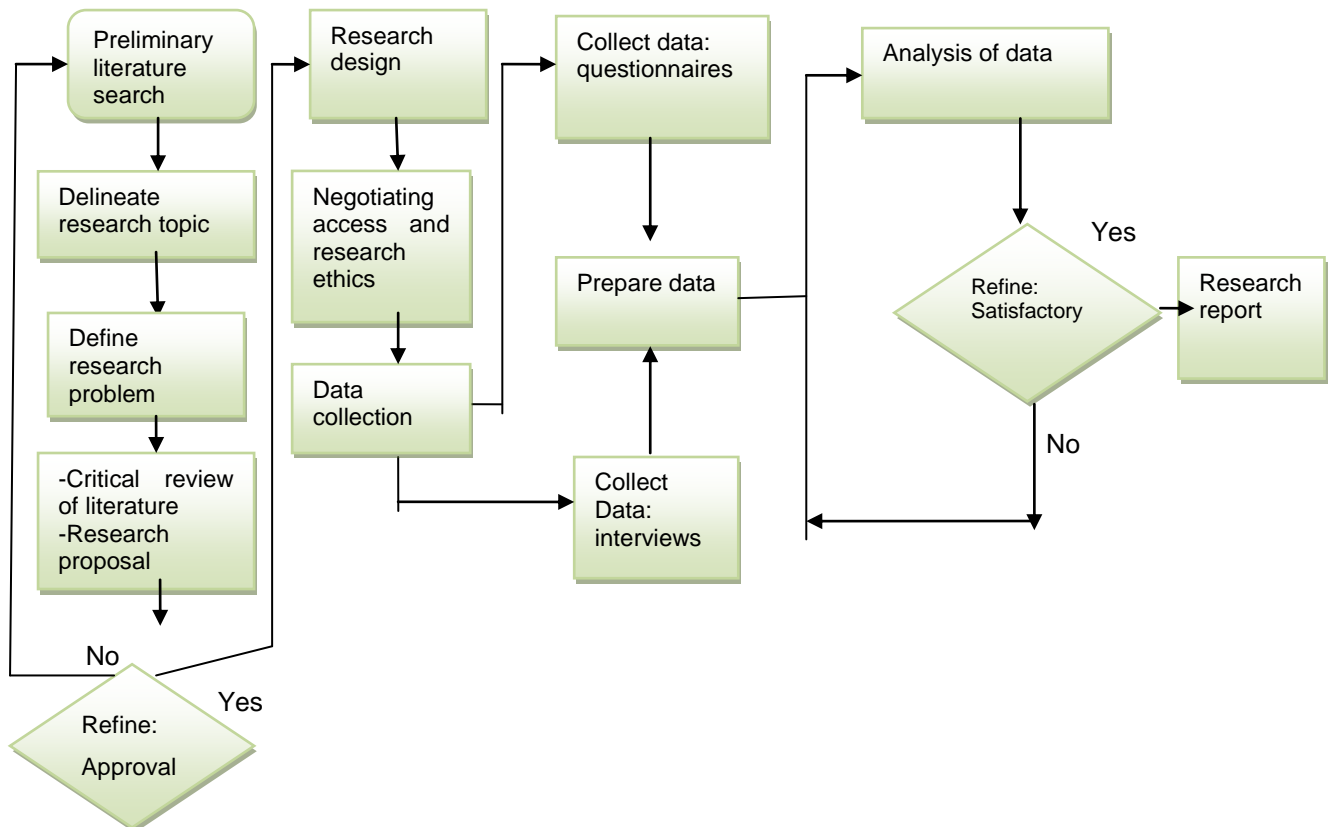
The literature reviewed in earlier chapters revealed the enormous potential for knowledge management in firms. The literature also showed that some factors of knowledge management are similar to the factors for organisational performance and these are:

- Strategy
- Leadership

- Culture/values
- Technology
- Structure
- Systems, practices and processes
- Employee motivation/engagement
- People systems/human resources management
- Resources, capacity, capability

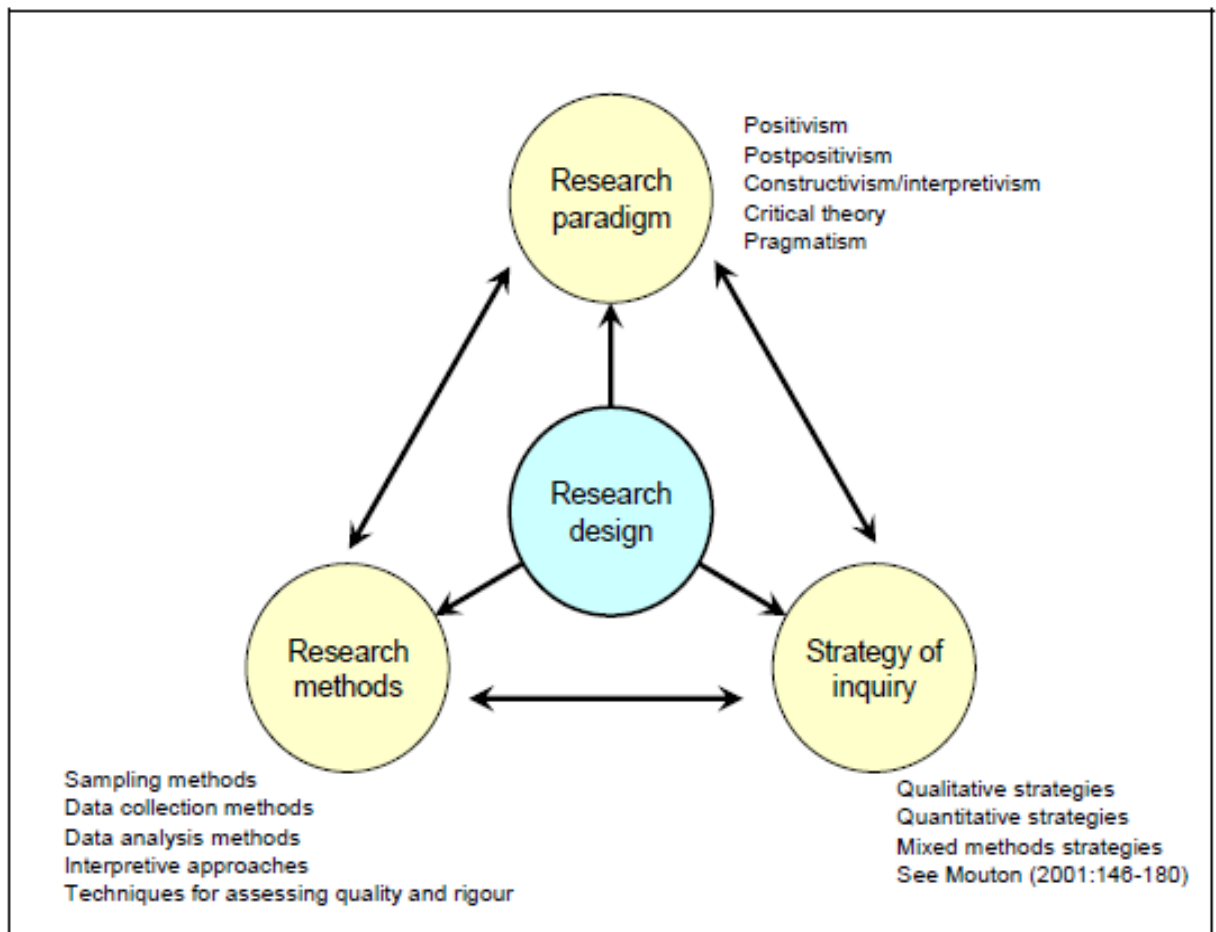
As also noted by Grover and Davenport (2001), it has been seen that research in knowledge management is fragmented into various components of the knowledge management processes and practices without much investigation into the role of these on organisational performance.

This chapter establishes the methodological framework for this investigation. The research reported in this thesis was done in an iterative manner. Figure 4.1 illustrates the research process mapping.



**Figure 4.1: The research process**

The chapter begins with discussions on the philosophical underpinnings governing the different research methods. This is followed by a consideration of the different research methods and research design chosen for this study. It identifies the target population, discusses the data collection instrument, validity and reliability issues, ethical considerations and the pilot study. The chapter ends with the techniques of analysis and validation of the empirical data used in illuminating the space of knowledge management in the construction and engineering companies in South Africa.

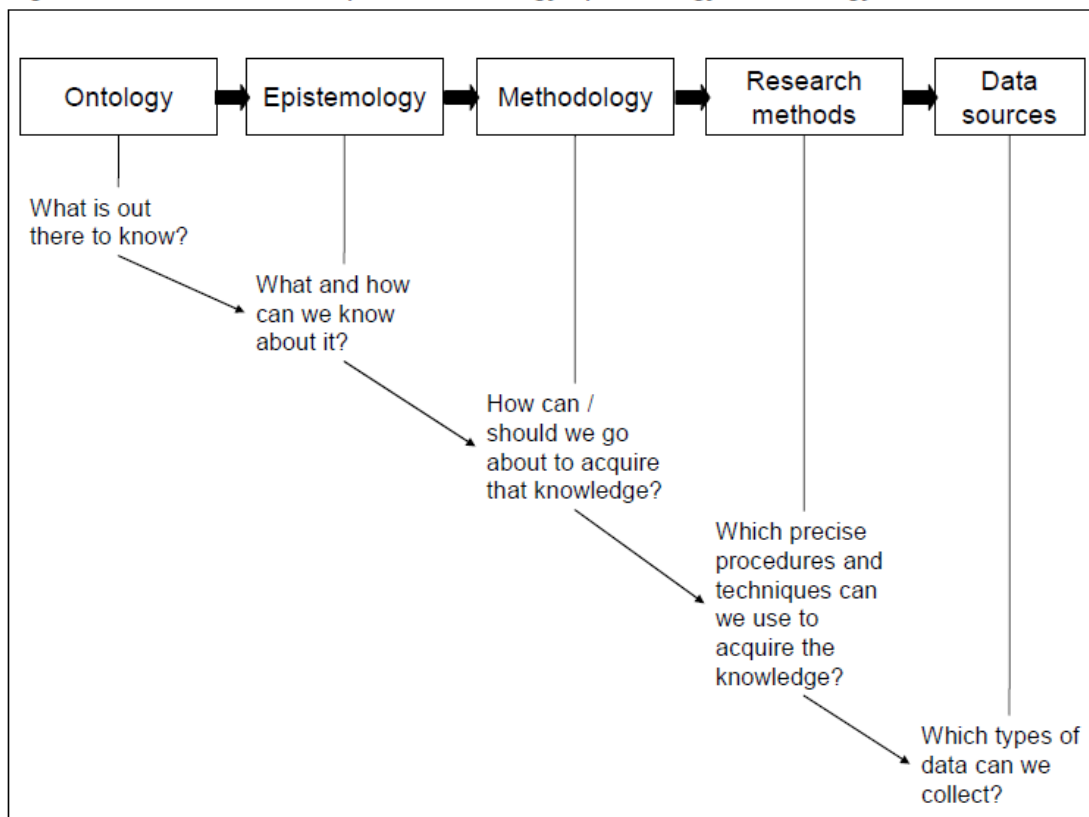


**Figure 4.2 Relationships between core research terms used**

(Source: Adapted from Creswell, 2008:5)

## 4.2 RESEARCH PARADIGM

Philosophy refers to the conceptual backgrounds underpinning the search for knowledge (Ponterotto, 2005:127). Fused within this research community's world-view are beliefs and assumptions regarding the nature of reality (ontology), the study of knowledge and how best it can be produced or acquired (epistemology), and the role of values in the research process as underlined by the relationship between the knower (research participant) and the would-be knower (the researcher) i.e. axiology and the process and procedures of research (methodology) (Denzin & Lincon, 2000; Ponterotto, 2005:127; Creswell, 2008). A researcher's or research community's assumptions about ontological, epistemological and axiological and their perspectives about appropriate research methodological are interdependent as per Figure 4.3.



**Figure 4.3: The interrelationship between ontology, epistemology, methodology, methods and data sources** (Source: Grix, 2002:180)



The research philosophies to be used for this study are two fundamentally different paradigms chosen for their relative value to the research and these are positivism and interpretivism. An analysis of the two paradigms now follows, so as to establish and appreciate their differences.

The positivism philosophy assumes the natural scientist posture whereby observable social reality is more preferable to the researcher. The positivists' truth and reality is that the behaviour of human beings is determined by their social world and is subject to patterns that are empirically observable (Ponterotto, 2005). To this end, the assumptions are that reality is external, positive, simple and produces measurable properties that are independent of the observer. Positivists generally test theories on the facts of their studies in an endeavour to understand phenomenon for causal explanation and fundamental laws then reduce the whole to its simplest possible elements to enable analysis.

The product of the research would then be generalised into laws as those produced by physical scientists. Positivists' research will lend itself to quantitative and experimental methods to test hypothetical-deductive generalisations which will lead to statistical analysis (Creswell, 2008; Saunders, Lewis and Tornhill, 2007:103).

On the other hand, the interpretive philosophy holds that the world is far too complex to be simplified to linear and quantifiable observations. The realities are multiple rather than single; objectivity is a myth, action stems from interactions in the bounded situations and the meanings ascribed to the words are imperfectly shared at best. Characteristically, this would lead to the use of qualitative approaches to inductively understand the human experience in the specific context settings. Interpretivists would attempt to understand and explain phenomenon rather than search for fundamental laws. The researchers mostly contribute to hypothesis and theory generation (Myers, 1997; Saunders *et al*, 2007:106).

The notable philosophical difference between the positivist and the interpretivist is that whilst the positivist relies on the quantitative research method, the interpretivist school of thought uses the qualitative approach. The use of both philosophies is a reflection of the stance of realism by the researcher as advocated by Saunders *et al*, (2007:116) in that business and management research is frequently a mixture between positivism and interpretivism.

The main purpose of this study is to investigate the role of knowledge management in organisational performance. The use of both these perspectives will enable the researcher to consider the multiple realities existing in organisations.

The choice of a specific method is dependent more on the underlying philosophical assumptions of the researcher, the aim of the study and the research questions being investigated rather than on the philosophical position adopted. Thus the qualitative approach is not synonymous to interpretivism nor is positivism synonymous to the quantitative approach. In fact, qualitative and quantitative research may sometimes be both interpretivist and positivist. Therefore, of the two paradigms, there is no one particular research philosophy that is better or more appropriate for this study than the other (Saunders *et al*, 2007:116).

### **4.3 DESCRIPTION OF THE STRATEGY OF INQUIRY**

Yin (1994) contends that the research design deals with the following four aspects of the research:

- what questions to study
- what data are relevant

- what data to collect
- how to analyse the results.

The strategy of inquiry employed in this study is the survey method. Ten construction and engineering firms listed on the JSE have been selected for the survey. The survey strategy is usually related to the deductive approach and mostly used to answer such questions as who, what, where, how many and how much (Saunders *et al*, 2007:138). Survey research is also characterised by Mouton, (2001:152) as a quantitative study that aims to provide a broad overview of a representative sample of a large population. Specifically, surveys have been applied in most knowledge management studies.

For example, a review of research in knowledge management identified 59 surveys conducted between 1997 and 2001 (Chauvel & Despres, 2002). It was, therefore, selected for this study for the following reasons:

- A survey brings a matter into focus by defining and specifying its various elements
- The results are quantifiable and thus can be analysed using statistical methods
- Statistical treatment allows the results obtained from a sample to be extended to a larger sample and therefore enabling the generation of more global generalisations
- It is faster, highly economical and more direct as compared to other methods (Chauvel & Despres, 2002).

Surveys may also be exploratory, descriptive or explanatory although quite often most studies have elements of all three (Babbie, 2001).

Exploratory surveys are often conducted as qualitative research and are adopted especially when the subject is new, with the aim of developing new insights and hence increasing the researcher's familiarity with the phenomenon

under investigation. It seeks to provide answers to research questions and concepts and formulate further problems for precise investigation. It does not seek to test hypothesis (Wong & Aspinwall, 2005).

Descriptive survey on the contrary observes then describes a situation, whilst explanatory survey seeks to answer the 'why' question. This study is on the main an exploratory survey with traces of descriptive and explanatory survey. It is exploratory in that it explores the role of knowledge management in organisational performance. Elements of explanatory survey emerge as the study examines the relationship between knowledge management and organisational performance.

#### **4.3.1 Quantitative and qualitative research methods**

It is important to identify and describe the research methodology so as to appreciate the reason behind the philosophical perspectives adopted in this research. Ponterotto (2005) defines a research method as a strategy of inquiry that moves from the philosophical assumptions to research and data collection. The choice of the research method influences the way the researcher collects data, the research skills employed, assumptions and the practices that are adopted.

Quantitative research methodology is anchored on the positivist philosophy and some of the assumptions that underline it are that there is only one reality and truth in nature, and that the reality is objective, positive and simple. It is also one of the quantitative reflections that human beings are influenced by their social environment, subject to fixed patterns that are socially observable. Quantitative research attempts exact measurement of phenomenon by answering the questions related to how often, how much, how many, when and who in numeric terms (Cooper & Schindler, 2006:198).

Examples of quantitative research methods would include the survey method, observations, and numerical methods such as mathematical modelling. A quantitative study investigates the human and social problems on the basis of testing theory made up of variables measured with numbers and analysed with statistical procedures. This would be done so as to determine if the predictive generalisations are true (Creswell, 2008:174).

On the other hand, qualitative research methods are designed to scientifically explain people and matters associated with them, and do not depend on numerical data (Fox & Bayat, 2007:7). Qualitative studies typically provide descriptions and/or interpretations that enable the researcher to gain insights into the fact under observation so as to develop new theoretical perspectives. Qualitative research analysis centres on qualitative techniques characterised by non-numeric data gathering methods. Examples are observation, texts interviews, questionnaires, field work, documents and text analysis, archive research, audio and video tapes.

A number of distinctions worth noting between quantitative and qualitative approaches to research have been drawn. Qualitative approaches are exploratory while quantitative approaches are definitive. Qualitative approaches ask 'why' questions while quantitative studies ask such questions as 'how many' and 'how often'. Quantitative approaches study action while qualitative approaches study motivation. Qualitative approaches enable discovery while quantitative approaches provide proof (Mwanje, 2001:22).

Quantitative research analysis is reliant on quantitative techniques that revolve around quantities in numeric form. These techniques enhance precision to measurement, facilitate economy of description, validate statements, boost accuracy in predictions and aid the decision making process. According to Ponterotto and Grieger (1999), quantitative research often includes large scale sampling and the application of statistical processes to study group means and variances.

Denzin and Lincoln (2000) further argue that quantitative studies stress the measurement and analysis of causal or correlational relationships between variables. This is particularly important to this study as it seeks to establish the possible existence or non-existence of a relationship between knowledge management and organisational performance. On the other hand, qualitative research analysis includes all non-numeric data and all data that has not been quantified. Denzin and Lincoln (2000) view qualitative findings as normally presented in everyday language and often incorporating participants' own words to describe a psychological event, experience, or phenomenon. Both quantitative and qualitative approaches are empirical methods in that they involve the collection, analysis and interpretation of data or observations (Ponterotto, 2005:128).

Nevertheless, quantitative and qualitative research methods tend to overlap. For example, both methods make use of interviews and questionnaires as techniques for gathering data. Quite often researchers have to make a choice between the quantitative and qualitative approach to research, and the choice of methodology made is informed by the insight to be gained in a particular study. However, establishing a very clear cut distinction between quantitative and qualitative research approaches is often debatable. This is because in some studies these two research approaches may be complementary to each other. Beccera-Fernandez, Gonzalez, and Sabherwal, (2004) call for the blending of quantitative and qualitative research approaches in knowledge management in order to get the most complete picture.

This study is mainly a quantitative research but will conscript some elements of a qualitative approach in order to clarify certain matters and this will be in the form of interviews. Therefore, this study moves towards a middle ground that bridges between the two approaches by adopting a mixed methods approach.

### 4.3.2 Mixed methods/triangulation

Triangulation is the combination of quantitative and qualitative techniques in the study of the same phenomenon (Powell & Silipigni, 2004). This is often done so that the weakness of one method would be compensated for by the strength of the other, and this spells the effectiveness of triangulation (Yin, 2003). Quantitative and qualitative research methods have different strengths and weaknesses but triangulation provides some moderation between the two.

Four types of triangulation have been identified namely:

- data triangulation whereby data is collected at different times from different sources;
- investigator triangulation where different investigators independently collect data;
- methodological triangulation where both quantitative and qualitative techniques are applied;
- triangulation of theories where theory from one discipline is used to explain a phenomenon in another discipline.

This study is mainly a quantitative research but the quantitative techniques will be blended with a few qualitative key-informant interviews for data collection so as to obtain a well formed picture. This is as dictated by the nature of the problem being investigated, the nature of data to be collected and the research questions to be addressed. As noted earlier, if the questions are related to 'how' and 'why' then qualitative methods are preferred but if the question is 'how often,' then there is need for quantitative methodologies (Mwanje, 2001; Babbie, 2001; Powell & Silipigni, 2004). The purpose set out for this study of understanding better the role that knowledge management plays in the performance of an organisation calls for a complementary research method that will explore the research questions from various dimensions and facets.

### 4.3.3 Common research methods in knowledge management studies

A review of literature shows that most researches in knowledge management employ case studies and surveys, with a balance on the adoption of quantitative or mixed method approach as the strategy of inquiry. In their study of the important knowledge management factors for adoption in the UK SME sector, Wong and Aspinwall (2005) surveyed SME's in the UK using a triangulation of qualitative and quantitative methods.

A study of knowledge management practices of financial institutions in Uganda by Bagorogoza, de Waal, van den Herik and van de Walle (2011) was undertaken using a combination of quantitative and qualitative research which provided an opportunity for triangulation of information, and the study employed a cross-sectional survey design. Squier and Snyman (2004) adopted a qualitative case study approach in their South Africa research of three financial institutions. Ndlela and du Toit (2001) conducted a survey in the Eskom Transmission Group, South Africa, to investigate the level of understanding of knowledge management concepts within the leadership strata. Eftekhazadeh's research (2008) into the implementation of knowledge management in developing countries relied on the survey method using questionnaires and semi-structured interviews.

Beccera-Fernandez *et al* (2004) advocate for the blending of qualitative and quantitative research approaches in knowledge management so as to obtain a well-formed picture. They argue that qualitative knowledge management assessment is most appropriate during the early phases of a knowledge management initiative when experience levels are generally low, but prescribe quantitative assessment measures when the organisation has gained more experience and quantifying gains has greater relevance. This view is backed by Grossman and McCarthy (2005) who postulate that given the fact that intellectual capital of organisations is intangible within the workforce and influenced by a complex web, the benefits of a blended approach are



predictable due to the socio-political and cultural factors affecting knowledge management implementation.

#### **4.3.4 Justification of methodology adopted for this study**

This study builds on the methodologies used in previous knowledge management studies as described above by adopting the triangulation of qualitative and quantitative methods of data collection (mixed methods approach). This approach provides an appropriate means to the end that this research has to achieve as defined by the objectives, research questions and the nature of information to be collected. The questionnaire for this study seeks to find answers to both qualitative and quantitative questions. The objectives set out in this research study, i.e. to investigate knowledge management's association with the measures that determine the overall performance of an organisation, dictates the need for a complementary research method.

Knowledge management practices and processes have qualitative elements and when treated under statistical analysis produce quantitative results whilst organisational performance is generally measured by quantifiable methods. In this case, organisational performance will be operationalised along the lines of revenue growth, earnings per share growth and share-price growth, all of which are quantifiable.

By combining qualitative techniques together with quantitative techniques, this study benefits from the techniques' combined strengths in an inter-related and complementary fashion. Triangulation provides considerable advantages in the study of new and under-studied areas in that rich insights would be generated (Amaratunga, Baldry, Sarsha, & Newton, 2002). It has been observed that knowledge management research is still a young discipline from which neither a codified universally accepted framework nor standard methodology have been established (Grover & Davenport, 2001; Rubenstein-Montano, Liebowitz & McCaw, 2001; Grossman & McCarthy, 2005).

Very little research, if at all, has been carried out on the role of knowledge management on the performance of organisations operating in the construction and engineering sector in South Africa. It is hoped that the adoption of the quantitative method together with qualitative interviews used as complimentary, will provide valuable insights into the state of knowledge management and validate the knowledge management processes and practices in the construction and engineering industry in South Africa.

#### **4.4 TARGET POPULATION**

Population is an important aspect to be considered in survey studies. The aggregate group that the researcher is dealing with from which inferences can be made is the population. The target population for the proposed study consists of organisations operating in the construction and engineering sector within South Africa.

The objectives of the research are to investigate knowledge management's association with measures that determine the overall performance of an organisation, determine the factors that enable/inhibit knowledge management in firms and to investigate knowledge management's role in organisational performance. Given these objectives of the research, it is appropriate to target organisations big enough to embrace the concept of knowledge management and also where the performance of the respective organisations is accessible, according to the performance measures that are to be used.

The selected sample for this survey is JSE-listed construction and engineering firms as of the 20<sup>th</sup> October 2013. The underlying criterion for the choice of this type of industry and companies is that they have a variety of operations requiring various skills. Given the diverse skills and knowledge workers involved and required in the construction and engineering companies, this

seemed to present a fertile area for investigation. Ten companies were selected to participate in the survey, as follows:

- Wilson Bayly Holmes Ovcon Ltd (WBHO)
- Raubex Group Ltd
- Murray & Roberts Holdings Ltd
- Invicta Holdings Ltd
- Group Five
- Esorfranki Ltd
- Basil Read Holdings Ltd
- Aveng Ltd
- Austro Group
- Accentuate Ltd

A brief description and background information of the aforesaid companies now follows.

### **Accentuate**

Accéntuate is a group of companies operating in South Africa and serving the construction and infrastructural development markets in southern Africa. The group focuses on the manufacturing and distribution of infrastructural supplies and maintenance solutions to the flooring sector, chemical cleaning, collateral supplies and other related infrastructure markets. The chemical blending business is a significant supplier of cleaning, adhesive, construction chemicals and related equipment to the public and private sectors (Accentuate, 2008; 2012).

The history of the company starts off with Marley Flooring that was established in 1953. Safic, which went on to acquire Marley Flooring in October of 2002, was established in 1981 and these two merged entities formed FloorworX Africa. They were later listed on the AltX of the JSE in November 2006 as Safic Holdings. Safic Holdings went on to acquire Centurion Glass and Aluminium in

2007 and the consolidated group changed its name from Safic Holdings to Accentuate Limited in 2008. Further acquisitions and disposals followed through when Accentuate Limited went on to acquire Interior Wooden Floors (Pty) Limited in October 2008. This was followed by the disposal of Centurion Glass and Aluminium in 2010 to Wys Investments (Accentuate, 2008; 2012).

### **Austro Group Limited**

Established in 1980, Austro Group Limited supplies specialised and branded industrial equipment and related supplies to corporate, commercial and infrastructure markets in South Africa and other African markets. The group services clients ranging from heavy industrial, construction and mining groups to wholesalers, retailers and manufacturers. The group's two main businesses have each been in existence for almost 30 years. The group listed on the JSE in February 2007. Austro Group Limited has two focused business offerings: New Way Power (Pty) and Austro (Pty) Ltd (Austro, 2008; 2012).

### **New Way Power (Pty) Limited**

New Way Power (Pty) Limited is a major supplier of commercial generators in sub-Saharan Africa. It also provides pumping equipment (used for dewatering, irrigation and fire suppression systems), marine propulsion (used in the fishing industry and high-end leisure craft), industrial components, Mitsubishi transport refrigeration and industrial diesel engines (used by original equipment manufacturers). It services customers in the commercial, industrial, mining and public sectors. New Way holds the sole distribution rights in sub-Saharan Africa for John Deere industrial and marine diesel engines. Other exclusive distributorships held by the company include Mitsubishi Heavy Industries, Doosan Infracore and Marathon Electric. Neptune Plant Hire, a division of New Way Power (Pty), delivers power solutions to industrial companies across a broad range of business sectors (Austro, 2008; 2012).

### Austro (Pty) Ltd

Austro (Pty) Ltd ('Wood') has grown into a leading distributor of machines, machine tools, edging and glue for the woodworking industry. The division focuses on the distribution of industrial aluminium, plastic and woodworking machinery, tooling and edging, together with the relevant after-sales and technical services. Management of the division acknowledges its continued focus on the expansion of the saw milling sector, with its portable saw-mill range that has resulted in expansion into Zambia and other central African countries. It is the view of the company that Wood's South African market share of Computerised Numerical Control ('CNC') equipment has increased substantially (Austro, 2008; 2012).

### The Aveng Group

Aveng (Africa) Limited is a multi-discipline construction and engineering group based in South Africa and focused on infrastructure, energy and mining opportunities in Africa. The Group employs some 18 000 people and has an annual turnover in excess of R12-billion. Aveng Limited, which is listed in the Heavy Construction and Construction and Materials sector of the JSE Limited, owns 75 percent of the issued share capital of Aveng (Africa) Limited. The balance of 25 percent is owned by a Black Economic Empowerment consortium (Tiso Group).

There are a number of operating groups within Aveng (Africa) Limited:

- Aveng Grinaker-LTA
- McConnel Dowell
- Aveng Engineering
- Aveng Manufacturing
- Aveng steel
- Aveng Mining.

(Aveng, 2008; 2012)

### Aveng Grinaker-LTA

Aveng Grinaker-LTA offers multi-disciplinary services across the construction and engineering value chain to its clients in South Africa, Mozambique, Mauritius and other selected markets in the rest of Africa. Services range from building, civil engineering and earthworks to mechanical and electrical engineering (Aveng, 2008; 2012).

### McConnell Dowell

Australian based, McConnell Dowell Corporation Limited operates predominantly in the Eastern Time Zone, and is a major engineering, construction, building and maintenance contractor servicing the building, infrastructure and resources markets with expertise in building, rail, civil, electrical, marine, mechanical pipelines, fabrication, tunnelling and underground services (Aveng, 2008; 2012).

### Aveng Engineering

Aveng Engineering offers engineering, design and project delivery services as well as the operation and maintenance of metallurgical processing plants (Aveng, 2008; 2012).

### Aveng Manufacturing

Aveng Manufacturing manufactures and supplies a diverse range of steel and concrete products, valves, services and engineered solutions in the mining, construction, infrastructure and building sectors in southern Africa. It also undertakes rail construction and maintenance projects in southern Africa and Australia (Aveng, 2008; 2012).

### Aveng Steel

Aveng Steel supplies a wide range of products to the domestic and export markets in the steel construction and automotive industries from its steel yards, processing centres and manufacturing plants (Aveng, 2008; 2012).

### Aveng Mining

Aveng Mining is one of only four deep-level shaft-sinking companies worldwide and is involved in all aspects across the mining value chain, ranging from shaft sinking, underground development and contract mining, opencast mining, mineral processing and acid mine drainage plants, to construction of mining related infrastructure and the supply of mining equipment and products.

The Aveng Group's capability is underpinned by its broad footprint and diverse group of construction, infrastructure and engineering entities (Aveng, 2008; 2012).

### Basil Read

Basil Read was founded and incorporated in 1952 in Pretoria, South Africa and listed on the JSE in 1987. Through its subsidiaries, it engages in civil engineering projects, road construction, building, integrated housing developments, property development, bitumen distribution, opencast mining and engineering design, procurement and construction management, as well as related services throughout Africa and other emerging markets.

The company's journey is signposted with many milestones, from its listing on the JSE in 1987, to a landmark empowerment deal in 2005; from a R5 billion turnover in 2008, to being top of the Sunday Times Top 100 Companies Survey in both 2008 and 2009. The group aimed to become a R10 billion turnover global construction group by 2013.

The group's construction division is involved in the development and implementation of technical and financial engineering for private and public

sector clients covering various projects, such as earthworks, bridges, pipelines, harbour and marine works, industrial plants, stadiums, roads, highways, airports, retail and office complexes, apartment blocks, educational facilities, hospitals, prisons and residential housing.

Basil Read's opencast mining operations comprise drill and blast, opencast contract mining, mine spoils rehabilitation, bulk earthmoving, seam mining, hard rock selective mining, and materials handling.

The group's developments division is involved in the construction, development and project management of integrated housing schemes and other property-related developments.

Basil Read's engineering division provides a full range of civil and structural engineering, project management and architectural services, as well as electrical and mechanical engineering solutions (Basil Read, 2008; 2012).

### **Esorfranki Limited**

Esorfranki Limited is engaged in the specialist geotechnical and civil engineering sector in South Africa and southern Africa. The company operates three segments: geotechnical, civils and pipelines. Civils segment is engaged in the construction of roads, township infrastructures, water and sewerage reticulation and concrete projects. The pipelines segment is engaged in the construction and rehabilitation of onshore pipelines. Pipeline operations are primarily located in South Africa. The geotechnical segment is engaged in the construction and provision of piling, pipe jacking, lateral support and ground improvement for the construction industry, primarily in South Africa. The Company's subsidiaries include Brookmay Properties (Pty) Limited, Esor Africa (Pty) Limited, Esorfranki Civils (Pty) Limited, Esorfranki Construction (Pty) Limited, Esorfranki Pipelines (Pty) Limited and Esorfranki Property Developments (Pty) Limited.



It is one of South Africa's engineering and construction groups providing specialist geotechnical services, roads, earthworks, building and pipeline construction. The range of services encompasses sub-surface foundation work and above-surface construction services.

The group's footprint extends throughout South Africa and into Africa covering Angola, Botswana, DRC, Ghana, Kenya, Malawi, Mozambique, Namibia, Seychelles, Tanzania, Uganda, Zambia, Zimbabwe and the Indian Ocean islands.

Esorfranki announced the disposal of its original listed business, Esorfranki Geotech to Keller Holdings for a cash consideration of R500m. Keller Group is an independent ground engineering contractor and is operational in 30 countries worldwide. Keller is listed on the London Stock Exchange (Esorfranki, 2008; 2012).

### **Group Five**

Group Five was established in 1974 and today stands as an integrated construction services, materials and infrastructure investment group operating in over 20 countries with more than 12 000 people in its employ. The Group employs people throughout its operations in Africa, the Indian Ocean Islands, the Middle East, Asia and Eastern Europe. With decades of construction experience, Group 5 has played a major role in the development of southern Africa's infrastructure, achieving a reputation for innovation and professionalism nationally and internationally (Group Five, 2008; 2012).

### **Invicta Holding Limited**

Invicta Holding Limited controls and manages assets worth R8 359 million (2011: R6 889 million). Its operations comprise:

- BMG (Bearing Man Group) - distributor of bearings, seals, power transmission components, drives, belting, fasteners, filtration and hydraulics.
- CEG (Capital Equipment Group) – is composed of Northmec, CSE, New Holland, Doosan SA and Criterion. These are also described here-under.
- Northmec- Distributor of a full range of agricultural machinery, implements and related spares.
- CSE - Wholesale and retail distributor of light earthmoving machinery, turf-grooming machinery, golf cars, utility vehicles and related spares.
- New Holland - Wholesale distributor of agricultural machinery, implements and related spares.
- Doosan SA - supplies predominantly heavy earthmoving machinery for construction and mining applications.
- Criterion - Importer and distributor of materials handling equipment and related spares.
- ESP - after-market replacement parts, ground engaging tools and undercarriage parts for earthmoving equipment.
- Tiletoria - an importer and distributor of tiles and related sanitary ware in the Western Cape, Gauteng and KwaZulu-Natal.

(Invicta Holdings, 2008; 2012).

### **Murray & Roberts**

Murray & Roberts is an engineering and construction services company based in South Africa and is listed on the JSE Securities Exchange. It has delivered infrastructure throughout South Africa and southern Africa for more than 112 years and is today recognised as an international engineering and construction group.

The company offers civil, mechanical, electrical, mining and process engineering, general building, procurement, construction, commissioning, operations and maintenance services. Murray & Roberts offers its services in

the global underground mining market, selected international oil & gas markets, selected African power and industrial markets and selected African infrastructure sectors.

Murray & Roberts operates in Southern, Central and Western Africa, Middle East, Southeast Asia, Australasia and North and South America. The company is based in Johannesburg South Africa. It has offices in Australia, Botswana, Canada, Chile, Ghana, Mozambique, Namibia, United Arab Emirates, United States of America and Zambia.

In addition to the many buildings, Murray & Roberts has been involved in the construction of the Gautrain railroad, the Medupi Power Station and the Cape Town Stadium. Over the years, Murray & Roberts has participated in some of the world's leading engineering projects at home and abroad. It has built a legacy of landmark roads, bridges and harbours, commercial, retail and entertainment centres, industrial, manufacturing facilities and public transport infrastructure.

From humble beginnings in 1902 as an emerging house builder in the Cape Colony, Murray & Roberts expanded steadily throughout southern Africa, across all industry sectors and into many international markets, pioneering the introduction of new technologies, materials and methodologies into the domestic construction and engineering industry. It was listed on the JSE in 1951. Over the years, non-core assets were sold, including Unitrans, and this released capital for significant strategic acquisitions, the most notable of which were the Cementation Group, Clough and Concor (Murray & Roberts, 2008; 2012).

### **Raubex**

Raubex is a construction group operating across all nine South African provinces and throughout southern Africa with a specific focus on infrastructure

development. The group consists of a construction division and a materials division.

The construction division specialises in all aspects of road construction, rehabilitation and related infrastructure development including bulk earthworks, services, concrete structures and asphalt surfacing.

Raumix is the materials division of the group, specialising in the supply of aggregate from commercial quarries and providing mobile crushing solutions for remote project sites. Through its subsidiaries, B&E International and SPH Kundalila, the group is a leading provider of material handling and screening services to the mining industry. Raubex has been operating since 1974 and listed on the JSE Limited in March 2007 (Raubex, 2008; 2012).

### **WBHO Construction**

The origins of the present group dates back to 1970 when Wilson-Holmes [Pty] Ltd was formed by John Wilson and Brian Holmes. A number of mergers followed resulting in the name being changed to Wilson Bayly Holmes [Pty] Limited in 1983 and finally to WBHO Construction in 1994. Today the group is one of the largest construction companies in southern Africa and is listed on the-Johannesburg-Securities-Exchange.

WBHO's offices are strategically located in Sandton, Cape Town, Durban, Port Elizabeth and East London. Construction activities, which cover the full spectrum, are divided into three main operating divisions, Building Construction, Civil Engineering and Roads and Earthworks. WBHO's Australian subsidiary, Probuild Constructions, has its headquarters in Melbourne (WBHO, 2008; 2012).

#### **4.4.1 Units of analysis**

The units of analysis refer to the entities about which the researcher wishes to draw conclusions (Terre Blance & Durrheim, 2004:37). The units of analysis can be individuals, families, organisational sub-units, organisations, regions, countries, nations, other groupings or entities. Sample units are also entities from which data will be collected. In this study, the units of analysis are the surveyed organisations and sample units are the individuals in the various organisations.

Data sources will be the overseers of various departments within the selected organisations and those considered to be the thought-leaders. The potential participants will be knowledge workers in the respective construction and engineering organisations that have been targeted. Knowledge workers are defined by Tobin and Magenuka (2007) as professional workers from such specialist fields as civil engineers, mechanical engineers, architects, surveyors, designers, technicians, electrical engineers and project managers in the target companies.

### **4.5 SAMPLING**

#### **4.5.1 Sampling method**

The objective of any sampling plan is to obtain a sample that is representative of the characteristics of the population. Leedy and Omrod (2007:207) state that the results of a survey are no more trustworthy than the representativeness of the sample. So as to achieve the trustworthy results, choosing a method that yields the most representative results is imperative.

Two basic types of sampling designs are generally used, and these are probability sampling and non-probability sampling. In probability sampling, the

chance or probability of each case being selected from the population is known and is usually equal for all cases. Examples of probability sampling are simple random sampling, systematic random sampling, stratified sampling and cluster sampling.

On the other hand, purposive-sampling is a non-probability sampling technique and is the one being proposed for this study. Other examples of non-probability sampling techniques include convenience, haphazard, self-selected, incomplete and quota sampling (Powell & Silipigni, 2004). Purposive sampling requires the researcher to identify and target a particular group of individuals who are believed to be the type of the population that is wanted. Purposive sampling ensures maximum variation within the context of the research questions.

The technique is normally used when small samples are drawn from the target population and heterogeneous sampling is conducted in order to gather data for the purpose of identifying themes that emerge (Welman, Kruger & Mitchall, 2005:69; Davies, 2007:57; Saunders *et al*, 2007:230). Purposive sampling is based on one's knowledge of the population and the objective of the research.

This sampling method technique was chosen by the researcher as it is supported by previous researchers studying knowledge management. Guidelines set by Saunders *et al* (2007:227) set the purposive sampling as the most appropriate technique for this study. The use of the method helped to ensure that the questionnaire reached the knowledge workers described earlier. Through purposive sampling, the abovementioned positions were identified in the respective organisations and then replicated at each level for the various companies.

Snowball sampling was also used when a respondent identified other potential respondents who could be targeted. So in some instances, management contacts in the various companies were used as key informants to identify potential candidates who could be targeted and be given a questionnaire or be

interviewed. This ensured adequate distribution of the questionnaire and interviews in the targeted levels that were meant to be replicated.

However, the major limitation of non-probability sampling technique as pointed out by Saunders *et al*, 2007:207 is that although it is easier and much cheaper to use, it is often difficult to state the probability of each case being selected from the total population or of a specific element of the population being represented in the sample (Powell & Silipigni, 2004; Saunders *et al*, 2007). The other limitation is that in non-probability sampling, the units of analysis in the population do not have an equal chance of being included in the sample (Fox & Bayat, 2007:58). Furthermore, with the use of the non-probability sampling method, the temptations for generalizing the findings of the study needs to be resisted.

#### **4.5.2 Sample size**

In quantitative studies, the larger the sample size the better, is the rule of thumb when determining the sample size (Babbie, 2001). Of note is that an unnecessarily large sample in this case of an exploratory study may be expensive and time consuming. Qualitative samples are often small in size. For qualitative studies, what is critical is the depth, richness and complexity of the data as there is no formula that provides the correct sample size. One method in qualitative studies suggested by Powell and Silipigni, (2004) is to gather data until critical elements of the study are saturated.

In other knowledge management studies, the samples were composed of around 150-400 respondents (Wong & Aspinwall, 2005:67; Eftekhazadeh, 2008:50). In order for a sample to be effective, the maximum likelihood estimation (MLE) proposes the number of respondents to be between 100 and 150 (Wong & Aspinwall, 2005). Taking into account all the above considerations, this study has aimed at achieving a sample of about 200.

The ten construction and engineering companies listed on the JSE at the time of the study were all included in this survey. All the construction and engineering companies listed on the JSE at the time of the study made up the total population from which the sample was drawn, making it a census. This decision was reached taking into account that the unit of analysis for the study was the organisation.

However, the company's operations are scattered throughout the country and some have their head-offices in Johannesburg. Some of the details per company from which the sample will be drawn are as per Table 4.1. Due to time and cost constraints, the focus was on the Gauteng operations that were accessible. To uphold anonymity and confidentiality, the names of the participating organisations are not shown but are represented by alphabetical letters ranging from A to J.

**Table 4.1: JSE Construction and Engineering Companies details** (Source: 2007-2012 Company annual reports).

	No. of Issued Shares (Millions)	Share price – 2008 (R)	Share price – 2012 (R)	Share Price change (%)	Market Capitalisation (2012) ('000)	Earnings per Share (cents)	Change in Revenue (%)
Company E	111,1	0.50	0.77	54%	85,547	0.09	8%
Company A	395,3	2.68	0.42	-84%	166,026	-0.39	50%
Company H	389,8	5800	3580	-38%	1,395,484,000	0.33	-78%
Company B	131,7	24.75	12.16	-51%	1,601,472	- 130.84	94%
Company F	395,2	1.21	2.37	96%	936,624	0.05	80%



Company G	96,5	45.11	25.97	-42%	2,506,105	116	-13%
Company I	70,4	25.50	65	155%	4,576,000	698	68%
Company C	444,7	90	20	-78%	8,894,000	-246	52%
Company D	184,5	39	12	-93%	1,951,200	177,2	135 %
Company J	66	11050	12429	13%	820,314,000	1166,7	64%

#### 4.6 DATA COLLECTION

Lewis, (2003:56-57) suggests the following guidelines in order to get to a suitable choice of data collection method for a proposed study:

- Establish if the required data already exists.
- Ascertain how best the research objectives can be met, e.g. by interviewing the participants or observing their behaviour.
- Determine if conducting interviews will be sufficiently detailed, accurate and complete.
- Verify whose interpretation is important between that of the researcher and the participant.

The main method of data collection in this study is questionnaires which are complemented by semi-structured interviews on the key informants (data triangulation). The combination of these two instruments will enable the weaknesses of one method to be moderated by the strengths of the other. Questionnaires and interviews were used in the collection and validation of the empirical data in order to explore the role that knowledge management plays in organisational performance.

A total of 50 questionnaires per company were distributed to the targeted JSE listed construction and engineering companies. A cover letter was also included with the questionnaire during distribution, which explained the purpose of the research to the respondents. An average of 2 face-to-face

interviews were also conducted per company, mostly with the initial contact person and/or other employees close to the contact person. For instance, the initial contact was mostly the Site Manager and this position was accountable and responsible for all the activities at a construction site. The site manager was responsible for activities by all workers and contractors such as architects, quantity surveyors, structural and civil engineers, mechanical engineers, electrical engineers and site safety among others. The Site Manager would then refer the researcher to the Site Engineer, for example, as the second respondent.

This was in line with the initial survey plan of having data sources as the overseers of the various departments within the selected organisations and those considered to be the thought leaders. The other employees as potential participants had to be knowledge workers in the respective construction and engineering organisations that were targeted. The interviews were conducted as guided by the interview protocol.

Babbie, (2001) contends that the greatest advantage of face-to-face interviews is that they afford flexibility. The interviewer is able to assess attitudes and opinions more readily. Verbal and non-verbal behaviour can also be observed during the interview and recorded. An important feature of interviews is that the interviewer is able to keep the respondents interested and responsive until the end of the interviews (Squier & Snyman 2007). To that end, notes were made during the interviews. Some of the interviews were conducted at the construction sites and these proved to be very informative as the interviewer readily saw some of the organisational designs and arrangements.

#### **4.6.1 The questionnaire**

Knowledge management, in this study, is being considered in the context of its ability to influence business success. Ali and Ahmad (2006) contend that people, technology and organisational design perspectives are important

elements that contribute to knowledge processes, and the essence of knowledge management is to manage these elements for organisational effectiveness. As already alluded to, the three main knowledge management practices are knowledge acquisition, knowledge dissemination and responsiveness to knowledge; and this needs to be considered in questionnaire construction. It is from this background that the survey instrument for knowledge management that was originally developed and tested by Darroch (2003; 2005) was adopted for this research but with modifications. The modifications include another section on organisational performance being added to the instrument so as to gauge the relationship of knowledge management to business success. From the four components of the research instrument (Appendix A), fourteen survey items relate to knowledge acquisition, fifteen survey items relate to knowledge dissemination, thirteen items relate to knowledge responsiveness and seven items relate to organisational performance. These knowledge management components' sections are preceded by a section on the profile of the respondent. A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was adopted, with a 'neutral' middle point which is essential in scales where respondents may not have an opinion (Likert, 2007; Chung Ho Yu, 2008; Dawes, 2008).

The questionnaire was pilot-tested before its distribution using two unlisted construction and engineering firms namely, G.D. Irons Construction and Iguana Construction. This was to assess the comprehension of the questions and time commitment, among others. Cooper and Schindler (2003:390) contend that participant pre-tests be conducted on a sample of participant surrogates. This would entail interviewing individuals with characteristics and backgrounds similar to the desired participants. Thus the pilot study validates the research method and provides a trial run for the questionnaire whereby the wording of the questions would be tested. It also enhances the structure and the interviewing skills of the researcher over and above the development of a preliminary protocol for analysing interviews.

The questions are structured in two different ways. Firstly, there are questions with a check list of items where the participant will respond either by indicating 'yes' or 'no' depending on their applicable answer or just choosing the appropriate option on the given variables. The second category of questions are closed questions that seek to establish the opinion, experiences, views and feelings towards knowledge management and enabling factors.

The advantages for using questionnaires as a survey instrument are that it facilitates wider geographic contact; constraints emanating from logistics, practicality and time are averted; it maintains anonymity and ensures uniformity of measurement from one unit of measurement to another and hence also enhancing reliability. The quantitative data obtained from closed-ended questions is appropriate in assessing the behavioural and descriptive components and, therefore, presents an opportunity for the respondent to provide frank and unstructured answers that enhance reliability (Babbie, 2001; Powell & Silipigni, 2004).

#### **4.6.2 Semi-structured interviews**

The aim of qualitative interviews is for the researcher to gain insight into the realities and subjective meanings respondents attach to phenomenon under research. Thus interviews can provide the researcher with in-depth information that is very descriptive and that enables greater insights into participants' subjective realities (Nieuwenhuis, 2007:87). Ritchie, (2003:36) concurs and adds that in-depth interviews provide undiluted focus on the individual and also provide the opportunity for a detailed investigation for comprehensive understanding of the personal context within which the research phenomena are located.

Therefore, the semi-structured interviews conducted in the study are aimed at establishing a conversational partnership between the researcher and the respondent, providing the opportunity for the researcher to follow up on issues

raised by the respondents thus enabling the acquisition of additional information not probed in the questionnaire.

Semi-structured interviews do have their own limitations. Kumar (2005:131-132) identify the following disadvantages of semi-structured interviews:

- The quality of data cannot be standardised as it depends on the quality of interaction between the interviewer and the interviewee.
- Interviewing can be time consuming.
- There is a possibility that the framing of questions and interpretation of responses may be impinged on by the researcher bias.
- The skills and experience of the interviewer may be reflected in the quality of data.

Considering that architects and engineers in the construction industry are often under time constraints and it is sometimes difficult to get them to settle down so as to complete a questionnaire, interactive discussions from semi-structured interviews offered a more substantive input for this study. It also would increase the response rate, and that's why it was chosen for this research.

#### **4.6.3 Data collection procedure**

The administration of the data collection progressed in two simultaneous phases. The first phase involved the distribution and collection of questionnaires. The second phase entailed face-to-face semi-structured interviews with the contact persons in the target companies and some knowledge workers who were accessible as advised by the contact persons.

Some questionnaires were delivered, and the researcher also conducted interviews with the aid of a semi-structured interview guide (Appendix D). Whilst designing the guide, it was determined that two separate documents would assist the researcher; the interview guide specifically for the

interviewees designed at a high level detailing the topics to be discussed at the interview (see Appendix D) and the questionnaire used as a guide by the researcher which provided more detail on the questions to be asked under the topics for discussion (see Appendix A). The researcher perceived that such a complimentary process would ensure that the interview would be much focussed and that the interviewer is positioned to guide this process.

The distribution and collection of the questionnaires and the interviews took place over a period of about three months. Reminders were sent out fortnightly either through e-mail or by telephone.

## **4.7 DATA ANALYSIS**

The main purpose of the data analysis method used will be to get a summation of the observations in a manner that would provide answers to the research questions. On the main, quantitative data analysis will be the major analysis to be carried out and will be complemented by qualitative analysis on the interviews to be carried out. Factor analysis will be used to analyse quantitative data.

### **4.7.1 Factor Analysis**

The factor analysis technique will be used to analyse the data. Factor analysis is a statistical procedure developed for the purpose of analysing the inter-correlations within a set of variables (Powell & Silipigni, 2004). These relationships are represented by weighted linear combinations known as factor scores or variates, which are in turn used in the development of constructs or theories. Thus, factor analysis can be used to explore the data for patterns, confirm hypothesis or reduce many variables to a more manageable number. Factor analysis is divided into a number of different techniques and each technique is appropriate for a specific type of investigation.

Exploratory factor analysis (EFA) is used to explore the dimensionality of a measurement instrument by finding the smallest number of interpretable factors needed to explain the correlations among a set of variables. It is exploratory in that it places no structure on the linear relationships between the observed variables, but only specifies the number of latent variables. Latent variables are unobserved, underlying variables.

Confirmatory factor analysis (CFA) is used to study how well a hypothesised factor model fits a new sample from the same population or a sample from a different population. This is characterised by allowing restrictions on the parameters of the model.

Some of the common uses for factor analysis proposed by Garrett-Mayer (2006) include:

- Investigating patterns of variable relationships
- Reducing data
- Analysing the structure of a phenomenon
- Classifying or describing individuals, groups or variables
- Developing of measurement scales
- Testing hypothesis or research questions
- Making preliminary investigations in new areas of research
- Developing theories.

#### **4.7.2 Steps in Factor Analysis**

The steps that will be followed for this study, using a typical factor analysis procedure; begin with:

- 1) The collection and exploration of data. The choice of variables is already done at this stage.
- 2) This will be followed by the extraction of initial factors via principal components.

- 3) The choice of the number of factors to retain will be made.
- 4) Choice of estimation method and then estimate the model.
- 5) Rotate factors and interpret.
- 6) Decide if changes need to be made, such as dropping items or including items, and then repeat (4) and (5).
- 7) Construct scales and use in further analysis.

Because of the complexity of many of these methods, much of these multivariate statistics will be handled and done in conjunction with the University of Pretoria's Statistics Department.

Factor analysis is totally dependent on correlations between variables and summarises the correlation structure. Correlations between variables, measured on the same scale, will be high or low. High would represent good and low bad. When the quantifiable variables have been transformed via a computer, they will result in a correlation factor matrix with rows and columns.

- Columns will represent the derived factors
- Rows represent input variables
- Loadings characterise the degree to which each of the variables correlates with each of the factors
- Loadings would normally range from -1 to 1
- An inspection of the factor loadings would show the extent to which each of the variables contributes to the meaning of each of the factors
- High loadings do provide meaning and interpretation of the factors.

(Gareth-Mayer, 2006)

In this study, factor analysis will be used in the investigation of intercorrelations between knowledge management, knowledge management factors and organisational performance. It will also be used to confirm the hypothesis that there is a relationship between knowledge management and organisational performance. Explorations into the patterns and strength of the relationships, if any, will also be carried out.



### 4.7.3 Principal components

Principal components method will be employed in determining the number of factors that explain the correlations among the variables. Factoring a matrix consists of extracting eigenvectors and their associated eigenvalues. Eigenvectors are factor loadings or numerical values from -1 to +1 indicating the amount of contribution each variable makes towards defining a factor. A loading is a quantified relationship – the farther its value is away from zero, the more relevant the variable is to the factor. Eigenvalues from the principal components analysis will be considered in selecting how many factors to use. Eigenvalues are normally interpreted as pointing to the: (1) equivalent number of variables which the factor represents, or (2) the amount of variance in the data described by the factor. One common procedure is to interpret only those factors with eigenvalues greater than 1.00. The scree plot of the principal components will also be presented.

### 4.7.4 Grouped t - tests

In research, when two groups of subjects are tested: one group receives some type of treatment and the other serves as the control. After treatment is administered, both groups are tested and the results are compared to determine if there is a statistically significant difference between the groups. This is to say did the treatment have an effect on the results of the test. In such instances, the mean score for each group is compared through the use of a t-test (Powell & Silipigni, 2004).

A variety of t-test alternatives are available depending on the problem under consideration and the situation of a particular research study. Variations of the t-test are available for testing independent groups, related groups and situations where the population mean is either known or unknown (Saunders *et al*, 2007). The t-test assumes that the variables in the populations from which

the samples are drawn are normally distributed. The test also assumes that the populations have homogeneity of variance, i.e. they deviate equally from the mean.

In this study, grouped t-tests will be carried out for data analysis to test for relatedness of groups/organisations or independence of the groups in terms of their performance using the population mean (Gareth-Mayer, 2006).

#### **4.7.5 The General Linear Model Procedure/Analysis of Variance (ANOVA)**

The purpose of analysis of variance (ANOVA) will be to test for significant differences between two or more group means. The  $t$ -test is the most elementary method for comparing two groups' mean scores. However, in instances where researchers must investigate differences between more than two groups of subjects, measure the effects of different degrees or levels of an independent variable, a  $t$ -test in these instances would not be adequate. Saunders *et al*, 2012 advocate the ANOVA and argue that ANOVA is an extension of the  $t$ -test and that it analyses the variance, i.e. the spread of data values, within and between groups of data by comparing means. The  $F$  ratio or  $F$  statistic represents these differences. If the likelihood of any difference between groups occurring by chance alone is low, this will be represented by a large  $F$  ratio with a probability of less than 0.05. This is termed statistically significant.

According to Dancey and Reidy (2008), the ANOVA model assumes four things:

- that the data for each group are normally distributed
- that variances for each group are equal or the data for each group have the same variance
- that the subjects are randomly selected from the population

- that the scores are statistically independent, they have no concomitant relationship with any other variable or score.

#### **4.7.6 Qualitative analysis**

Qualitative data derived from the interviews will be subjected to content analysis. Content analysis is a systematic qualitative analysis of the occurrence of words, phrases and concepts (Easterby-Smith, Thorpe and Lowe, 2002). Qualitative data analysis consists of concurrent, interactive and cyclical flow of activity known as data reduction (process of selecting, focussing, simplifying, abstracting and transforming data in written-up field notes or transcriptions), data display and conclusion drawing and verification (Powell & Silipigni, 2004).

Qualitative data may be analysed by pattern matching, explanation building or by time series analysis (Amaratunga, Baldry, Sarsha, & Newton, 2002). The pattern matching logic technique was adopted for analysing qualitative data. The method uses a priori theory for analysis by enabling a comparison between empirically-based patterns with the predicted pattern. If similar results occur the evidence is said to describe the same phenomenon and it is known as literal replication, and if on the other hand the qualitative analysis produces different results from the theory, it is known as theoretical replication. This has the advantage of controlling deviations that occur in the analysis of qualitative and quantitative data (Powell & Silipigni, 2004).

### **4.8 ASSESSING AND DEMONSTRATING THE QUALITY AND RIGOUR OF THE PROPOSED RESEARCH DESIGN**

Reducing the possibility of getting the wrong answers to the research means that attention has to be paid to two particular emphases on the research design: reliability and validity (Saunders *et al*, 2007).

#### 4.8.1 Validity and reliability

Saunders *et al*, (2007:150) posit that “validity is concerned with whether the findings are really about what they appear to be about.” Research is said to be valid when conclusions are true. On the other hand, reliability refers to the extent to which a test or analysis procedure produces consistent findings under constant conditions on all occasions (Powell & Silipigni, 2004; Saunders *et al*, 2007:149). Therefore, reliability is in essence repeatability.

Validity differs within the context of quantitative and qualitative research methodology. In the quantitative technique, the measure of validity is often considered within internal validity, external validity or construct validity (Yin 1994; Powell & Silipigni, 2004). Internal validity considers whether what has been identified as the cause actually produces what has been interpreted as the effect or response. Effectively, it checks whether the correct relationship has been established, thus the way results support conclusions. External validity is the extent to which research findings can be generalised beyond the immediate research sample or setting in which the research was conducted.

Construct validity is a measure of the extent to which an instrument measures the construct or concept it intends to measure. The questionnaire was modified taking into account suggestions from the supervisor. Further expert advice was sought from the Statistics Department to make sure that the research instrument collected the required information, including its structure and general presentation. The questionnaire was pilot-tested before its distribution using two unlisted construction and engineering firms, after which it was critically reviewed to ensure that there is some congruence and complementarities amongst the questions in the questionnaire.

A common reliability coefficient, the Cronbach’s alpha, will be used for this study. It uses the analysis of variance approach to assess the general

reliability of a measure. Saunders *et al* (2012) characterise the Cronbach's alpha as a statistic used to measure the consistency of responses across a set of questions (scale items) designed to measure a particular concept together (scale). It consists of an alpha coefficient with a value between 0 and 1. Values of 0.7 and above suggest that the questions in the scale are measuring the same thing.

Qualitative researchers on the other hand developed the following criteria so as to ensure trustworthiness in qualitative studies; credibility (in place of internal validity), transferability (in place of external validity and generalizability), dependability (in place of reliability) and conformability (in place of objectivity), (Easterby-Smith, *et al*, 2003).

#### **4.8.2 Strategies for overcoming data quality issues**

Strategies that can be employed to ensure that data meets the abovementioned criteria, and is hence trustworthy in qualitative studies are triangulation, interactive questioning using probes, rephrasing of questions to test honesty from the respondent, the promoter and researcher having an opportunity to scrutinise the instrument, student and promoter having frequent debriefing sessions so as to broaden the researcher's horizon, an in-depth methodological description provided in the study, and studying previous findings (Shenton, 2004). Since this study will adopt the quantitative and qualitative research methods, the above measures were considered in this study so as to ensure the internal and external validity of quantitative data and also the credibility, transferability, dependability and conformability of the qualitative data.

#### **4.9 RESEARCH ETHICS**

The study was guided by the provisions of the University of Pretoria's research ethics policy. The policy clearly states that research staff, students and

research collaborators of the University should at all times meet the legal requirements and should comply with the research ethical rules applicable within the University, Faculty and/or discipline.

The importance of observing the necessary ethical principles when dealing with human subjects has been emphasised by social science researchers (Powell & Silipigni, 2004; Saunders *et al*, 2007:188-194). The different ethical issues that were observed in this research are detailed below:

- Informed consent – Participants were informed and assured that they are under no obligation to complete the questionnaire and, therefore, participation is purely voluntary. Appendix B contains a draft of the informed consent form that was used in the study.
- Confidentiality and anonymity – The identities and names of the participants were kept secret at all times.
- Negotiating access – Involves observing the organisation’s hierarchy in the process of getting clearance. To this end, the researcher provided the requisite information about the study in terms of the objectives, purpose and why the particular setting was chosen. More so, the envisaged number of visits and range of respondents to be visited was confirmed.
- No incentive – No incentive was offered to respondents, financial or otherwise.

From The University of Pretoria (UP) perspective, the researcher had to apply for ethical clearance through the UP Ethics Clearance Committee. The approval system entailed the lodging of an application with the following documents making up the checklist of appendices:

- Approved Title Registration form
- Research proposal

- Data collection instruments (only conditional approval will be granted if survey questionnaire or interview schedule or observation guide, etc. are not yet finalised)
- Letter of Introduction
- Letter of Permission
- Letter of Informed consent

#### **4.10 CHAPTER SUMMARY**

This chapter presented the methodological framework for this investigation. It began with discussions on the philosophical underpinnings governing the different research methods. The research philosophies to be used for the study were presented as positivism and interpretivism. An analysis of the two paradigms followed, so as to establish and appreciate their differences. The notable philosophical difference between the positivist and the interpretivist is that whilst the positivist relies on the quantitative research method, the interpretivist school of thought uses the qualitative approach. The use of both philosophies was a reflection of the stance of realism by the researcher as advocated by Saunders *et al*, (2007:116) that business and management research is frequently a mixture between positivism and interpretivism.

This was followed by a consideration of the different research methods and research design chosen for this study. The strategy of inquiry employed in this study is the survey method. Survey research was defined as a quantitative study that aims to provide a broad overview of a representative sample of a large population (Mouton, 2001:152).

The target population was identified, followed by a discussion of the different data collection instruments. The target population for the proposed study consists of organisations operating in the construction and engineering sector within South Africa. Ten construction and engineering firms listed on the JSE were selected for the survey. The selected construction and engineering firms

were already listed on the JSE as of the 20<sup>th</sup> October 2013. A brief description and background information of the selected companies was also given. The unit of analysis was given as the surveyed organisations and sample units being the individuals in the various organisations.

Data sources were the overseers of various departments within the selected organisations and those considered to be the thought leaders. The potential participants would be knowledge workers in the respective construction and engineering organisations that were targeted.

Two basic types of sampling designs that are generally used were identified as non-probability sampling and probability sampling. Purposive-sampling, being a non-probability sampling technique, was presented as the one being proposed for this study. The study aimed at achieving a sample size of about 200 participants. A total of 50 questionnaires per company were distributed to the targeted JSE listed construction and engineering companies. A cover letter was also included with the questionnaire during distribution, which explained the purpose of the research to the respondents. An average of 2 face-to-face interviews was conducted per company, mostly with the initial contact person and/or other employees close to the contact person. The method for data collection is a combination (data triangulation) of questionnaires and semi-structured interviews.

The survey instrument for knowledge management that was originally developed and tested by Darroch (2003; 2005) was adopted for this research but with modifications. The three main knowledge management processes and practices which are knowledge acquisition, knowledge dissemination and responsiveness to knowledge were taken into consideration during questionnaire construction. The modifications included adding another section on organisational performance to the instrument so as to gauge the relationship of knowledge management to business success. The questionnaire was pilot-tested, before its distribution, using two unlisted construction and engineering firms.



This was to assess the comprehension of the questions and time commitment among others. The questions are structured in two different ways. Firstly there are questions with a check list of items where the participant will respond either by indicating 'yes' or 'no' depending on their applicable answer or just choosing the appropriate option on the given variables. The second category of questions are closed questions that seek to establish the opinion, experiences, views and feelings towards knowledge management and enabling factors.

The administration of the data collection progressed in two simultaneous phases. The first phase involved the distribution and collection of questionnaires. The second phase entailed face-to-face semi-structured interviews with the contact persons/key informants in the target companies and some knowledge workers who were accessible as referred by the contact persons.

The factor analysis technique was used to analyse the data. Factor analysis is a statistical procedure developed for the purpose of analysing the inter-correlations within a set of variables (Powell & Silipigni, 2004). These relationships are represented by weighted linear combinations known as factor scores or variates, which are in turn used in the development of constructs or theories. Thus, factor analysis can be used to explore the data for patterns, confirm hypothesis or reduce many variables to a more manageable number. Factor analysis is divided into a number of different techniques and each technique is appropriate for a specific type of investigation.

These are described as exploratory factor analysis (EFA), which is used to explore the dimensionality of a measurement instrument by finding the smallest number of interpretable factors needed to explain the correlations among a set of variables. The second one, confirmatory factor analysis (CFA), is used to study how well a hypothesised factor model fits a new sample from the same population or a sample from a different population.

Factor analysis is totally dependent on correlations between variables and summarises the correlation structure. Correlations between variables, measured on the same scale, will be high or low. High would represent good and low bad.

The principal components method was employed in determining the number of factors that explain the correlations among the variables. Factoring a matrix consisted of extracting eigenvectors and their associated eigenvalues. Eigenvectors are factor loadings or numerical values from -1 to +1 indicating the amount of contribution each variable makes towards defining a factor. A loading is a quantified relationship – the farther its value is away from zero, the more relevant the variable is to the factor. Eigenvalues from the principal components analysis were considered in selecting how many factors to use.

The purpose of analysis of variance (ANOVA) was to test for significant differences between two or more group means. The *t*-test is the most elementary method for comparing two groups' mean scores. However, in instances where researchers must investigate differences between more than two groups of subjects, measure the effects of different degrees or levels of an independent variable, a *t*-test in these instances would not be adequate. Saunders *et al* (2012) advocate for the ANOVA and argue that ANOVA is an extension of the *t*-test and that it analyses the variance, i.e. the spread of data values within and between groups of data by comparing means. The *F* ratio or *F* statistic represents these differences. If the likelihood of any difference between groups occurring by chance alone is low, this will be represented by a large *F* ratio with a probability of less than 0.05. This is termed statistically significant.

The chapter ends with the techniques of analysis and validation of the empirical data. Saunders *et al* (2007:150) suggest that validity is concerned with whether the findings are really about what they appear to be about. Research is said to be valid when conclusions are true. On the other hand, reliability refers to the extent to which a test or analysis procedure produces

consistent findings under constant conditions on all occasions (Powell & Silipigni, 2004; Saunders *et al*, 2007:149). Therefore, reliability is in essence repeatability. A common reliability coefficient, the Cronbach's alpha, was used for this study. It uses the analysis of variance approach to assess the general reliability of a measure. Saunders *et al* (2012) characterise the Cronbach's alpha as a statistic used to measure the consistency of responses across a set of questions (scale items) designed to measure a particular concept together (scale). It consists of an alpha coefficient with a value between 0 and 1. Values of 0.7 and above suggest that the questions in the scale are measuring the same thing.

The importance of observing the necessary ethical principles when dealing with human subjects was also emphasised. The different ethical issues were observed in the research.

## **CHAPTER 5**

### **PRESENTATION OF RESULTS**

#### **5.1 INTRODUCTION**

The purpose of this chapter is to present the empirical data that has been collected from the questionnaires. This is done in pursuance of exploring the role that knowledge management plays in organisational performance. The quantitative data from the questionnaires was carefully recorded, analysed and utilised. All captured data was digitalised through keyboard entry. This was done in conjunction with the University of Pretoria's Statistics Department. The data was checked for entering and capturing errors. Checks also included frequencies, checks for missing values and checks for range of values.

After the verification process had been complete, all collected data was prepared for tabular and graphic presentation, analysis and interpretation. Out of the 500 questionnaires distributed to the variously listed construction and engineering companies, 191 completed questionnaires were returned, yielding a return rate of 38,2%. Of these, 130 questionnaires were used representing 26%. This is comparable to previous surveys carried out in the knowledge management field and in South Africa, i.e. Wong and Aspinwall (2005)–19.1%, Tobin and Volavsek (2006) – 25%, Tobin and Magenuka (2007) - 39%. Semi-structured interviews were conducted with twenty respondents from the different companies, especially at the point of contact with key informants.

All the quantitative data was coded for analysis. For the qualitative data, codes were produced deductively and then included as descriptive information about the data. Therefore, the researcher had to identify which codes are used most

and that might be the most important concepts for the interviewee. This is to say what concepts (represented through codes) are discussed most.

The data collection instrument was designed to answer the following research questions:

- Is there a relationship between knowledge management and organisational performance?
- What particular factors enable knowledge management in an organisation?
- What are the relationships, if any, between the identified factors and organisational performance indicators like earnings per share, revenue growth and share price growth?
- What systems are in place for South African firms that support knowledge management?

The questionnaire (Appendix A) consisted of six sections, namely:

- Personal profile
- Knowledge management practices
- Knowledge acquisition
- Knowledge dissemination
- Responsiveness to knowledge
- Organisational performance component.

The results presentations follow through the same sequence of the questionnaire. The personal profile section is made up of four questions whilst the knowledge management practices section has eleven questions. Fourteen survey items refer to knowledge acquisition, fifteen survey items refer to knowledge dissemination, thirteen items refer to responsiveness to knowledge and seven items refer to organisational performance. A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was adopted, with a 'neutral' middle point where respondents may not have an opinion.

The presentation that follows consists of descriptive statistics used for each question. These descriptive statistics involve arranging, summarising and presenting the data in such a way that the essential meaning of the data can be extracted so as to be easily interpreted.

For every section, the quantitative analysis forms the major part of the analysis and is complimented by a section of qualitative analysis as alluded to in earlier discussions. Therefore, the quantitative analysis is done first followed by the qualitative analysis.

The statistical analysis is in two main parts, with the first part being concerned with establishing the basic statistical measures of the response variables for every question covering aspects that pertain to knowledge management. The second part is concerned with the testing of relationships between certain model variables.

For the qualitative analysis, the data excerpts collected were used for the analysis using content analysis. Through the content analysis, the researcher wanted to establish what concepts (represented through codes) are discussed most.

To uphold anonymity and confidentiality, the names of the participating organisations are not shown but are represented by alphabetical letters. The alphabet assigned to each company is of no significance in itself.

## **5.2 PERSONAL PROFILE**

This section presents information on the educational background of the respondents including their length of service within their company and industry respectively. The first question in this section inquired of the respondents' level of education. The frequency distribution of the respondents as to their level of education revealed an almost equal split between those with a bachelors

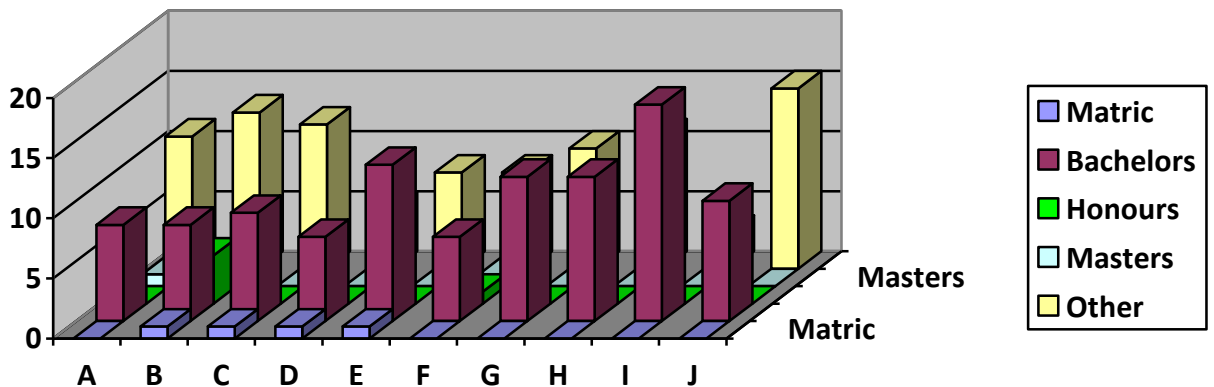
degree 104(49%) and those in the other category 96(45.5%), whilst 5 (0.3%) of the respondents had an honours degree, 2 (0.009%) had a masters degree (Table 5.1) and 4 (0.02%) had a matriculation qualification.

The 'other' professional qualifications that the respondents had 96(45.5%), were mainly diplomas and higher national diplomas in various fields required in the construction and engineering sector.

**Table 5.1: Respondents dispersion per company**

<b>Company</b>	<b>Total no. of respondents</b>	<b>Matric</b>	<b>Bachelors</b>	<b>Honours</b>	<b>Masters</b>	<b>Other</b>
<b>A</b>	20	0	8	0	1	11
<b>B</b>	26	1	8	4	0	13
<b>C</b>	22	1	9	0	0	12
<b>D</b>	13	1	7	0	0	5
<b>E</b>	22	1	13	0	0	8
<b>F</b>	17	0	7	1	1	8
<b>G</b>	22	0	12	0	0	10
<b>H</b>	23	0	12	0	0	11
<b>I</b>	21	0	18	0	0	3
<b>J</b>	25	0	10	0	0	15

The occurrence of these qualifications in the various surveyed companies is as per Figure 5.1. Company I has the most respondents with bachelors degree qualifications (17.3%), followed by companies E(12.5%), G(11.5%) and H(11.5%). Respondents from companies D and A had the least bachelor's degrees, 6.7% and 7.6% respectively.



**Figure 5.1: Level of education per company**

The purpose of the second question in the personal profile section was to establish how long the respondents had been with the current organisation they are working for. The length of service of the respondents ranges from 1 year to 9 years. However most of them are within the 1 year to 6 years range. The length of service of all the respondents is represented as follows: 18(9.4%) have been with their organisations for up to a year, 42(22%) for 2 years, 40(20.9%) for 3 years, 35(18.3%) for 4 years, 23(12%) for 5 years, 16(8.4%) for 6 years, 7(3.7%) for 7 years, 6(3.1%) for 8 years, 1(0.5%) for 9 years and 3(1.6%) for 10 years.

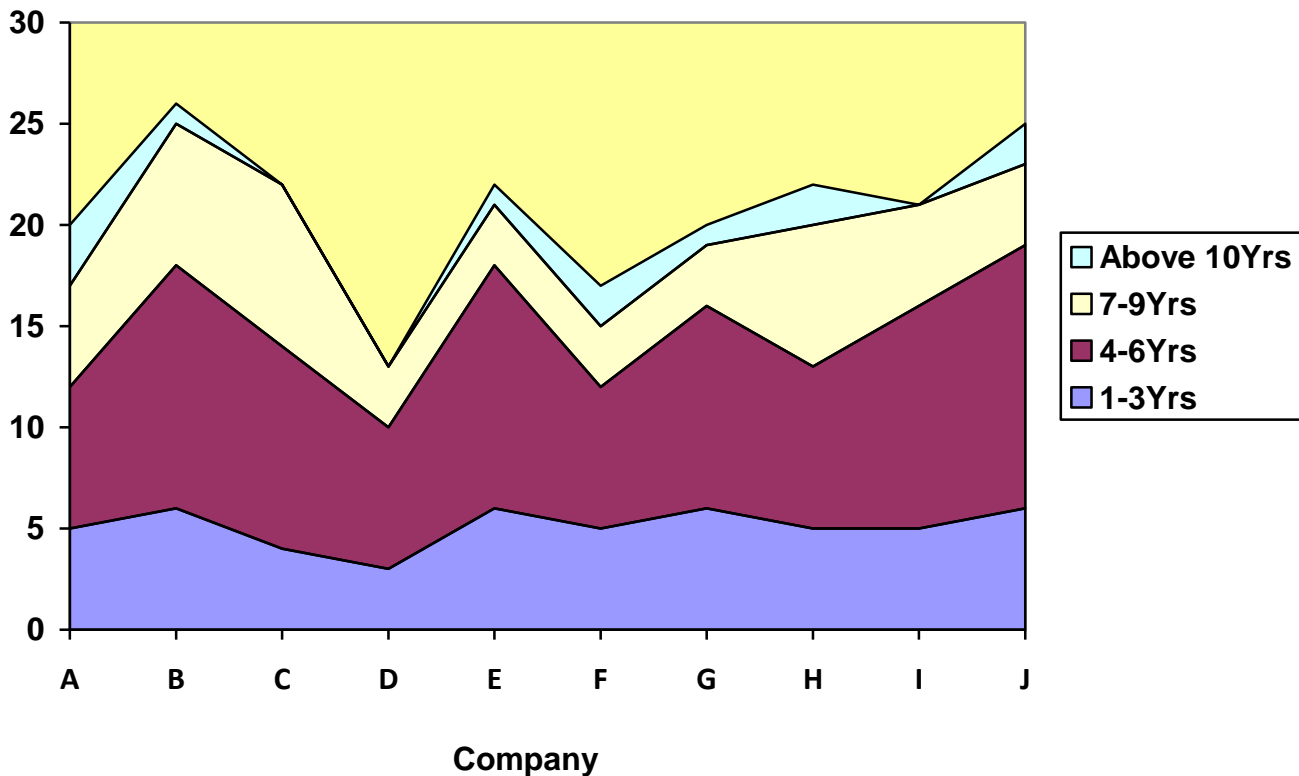
The respondents overall experience in the construction and engineering sector is the focus of question 4. This includes the time they spent at other companies in the same sector before they joined the current organisation in order to establish the participants experience in the duties they are performing. The length of time spent by the surveyed employees in the construction sector is as per Figure 5.2.

The spectrum of the number of years respondents have spent in the construction and engineering industry is as follows; 3 (1.6%) left the question blank, 5(2.6%) have worked in this industry for a year, 11(5.8%) for 2 years,



20(10.5%) for 3 years, 38(20%) for 4 years, 34(17.8%) for 5 years, 25(13.1%) for 6 years, 25(13.1) also for 7 years, 10(5.2%) for 8 years, 8(4.2%) for 9 years, 9(4.7%) for 10 years and 3(1.6%) for 12 years.

**Frequency**



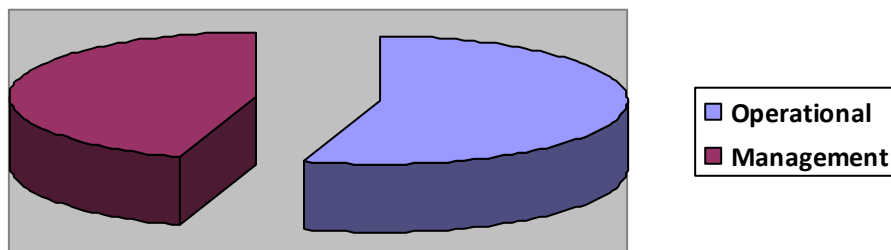
**Figure 5.2: Number of years in the construction and engineering industry**

Further probing during the interviews on what were the causes for staff mobility in the construction and engineering sector in South Africa, issues such as the lack of incentives to remain in the same organisation and a lack of career development plans were mentioned. This question was prompted by the rarity of respondents who had been in the same organisation for ten years and above as established from the quantitative questionnaires. The qualitative issues are summarised in Table 5.1.1.

**Table 5.1.1: Personal profile qualitative findings**

Company	Respondent number	Issues raised	Summary
A	1	No incentives to remain in the company	Length of service in the construction and engineering sector mostly below 10 years. The impact of this could filter into the firm's performance as most knowledgeable and experienced employees would have moved on in the course of staff mobility and retirements.
B	2	Lack of career development plans	
C	2	High staff mobility and retirements	

Question 3 sought to profile the participants according to their levels on the organogram in their various organisational structures. Although three options had been provided, two dominant groups emerged, namely: 55%(105) of them were working at an operational level whilst 45%(86) were in management positions.



**Figure 5.3: Management level of respondents**

### 5.3 VALIDATION OF KNOWLEDGE MANAGEMENT SCALES

Testing for reliability of the knowledge management scales is important and to this end, reliability and validity tests were carried out. The calculated reliability of a scale, construct or factor examines its internal consistency in measuring a concept; in particular whether or not it will produce consistent findings. The Cronbach's alpha is a commonly used test of internal reliability. The Cronbach's alpha is reflective of the consistency between different items in a scale in measuring the same attribute (Wong & Aspinwall, 2005).

It also indicates the extent to which items/elements within a scale are correlated or homogenous. Generally, Cronbach's alpha coefficients greater than 0.7 are regarded as indicating that the questions combined in the scale are measuring the same thing (Saunders *et al*, 2012; Wong & Aspinwall, 2005). Table 5.2 summarises the reliability analysis for each scale.

<b>Table 5.2: Results of reliability analysis – Cronbach's coefficient alpha</b>				
Factors (scales)	No. of items	Raw alpha value	Item deleted	Standardised alpha value
KM Practices	9	0.839421	V11	0.833885
Knowledge Acquisition	14	0.907822	V25	0.898226
Knowledge Dissemination	15	0.92581	V37	0.91768
Responsiveness to knowledge	13	0.915519	V54	0.905934
Organisational performance (subjective)	7	0.950784	-	0.951231

The coefficient alphas ranged from 0.797508 to 0.931057 and were all in order. However, certain items were taken out, particularly those that were out of place when it came to correlation with the total as they distorted the consistency. For example item v25, 'encouraged to undertake courses', correlated negatively with the total whilst the other ones (v11-colleagues benefit from my experience, v37- often use teleconferencing and v54-frequently change marketing strategies) had low correlation with the total and looked totally out of place compared to other questions within the same scale. The resultant range of standardised alpha values provides evidence that all the scale items have high internal consistency and are, therefore, reliable.

## **5.4 SCALE DEVELOPMENT AND DISCUSSION**

In order to have a measure of the knowledge management performance of the surveyed companies, knowledge management scales were developed. The scales were drawn from the components of the knowledge management assessment questionnaire (Appendix A). These are knowledge management practice (KMP), knowledge acquisition (KAC), knowledge dissemination (KDI) and responsiveness to knowledge (RTK). The scales are described in turn below.

### **5.4.1 Knowledge management practices (KMP)**

Questions V5 to V15 were aimed at organisational policy and practice when it comes to knowledge management. This was to establish the presence or absence of a knowledge management policy as well as the recruitment practices of the companies in terms of the recognition of the importance of theoretical knowledge, professional experience and personal business networking vis-à-vis job skills requirements. This forms the intangible knowledge capital of the employees.

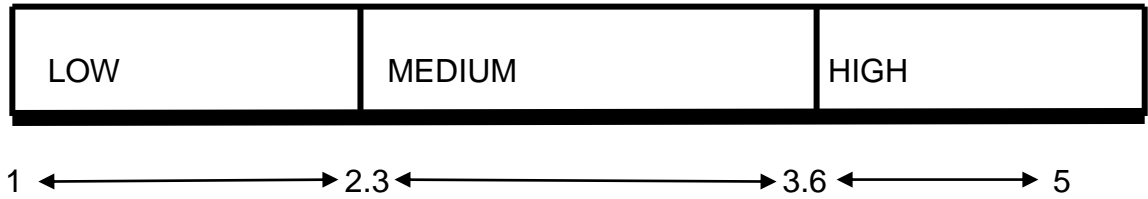
Question V5, requiring a 'yes' or 'no' response, revealed that the organisations sampled for the survey were a mixed bag in terms of the presence or absence of a formal knowledge management programme. Companies I(73.7%), D(63.4%) and J(56.5%) had more respondents affirming that they in-fact did have a formal knowledge management programme whilst on the other end companies A(94.4%), G(75%), F(73.3%), C(70%) and E(60%) had the majority of respondents suggesting that their organisations did not have a formal knowledge management programme. This augured well, for comparison purposes, for the effect of knowledge management on the performance of the respective companies.

Question V6 sought from the respondents whether their organisations had a written knowledge management policy. The responses were varied and followed the pattern of Question V5.

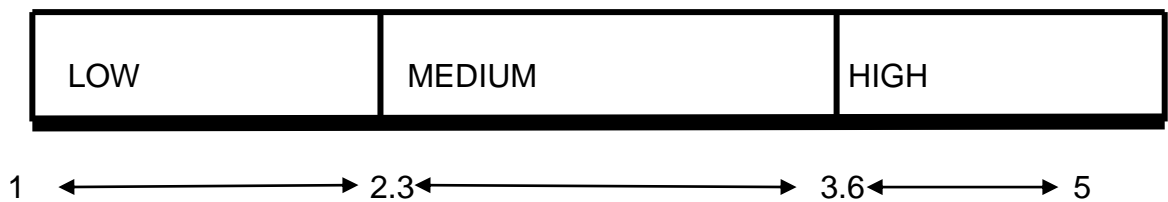
A scoring measure for the knowledge management scales was developed. This is based on the rating system capturing sheet (Appendix C) in which a score is attached to a response on the 5 options of responses available on the questionnaire, e.g. strongly agree = 5 points, strongly disagree = 1 point. The companies are then ranked in three categories of 'low', 'medium' or 'high' on the knowledge management scales depending on the scores obtained from the rating sheet. Three scoring instruments were developed in order to rate three aspects per knowledge management scale, namely:

- individual question score
- average score per question
- the overall knowledge management component score, e.g. knowledge acquisition (KAC) score.

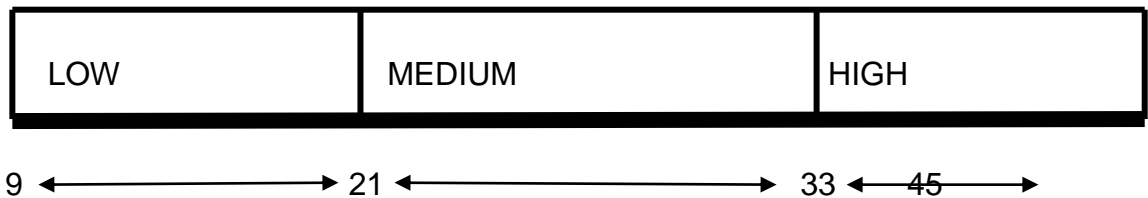
Figures 5.4, 5.5 and 5.6 illustrate the aforementioned scoring instruments. The individual question score scale and the average score per question scale are constant for all questions but the overall knowledge management score varies per knowledge management scale.



**Figure 5.4: Individual question score**



**Figure 5.5: Average score per question**



**Figure 5.6: KMP score**

The lowest and highest score on the knowledge management scale are determined by the number of questions that are on a scale. The overall score attained per knowledge management scale will be the sum of all the points obtained for all the questions on a scale.

Qualitative results from content analysis will be captured using a table as in table 5.3. In this instance, the researcher looks at the field notes from the structured interviews to see what people spoke about the most, what themes

emerged and eventually to see if and how the themes relate to each other. The qualitative results will be presented after the quantitative results for every knowledge management component.

**Table 5.3: Table for presenting qualitative results**

<b>Company</b>	<b>Respondent no.</b>	<b>Issues raised</b>	<b>Summary</b>
A	1		
B	2		
	3		

The aim of the next set of questions was to gauge the usefulness placed by construction and engineering firms on the three basic elements of an individual's knowledge capital, i.e. theoretical knowledge, professional knowledge (or experience) and professional contacts, and to take note of the level of awareness of their knowledge amongst their colleagues. Some of the questions sought to analyse how well connected staff were as well as the usefulness of their basic knowledge. A summary of the average scores for all the respondents per company for a question in the knowledge management practices (KMP) scale is given in Table 5.4. A description of the various scores per question is also given and this is then followed by a presentation of the overall KMP score per company.

**Table 5.4: KMP score**

<b>KNOWLEDGE MANAGEMENT PRACTICE (Average scores on the KMP scale)</b>											
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>Average score per question</b>
V7	4	3.9	4.5	4.6	4	4.3	4.3	4.1	4.5	4.3	<b>4.25</b>
V8	3.8	3.7	4	3.7	3.6	3.9	3.9	3.4	4	3.8	<b>3.78</b>
V9	3.2	2.9	3	2.9	2.8	2.2	2.7	3.1	3.2	3	<b>2.9</b>
V10	4.1	3.6	4.2	3.6	3.9	4	3.8	3.9	4.1	3.7	<b>3.89</b>
V11	3.6	3.8	3.8	3.7	3.8	3.3	3.3	3.6	4	3.8	<b>3.67</b>
V12	2.8	2.9	2.6	2.7	2.6	1.9	2.3	3	2.6	2.7	<b>2.61</b>
V13	2.9	2.2	2.2	2.3	2.4	2.1	2.1	2.5	2.5	2.4	<b>2.36</b>
V14	2.7	2.1	2	2.2	2.2	1.9	1.9	2.5	2.4	2.3	<b>2.22</b>
V15	2.4	2	1.9	2.1	2.2	1.9	1.9	2.5	2.4	2.1	<b>2.14</b>
<b>Total Company Score</b>	<b>29.5</b>	<b>27.1</b>	<b>28.2</b>	<b>27.8</b>	<b>27.5</b>	<b>25.5</b>	<b>26.2</b>	<b>28.6</b>	<b>29.7</b>	<b>28.1</b>	

In Question V7, the usefulness of the respondents' knowledge (education) at the workplace was sought. All of the organisations scores were in the high bracket on the individual question score for this question as per Figure 5.4,



particularly company D(4.6), C(4.5) and I(4.5). The lowest scores were 3.9 and 4 in company B and A respectively but these still fall within the high range. About 94% of the respondents acknowledged that their knowledge was useful at work, split with 64 (33.5%) strongly agreeing and 115(60.2%) agreeing. Only 9(5%) indicated that their knowledge was not useful for the work they did whilst 3 (1.6%) did not have an opinion about it.

That most respondents were using their educational knowledge in their work is reflected in the high scores by the individual organisations surveyed, with all surveyed respondents in the following companies admitting to using their educational knowledge in their work: companies E, F, G, H, I and J. The rest were above 95%, except for company B at 79%. The average score for this question is at 4.25, which is also in the high bracket for knowledge management practices.

Also related to Question V7 is the usefulness of the respondents' knowledge to the work of others and this was questioned in V8. Most respondents, 161(84.3%), agreed that their knowledge was useful to the work of others. Companies I(4), G(3.9) and F(3.9) scored the highest, whilst company H(3.4) was the only one in the medium category on this question. The average score for this knowledge management practice was also in the high category.

Question V9 was used to establish the awareness amongst colleagues of the knowledge held by workmates. About 74(38.7%) did not know if their colleagues were aware of their knowledge or not. A total of 64(33.5%) disagreed with the view that their colleagues were aware of their knowledge. About 45(23.6%) agreed, whilst 7(3.7%) agreed strongly. Most of the companies had low scores. Company F(2.2) actually scored in the low category for this knowledge management practice. The rest of the companies' scores were in the medium category, as follows: A(3.2), B(2.9), C(3), D(2.9), E(2.8), G(2.7), H(3.1), I(3.2) and J(3).

Questions V10 to V12 dealt with knowledge management practices in the surveyed companies with regards to experience. In question V10, participants were asked if their experience was useful at work. This reflected strongly on the recruitment focus for these construction and engineering firms in terms of their need for experience. Individually, the companies exhibited a uniform and similar trend of valuing experience with the scores in the high category as follows, Company A(4.1), B(3.6), C(4.2), D(3.6), E(3.9), F(4), G(3.8), H(3.9), I(4.1) and J(3.7). Most respondents agreed (90%) that their experience was useful in the work they did, split up as: 82.7% (agree) and 7.3% (strongly agree). Only 2.1% disagreed, whilst 2.6% did not answer the question. The average score for experience usefulness was in the high category.

Asked if colleagues benefit from their experience (V11), the view from most of the respondents was positive with those agreeing represented in the surveyed companies as follows: I(94.7%), B(83.3%), E(75%), G(75%), J(73.9%), H(71.1%), D(72.7), A(66.7%) and C at 70%. On the question score, companies I, J, E, B, C and A scores were in the high bracket. The remainder scored in the medium category. Quite conspicuous was company F with most respondents (67%) being not sure if their experience was of any benefit to the company. The average score for the question was in the high bracket at 3.67.

A totally different picture is painted by responses to Question V12, which seeks to establish if colleagues in the organisation are aware of the respondents' experience. All the company scores fell within the low to medium category. On the individual question scale, company scores were A(2.8), B(2.9), C(2.6), D(2.7) E(2.6), F(1.9), G(2.3), H(3), I(2.6) and J(2.7).

More than 52% of respondents, on average, from all the surveyed companies were of the view that their workmates were not aware of their experience. Higher percentages of this view were particularly dominant in companies F(86.7%), E(70%), G(70%) and C(65%). The remaining percentage in each company mostly fell in the 'neutral' response. The average score for this question was in the medium bracket on the scale.

The final questions in this scale on the knowledge management practices (KMP), i.e. Question V13 to Question V15, sought the views of the respondents on the usefulness of their various contacts. V13 was about the usefulness of personal business contacts at their work. The company scores for the question were in the low category, especially B(2.2), C(2.2), D(2.3), E(2.4), F(2.1) and G(2.1). Medium scores were found in companies' A(2.9), H(2.5), I(2.5) and J(2.4), with no company scoring in the high bracket. The average score for all companies for the question was also in the low bracket borderline.

The same sentiment was expressed on the usefulness of personal business contacts for the other work colleagues, Question V14. Respondents were of the view that their personal business contacts were not of any use to their colleagues. This translated to low scores for the companies on the question score: B(2.1), C(2), D(2.2), E(2.2), F(1.9), G(1.9). In the medium range were companies' H(2.5), I(2.4), J(2.3) and A(2.7). The average score was a low 2.22.

On the question of the awareness by work colleagues of the respondents personal business contacts (V15), there was more confirmation on the fact that personal business contacts were not being harnessed for knowledge management purposes. The ratings for this view were as follows: A(2.4), B(2), C(1.9), D(2.1), E(2.2), F(1.9), G(1.9), H(2.5), I(2.4) and J(2.1). The average score for this question was the lowest for this scale at 2.14.

The various surveyed companies have the following response rates in percentages on the knowledge management practices scale (Table 5.5).

**Table 5.5: Percentage rates on the KMP scale**

<b>KNOWLEDGE MANAGEMENT PRACTICE</b>	<b>Strongly disagree%</b>	<b>Disagree%</b>	<b>Neutral %</b>	<b>Agree %</b>	<b>Strongly agree %</b>
V7. My knowledge (education) is useful at work	1.1	3.7	1.3	60.4	33.5
V8. My knowledge is useful for the work of other colleagues.	1.3	6.8	7.4	79.6	4.9
V9. My work colleagues are aware of my knowledge.	4.4	29.3	38.8	23.8	3.7
V10. My experience is useful at work.	0.8	1.6	5.4	84.7	8.5
V11. My colleagues at work benefit from my experience.	0.6	3.1	23.6	69.6	3.1
V12. My work colleagues are aware of my experience	11.5	40.8	25.7	18.3	3.7
V13. My personal business contacts are useful at work	14.7	48.2	23.5	13.1	0.5
V14. My personal business contacts are useful for other work colleagues.	16.8	53.4	19.9	8.4	1.5
V15. My colleagues are aware of my personal business contacts.	19.9	52.9	19.9	6.8	0.5

Finally, the overall knowledge management practices (KMP) scores for the various surveyed companies on the KMP scale (Figure 5.6) are as follows: A(29.5), B(27.1), C(28.2), D(27.8), E(27.5), F(25.5), G(26.2), H(28.6), I(29.7), J(28.1).

Table 5.6 presents issues raised during the qualitative interviews.

**Table 5.6: KMP qualitative findings**

Company	Respondent number	Issues raised	Summary
J	1	Project management qualifications prerequisite	<p>It is quite evident that there is much recognition of the usefulness of two out of three basic elements of an individual's intangible knowledge capital i.e. educational knowledge (qualifications) and professional knowledge (experience).</p> <p>This could point to the reservoir of knowledge capital attracted by the construction and engineering sector.</p>
	2	<p>Project management experience prerequisite</p> <p>Engineering qualifications</p> <p>Hiring practice of recognising experience and qualifications.</p>	
D	2	Separation of personal contacts and business contacts.	<p>However, personal contacts are not being utilised for business purposes. Business opportunities could be lost in the affected companies.</p>
A	1	Ignorance of what KM is.	<p>Level of awareness of the qualifications, experience and contacts amongst other colleagues not regarded as useful. This could result in long searches for knowledge when needed, compromising the performance of the respective organisations.</p> <p>This could point to how well connected or unconnected staff are.</p>

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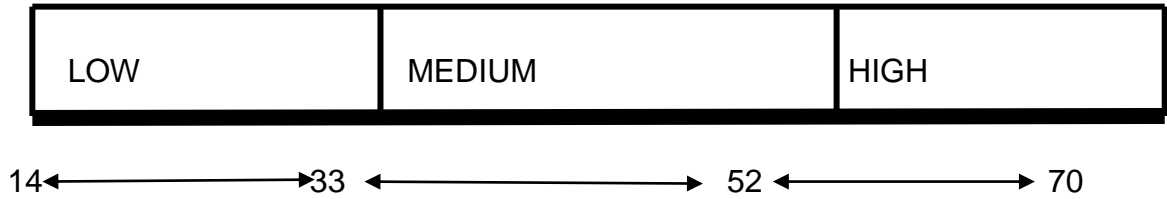
The interviews revealed that most of the companies in the construction and engineering sector in South Africa put much emphasis on qualifications (theoretical knowledge) and experience (professional knowledge) but professional contacts, from past employer or personal, were not regarded as useful and therefore were not being harnessed for use at the work place.

There was little importance attached to awareness amongst other colleagues of the knowledge and experience existing among them and this was in congruence with the outcomes of the questionnaires. These aspects could also give an indication of how well connected employees are. There were also instances where respondents displayed ignorance of the meaning of knowledge management and what it was all about.

#### **5.4.2 Knowledge acquisition (KAC)**

The knowledge acquisition scale was divided into five sections known as knowledge acquisition factors (KAF1 to KAF5). This was to gauge the organisation's knowledge acquisition aptitude in specific areas.

The first two scoring instruments (Figure 5.4 & 5.5) are static but the overall knowledge management scale score varies per scale. This variation is caused by the difference in the number of questions that are on a scale. Thus, the knowledge acquisition scores range from fourteen on the minimum side to seventy on the maximum side, as per Figure 5.7.



**Figure 5.7: KAC score**

Questions V16 and V17 fall under the same knowledge acquisition factor, i.e. KAF1, exploring the organisation's sensitivity to information about changes in the market place. V16 sought the respondents view on the ability of the organisation to detect changes in customer preferences and organisations A to C scored in the low bracket on the individual question score as follows; A(2.2), B(2), C(1.9) whilst D(2.8) and E(3.3) are in the medium category. The remainder of the organisations (F to J) scored in the high range. The average score for the question was in the medium range.

On information about competitors' activity, Question V17, the organisations had the same trend as in Question V16 with company D(2.2) dropping into the low bracket together with companies A(1.7), B(1.7) and C(1.6). The scores were much lower across the question including the lower end of the medium range: E(3), H(3.5) and the lower end of the high range for F(3.7), G(3.8) and I(4.3). The average score for the question was in the medium bracket at 2.9. A summary of the knowledge acquisition scale (KAC) scores are presented in Table 5.7.

**Table 5.7: KAC scale scores**

<b>KNOWLEDGE ACQUISITION (Scores on the KAC scale)</b>											
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>Average score per question</b>
V16	2.2	2	1.9	2.8	3.3	4.4	4.3	4.1	4.3	4.4	<b>3.4</b>
V17	1.7	1.7	1.6	2.2	3	3.7	3.8	3.5	3.8	4.3	<b>2.9</b>
V18	2.3	1.8	1.7	2.5	3.2	3.9	3.8	3.7	4.3	4.1	<b>3.1</b>
V19	2.7	2	3.3	3.1	3.2	4	3.7	3.8	4.1	4	<b>3.4</b>
V20	2.1	3	3	4.1	3.4	4.1	3.9	4	4.3	4.7	<b>3.7</b>
V21	2.2	1.8	1.4	1.8	2.9	4.1	3.9	4.4	4.2	3.8	<b>3.1</b>
V22	1.6	1.5	1.5	2	2.3	3.5	3.2	3.9	3.7	4	<b>2.7</b>
V23	2.3	2.3	2.1	3.1	2.6	3.5	3.2	3.5	3.6	4	<b>3</b>
V24	2.1	1.3	1.5	2.2	2.2	3.9	3.6	3.5	3.6	4	<b>2.8</b>
V25	3.8	4.3	4.4	4	4.1	3.1	2.8	3.2	3.6	3.8	<b>3.7</b>
V26	2.7	3.1	3	3.1	3	3.5	3	3.8	3.9	3.7	<b>3.3</b>
V27	3.8	3.3	3.1	3.9	4	4.4	4.4	4	4.4	4.7	<b>4</b>
V28	2.9	2	2	2.9	3	4.2	4.1	4.5	4.4	4.4	<b>3.4</b>
V29	3.6	3.5	3.7	3.8	3.5	4.3	4.4	4.6	4.4	4.7	<b>4.1</b>
<b>Total Company Score</b>	<b>36</b>	<b>33.6</b>	<b>34.2</b>	<b>41.5</b>	<b>43.7</b>	<b>54.6</b>	<b>52.1</b>	<b>54.5</b>	<b>56.6</b>	<b>58.6</b>	

The next knowledge acquisition factor, (KAF2), was on working in partnerships for ideas and comprised of questions V18 and V19. On scheduling meetings with customers to ascertain their future preferences, Question V18, only companies B(1.8) and C(1.7) had low scores. The medium range comprised of companies A(2.3), D(2.5)and E(3.2), whilst the high bracket had F(3.9), G(3.8), I(4.3) and J(4.1).



On the acquisition of new ideas from export activities (V19), there were more respondents who chose the neutral and disagree options (107 out 191 respondents) than the agreeing options. However, these adverse scores were moderated by some very good scores from some of the engineering and construction companies who seem to be quite active on the export market. The companies actively engaged on the export market are I(4.1), J(4), F(4), H(3.8) and G(3.7). These are in the high score bracket. The medium range is comprised of C(3.3), E(3.2), D(3.1) and A(2.7). Company B(2) scored in the low range and the average score for the question was in the medium bracket at 3.4

Knowledge acquisition factor 3 (KAF3) comprised of questions V20 and V21, with a focus on surveys as a method of acquiring knowledge. Respondents in most of the surveyed organisation acknowledged that their organisation engaged in market research (V20). On the question scale, companies J(4.7), I(4.3), D(4.1), F(4.1), H(4) and G(3.9) scores were in the high category. The middle bracket was made up of E(3.4), C(3) and B(3), whilst B(2.1) was the only company that scored lowly on this aspect. The average score for this question was also high at 3.66.

Question V21 addressed the frequency of research on quality and low scores were obtained by Firm C(1.4), D(1.8), B(1.8) and A(2.2). Company E(2.9) was the only one with medium scores whilst J(3.8), G(3.9), F(4.1), I(4.2) and H(4.4) scores were in the high bracket on the question score.

Knowledge acquisition factor 4 (KAF4) probed on the value placed on employee attitudes and opinions. Questions V22 to V26 made up the KAF4. Companies A to E all showed that they did not survey their employees regularly to assess their attitudes towards work, Question V22, with respective low scores of (1.6), (1.5), (1.5), (2) and (2.3). In the high bracket were companies J(4), H(3.9) and I(3.7). Companies G and F scored in the medium bracket.

On regular staff appraisals and needs discussion, V23, the pattern was rather more positive than the previous question. All the companies' scores were in the medium range except for Company C that scored in the low bracket (2.1) and Company J in the high bracket at (4).

Respondents from half of the surveyed construction and engineering companies indicated that the companies do not encourage employees to attend training seminars and conferences (Question V24). About 45% of all the respondents disagreed with the statement, whilst 16% were neutral. Companies A to E scores were all in the low range, with only F and J scores in the high range.

However, all companies seemed to encourage their employees to undertake university and polytechnic courses as the company scores for Question V25 were mostly high. Only company F and H were in the medium bracket.

Finally for this KAF4, the holding of regular meetings was probed in Question V26. Of note was the high percentage of respondents who did not answer the question (13%). This, taken together with the (18%) who were neutral, makes a significant indication on this aspect. In terms of the question score, all the companies fell within the medium range with the exception of companies H, I and J that scored in the high bracket.

Knowledge acquisition factor 5 (KAF5) investigated the financial reporting system in the various surveyed organisations to establish how well developed it was. The KAF5 comprised of three questions: V27, V28 and V29. On the knowledge of how much each product cost the firm (V27), there were high scores across the board with only Company B(3.5) and E(3.5) scores being in the medium range. From the average score for the question, there was confirmation that most of the organisations had a well-developed financial system to track how much each product costs the organisation, with a high score of 40 on the question score.

Question V28 was about analysing the contribution of each product. It was a question of two extremes between low and high. The companies with most respondents who believed their companies did not analyse the contribution of each product were B(2), E(2) A(2.9), D(2.9) and E(3). On the other side was H(4.5), I(4.4), J(4.4), F(4.2) and G(4.1), where most respondents believed their companies analysed the contribution of each product.

The last question on this KAF5 sought the view of the participants on the quality of financial information in their organisation. All the surveyed firms had a high bracket score for this question. The participants were of the view that their organisations had good financial information. Organisations E to J, particularly, were on the upper end of this view.

The overall knowledge acquisition scale (KAC) scores for the surveyed companies show that companies J(58.6), I(56.6), F(54.6), H(54.5), G(52.1), E(43.7) and D(41.5) consistently scored better than all the other surveyed organisations in all the aspects probed on the knowledge acquisition capability of the organisations. Question V17, V21 and V22 were the ones notably with the lowest scores; V17, in particular; had the lowest scores across the board.

The various surveyed companies have the following response rates in percentages on the knowledge management practices scale (Table 5.8).

**Table 5.8: KAC percentage scores**

Questions	Strongly disagree%	Disagree%	Neutral %	Agree %	Strongly agree %
V16 We are quick to detect changes in our customers' preferences	10.5	24.6	6.8	35.1	23
V17 Information about our competitors is collected by more than one department	14.7	28.8	12	30.9	12.6
V18 We meet with customers at least once a	10.5	29.8	16.2	21.5	21.5

year to find out what products/services they will need in future					
V19 We often acquire new ideas through export activities	1.6	18.3	35.6	26.2	17.8
V20 Our organisation does a lot of market research	4.7	13.1	18.9	35.1	27.2
V21 We survey end-users at least once a year to assess the quality of our products/services	16.2	27.2	8.9	25.7	21.5
V22 Employees are surveyed regularly to assess their attitudes towards work	1.1	21.5	26.2	16.8	21.5
V23 There are regular staff appraisals where staff needs are also discussed	7.9	31.9	19.9	30.4	9.4
V24 Employees are encouraged to attend training seminars and conferences	25.7	19.4	16.2	21.5	15.7
V25 Employees are encouraged to undertake university & polytechnic courses	2.1	11.5	14.1	48.2	22.5
V26 We have regular meetings with employees	0.5	8.4	17.8	45	15.7
V27 We know exactly how much each of our products/services costs us	2.6	5.8	11.5	46.6	33.5
V28 We analyse the contribution of our products/services	4.7	28.8	13.1	25.7	27.8
V29 We have good financial information on our organisation	2.6	6.8	10	44.5	36.1

The key findings from the interviews on knowledge acquisition are summarised in Table 5.9.

**Table 5.9: KAC qualitative findings**

<b>Company</b>	<b>Respondent number</b>	<b>Issues raised</b>	<b>Brief Discussion</b>
I	1	Extensive use of contractors	The companies engaged contractors for specialist knowledge e.g. architects. The impact of this for knowledge management could be interesting as contractors may opt to retain rather than share their knowledge in order to remain relevant for future projects.
B	2	Most employees are engaged on a contract basis	The commitment of an employee employed temporarily is questionable when it comes to sharing knowledge, and this could have an effect on the overall performance of the organisation
C	2	Further education is regarded as the responsibility of the individual	This implies that the company is not favourably disposed towards financing or providing opportunities for further education of the individual. In such a situation, knowledge growth can be stunted

The companies engaged contractors with specialist knowledge on some of the activities required at every stage as opposed to possessing the knowledge in-house. This behaviour was quite widespread so much that for most construction sites visited, a board was set up detailing the name of the sub-contractor for every specialist activity, like quantity surveyors, fire consultancy etc.

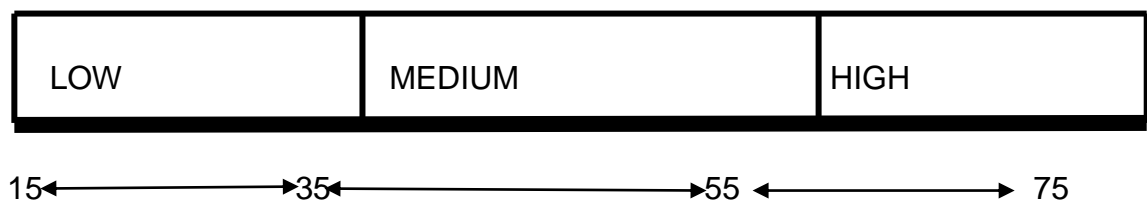
Most employees were also engaged on a contract basis based on the available projects. It was also established that most of the surveyed construction and

engineering organisations did not value further education and so did not provide opportunities for it. Time was pointed out as the inhibiting factor.

### 5.4.3 Knowledge dissemination (KDI)

The knowledge dissemination scale (KDI) is also divided into five sections known as knowledge dissemination factors (KDF1 to KDF5). Each factor is comprised of about three questions that are designed to test and measure the organisations' capacity on knowledge dissemination in specific areas.

The individual question score and the average score per question are still the same as per Figures 5.4 and 5.5. The knowledge dissemination scale (KDI) score, being the component knowledge management scale, has fifteen questions. Therefore, the KDI scores range from fifteen on the minimum side to seventy-five on the maximum side, as per Figure 5.8.



**Figure 5.8: KDI score**

The knowledge dissemination scores for the ten surveyed construction and engineering companies are summarised in Table 5.10. A description of the results comes after.

The first set of questions, from V30 to V32, belonged to knowledge dissemination factor one (KDF1) that probed the degree to which knowledge is disseminated on the job. Asked if the work space is set up to make it easy for people to talk to each other (V30), only four companies had more employees

who agreed that indeed it was, i.e. J(4), I(3.8), H(3.8) and G(3.7). The other six scores were all in the low range.

**Table 5.10: KDI scale**

<b>KNOWLEDGE DISSEMINATION</b> (Scores on the KDI scale)											
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>Average score per question</b>
V30	3	3.3	2.3	2.7	3.5	3.1	3.7	3.8	3.8	4	<b>3.3</b>
V31	1.8	1.4	2.1	3.3	2.5	3.1	3.7	4.1	3.9	4.3	<b>3</b>
V32	2	1.6	1.7	1.6	3	3.5	3.4	4.1	4.2	4.3	<b>2.9</b>
V33	1.7	1.8	1.5	1.7	2.8	3.5	3.8	3.7	3.4	3.9	<b>2.8</b>
V34	1.9	2.4	2	2.6	2.6	3.7	3.1	3.5	3.6	3.8	<b>2.9</b>
V35	1.9	1.8	1.6	2.6	2.1	3	3.3	3.7	3.8	4	<b>2.8</b>
V36	1.9	2.4	3.2	3.8	2.7	2.9	2.4	2.7	3.4	3.7	<b>2.9</b>
V37	3.6	4	3.9	3.9	3.8	3.2	2.9	3.2	3.4	4	<b>3.6</b>
V38	2	1.5	1.7	2	2.1	3.1	3.1	3.3	3.6	4	<b>2.6</b>
V39	2.1	2	1.8	2.5	2.6	3.7	4	3.9	4.1	4.3	<b>3</b>
V40	3.5	3.8	2.9	3.2	3.8	3.3	3.8	3.9	4.1	4.3	<b>3.7</b>
V41	1.8	1.5	1.5	2.2	2.2	3.4	3.5	3.9	4	4.5	<b>2.9</b>
V42	2.7	2.6	2.6	3.2	2.7	3.3	3.3	3.4	3.3	4	<b>3.1</b>
V43	2.2	1.9	1.9	2.7	2.6	3.2	3.1	3.7	3.3	4.1	<b>2.9</b>
V44	1.9	1.3	1.4	1.7	2.3	3.1	3.8	3.7	3.9	4.4	<b>2.8</b>
<b>Total Company Score</b>	<b>34</b>	<b>33.3</b>	<b>32.1</b>	<b>39.7</b>	<b>41.3</b>	<b>49.1</b>	<b>50.9</b>	<b>54.6</b>	<b>55.8</b>	<b>61.6</b>	

Much lower scores were observed in Question V31 when participants were asked to rate if their respective companies encouraged people with similar interests to work together to solve a problem. Companies A(1.8), B(1.4) and C(2.1) scored in the low bracket with F(3.1), E(2.5) and D(3.3) in the medium range.

Asked if the respondents frequently stepped back to reflect on what went right or wrong in aspects of the business (V32), there were more, about 60%, who responded negatively to this statement across the board. For the companies that had been scoring lowly on the first two questions (A to D), the trend continued even for this question, whilst the top end maintained the better trend. The average question score was also lower at 2.9.

The use of specific techniques to disseminate knowledge was the theme of questions under KDF2 (V33 to V35). Question V33 checked on the use of techniques such as quality circles in the surveyed firms. Such techniques seemed not to be employed as reflected by the lower scores. Companies' (A – D) scores were in the low range (1.7, 1.8, 1.5, and 1.7 respectively), with only G(3.8), H(3.7) and J(3.9) in the high range. The average score averaged a medium score of 2.8.

Mentoring and coaching was under the spotlight in V34. The scores showed that compared to such techniques as quality circles, this was better used; although the use was still in the low range for companies A(1.9), C(2), B(2.4) and D(2.6). The average score was in the medium bracket at 29.2, mostly propped up by scores from companies J(3.8), I(3.6) and H(3.5).

Question V35 investigated the writing of case notes on successful and unsuccessful products and processes. This also seemed to be a less used technique to disseminate knowledge as the average score was in the average range at 2.8. Of note within this section (KDF2) are the percentages of respondents who left the questions blank, i.e. not answering the questions



particularly questions V34(19%) and V35(17%). This could signal that the respondents did not know, totally, the activities being inquired about.

KDF3 section comprised of three questions, V36, V37 and V38, and these had to do with the organisations' use of technology to disseminate knowledge. Particularly, the use of video conferencing, teleconferencing and GroupWare such as Lotus Notes to share information was under spotlight. The lowest scores in this section were for Question V38 on GroupWare for sharing knowledge. Half of the surveyed companies, i.e. A to E, all had scores in the low range. The average score for the same question, V38 at 2.6, was the lowest on the KDI scale. The questions on video conferencing (V36) and teleconferencing (V37) saw the normal trend observed so far being maintained whereby companies G, H, I and J scored in the high range.

Of the three, teleconferencing (V37) scored the highest across the surveyed firms. The question scores lay in the medium to high range with no company scoring in the low range. Even the average score for the question was the highest for the knowledge dissemination scale (KDI) at 3.6. Also of note is the percentage of respondents who were neutral on the sharing of knowledge through video conferencing (25%) and GroupWare (27%).

The KDF4 section is made up of questions V39, V40 and V41 and these prodded on the dissemination of market information. V39 checked if there were regular meetings between departments to discuss market trends. Companies F(3.7), G(4), H(3.9), I(4.1) and J(4.3) had scores in the high bracket whilst D(2.5) and E(2.6) are in the medium range.

V40 was to establish if the surveyed companies kept a customer information database. All the companies had positive ratings for this question, with all ratings between the medium and high bracket. The neutral rate of 25% for this question could be attributed to the fact that as operatives, some of the respondents did not have access to or knowledge of the customer database.

On marketing people frequently spending time with the technical department people discussing customers' future needs (V41), 50% of the respondents disagreed with the statement, whilst 8% were neutral. The remaining 42% who agreed with the statement were distributed amongst companies J(4.5), I(4) and H(3.9). Companies F(3.4) and G(3.5) were the only ones with medium scores, whilst the rest were in the low bracket accounting for the 58% who disagreed with the statement and the neutral ones.

KDF5, the final knowledge dissemination factor for this knowledge management scale, was about the preference of written communication by the surveyed organisations. This was tested through three questions, V42, V43 and V44.

V42 tested if a large number of written reports circulate in the respondents' organisation. There was no organisation with scores in the low bracket on this aspect. The ones normally in the low ranges were all in the medium bracket with the rest of the other companies. Only Company J(4) had a score in the high range on the scale. Invariably, the average score for this question was also in the medium range, at 3.1.

V43 was about company policy and procedure manuals and how often they were updated. Overall, about 50% of all the respondents confirmed that their organisations did not update their policy and procedure manuals that often, whilst the neutral respondents were about 15%. Most of these belonged to companies A, B and C. Companies H, I and J ranked in the high score category.

On the expectation of employees that they provide feedback to others whenever they attend conferences, exhibitions or seminars (V44), low scores were also observed so much that the average score for the question lay at 2.7. Previous trends observed for the individual companies were also maintained, whereby companies A to E scores were low whilst G to J were in the high range.

The overall scores for the individual companies on the knowledge dissemination scale (KDI), Figure 5.8, all lay within the medium to high range as follows A(34); B(33.3); C(32.1); D(39.7) E(41.3); F(49.1); G(50.9); H(54.6); I(55.8) and J(61.6).

The qualitative issues identified under knowledge dissemination are as per Table 5.11.

**Table 5.11: KDI qualitative findings**

Company	Respondent number	Issues raised	Summary
D	1	Lack of time for knowledge dissemination	The concepts that were highlighted the most were lack of time, temporary residence at project site and the lack of a knowledge sharing culture.
	2	Temporary residence at project sites & so cannot set-up facilities to casually congregate for tea or water.	
A	1	No tradition of sharing knowledge.  Work alone	Under such circumstances of the raised issues, knowledge sharing is inhibited for the affected companies and it remains to be seen what effect this would have on the performance of the said companies.
H	2	All too busy.	

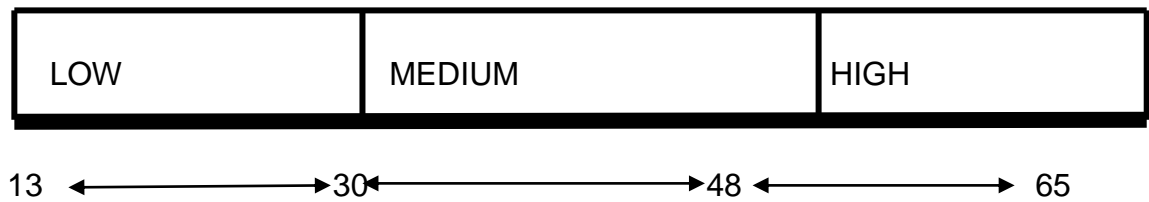
The issues raised as inhibiting knowledge dissemination were lack of time, temporary residence at project sites, lack of a tradition to share knowledge, working alone and being too busy to find time to disseminate knowledge.

Time is perceived as being of essence in the construction and engineering sector. This was coupled to working on schedules and timelines to deliver the project. Temporary residence at project sites was raised in the sense that because of it they could not set up facilities such as water dispensing machines to encourage casual congregations.

The respondents also acknowledged the absence of a culture to disseminate knowledge. Some worked alone variously on their assignments on a project with targets of time, being experts in their own field. This did not allow for knowledge dissemination. Ultimately, everyone was so busy even to an extent that it was so difficult to pin them down for an interview, a fact that was also pointed out.

#### **5.4.4 Responsiveness to knowledge (RTK)**

The responsiveness to knowledge scale (RTK) is the final of the knowledge management components to be measured. It is also divided into four sections known as the knowledge responsiveness factors (KRF1 to KRF4). Each factor is made up of about three questions that are meant to test the organisations' capacity on responsiveness to knowledge in particular business areas. The three measuring instruments still remain. The responsiveness to knowledge scale, being the component knowledge management scale, has thirteen questions. The scores range from thirteen on the minimum side to sixty-five on the maximum side, as per Figure 5.9.



**Figure 5.9: RTK score**

A summary of the findings on the responsiveness to knowledge (RTK) scale for the ten surveyed construction and engineering companies is presented in Table 5.12. An in-depth discussion of these is also presented thereafter.

**Table 5.12: RTK score**

RESPONSIVENESS TO KNOWLEDGE (Scores on the RTK scale)											
	A	B	C	D	E	F	G	H	I	J	Average score per question
V45	3.8	3.8	2.5	3.7	3.7	3.8	3.7	4.3	4.2	4.5	<b>3.8</b>
V46	2.3	1.8	1.2	2.3	2.1	3.5	3.9	4.2	4.3	4.2	<b>3</b>
V47	3.4	3.5	2.5	3.6	3.7	3.7	3.6	3.9	4.1	4.4	<b>3.6</b>
V48	1.6	1	1.2	2.1	1.8	3.2	3.6	4	4	4.3	<b>2.7</b>
V49	1.8	1.9	1.5	2	2.2	2.9	3.2	3.5	4	3.9	<b>2.7</b>
V50	2	1.2	1.3	2.3	2	3.5	3.6	3.8	4.2	4.4	<b>2.8</b>
V51	2.6	1.3	1.3	3.1	2.1	3	3.3	3.7	4.2	4.3	<b>2.9</b>
V52	2.2	1.9	1.8	3	2.3	2.9	2.9	2.5	2.9	3.8	<b>2.6</b>
V53	3	3	2.5	3.5	3.4	3.2	3.6	3.7	3.6	4.1	<b>3.4</b>
V54	3.2	3.9	3.4	3.9	3.8	3.4	3.4	3.6	3.7	4.3	<b>3.7</b>
V55	1.9	2.9	3.4	3.4	3.6	3.9	3.8	4.2	4.1	4.6	<b>3.6</b>
V56	1.7	1.6	1.6	1.6	2.1	3.3	3.2	3.9	4.2	4.4	<b>2.8</b>
V57	1.7	1.7	1.4	1.2	1.9	3.5	3.4	4	4.2	4.3	<b>2.7</b>
<b>Total</b>	<b>31.2</b>	<b>29.5</b>	<b>25.6</b>	<b>35.7</b>	<b>34.7</b>	<b>43.8</b>	<b>45.2</b>	<b>49.3</b>	<b>51.7</b>	<b>55.5</b>	

<b>Company</b>											
<b>Score</b>											

Knowledge responsiveness factor one (KRF1) was to gauge if the organisation responds to customers. Question V45 focussed on the immediacy of the response to customers who are dissatisfied with the quality of product or service. All the surveyed firms did well for this question, with scores in the high range. Only Company C(2.5) was in the medium bracket.

Ratings by the participants on the companies' response to changes in customer needs (V46) were lower compared to the ones obtained in question (V45), and saw companies A to E scores being in the low range. Company E was the only one in the medium bracket, whilst Companies G to J scores were in the high bracket.

Response to customer complaints (V47) was rated quite well for most of the companies except for Company C whose score was well below other companies' scores. Companies D to J scores were in the high range for quick response to customer complaints; A and B were in the medium bracket.

Quick response to concerns raised by employees (V48) had the lowest rating on the responsiveness to knowledge scale, with an average score of 2.7. The major contributors to the low rating on this aspect are B(1), C(1.2), A(1.6), E(1.8) and D(2.1). The good showing by companies H, I and J persisted as their scores were in the high range; F and G scored in the medium range.

Knowledge responsive factor two (KRF2) was concerned with the companies' response to competitors. Questions V49, V50 and V51 explored the various aspects to do with response to competitors. The first question (V49) was about how quickly everyone in the company would know if something happened to a competitor. Only 27% of the surveyed respondents were of the opinion that their respective companies were quick to know and share competitor

information. About 52% thought otherwise, whilst 18% were neutral. Companies A to E all had scores in the low bracket and contributed significantly to the negative opinions. The average score for the question was also one of the lowest in the (KRF2) at 2.7, a medium bracket score.

A similar trend was observed on the question of the implementation of strategies in response to significant changes to competitors' pricing model (V50), whereby companies A to E still underperformed with scores in the low bracket.

The question of the implementation of an immediate response if a competitor launched a campaign targeted at the company's customers (V51) saw companies A and D breaking ranks from the low scorers and drifting into the medium range with companies F and G. Companies B and C maintained the low range scores, and H, I, and J the high range score.

Knowledge responsiveness factor three (KRF3) tested the organisations' flexibility and also if they are opportunistic. Questions V52, V53 and V54 explored these.

Question V52 on the frequency of changes to procedures for doing things also had one of the lowest average scores at 2.6. Again, companies A, B, C and E impacted the score negatively because of their low bracket scores. Even the usual high score range companies G, H and I were low in the medium bracket for not changing their procedures that frequently.

An improvement was noted in this KRF3 on Question V53 compared to Question V52, where the frequency in change of the product range was tested. About 55% of all the respondents acknowledged that their company often changed the range of their products.

It is quite apparent that the construction and engineering sector companies in South Africa often change their marketing strategies (V54), as most of the

surveyed companies scores were in the high bracket except for A, C and F. The average score for this question also moved into the high range at 3.7.

The final knowledge responsiveness factor four (KRF4) was on how responsive the surveyed organisations were to technology. Questions V55, V56 and V57 tested aspects of technology.

On keeping up with technological developments that could affect the company's business (V55), only Company A(1.9) had most respondents disagreeing with the statement; all the other companies had scores in the medium to high range.

The circulation of information about new technological developments that might affect company business (V56) had low scores compared to (V55). Even the average score for the question was also quite low at 2.7. Only companies H, I and J had high scores.

A similar trend of low scores was observed for question V57 on periodic reviews of technological changes that are likely to affect customers. The average score was at 2.7, with companies A to E being major contributors to the low score.

The overall responsiveness to knowledge (RTK) score per company, being the component knowledge management scale, saw the lower end being comprised of companies C(25.6), B(29.5) and A(31.2); all being in the medium range. No company had scores in the low range. The high bracket was made up of companies J(55.5), I(51.7), H(49.3), G(45.2), F(43.8), D(35.7) and E(34.7). The three worst performance areas across the board on this scale were on:

- Companies not being flexible and opportunistic by not often changing procedures of doing things (V52)
- Not responding to concerns raised by employees (V48)
- Companies not quickly sharing information on competitor activity.



The best performance areas with the highest scores on this scale were on:

- Quick response to customers dissatisfied with product or service quality (V45)
- Frequently changing marketing strategies (V54)
- Quick response to customer complaints (V47).

The qualitative findings on the aspect of the organisations' responsiveness to knowledge are presented in Table 5.13.

**Table 5.13: RTK qualitative findings**

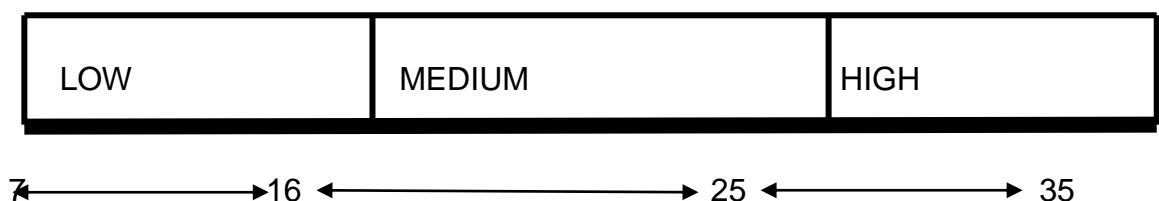
Company	Respondent number	Issues raised	Summary
E	1	Immediate response to customer queries	The fast response to customer queries heralds good performance for the involved companies.
	2	Mistakes costly/difficult to reverse	Mistakes regarded as costly as they can be fatal, life-threatening especially with faulty structures.
F	1	Competition based on price, brand and reputation	Very little contact with competition could result in the lack of competitor knowledge, which could have an effect on the development of strategies that tilt competitive advantage in favour of company F.
	2	Contact with competition only when bidding for tenders	

There was universal agreement on the fact that sub-standard plans and structures would be life threatening and therefore any mistakes were very costly in this industry and extremely difficult to reverse. This was the reason why there was an immediate response to customer queries whenever they arose.

There seems to be no tracking of competitor activity by participants of the construction and engineering sector in South Africa. This is because respondents acknowledged that their only point of contact with competition was when bidding for tenders and competitiveness was based on price, reputation and the brand of the company.

#### 5.4.5 Organisational performance (OP)

Organisational performance, being the dependant variable, was divided into two sections known as knowledge performance factors KPF1 and KPF2. The KPF1 section, which focused on comparing the performance of the specific company to the general industry performance in terms of profitability, market share and growth rate, was made up of three questions; whilst KPF2 had four questions that were meant to test the organisations' internal performance, comparing past performance to present performance. Organisational performance, being the overall component scale score, had seven questions. The scores range from seven on the minimum side to thirty-five on the maximum side, as per Figure 5.10.



**Figure 5.10: OP score**

A summary of the findings on the organisational performance (OP) scale for the ten surveyed construction and engineering companies is also presented in Table 5.13. A detailed discussion of these is presented subsequently.

The purpose of including this section in the research instrument was to gauge the perception of the various participants with regards to the performance of their organisations. Their perception will then be compared with the actual performance as published in the reports and financial statements, since all of the surveyed organisations are public companies listed on the Johannesburg Stock Exchange.

**Table 5.13: Summary findings on organisational performance**

<b>ORGANISATIONAL PERFORMANCE</b> (Scores on the OP scale)											
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>Average score per question</b>
V58	1.6	1.3	1.9	3	2.5	3.6	4	4.2	4.4	4.5	<b>3.1</b>
V59	1.6	1.8	2.8	2.7	2.6	3.6	4.3	4.4	4.4	4.4	<b>3.3</b>
V60	2	1.5	2	4.3	2.6	4.3	4.1	4.5	4.5	4.2	<b>3.4</b>
V61	3.6	1.6	1.7	4.1	3.1	4.2	4.4	4.4	4.3	4.6	<b>3.6</b>
V62	3.2	1.8	1.6	3.3	3.1	4.1	4.5	4.3	4.5	4.5	<b>3.5</b>
V63	2.3	1.8	1.8	2.9	3	4.1	4.2	3.8	4	4.7	<b>3.3</b>
V64	2.3	1.3	1.7	2.8	2.8	3.7	4.4	4.1	4.4	4.5	<b>3.2</b>
<b>Total Company Score</b>	<b>16.6</b>	<b>11.1</b>	<b>13.5</b>	<b>23.1</b>	<b>19.7</b>	<b>27.6</b>	<b>29.9</b>	<b>29.7</b>	<b>30.5</b>	<b>31.4</b>	

Under the (KPF1) on comparative performance at industry level, Question V58 required the opinion of the respondents if their organisation was more profitable compared to the industry average. Participants from companies

B(1.3), A(1.6) and C(1.9) were of the opinion that their companies' performance was below the industry average as denoted from the low scores. The only medium score was from B(2.5); and the remaining ones (J(4.5), I(4.4), H(4.2), G(4) and F(3.6) were all in the high range. The average score for this question was the lowest amongst all the scores on the OP scale.

Question V59 compared the organisation's market share with the industry average and the respondents from most of the companies actually perceived their company's market share to be greater than the industry average. Only companies A and B were in the low bracket on this aspect. The average score was in the medium range.

The last question on comparative performance (V60) compared organisational growth with the industry average. There was agreement with this statement that the organisation was growing more rapidly by respondents from companies D and F to J, with the company scores in the high bracket. Companies A to C scores were in the low range.

Knowledge performance factor two (KPF2), focussing on comparing the company's past performance to present performance, comprised of questions V61 to V64. The notion that the organisation was performing better than it did twelve months ago (61) was widely agreed with by 62% of the respondents. This is reflected in the individual company's high bracket scores for this question, except for companies B(1.6) and C(1.7) that were the only ones within the low range.

The same sentiment was observed when current organisational performance was compared to performance five years ago (V62). Again respondents from all surveyed companies were of the opinion that their organisations were performing better than they did five years ago except for companies B and C that had scores in the low bracket.

The scores were lower when asked if the organisation has met its performance objectives over the past twelve months (V63), although the individual companies managed to maintain the overall score bracket observed so far in this section.

It is also quite evident that the performance of all the surveyed companies was on a declining trajectory, especially when compared to performance from five years ago. This was confirmed by the respondents' assertions that the company had not met its objectives in the past five years.

On the overall organisational performance (OP) scale, low performance opinions were recorded for companies B(11.1), C(13.5) and A(16.6). In the medium range were companies E(19.7) and D(23.1). The companies with employees who thought their organisations have been performing well are J(31.4), I(30.5), G(29.9), H(29.7) and F(27.6).

## 5.5 SCALES RELATIONSHIPS

A summary rating of the surveyed companies is presented in Table 5.14, in terms of where they fall on each of the component knowledge management scales.

**Table 5.14: Summary of company ratings**

SCALE	HIGH	MEDIUM	LOW
Knowledge Management Practices ( <b>KMP</b> )	None	All	None
Knowledge Acquisition ( <b>KAC</b> )	F; G; H; I; J	A; B; C; D; E	None
Knowledge Dissemination	I; J	D; E; F; G; H	A; B; C

<b>(KDI)</b>			
Responsiveness to Knowledge <b>(RTK)</b>	H; I; J	A; D; E; F; G	B; C
Organisational Performance <b>(OP)</b>	F; G; H; I; J	D; E	A; B; C

Of note is the fact that no company was rated highly in all of the five knowledge management components that were being examined. In-fact, they all came short on knowledge management practices (KMP) as none of the companies was rated in the high range on the knowledge management practices (KMP) scale. All of them belong in the medium category on that aspect.

Only companies I and J scores are in the high bracket on four out of the five knowledge management scales that they were rated in. Company H also did well in three out of five of the knowledge management components, also missing the high ranking for knowledge dissemination that I and J did well in.

Companies F and G have scores mostly in the medium category with high ratings only for knowledge acquisition (KAC) and organisational performance (OP). Companies D and E were in the medium range for all of the five components of knowledge management being examined.

Companies A, B and C were rated lowly in three of the five knowledge management aspects. The lowest scores were also observed in these three companies consistently. It is also worth noting that none of the ten surveyed companies is rated in the low bracket on knowledge acquisition (KAC) and knowledge management practices (KMP).

The total knowledge management scores for all the scales were also compared to the actual performance for each organisation as published in the financial statements. Organisational performance was divided into three measures, namely; earnings per share, change in share-price over the five years, and change in revenue. These are presented in Table 5.15.

**Table 5.15: KM compared to actual performance**

Company	Knowledge Management					Actual Organisational Performance		
	KMP	KAC	KDI	RTK	KM Total	EPS	Change in Revenue (sales) %	Change in Share price %
<b>A</b>	29.5	36	34	31.2	<b>130.7</b>	-0.39	50	-84
<b>B</b>	27.1	33.6	33.3	29.5	<b>123.5</b>	-130.84	94	-51
<b>C</b>	28.2	34.2	32.1	25.6	<b>120.1</b>	-246	52	-78
<b>D</b>	27.8	41.5	39.7	35.7	<b>144.7</b>	177.2	135	-93
<b>E</b>	27.5	43.7	41.3	34.7	<b>147.2</b>	0.09	8	54
<b>F</b>	25.5	54.6	49.1	43.8	<b>173</b>	0.05	80	96
<b>G</b>	26.2	52.1	50.9	45.2	<b>174.4</b>	116	-13	-42
<b>H</b>	28.6	54.5	54.6	49.3	<b>187</b>	0.33	-78	-38
<b>I</b>	29.7	56.6	55.8	51.7	<b>193.8</b>	698	68	155
<b>J</b>	28.1	58.6	61.6	55.5	<b>203.8</b>	1166.7	64	13

Some correlation is quite evident, particularly on the two extreme ends, whereby a high knowledge management score is linked to high organisational performance; and a low score in knowledge management is followed by poor organisational performance. This is true for companies H, I, and J that are in

the high bracket for both knowledge management and organisational performance. The same is applicable to companies A, B and C, whose poor organisational performance is linked to poor performance on knowledge management. This is illustrated in Table 5.16.

**Table 5.16: Cross tabulation of KM and OP**

	Organisational Performance		
	High	Medium	Low
Knowledge Management			
High	J; I;	H	
Medium	G; D	F; E	
Low			C; B; A

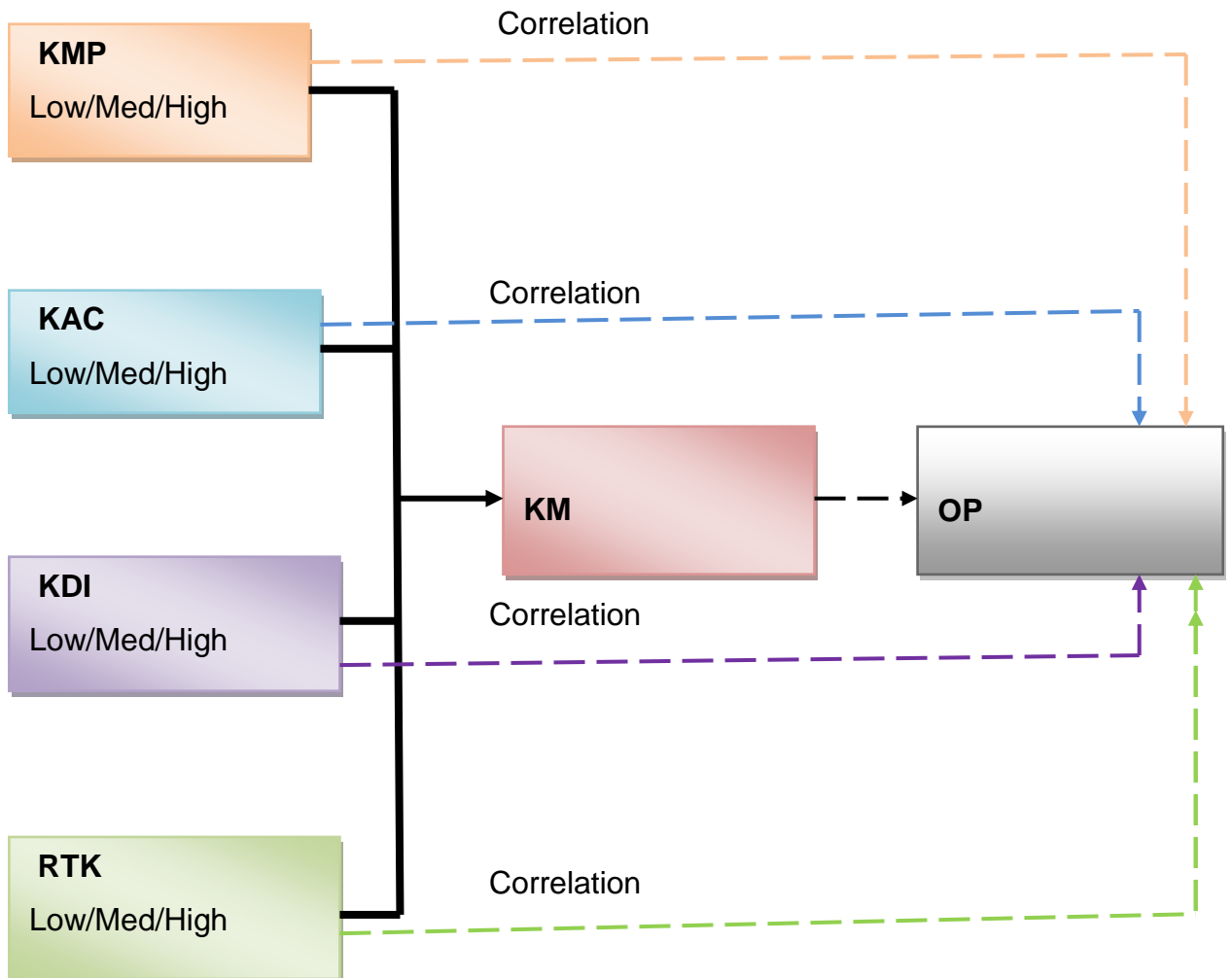
## 5.6 FACTOR ANALYSIS

As a data reduction tool that removes redundancy or duplication from a set of correlated variables, factor analysis will be used to establish whether there is a tendency in the groups of the variables to be inter-related. According to Gareth-Mayer (2006), applications of factor analysis include the following:

1. Identification of underlying factors, whereby:
  - a) Variables are clustered into homogeneous sets
  - b) New factors are created
  - c) Gaining of insight into new categories is also allowed.
  
2. Screening of variables:
  - a) Identifies groupings that allow the selection of one variable to represent many
  - b) Useful in regression (collinearity).



3. Summary:
  - a) Allows the description of many variables using a few factors.
4. Sampling of variables:
  - a) Aids in the selection of a small group of variables as representative variables from a larger set.
5. Clustering of objectives:
  - a) Helps in putting objects (organisations, people) into factor scores depending on their factor scores.



**Figure 5.11: The research model**

### **Key**

KMP – knowledge management practices

KAC – knowledge acquisition

KDI – knowledge dissemination

RTK – responsiveness to knowledge

KM – knowledge management

OP – organisational performance

Figure 5.11 presents the model for the proposed relationship between the variables. The independent variables are the knowledge management factors that are hypothesised to influence organisational performance, the dependant variable.

However, establishing the reliability and validity of the proposed measures is important for assessing their quality.

### **5.6.1 Principal components procedure**

The principal components analysis was performed on the items under the four knowledge management factors, namely; knowledge management practices (KMP), knowledge acquisition (KAC), knowledge dissemination (KDI) and responsiveness to knowledge (RTK). Eigenvectors were extracted and their associated eigenvalues from the principal components analysis, the latter of which is presented in Table 5.17. Eigenvalues are used to determine which factors are relevant and hence should be analysed. The rules to go by are:

- Number of eigenvalues should be greater than 1
- Percentage variance explained
- Scree plot.

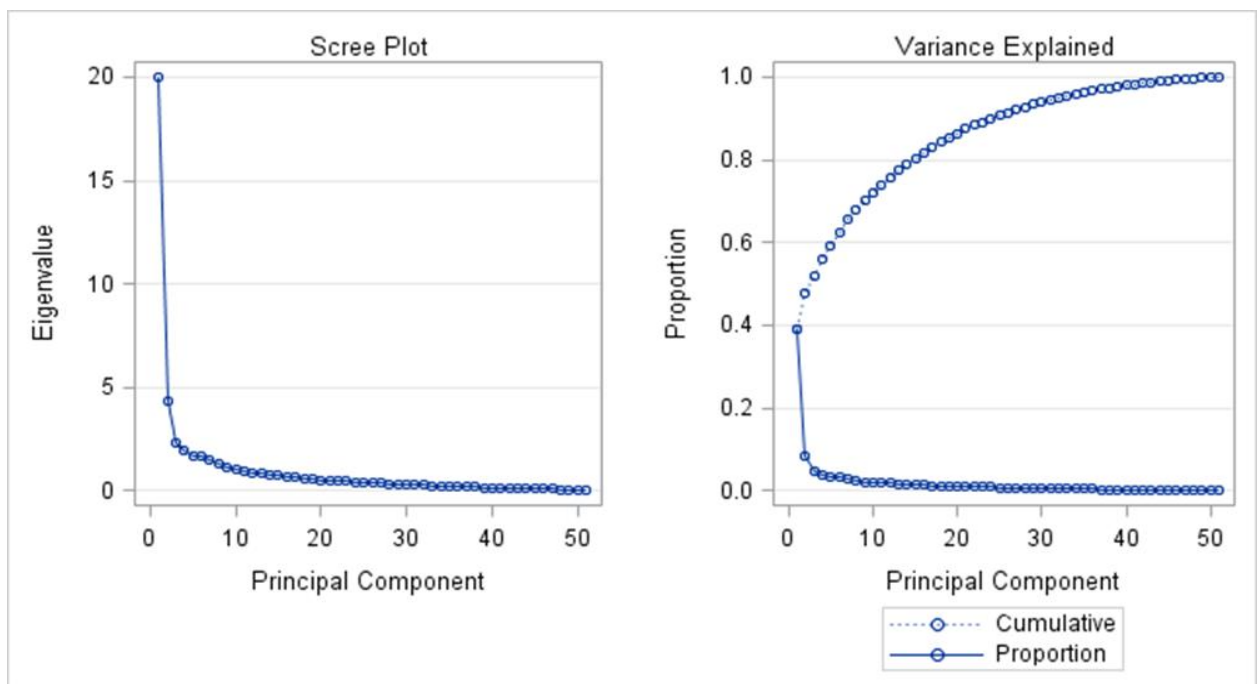
**Table 5.17: Principal components - all KM questions**

<b>Eigenvalues of the Correlation Matrix</b>				
	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<b>1</b>	19.9640613	15.6509551	0.3915	0.3915
<b>2</b>	4.3131061	2.0203949	0.0846	0.476
<b>3</b>	2.2927112	0.3637917	0.045	0.521
<b>4</b>	1.9289195	0.2187387	0.0378	0.5588
<b>5</b>	1.7101808	0.0461644	0.0335	0.5923
<b>6</b>	1.6640163	0.1677041	0.0326	0.625
<b>7</b>	1.4963122	0.175504	0.0293	0.6543
<b>8</b>	1.3208082	0.2364087	0.0259	0.6802
<b>9</b>	1.0843995	0.0657215	0.0213	0.7015
<b>10</b>	1.0186781	0.0360384	0.02	0.7214
<b>11</b>	0.9826396	0.0942806	0.0193	0.7407
<b>12</b>	0.888359	0.0653252	0.0174	0.7581
<b>13</b>	0.8230338	0.0357368	0.0161	0.7743
<b>14</b>	0.787297	0.0300154	0.0154	0.7897
<b>15</b>	0.7572816	0.0564374	0.0148	0.8045
<b>16</b>	0.7008441	0.0480744	0.0137	0.8183
<b>17</b>	0.6527697	0.0530115	0.0128	0.8311
<b>18</b>	0.5997583	0.0262195	0.0118	0.8428
<b>19</b>	0.5735388	0.0464316	0.0112	0.8541
<b>20</b>	0.5271071	0.039886	0.0103	0.8644
<b>21</b>	0.4872212	0.0126286	0.0096	0.874
<b>22</b>	0.4745925	0.0220646	0.0093	0.8833

23	0.452528	0.022986	0.0089	0.8922
24	0.429542	0.0562828	0.0084	0.9006
25	0.3732591	0.0198405	0.0073	0.9079
26	0.3534186	0.0019729	0.0069	0.9148
27	0.3514457	0.0146641	0.0069	0.9217
28	0.3367816	0.0206922	0.0066	0.9283
29	0.3160895	0.0097698	0.0062	0.9345
30	0.3063196	0.0076527	0.006	0.9405
31	0.2986669	0.034321	0.0059	0.9464
32	0.264346	0.0428289	0.0052	0.9516
33	0.2215171	0.012119	0.0043	0.9559
34	0.209398	0.0135691	0.0041	0.96
35	0.195829	0.0051751	0.0038	0.9639
36	0.1906539	0.008702	0.0037	0.9676
37	0.1819519	0.0126382	0.0036	0.9712
38	0.1693136	0.009207	0.0033	0.9745
39	0.1601067	0.0199331	0.0031	0.9776
40	0.1401736	0.0054414	0.0027	0.9804
41	0.1347322	0.0047918	0.0026	0.983
42	0.1299404	0.017046	0.0025	0.9856
43	0.1128944	0.0095991	0.0022	0.9878
44	0.1032953	0.0043969	0.002	0.9898
45	0.0988984	0.0023371	0.0019	0.9917
46	0.0965614	0.0083318	0.0019	0.9936
47	0.0882296	0.0158125	0.0017	0.9954
48	0.0724171	0.0111802	0.0014	0.9968
49	0.0612368	0.0025747	0.0012	0.998

50	0.0586622	0.0145066	0.0012	0.9991
51	0.0441556		0.0009	1

The eigenvalues can be interpreted as the equivalent number of variables which a factor represents or the amount of variance in the data described by a factor (Gareth-Mayer, 2006). Therefore, as can be seen from the returned eigenvalues, only two factors out of the four knowledge management components were significant as they accounted for 48% of the variance in the data; with the rest having very insignificant values. The scree plot of the principal components of all knowledge management questions is presented in Figure 5.12.



**Figure 5.12: Scree plot of principal components-all KM questions**

This called for a look at the factor loadings as read from the eigenvectors, since factor loadings measure how strongly each question loads and relates to

the factors, constructs or components. The eigenvectors are presented in Table 5.18.

**Table 5.18: Sorted principal components – Knowledge Process Capability (KPC) and KMP**

<b>Eigenvectors</b>				
<b>Item</b>	<b>Question</b>	<b>KPC</b>	<b>KMP</b>	<b>Construct</b>
<b>V32</b>	Frequently step back and reflect	0.19531	0.00792	KAC, KDI, RTK items
<b>V41</b>	Marketing spends time with technical people	0.19514	0.0102	KAC, KDI, RTK items
<b>V50</b>	Strategies to changes in competitor pricing	0.1923	-0.07523	KAC, KDI, RTK items
<b>V48</b>	Quick to respond to concerns raised by employees	0.19098	-0.00786	KAC, KDI, RTK items
<b>V39</b>	Regular meetings to discuss market trends	0.18989	-0.03904	KAC, KDI, RTK items
<b>V44</b>	We give feedback whenever we attend conferences	0.18864	-0.05188	KAC, KDI, RTK items
<b>V57</b>	Review effect of changes on customers	0.18628	-0.06379	KAC, KDI, RTK items
<b>V56</b>	Technological developments are circulated quickly	0.18491	-0.0604	KAC, KDI, RTK items
<b>V28</b>	Analyse contribution of products	0.18418	0.02021	KAC, KDI, RTK items
<b>V17</b>	Collect information about competitors	0.18375	-0.03414	KAC, KDI, RTK items
<b>V22</b>	Employees surveyed regularly	0.18362	0.05037	KAC, KDI, RTK items
<b>V18</b>	Meet customers at least once a year	0.18254	0.01112	KAC, KDI, RTK

				items
<b>V16</b>	Detect change in customer preference	0.18105	0.00187	KAC, KDI, RTK items
<b>V51</b>	Respond immediately to competitor campaign	0.17973	-0.01565	KAC, KDI, RTK items
<b>V31</b>	People with similar interests work together	0.17912	-0.00022	KAC, KDI, RTK items
<b>V35</b>	Often write case notes	0.17912	-0.00559	KAC, KDI, RTK items
<b>V21</b>	Survey end-users at least once a year	0.17857	-0.05097	KAC, KDI, RTK items
<b>V46</b>	Respond to changes in customer needs	0.17766	-0.02553	KAC, KDI, RTK items
<b>V33</b>	Quality circles are frequently used	0.17572	-0.09279	KAC, KDI, RTK items
<b>V38</b>	Make good use of Group Ware	0.17563	-0.0399	KAC, KDI, RTK items
<b>V34</b>	Actively encourages mentoring	0.17321	-0.0184	KAC, KDI, RTK items
<b>V24</b>	Encouraged to attend training	0.17205	0.01147	KAC, KDI, RTK items
<b>V43</b>	Often update policy and procedure	0.16879	0.00191	KAC, KDI, RTK items
<b>V49</b>	Know when something happens to competitor	0.16414	-0.0567	KAC, KDI, RTK items
<b>V23</b>	Regular staff appraisals	0.14978	0.03263	KAC, KDI, RTK items
<b>V27</b>	Know how much products cost	0.14168	0.04924	KAC, KDI, RTK items
<b>V29</b>	Good financial information	0.13481	0.04941	KAC, KDI, RTK items
<b>V20</b>	Lot of market research	0.13466	-0.00523	KAC, KDI, RTK

				items
<b>V52</b>	Often change our procedures	0.1334	0.00529	KAC, KDI, RTK items
<b>V42</b>	Large number of written reports	0.12436	0.06971	KAC, KDI, RTK items
<b>V19</b>	Acquire new ideas through export	0.12387	0.0667	KAC, KDI, RTK items
<b>V55</b>	Up to date with technological developments	0.11858	-0.06071	KAC, KDI, RTK items
<b>V47</b>	Quick to respond to customer complaints	0.10071	0.01935	KAC, KDI, RTK items
<b>V30</b>	Work space easy for people to talk	0.09928	0.10341	KDI items
<b>V53</b>	Often change the range of products	0.09711	-0.00367	KAC, KDI, RTK items
<b>V45</b>	Respond to customers if dissatisfied	0.09196	0.07848	KAC, KDI, RTK items
<b>V40</b>	Customer information database easy to access	0.08776	0.04227	KAC, KDI, RTK items
<b>V36</b>	Often use video conferencing	0.07107	0.07887	KDI items
<b>V26</b>	Regular meetings with employees	0.04037	-0.00817	KAC, KDI, RTK items
<b>V54</b>	Frequently change marketing strategies	0.02696	-0.0164	KAC, KDI, RTK items
<b>V25</b>	Encouraged to undertake courses	- 0.06885	0.09407	KDI items
<b>V37</b>	Often use teleconferencing	- 0.03564	0.02946	KDI items
<b>V14</b>	Business contacts useful for colleagues	0.02316	0.40636	<b>KMP items</b>
<b>V13</b>	Business contacts are useful	0.02171	0.39729	<b>KMP items</b>
<b>V15</b>	Colleagues aware of business	0.02666	0.39187	<b>KMP items</b>



	contacts			
<b>V9</b>	Colleagues aware of my knowledge	0.00388	0.34	<b>KMP items</b>
<b>V12</b>	Colleagues are aware of my experience	- 0.02211	0.31264	<b>KMP items</b>
<b>V8</b>	My knowledge is useful for colleagues	0.01357	0.25145	<b>KMP items</b>
<b>V7</b>	My knowledge is useful at work	0.04081	0.25026	<b>KMP items</b>
<b>V10</b>	My experience is useful at work	0.02725	0.24655	<b>KMP items</b>
<b>V11</b>	Colleagues benefit from my experience	0.0176	0.17242	<b>KMP items</b>

From Table 5.18, variables shaded in a light shade of tan are associated with the factor labelled as knowledge process capability (KPC), whilst the ones shaded in blue are associated with factor labelled knowledge management practices (KMP). Inspection of the variables associated with the factor KM1 (now KPC) show that these were items originally under constructs KAC, KDI and RTK.

Statistical analysis revealed the inability of respondents to clearly distinguish between the three constructs. Therefore, respondents to the questionnaires did not perceive as different, the constructs knowledge acquisition, knowledge dissemination and responsiveness to knowledge. It became imperative to combine them into one factor. These merged factors (KAC, KDI, RTK) will thus be referred to together, hereafter, as the knowledge process capability (KPC).

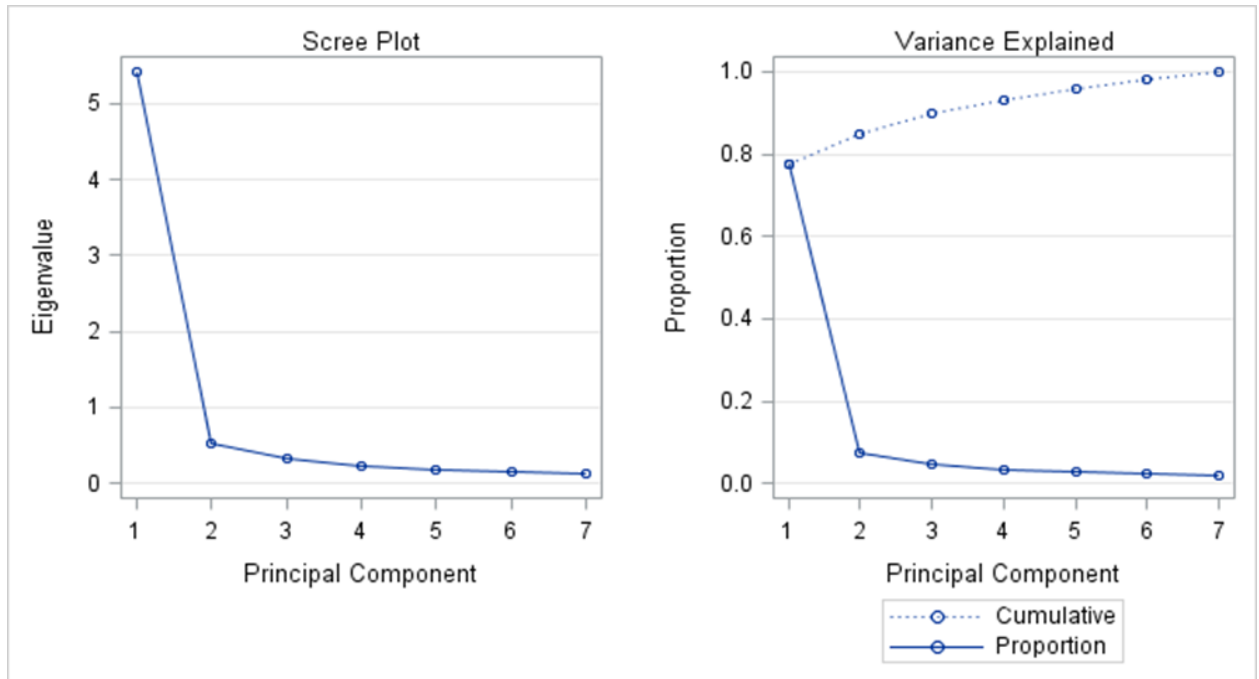
The blue shaded variables are items of the knowledge management practices (KMP) factor that loaded strongly with the same factor. The four items in the yellow shade had weak loadings and could sit in either of the two factors, i.e. knowledge process capability (KPC) or knowledge management practices (KMP).

The same analysis was undertaken for organisational performance (OP) as a component. However, this is subjective organisational performance since it reflects the personal views of the various respondents on their respective companies' performance. The results are presented in Table 5.19.

**Table 5.19: Principal components – subjective organisational performance; Eigenvalues of the Correlation Matrix**

	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>	<b>Cumulative</b>
<b>1</b>	<b>5.41749095</b>	<b>4.88047554</b>	<b>0.7739</b>	<b>0.7739</b>
<b>2</b>	0.53701541	0.20772179	0.0767	0.8506
<b>3</b>	0.32929362	0.10225951	0.047	0.8977
<b>4</b>	0.22703411	0.03652271	0.0324	0.9301
<b>5</b>	0.1905114	0.02746403	0.0272	0.9573
<b>6</b>	0.16304737	0.02744022	0.0233	0.9806
<b>7</b>	0.13560715		0.0194	1

The eigenvalues confirmed organisational performance as a strong factor, component or construct as it explained 77% of the variance (in bold). This can also be observed from the scree plot in Figure 5.13.



**Figure 5.13: Scree plot of principal components - organisational performance**

## 5.6.2 The General Linear Model Procedure – OP and KM

### 5.6.2.1 *t*-Tests

The collected data is amenable to parametric analyses such as *t*-tests. Parametric statistical methods are considered powerful with higher level numerical data and results are intended to be generalised to the population from which the sample was drawn (Saunders *et al*, 2012). The most basic parametric statistic is the *t*-test. The *t*-test was administered to determine the likelihood of a pattern, i.e. differences between the variables occurring by chance alone. Therefore, the question is ‘Are the differences in the categories statistically significant?’

**Table 5.20: t-Tests (LSD) for OP**

Alpha	0.05
Error Degrees of Freedom	118
Error Mean Squares	0.816189
Critical Value of t	1.98027
Least Significant difference	0.7243
Harmonic Mean of Cell Sizes	12.20172

As can be seen from Table 5.20, 1.98027 is the critical value for the t-statistic tested at the 0.05% level of significance for the sample size means that any t-statistic greater than 1.98027 indicates that the organisational performance (OP) scores for that set of companies are significantly different. The probability of the differences between each of the grouping in the model occurring by chance is low.

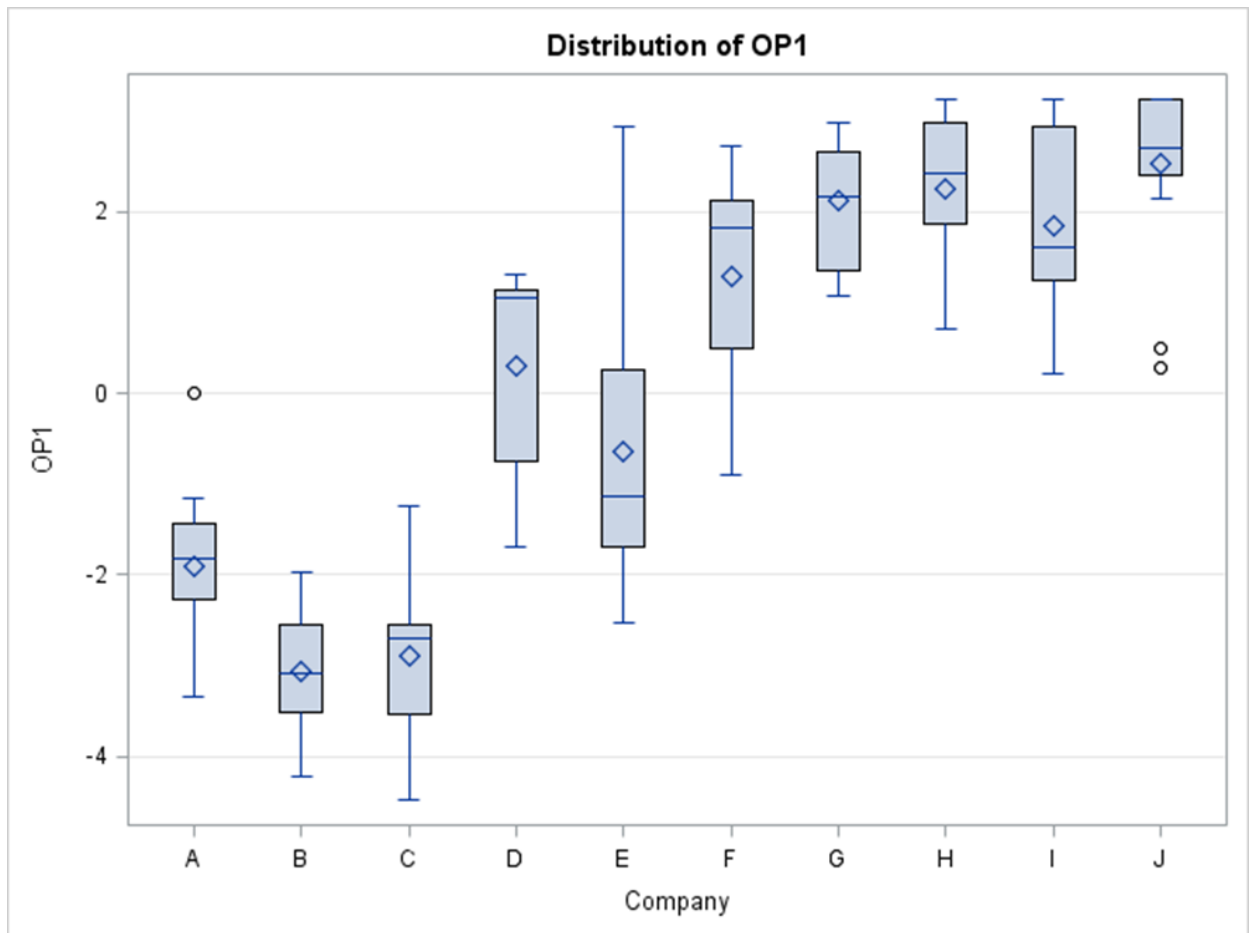
Table 5.21 shows the t–grouping of the ten companies that were surveyed. The summary of the company means indicates which pairs are significantly different and which are not. The mean for each company is given and means with the same letter are not significantly different. Therefore, companies with the same letter belong to the same group in terms of their organisational performance. For example, companies J, H, G and I are not significantly different from one another; and companies J, H and G are significantly different from Company F but Company I is not significantly different from Company F.

**Table 5.21: t-Grouping**

<b>Means with the same letter are not significantly different.</b>				
<b>t-Grouping</b>		<b>Mean</b>	<b>N</b>	<b>Company</b>
	A	2.5202	16	J
	A			
	A	2.2395	9	H
	A			
	A	2.1121	13	G
	A			
B	A	1.8438	14	I
B				
B		1.2783	13	F
	C	0.3106	8	D
	D	-0.6515	11	E
	E	-1.8948	14	A
	F	-2.888	12	C
	F			
	F	-3.0539	20	B

More of these groupings can also be observed from Table 5.21 and Figure 5.14, the Box and Whisker plot. This t-grouping is similar to the cross tabulation in Table 5.16 whereby companies' knowledge management performance is compared to organisational performance in terms of the earnings per share (EPS). The same groupings in Table 5.14 tend to replicate themselves in this statistical t-grouping under Table 5.21, confirming that

indeed the knowledge management performance groups that correlate to organisational performance are statistically correct.



**Figure 5.14: Box and Whisker plot**

### 5.6.2.2 Analysis of Variance (ANOVA)

An ANOVA was also administered and is essentially an extension of the t-test but has the advantage that it can also be used in factorial designs, i.e. research involving simultaneous analysis of two or more independent variables or factors. It analyses the variance, i.e. the spread of data values within and between groups of data by comparing the means. Additionally, an ANOVA

breaks down the total variability of a set of data into its component *sources of variation*, explaining the variation in a set of scores on one or more independent variables (see Tables 5.18 and 5.20). Also an ANOVA identifies and explains two types of variance: *systematic* (variance in data which is attributable to a known factor that increases/decreases all scores that it influences) and *error* (variance in data attributable to an unknown factor that has not been examined/controlled in the study). These are also presented in the Table 5.20.

### Hypothesis testing

The null hypothesis to be tested is:

Ho: There is no relationship between knowledge management and organisational performance.

**Table 5.22: ANOVA: Dependant variable - OP**

Source	df	Sum of Squares (SS)	Mean Square	F value	Pr > F
Model	11	636.5246783	57.8658798	70.9	< .0001
Error	118	96.3102458	0.8161885		
Corrected Total	129	732.834924			

**SS Error and SS Effect** - The within-group variability (OP) is referred to as *error* variance. It represents the fact that we cannot readily explain or account for it in the current design. However, the *SS effect* (model) can be explained in that the variability of organisational performance is due to the differences in means between the groups. Put differently, group membership explains this variability because it is known to be due to the differences in means.

**Significance testing** - statistical significance testing in this instance is based on a comparison of the variance due to the between-groups variability (called mean square effect) with the within-group variability (called mean square error) which also explains why many statistical tests are represented by ratios of explained and unexplained variability, just like ANOVA does. Under the null hypothesis, some minor random fluctuation in the means for the groups can be expected. Therefore, under the null hypothesis, the variance estimated based on within-group variability should be about the same as the variance due to between-groups variability.

A comparison of those two estimates of variance can be done via the *F*-test (*F* value), which tests whether the ratio of the two variance estimates is significantly greater than 1. In this instance, the test is highly significant, and it can be concluded that in fact the means for the groups are significantly different from each other. The *F* value in Table 5.22 represents the ratio of variance. An *F* statistic of 70.9 represents a low likelihood of any difference between the groups occurring by chance alone, and this is statistically significant.

**Table 5.23: Assessing the strength of relationship**

R-Square	Coeff Var	Root MSE	OP Mean
0.868579	3431.562	0.903432	0.026327

The coefficient of multiple determination (R-squared) shows that 87% of the variation in organisational performance is explained by knowledge management, having knowledge process capability (KPC), and knowledge management practices (KMP) as the components (Table 5.23). This indicates a high degree of goodness of fit for the estimated model.



**Table 5.24: Interaction**

Source	df	Type III SS	Mean Square	F value	Pr > F
KPC	1	20.51998933	20.51998933	25.14	< .0001
KMP	1	0.02448644	0.02448644	0.03	0.8628
Company	9	48.9075185	5.43416872	6.66	< .0001

Table 5.24 shows that there is a strong relationship between knowledge process capability (KPC) and organisational performance. These findings are statistically significant at the 0.0001 level, so much that the risk of getting a relationship as strong as 87% when there is no relationship in the variables is no higher than 0.001 in 100 implying that the results are unlikely to have occurred by chance. Therefore, the null hypothesis is rejected. Knowledge management practices (KMP) have, however, shown to have a weak relationship with organisational performance.

The null hypothesis of knowledge management processes (enablers) not leading to improved organisational performance (increased earnings per share) is also rejected. Variations have been noted through the differences in the means. The t-test was administered to determine the likelihood of differences between the variables occurring by chance alone. The coefficient of multiple determination (R-squared) has shown that 87% of the variation in organisational performance is explained by knowledge process capability (KPC) and knowledge management practices (KMP), and this is proof enough that knowledge management leads to improved organisational performance.

In summary of the discussion of the analysis of variance (ANOVA), the purpose of the analysis of variance was to test differences in the means (for groups/variables) for statistical significance. This was accomplished by analysing the variance through partitioning the total variance into the component that is due to true random error, that is, within group (sum of

squares) and the components that are due to differences between means (mean square). The variances due to differences between means (mean square components) were then tested for statistical significance. The null hypothesis of no differences between means was rejected; and it was accepted that the means (in the surveyed companies) are different from each other.

## **5.7 ASSESSMENT OF THE STRENGTH OF CONSTRUCT RELATIONSHIPS**

Using the statistical data presented in Table 5.25, an assessment of the strength of relationships between knowledge management practices (KMP), knowledge process capability (KPC), knowledge management (KM) and organisational performance (OP) is presented.

The sums of squares (SS) and the mean square figures computed in the General Linear model (GLM procedure) will be used to derive the strength of the effect on organisational performance and its source against the error variance. The quantifiable strength in the relationships would then be applied to the proposed knowledge management model.

### **5.7.1 The relationship between knowledge management and organisational performance**

Knowledge management, being the quantifiable independent variable, has shown to have a strong relationship with organisational performance, which is the quantifiable dependent variable. This assessment is drawn from the regression coefficient (R-squared) of 87% which explains the amount of variation in organisational performance between the sampled organisations that is explained and attributable to the effect of knowledge management.

**Table 5.25: Strength of relationship between KM components and OP**

PCA data summaries - Subjective OP and KM - by Company

The GLM Procedure

Class Level Information	
Class	Levels
Company	Values
	10 A B C D E F G H I J
Number of Observations Read	191
Number of Observations Used	130

PCA Glm 3 July 2014 2014

PCA data summaries - Subjective OP and KM - by Company

The GLM Procedure

Dependent Variable: OP1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	636.5246783	57.8658798	70.9	<.0001
Error	118	96.3102458	0.8161885		
Corrected Total	129	732.834924			

R-Square	Coeff Var	Root MSE	OP1 Mean
0.868579	3431.562	0.903432	0.026327

Source	DF	Type III SS	Mean Square	F Value	Pr > F
KPC	1	20.51998933	20.51998933	25.14	<.0001
KMP	1	0.02448644	0.02448644	0.03	0.8628
Company	9	48.9075185	5.43416872	6.66	<.0001

Also the *sum of squares* (SS) of the knowledge management model amounting to 636.5 against an error variance *sum of squares* (SS) of 96 from the GLM procedure on organisational performance suggest that the systematic variance in the organisational performance data is attributable to a known factor that systematically increases the scores it influences, and that known factor in this regard is knowledge management.

The difference in the means as denoted by the mean square (50.86 for the knowledge management model against 0.82 for an unknown factor) shows that the likelihood of any performance differences occurring by chance alone is low.

All of these statistics contribute to the strong correlation between knowledge management and organisational performance denoted by the correlation coefficient i.e. R-squared, of 87%.

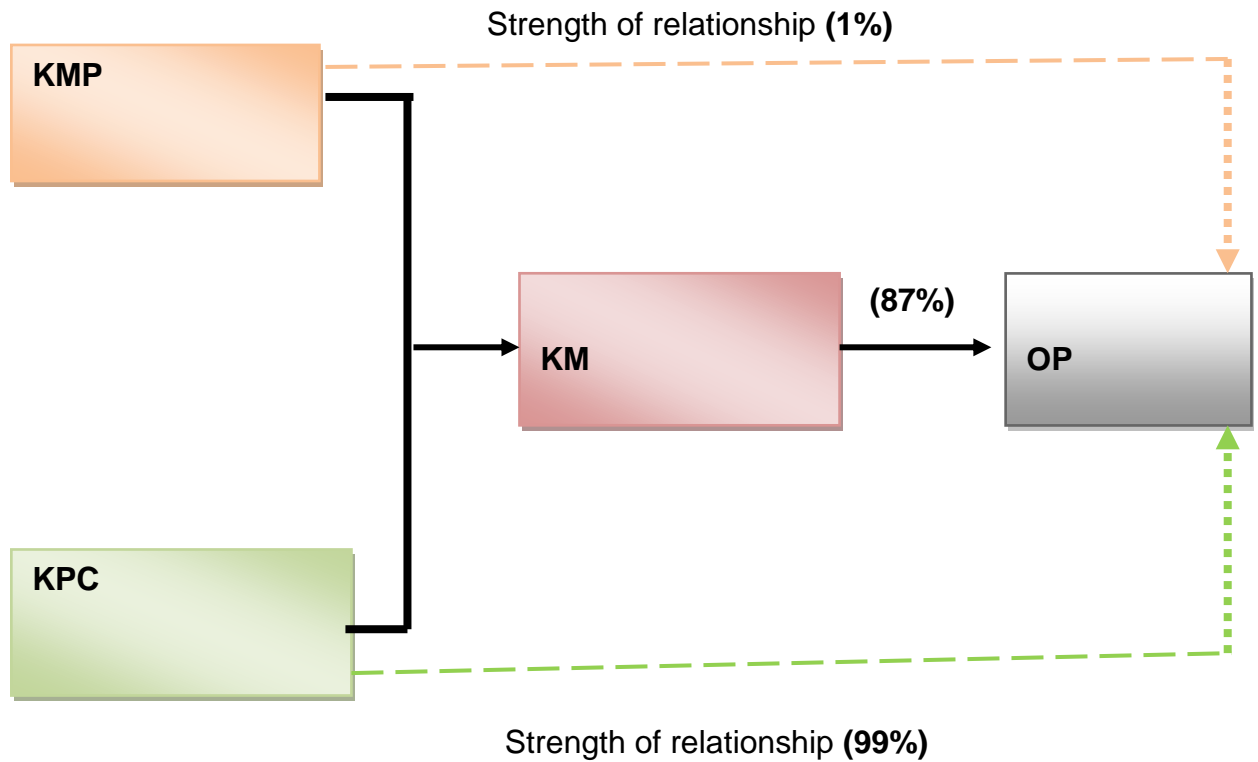
### **5.7.2 The relationship between knowledge process capability, knowledge management practices and organisational performance**

A two-way ANOVA was used to analyse the knowledge management variables' effect on organisational performance. The two knowledge management variables investigated were knowledge process capability (KPC) and knowledge management practices. Because of the interaction between these independent variables, the *interaction* is reported and interpreted. The *interaction* as read from the *type III sum of squares* ( $SS=20.52$ ), shows that knowledge process capability (KPC) contributes more (99%) to the relationship between knowledge management and organisational performance than knowledge management practices' 1% (*type III sum of squares* ( $SS=0.024$ )).

This can be depicted in Figure 5.15

## **5.8 CHAPTER SUMMARY**

The purpose of this chapter was to present the empirical data that has been collected from the questionnaires and semi-structured interviews. The quantitative data from the questionnaires was recorded, analysed and utilised. This was done in conjunction with the University of Pretoria's Statistics Department. Out of the 500 questionnaires distributed to the variously listed construction and engineering companies, 191 completed questionnaires were returned, yielding a return rate of 38,2%.



**Figure 5.15: The strength of relationships**

Key

KMP = knowledge management practices

KPC = knowledge process capability (KAC+ KDI + RTK)

KM = knowledge management (KMP + KPC)

OP = organisational performance

The statistics that were used consisted of two parts, the first part being concerned with establishing the basic statistical measures of the response variables for every question covering aspects that pertain to knowledge management. The second part was concerned with the testing of relationships between certain model variables.

No company was rated highly in all of the five knowledge management components that were being examined. None of the companies was rated in the high range on the knowledge management practices (KMP) scale. All of them belonged in the medium category on that aspect. Only companies I and J scores were in the high bracket on four out of the five knowledge management scales. Company H also did well in three out of five of the knowledge management components, also missing the high ranking for knowledge dissemination that I and J did well in.

The principal components analysis was performed on the items under the four knowledge management factors, namely: knowledge management practices (KMP), knowledge acquisition (KAC), knowledge dissemination (KDI) and responsiveness to knowledge (RTK). Eigenvectors were extracted and their associated eigenvalues from the principal components analysis. The same analysis was undertaken for organisational performance as a component. However, this was subjective organisational performance. The eigenvalues confirmed organisational performance as a strong factor, component or construct as it explained 77% of the variance (highlighted).

The t-test was administered to determine the likelihood of a pattern, i.e. differences between the variables occurring by chance alone. The same groupings found in Table 5.14 tended to replicate itself in the statistical t-grouping under Table 5.21, confirming that indeed the knowledge management performance groups that correlated to organisational performance were statistically correct.

An ANOVA was also administered and the resulting F statistic of 70.9 represented a low likelihood of any difference between the groups occurring by chance alone and this is statistically significant.

The coefficient of multiple determination (R-squared) showed that 87% of the variation in organisational performance was explained by knowledge process

capability (KPC) and knowledge management practices (KMP) in Table 5.22. This indicated a high degree of goodness of fit for the estimated model.

The qualitative data was analysed through content analysis. This involved the collection of data excerpts that were then used to establish what concepts are discussed most. These were presented in tables under each knowledge management component after the quantitative data.

## **CHAPTER 6**

### **FINDINGS AND DISCUSSION**

#### **6.1 INTRODUCTION**

This chapter provides a general discussion and reflection on the research findings principally based on the analysis of the data that was collected. The aim of this study was to investigate the role that knowledge management plays in the performance of an organisation. Because of the little, if at all, previously published formal academic research on the role of knowledge management in the performance of the South African construction and engineering sector firms, it was decided to focus on the construction and engineering companies that are listed on the Johannesburg Stock Exchange (JSE) at the time the research was conducted. Therefore, it can be said that the cardinal objective of this research was to investigate the inter-dependencies between knowledge management and organisational performance in the JSE-listed construction and engineering companies in South Africa.

The expectation was that the research would provide insights into the relationships between knowledge management and organisational performance. Apart from providing researchers and managers with empirical evidence that illuminates the relationship between knowledge management and organisational performance, this research is also expected to provide practitioners a better appreciation of how knowledge management can be effectively implemented through the understanding of the factors that guide the



institutionalisation of knowledge management through a more targeted and direct approach.

By drawing together the observations from the previous chapters, the main findings will be highlighted in this chapter. Connections will also be made between the results obtained in Chapter 5 and the literature reviewed in chapters 1 to 3 relating to broader areas of knowledge management, intellectual capital and organisational performance. This chapter is divided into three sections - personal profile, knowledge management and organisational performance: and will discuss and reflect on the findings from each section. Findings from the statistical analysis as well as from the complimentary qualitative interviews will also be discussed.

## **6.2 PERSONAL PROFILE OF RESPONDENTS**

The first section of the questionnaire dealing with the personal profile of the respondents revealed that the predominant qualifications in the construction and engineering sector were the bachelors degrees and 'other' qualifications. Diplomas and higher national diplomas make up most of the qualifications in the 'other' category. The bachelors degrees and the 'other' qualifications accounted for 95% of the surveyed respondents and were split up almost on a 50-50 proportion. Honours and masters degree qualifications in this sector were very rare. Workers with matric qualifications were also found. The lack of progression from diplomas and bachelors degrees could be linked to the non-encouragement of further study from the industry perspective.

Staff mobility seems quite evident in this industry. Perhaps it could be a consequence of inadequate mechanisms for staff retention, as most of the respondents had spent less than five years with their current organisation. This supports the basis of this study as raised in the problem definition of the research that a significant number of experienced employees are retiring, changing to part-time or moving from their employment so much that critical

institutional knowledge is at risk of being lost (Stevens, 2010). Some of the qualitative information obtained from many of the respondents during the interviews, especially respondents from companies A, B and C, included the fact that there are no incentives to remain in the company. Other respondents cited what they called the 'lack of career development plans'.

This confirms the observation by Tobin and Magenuka (2007) in their research of the JSE-listed construction sector companies that the construction industry in South Africa is widely perceived as an industry with low productivity and poor performance because of a lack of knowledge dissemination particularly 'project-driven' knowledge and the use of project-generated knowledge. This could be attributable to the lack of incentives for employees to stay long enough in the same company so as to disseminate the driving project knowledge that underpins the engineering and construction industry.

It also makes it difficult to compile and disseminate useful knowledge to other projects. The respondents' length of service in the construction industry across the surveyed companies hardly goes beyond 10 years, also confirming that retirements and movements from employment could have caused the lack of large numbers of employees above 10 years.

## **6.3 KNOWLEDGE MANAGEMENT**

### **6.3.1 Knowledge management practices**

The study shows that most of the respondents from companies A to C confirmed that their organisations did not have a formal knowledge management programme in place. Also of note are companies I and J that had more respondents affirming that they in-fact did have a formal knowledge management programme and this is reflected in their performance and thus

one can start drawing parallels between the presence of knowledge management policy and its effects on organisational performance.

The recruitment policy and practice of 94% of the companies shows that they link skills to positions as most of the respondents acknowledged that their education was useful to the job they are doing. An interviewee opined: “I am a project manager partly because I have a project management qualification”, “yes, I am a qualified engineer” retorted another. Over 90% of respondents also acknowledged that their knowledge was useful to the work of others. However, some disconnection was revealed by the fact that 70% of the respondents disagreed with the idea that their colleagues were aware of or benefited from their knowledge, and this applied to most of the surveyed companies.

Individually, the companies exhibited a uniform and similar trend of valuing experience during recruitment but the employees were not connected enough to enable other knowledge management processes to take place. Most of the employees boasted of having worked for other construction and engineering companies before joining their current organisation. “I gained much of my experience in project management at ..... before joining this company” was one of such shows of experience. The trend of valuing experience could be explained by the possibility that it could be that the companies would want to engage employees qualified and experienced enough to hit the ground running.

The lack of connectedness to enable knowledge management processes might be contextualised especially taking into account the modus operandi of construction firms, whereby most activities in construction are done on a project basis and project teams are disbanded on completion of a project. Construction projects would come up in different and varied geographical locations and a team of relevant staff would be put together for that specific project, only to be disbanded at the end of the project - normally in a matter of months to a year. Even the researcher found it difficult to pin the respondents

down to take a few moments to answer the questions. Responses such as “I do not have time to talk to you as we have to hand-over this project in so many weeks’ time” were quite popular.

This operating arrangement leaves little room for staff to have enough time and space to engage in knowledge process capability actions such as knowledge acquisition, dissemination and knowledge responsiveness activities that would lead to an awareness by colleagues of individual knowledge. Employees would be focussing on project completion and delivery of the finished buildings as they normally operate under tight project delivery milestones. These conditions warrant a deliberate programme of knowledge management so as to create opportunities for the awareness of knowledge held by and amongst colleagues.

The aim of the sub-questions in Question 6 was to rank the usefulness of three basic elements of an individual’s intangible knowledge capital (theoretical knowledge, professional knowledge and professional contacts) and to record the level of awareness among other colleagues. The questions also tried to analyse how well connected to each other staff were as well as the usefulness of their basic knowledge elements. All these reflect the knowledge management practices of the various companies surveyed. This is quite important when it comes to knowledge transfer as Alhammad *et al* (2009) identified four dimensions of knowledge transfer with social connotations. These are:

- Mutual relationships
- Team - sense of togetherness
- Positive feelings about sharing knowledge
- Intention to share knowledge.

The same sentiment was expressed on personal business contacts whereby the respondents were of the view that personal business contacts were not useful for the other work colleagues; neither were their colleagues aware of

their contacts. One respondent objected “we only use company contacts for all company related business”. Another was of the view that “my personal business contacts are purely for my purposes only”. Others believed that “my personal contacts are of no use to my employment space”. This provided confirmation of the fact that either they were not connected to each other enough to know what is useful to other colleagues or personal business contacts were not being harnessed for knowledge management purposes.

The implications of these findings are that although the construction and engineering firms are unconsciously practising some *ad hoc* form of knowledge management practices, they have not yet adopted a formal knowledge management programme. It became obvious from the interviews that some of the participants were not aware of the concept of knowledge management. The following questions/responses from some of the interviewees about the meaning of knowledge management revealed that the concept of knowledge management was not readily floated around. A respondent inquired if “knowledge management is a trade secret?” and another quipped “is knowledge management a client’s offering?” Another was of the view that “knowledge management is difficult because customers would not be prepared to pay for it”. This is unsurprising as prior empirical studies have shown that most enterprises lack an understanding of knowledge management practices and are just beginning to get to grips on how knowledge management might assist them (Lim & Klobas, 2000; Tobin & Magenuka, 2007).

Joshi and Sarker (2006) also studied the factors associated with knowledge transfer with a particular focus on:

- Team member’s capacity to absorb
- Motivation
- Communication amongst members
- Group culture
- Group cohesion.

They found that if the knowledge receiver interacts widely with other team members and is part of a syndicate with a high affinity for knowledge transfer, then the individual is able to internalise a substantial quantity of transferred knowledge.

### **6.3.2 Knowledge process capability**

The study investigated existing processes for obtaining knowledge in the broader scheme of knowledge management in organisations. In literature, various terms are used to describe these processes, namely: knowledge creation, generation, collaboration and seeking. The underlying theme in all these terms is the acquisition of knowledge. From the literature reviewed in Chapter 2, it was noted that knowledge acquisition can be accomplished in the course of socialisation (Nonaka *et al*, 2000); mentorship and use of teams (Mitchell, Nicholas & Boyle, 2009); open conversations and deliberations using facilitators as catalysts who are skilled in extracting vital knowledge and speed up the process (Fong, Hills & Hayles, 2007); co-operation (Yang, 2007); and porous organisational boundaries and contingent work (Gold *et al*, 2001).

Variations were observed per organisation on the various knowledge acquisition factors (i.e. KAF1 to KAF5) being explored. The surveyed firms scored low on their valuing of employees attitudes and opinions. This knowledge acquisition factor also had the lowest average score on the overall knowledge acquisition scale. In fact, one of the items on this factor i.e. 'employees are encouraged to undertake university & polytechnic courses', had negative loadings on the principal components.

It is quite apparent that knowledge acquisition through training is not a priority in the construction and engineering companies. A site manager on one of the constructions companies' site intimated that "we also engage contactors with specialist knowledge on the various activities required at every stage of the project". The names of the contacted companies were even displayed on the project information board displayed at the site, as is the custom of all the

construction companies visited by the researcher. The reason for this could be found in the nature of the companies' operations whereby jobs come in the form of projects with completion time-lines and therefore there would be limited time for sending employees for training. Some of the employees interviewed were on the various construction sites.

It was discovered that over 50% of the surveyed companies did not regularly assess their employees' attitudes towards work. The main concern raised by respondents during the interviews was that "we are contract employees and our services are only required from contract to contract." This seemed to create a monetary/labourer relationship without a valued long-term relationship. On regular staff appraisals and needs discussion, the pattern was rather more positive and the same platform could be used to attend to the causes of negative employees' feelings about their perceived value.

That the organisations have well-developed financial reporting systems got the highest scores, even on the average scale. The organisations that had the highest scores on this knowledge acquisition factor were companies G, I and J (see section 5.4.2). These companies also scored high on the aspect of working within international partnerships (see V20 and V21 under KAF2) and therefore they could have benefited in acquiring that knowledge from their international partners.

Knowledge dissemination, sharing or transfer is one of the components of the knowledge process capability that is also affected by the organisational social discourse (Davenport & Prusak, 2000). Yang (2007) argues that the eventual aim of acquiring and sharing knowledge is to transform all individual know-how and experiences into organisational competencies. The strength of organisational competencies and their effectiveness would increase if more of the personal intellectual capital is transmitted to and converted into organisational assets.

It is quite apparent that in companies C, B and A, knowledge is not generally disseminated on the job, as observed from the questionnaire feedback. While companies H, I and J seem to be doing well in this aspect, negative responses were given for the items measuring knowledge dissemination on the job namely:

- The workspace being set up to make it easy for people to talk to each other.
- People with similar interests being encouraged to work together to solve problems.
- Frequent reflections on what went wrong/right in aspects of business.

The work space is not set up to make it easy for people to talk to each other. Most respondents were surveyed from their construction sites and they did not have places where they could casually congregate for tea or water dispensing machines that would facilitate mini chats. The view of some of the respondents was that “there is no time to waste gossiping”. Another respondent opined “we are always temporarily resident at project sites and so we cannot set-up such facilities”. Again this can be attributed to the nature of their job. The same negative responses were given for people with similar interest working together and stepping back to reflect on what went wrong/right. The issue of time being of essence in this industry was quite overwhelming in most responses.

The increased complexity of knowledge dissemination as compared to the other knowledge management components is rooted in the reality that:

- knowledge exists in organisational participants, daily tasks, tools and their sub-networks (Argote, McEvily & Rogers, 2003),
- a considerable amount of the knowledge in organisations is tacit and therefore difficult to articulate (Nonaka & Takeuchi, 1995).

It is, therefore, part of the findings that the construction and engineering firms find ways to enhance the social aspect at the various sites of their projects.



Knowledge dissemination in this instance is interpreted through the social perspective whereby recognition is given to the manifestation of human and social dimensions as its major components. According to Nonaka and Takeuchi's (1995), knowledge is created, shared, amplified, enlarged and justified in organisational settings through social and collaborative processes.

The use of specific techniques to disseminate knowledge got the worst ratings, particularly on the question average scale. Some companies employed quality circles techniques, encouraged mentoring and wrote case notes, but these were in the minority. Employing such techniques provides a vast area of opportunity in the construction and engineering industry for personal communication, construction of individual knowledge and cultures of sharing and trust (Southon & Todd, 1999). The incorporation of such techniques into knowledge communities also results in organisational opportunities for building social capital that includes trust and cooperation.

On using technology to disseminate knowledge, four companies out of ten had scores in the high range. These are the same companies that did generally well in most aspects of knowledge management. Amongst the technological tools considered (video conferencing, lotus notes and teleconferencing), the use of Group-Ware such as Lotus Notes to share information on products and processes had the lowest scores. This could be attributable to the fact that the use of video conferencing and teleconferencing entails getting employees to sit down in a venue and watch or listen and yet this goes against the sentiment of time and tight project milestones which define the construction and engineering industry. A to E had scores in the low range in this category.

Knowledge management implementations often rely on technology support and although there is a debate about the degree of importance of such technologies, many organisations consider them as very important enablers that support the implementation of a knowledge management strategy (Tobin & Magenuka, 2007). These technical systems define how knowledge travels throughout the firm and how it is accessed. In the respondent population

however, they are still to appreciate the benefits of such technologies as they only value technology which directly related to specific construction tasks at that moment.

The knowledge dissemination factor that tested if market information was being freely disseminated produced variations amongst companies; with those that had shown some measure of knowledge management awareness scoring in the high range. Poor performance was exhibited on the average question score level across the board on the issue of inter-departmental discussions/meetings, e.g. technical department meeting with marketing department to discuss future customer needs. This item also had a low score compared to other items in the same knowledge dissemination factor.

The inability to build communities of knowledge that was exhibited by the surveyed construction and engineering companies could have affected particularly the scores of this component of knowledge dissemination. As has been seen from literature on organisational knowledge infrastructure, a knowledge community is one of the most vital aspects of a knowledge management puzzle: a place in which people discover, use and manipulate knowledge whilst interacting and having encounters with others who are doing the same (Erickson & Kellogg, 2000). The essential characteristic of a knowledge community is the presence of conversation and other forms of narrative, i.e. stories and unguarded discussions among people who know each other, share professional interests and understand the contexts under which the conversation is taking place (Thomas *et al*, 2001).

Low scores were also observed on the expectation that employees provide feedback to others whenever they attend conferences, exhibitions or seminars because this question is related to the earlier question of employees being encouraged to attend seminars, conferences and training where low scores were also seen because the construction and engineering firms do not really encourage employees to attend seminars and conferences. This goes against the position of Erickson and Kellogg (2000) who advocate a variety of

techniques that could effectively contribute to knowledge management in this regard such as supporting new forms of group interaction, using metaphors so as to enhance creativity and supporting expressive communication.

The knowledge process capability aspect that related to the responsiveness of the surveyed companies to knowledge showed that the construction and engineering sector is quite responsive to customers in terms of quality, changes in customer needs and customer complaints. “We have to respond to customer queries immediately due to the nature of our products” one responded said, with reference to the life threat that could be caused by sub-standard plans and structures. “Mistakes are costly in this industry as it can also be extremely difficult to reverse an error” was the response of another on the aspect of quality and customer complains. It can be noted that the service and quality levels in the construction and engineering sector in South Africa have been kept in line with international standards. Lower scores on this variable were on response to concerns raised by employees. These were mainly to do with the welfare of the employees and conditions of employment. For effective knowledge management, it is as important for the organisation to manage external knowledge as it is to manage internal knowledge.

For the organisation’s products or services to be reflective of its knowledge, it is imperative to develop processes for applying the best knowledge to it. This entails developing efficient processes and activities for classifying, storing, finding and sharing knowledge using electronic and face to face approaches (Makore & Eresia-Eke, 2014).

Response to competitor activity also had low ratings in all the three considered areas of: 1) competitor knowledge and strategic response to 2) competitor price war, and 3) targeted customer attack. This points to lack of systems and processes being in place to capture knowledge about competitor activity so as to immediately trigger the right response. This was particularly reflected in one of the responses that “our point of contact with competition is when we bid for tenders and it is normally about price and the reputation/brand of the

company”. Therefore, the companies seemed not to have an incentive to track competitor activities as a knowledge process capability that would ultimately give them the price and reputation leverage. The conversion inclined knowledge management processes are the ones that are oriented towards making existing knowledge useful. These knowledge conversion processes are anchored in the company’s ability to organise, combine, integrate, structure, coordinate and distribute knowledge (Gold *et al*, 2001).

Having a framework for structuring or organising knowledge in the knowledge process capability is also critical to the organisation because there would not be any consistency or common dialogue of knowledge without common representation standards, and this would make the asset very difficult to manage (Davenport & Klahr, 1998; McDermott & O’Dell, 2001). Combining or integrating knowledge reduces redundancy and therefore enables the firm to replace out-dated knowledge through these processes. The frequently named mechanisms for facilitating integration are routines, sequencing, rules and directives, group problem-solving and decision making (Gold *et al*, 2001; Mitchell, Nicholas & Boyle, 2009; Makore & Eresia-Eke, 2014).

The consideration of the construction and engineering companies being flexible and opportunistic by often changing their procedures for doing things saw all companies scoring low range ratings. This is a reflection of the organisational structures being used in the construction and engineering sector. The knowledge management structure of an organisation is supposed to be multi-dimensional. On the one hand, the structures are supposed to be flexible enough so as to allow the organisation to adapt to the ever changing environmental landscapes. On the other hand, organisational structures are supposed to encourage rather than inhibit interactions among employees, which is critical for the effective management of knowledge (Gold *et al*, 2001).

Some of the responses from the interviews further confirm the inflexible structures of the construction and engineering companies. Some respondents opined that “our firm does not have a tradition of sharing knowledge”. Others

felt that they “work alone and have no time to teach others”. There were also those who argued that they were “all too busy but maybe informally through chatting they could share information”. A couple of respondents volunteered that their “firm does not provide opportunities for further education because of the feeling that time taken to make money for the company is being wasted”. Some structures may encourage the sharing of knowledge within a functional area but inhibit knowledge sharing across the organisation. Alternatively, knowledge sharing may be optimised at functional level whilst being sub-optimised across the supply chain. Therefore, it is of essence that organisational structures are designed to be flexible, encouraging sharing and collaboration across organisational boundaries and also across the supply chain.

Response to technological developments that affect the construction and engineering business is also divided into the two extremes of low performers (companies A, B, C) and high performers (companies J, I, H). This also provides an avenue of improvement. According to Yeh *et al* (2006), information technology is the essential building wedge that supports and coordinates business activities including data bases, knowledge platforms, performance evaluation management systems and integrated performance support among others. Carvalho and Ferreira (2001) suggest that another function of information technology is to accelerate the speed of knowledge creation and transfer. Therefore, previously disjointed flows of information and knowledge can be cohesive through the linkage of information and communication systems in the company. Technologies in business intelligence also support knowledge about an organisation’s competition and environment.

### **6.3.3 Organisational performance**

Organisational performance was the dependent variable in the hypothesised relationship with knowledge management. The organisational performance measure presented in Chapter 5 was subjective as it is based upon

respondent perceptions of company performance. The relationship between knowledge management and subjective performance was positive. The same positive relationship was observed between knowledge management and actual performance as obtained from the published statements, although the scores for subjective performance were more per firm. A possible explanation could be that subjective performance may have benefited from a greater halo effect when managers exaggerate the performance of their own companies even more than they might consider the presence of knowledge management practices and behaviours.

It could also be that knowledge management might not have been the only variable to have affected performance as other variables such as the economic or competitive environment could also have been a contributor. Particularly, the period before the year 2010 was quite robust for construction companies as the country was preparing to host the Soccer World Cup, with a lot of construction and upgrades of infrastructure. This was followed by a lull period characterised by a lot of retrenchments within the industry. All these are responsible for the study's position not to imply causality but rather a relationship between knowledge management and organisational performance.

The objective performance indicators as published in the financial statements of the various organisations are shown in Table 6.1. A comparative analysis of Table 6.1 and knowledge management performance measures presented in Chapter 5 provide evidence that there is some relationship between a company's knowledge management endeavours and the organisation's performance. Performance of the various organisations was observed based on the company's earnings per share, a measure calculated by dividing the net profit after tax by the total number of issued shares.

As can be seen in Table 5.11, companies A, B and C had the lowest total scores in knowledge management and this corresponds to negative earnings per share. At the other end companies J, I and G had the highest knowledge

management scores and these were associated with the reported higher earnings per share. The other companies in the middle category in terms of their total knowledge management scores, companies E, F and H, also reported earnings per share that arguably belong in the middle bracket compared to the other surveyed organisations.

**Table 6.1: KM compared to actual performance**

Company	Knowledge Management					Actual Organisational Performance		
	KMP	KAC	KDI	RTK	KM Total	EPS	Change in Revenue (sales) %	Change in Share price %
<b>A</b>	29.5	36	34	31.2	<b>130.7</b>	-0.39	50	-84
<b>B</b>	27.1	33.6	33.3	29.5	<b>123.5</b>	-130.84	94	-51
<b>C</b>	28.2	34.2	32.1	25.6	<b>120.1</b>	-246	52	-78
<b>D</b>	27.8	41.5	39.7	35.7	<b>144.7</b>	177.2	135	-93
<b>E</b>	27.5	43.7	41.3	34.7	<b>147.2</b>	0.09	8	54
<b>F</b>	25.5	54.6	49.1	43.8	<b>173</b>	0.05	80	96
<b>G</b>	26.2	52.1	50.9	45.2	<b>174.4</b>	116	-13	-42
<b>H</b>	28.6	54.5	54.6	49.3	<b>187</b>	0.33	-78	-38
<b>I</b>	29.7	56.6	55.8	51.7	<b>193.8</b>	698	68	155
<b>J</b>	28.1	58.6	61.6	55.5	<b>203.8</b>	1166.7	64	13

Results from the comparison in Table 6.1 thus support the knowledge-based theory and the literature that suggests that:

- good knowledge management practices have important implications for achieving high organisational performance (Pillania, 2005; Wagner, 2009)
- that these knowledge management practices can affect and can also be positively affected by an organisational performance framework that creates a focus on organisational elements that work together to deliver a well-executed strategy through an engaged workforce, resulting in a great customer experience, profitability and high organisational performance (Waal, 2008; Right Management, 2010).

In the South African construction industry, this correlation between knowledge management and organisational performance has been shown as companies I and J, who have the highest earnings per share and have the highest knowledge management scores. The same is true for companies A, B and C that are on the low end of knowledge management performance; they have the lowest scores, and have exhibited a correlational poor organisational performance in the negative earnings per share (EPS) in their actual performance.

However, anomalies were observed in Company D and Company G whose earnings per share were quite good and better compared to the other companies in the same medium category on knowledge management performance. A close examination shows that these two companies also have negative share price growth amongst the medium category companies. Thus, this misnomer can be attributable to an effort by these companies to prop up their share prices that have been nose-diving by having high after tax net profit amounts attributable to the shareholders. (Earnings per share is calculated by dividing net profit by the number of issued ordinary shares). This would ensure that the companies are viewed in positive light when stock exchange investments and returns calculations are made, ultimately ensuring that the companies are viewed as a profitable investment destination on the stock exchange (JSE).



#### **6.3.4 The knowledge management and organisational performance nexus**

The presumption of this study was that knowledge management positively influences the organisational performance factors. By investigating the respective core elements of knowledge management more closely, one of the objectives of this research was to establish the relationship between knowledge management factors (i.e. knowledge management practices, knowledge acquisition, knowledge dissemination and responsiveness to knowledge) and the organisational performance framework in Figure 3.2.

The contribution made by each of these resources to organisational performance was presumed to likely vary across the firm. Therefore, focussing on particular knowledge management enablers and processes would provide some core understanding of an organisation's knowledge management capabilities which would in turn aid management decision-making at the resource level (Mills & Smith, 2011).

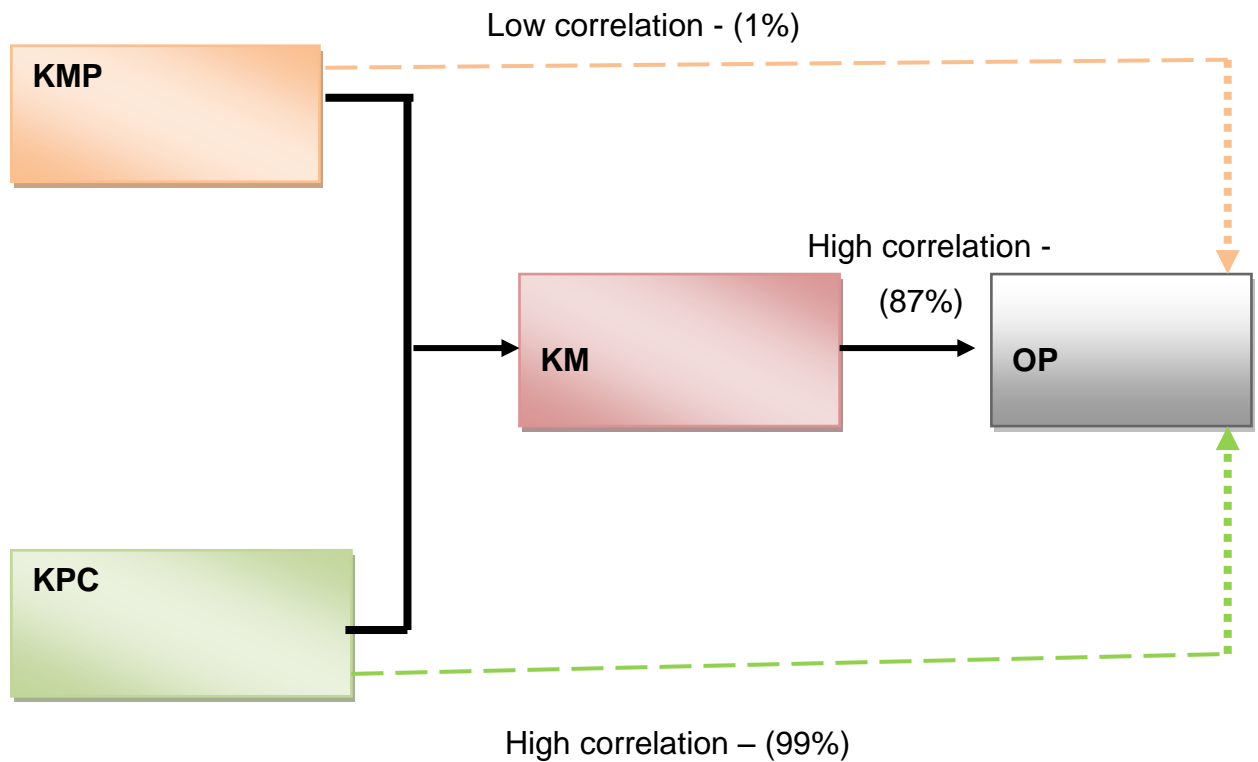
Consequently, a more detailed evaluation of links between the individual dimensions of knowledge management capabilities was meant to provide insights into the correlations between knowledge management processes and organisational performance. Apart from providing researchers and managers with empirical evidence that links knowledge management to organisational performance, this was also to provide guidance on how organisations can enhance the success of knowledge management institutionalisation through a more targeted and direct approach to knowledge management.

To this end, a correlational model with the four knowledge management components was developed, with individual linkages to organisational performance whilst contributing to knowledge management capability as presented in Figure 5.11.

However, the principal components analysis of knowledge management questions in Table 5.13 has shown that only two factors out of the four knowledge management components were significant as they accounted for 48% of the variance in the data. Of note is how three components loaded as one factor, i.e. knowledge acquisition (KA), knowledge dissemination (KDI) and responsiveness to knowledge (RTK). This was also confirmed by the scree plot of the principal components of the knowledge management questions presented in Figure 5.12. This meant that respondents did not view as different the above-mentioned three factors (KA, KDI & RTK), but instead viewed them as representing one construct.

The findings relating to non-discriminatory nature with which respondents viewed KAC, KDI and RTK contradicted findings by Darroch (2003) in a research conducted on New Zealand companies. Darroch (2003), who developed the questionnaire that was adopted for this research, presented knowledge management as a tri-dimensional construct with the components of knowledge acquisition, knowledge dissemination and responsiveness to knowledge.

So for the current study the three components of KAC, KDI and RTK were merged into one factor namely knowledge process capability (KPC). The other factor that stood separately to make them 2 is knowledge management practices (KMP). It is from these findings that a re-look of the proposed correlation model stems from. The model was adjusted to reflect these findings and the new model presented in Figure 6.1 mirrors the relationship between knowledge management, its pair of prime components and organisational performance in the construction and engineering sector in South Africa.



**Figure 6.1: The correlation model**

Key

KMP = knowledge management practices

KPC = knowledge process capability (KAC+ KDI + RTK)

KM = knowledge management (KMP + KPC)

OP = organisational performance

The administered statistical analysis showed strong links between knowledge management and organisational performance, with an 87% variation (R-Squared) being explained by the knowledge process capability (KPC) and knowledge management practices of a company (KMP). Of the two knowledge management factors, knowledge process capability component had a very strong link to organisational performance whilst knowledge management practices were not as important. The critical value for the t-statistic of 1.98027 tested at the 0.05% level of significance for the sample size meant that any t-

statistic greater than 1.98027 signified that the organisational performance (OP) scores for the set of companies were significantly different and the probability of the differences between each of the grouping in the model occurring by chance was low, can be observed from the *t* - grouping in Table 5.17.

The statistical *t*-grouping of the ten surveyed companies, whereby the companies' knowledge management performance was compared to organisational performance in terms of the earnings per share (EPS) and then grouped according to performance levels, was similar to the cross tabulation in Table 5.12 derived from the scoring and was meant to achieve the same objective. The same groupings in Table 5.12 tended to replicate themselves in the statistical *t*-grouping under Table 5.17, confirming that indeed the knowledge management performance groups that correlated to organisational performance were statistically correct.

The statistical significance testing that was conducted based on a comparison of the variance due to the between-groups variability (called mean square effect) with the within-group variability (called mean square error) which explains ratios of explained and unexplained variability, was done via the *F* test (*F* value). It also tested whether the ratio of the two variance estimates was significantly greater than 1. An *F* statistic of 70.9 represented a low likelihood of any difference between the groups occurring by chance alone and this is statistically significant. The test was highly significant and it could be concluded that in fact the means for the groups were significantly different from each other.

The difference in construct understanding can be attributed to geographical idiosyncrasies because whereas these knowledge management factors have been considered and established in some European studies, (see Alavi & Leidner, 2001; Darroch, 2003), the situation has proven to be different in South Africa. It might also signal the differences in the level of knowledge management institutionalisation in companies between the two continents.

# CHAPTER 7

## CONCLUSION AND RECOMMENDATIONS

### 7.1 INTRODUCTION

After re-visiting the research purpose and objectives of this study, this chapter presents a summary of the main findings followed by the conclusions through comparing the actual research outcomes and the objectives and research questions set out at the beginning of the research. Recommendations are also made for the construction and engineering sector and on possible areas for further research.

Emphasis is therefore given to the following discussions;

- research purpose revisited in terms of the research questions and objectives and the findings thereof
- conclusions
- practical implications of the results for the South African construction and engineering sector, and
- recommendations regarding further research

## 7.2 RESEARCH QUESTIONS AND OBJECTIVES

This investigation was embarked on with the following research questions in mind:

- Is there a relationship between knowledge management and organisational performance?
- What particular factors enable knowledge management in an organisation?
- What are the relationships, if any, between the identified factors and organisational performance indicators like earnings per share, revenue growth and share price growth?
- What systems are in place for South African firms that support knowledge management?

It is from these questions that the research objectives were formulated, aiming to:

- investigate knowledge management's role in organisational performance;
- determine the factors that enable/inhibit knowledge management in firms;
- investigate knowledge management's association with measures that determine the overall performance of an organisation;
- establish the system by which South African firms support knowledge management.

### 7.2.1 Research question 1/ Objective 1

Research studies have suggested that quite a number of intangible resources do impact on organisational performance (Michalism, Kline & Smith, 2000; Hitt, Bierman, Shimizu & Kochhar, 2001; Gouthier & Schmid, 2003). Although such research had established that some intangible resources have got an impact on organisational performance, not much attention had been devoted to

understanding the managerial processes by which the resources become valuable. Literature reviewed has shown that organisations that can manage their knowledge, an intangible resource, are capable of co-ordinating and combining their resources and capabilities in new and distinctive ways so as to provide more value for their customers. Therefore, it was hypothesised that:

*H1. There is a positive relationship between knowledge management practices and organisational performance.*

The investigation has shown that knowledge management has a strong relationship with organisational performance. This conclusion has been reached as drawn from the correlation coefficient (R-squared) of 87% which explains the amount of variation in the organisational performance of the sampled companies that is explained and attributable to the effect of knowledge management, the independent variable.

Other statistical modelling applied to the collected data has supported this finding of the existence of a relationship between knowledge management and organisational performance. These included the observation of the *sum of squares* (SS) from the knowledge management model against the error variance *sum of squares* (SS) from the GLM procedure on organisational performance that suggested that the systematic variation in the organisational performance data was attributable to a known factor that systematically increased the scores it influenced, and that known factor was knowledge management.

In order to show that the likelihood of any performance differences amongst the sampled organisations occurring by chance alone was low, the mean figures as denoted by the *mean square* for the knowledge management model and any unknown causative factor were calculated. The huge difference between these two numbers (50.86 for the knowledge management model against 0.82 for an unknown factor) showed that indeed the likelihood of any

performance differences amongst the sampled organisations occurring by chance alone was low.

### Hypothesis testing

The first hypothesis was that there is a positive relationship between knowledge management practices and organisational performance.

The correlation was proven in three ways. Firstly, a cross-tabulation of knowledge management performance and subjective organisational performance showed that companies H, I and J that had high scores in knowledge management also had high scores in the perceived organisational performance (subjective performance). The same trend was observed for companies A, B and C that performed poorly on knowledge management and concurrently performed poorly in the subjective organisational performance.

The second correlation was observed between scores on the knowledge management scale with organisational performance measured by the earnings per share (EPS). The groups of companies also fell within the same high and low performance groups.

The third connection was displayed in the statistical analysis. The statistical t-grouping of the ten surveyed companies, Table 5.17, based on performance levels confirmed that indeed organisations that fell in the high category of knowledge management also demonstrated better organisational performance. Moreover, an F statistic of 70.9 from the analysis of variance represented a low likelihood of any difference between the groups occurring by chance alone.

### **7.2.2 Research question 2/ Objective 2**

The second objective sought to determine the factors that enable knowledge management in firms. It was also suggested that a reflection of the processes



through which resources become valuable is vital and would provide insights into management's role in the conversion of the resources to a competitive edge position for the firm. Thus process research was vital to appreciate the processes through which resources become valuable for practical reasons of developing and extending the resource - based view so as to inform managers about best practices. It is from this reasoning that it was hypothesised again that:

*H2. Knowledge management processes (enablers) lead to improved organisational performance.*

Ultimately, the outcome of the research was meant to benefit the industry when companies are able to determine how knowledge management is effectively implemented through the understanding of the factors that guide knowledge management institutionalisation.

The principal components analysis was performed on four knowledge management factors. Eigenvalues, used to determine which factors are relevant and hence should be analysed, showed that two factors were significant as they accounted for 48% of the variance in the data. Knowledge process capability (KPC) and knowledge management practices (KMP) were found to be the factors that contributed to knowledge management.

The two-way ANOVA used to analyse the individual knowledge management factors' effect on organisational performance also displayed an interaction between knowledge process capability (KPC) and knowledge management practices (KMP) as read from the *type III sum of squares*, showing that knowledge process capability (KPC) contributed 99% to the relationship between knowledge management and organisational performance and knowledge management practices (KMP) 1%. This way, the factors that enable knowledge management in organisations were determined.

The hypothesis was however proven but with some qualification from a South African perspective especially with reference to specific processes and their contribution to organisational performance. The analysis of the hypothesised relationship showed that there was a strong relationship between knowledge process capability (KAC + KDI + RTK) and organisational performance. These findings were statistically significant at the 0.0001 level, so much that the risk of getting a relationship as strong as 87% when there was no relationship in the variables was no higher than 0.001 out of 100, implying that the results were very unlikely to have occurred by chance. Although knowledge management practices (KMP) was found to be one of the factors that contribute to knowledge management, it displayed a weaker relationship with organisational performance. Therefore, of the two knowledge management factors, companies would be advised to consider investing more in knowledge process capability (KPC).

However, the results on the factors that enable knowledge management were incongruent with past studies and thus a bit surprising. The findings relating to non-discriminatory nature with which respondents viewed knowledge acquisition (KAC), knowledge dissemination (KDI) and responsiveness to knowledge (RTK) contradicted findings by Darroch (2003) in a research conducted on New Zealand companies. Darroch (2003) presented knowledge management as a tri-dimensional construct with the individual components knowledge acquisition, knowledge dissemination and responsiveness to knowledge. Her findings confirmed correlations between the three individual knowledge management constructs and organisational performance.

Conversely, outcomes from this research amalgamate the components and observe them as one factor that correlates with organisational performance. The principal components analysis carried out returned only two factors as significant, from the four knowledge management components. Their loadings came out as accounting for 48% of the variance in the data. This variation in findings was attributed to geographical peculiarities. The three knowledge management factors, namely knowledge acquisition, knowledge dissemination

and responsiveness to knowledge, have been considered and established in some European studies (see Alavi & Leidner, 2001; Darroch, 2003) but the consideration from a South African perspective has yielded a different outcome.

This was also inconsistent with studies conducted elsewhere whose outcomes kept these same components as separate and stand-alone factors. Other researches conducted in Europe have also perceived these three components as different.

Another study by Bagorogoza, de Waal, van den Herik and van de Walle (2011) also used the Darroch's (2003) instrument on Ugandan financial institutions in a case study on improving organisational performance through knowledge management. They presented the three factors as different components accounting for different variances in the knowledge management performances. The detailed evaluation of links between the individual dimensions of knowledge management capabilities was meant to provide insights into the correlations between knowledge management factors and organisational performance so as to provide guidance on how organisations can enhance the success of knowledge management institutionalisation through a more targeted and direct approach to knowledge management.

### **7.2.3 Research question 3/ Objective 3**

This research objective sought to establish knowledge management's association with measures that reflect the overall performance of an organisation. There were several similarities between the drivers of the two constructs, with some unique drivers to each as well. An overview of the elements or drivers of these concepts provided a common understanding of the similarities and differences between the concepts.

It was found that the knowledge management factors established in section 7.2.2 have items within them that are similar to organisational performance elements so much that working on the knowledge management factors i.e. enablers (Figure 2.1) leads to the alignment of organisational performance elements. These included strategy, leadership, culture, structure, people and processes. Therefore, a direct relationship has been exhibited that exists between the institutionalisation of knowledge management and how it also configures the organisational performance framework elements for an enhanced performance (Figure 3.2). A discussion around the elements of each of these constructs provided a better understanding of their nature and provided more insight into their relationship (see sections 2.2; 3.2; 5.7.1; 5.7.2 and 6.3.4).

#### **7.2.4 Research question 4/ Objective 4**

This research question and objective sought to find the systems that are in place for South African firms that support knowledge management. The results from the study revealed that although there are no formal structures of knowledge management as such in the construction and engineering sector in South Africa, several techniques of knowledge management are nevertheless being implemented in the organisations on an *ad hoc* basis, even though they may not be aware that they are performing knowledge management functions.

The findings, particularly from the interviews, suggest the use of meetings, record management, office directory and office letters, incidents reports, use of log books, safety records, some informal platforms of discussions, tea/lunch breaks and induction training. Some of these techniques would thrive with the use of technologies to support them and there is no evidence in the findings that many construction and engineering companies have adopted these technologies.

Not many respondents indicated that they are using some of what may be considered as preliminary techniques of knowledge management such as best

practice, discussion of major projects after completion and professional development programmes.

Therefore, in as much as there might be some knowledge management techniques being implemented in some of the construction and engineering companies, these are not adequate and need to be improved.

### **7.3 CONCLUSION**

The empirical research examined the relevance and applicability of identified constructs and their relationships. The study's position that knowledge management is related and has a positive role to play in organisational performance was statistically confirmed. This role and relationship can be characterised in the following manner:

- Knowledge management is a prerequisite if an organisation is to have a good command of awareness and knowledge of its markets, customers, products, services, processes, methods, employee skills and its environment. (Kruger, 2009). Knowledge management would ensure that value is extracted from knowledge internal and external to the organisation. This would then be reflected in an organisation's performance.

It has also been demonstrated that knowledge management in an organisation offers a proactive and direct approach of dealing with the issues associated with the aging workforce. Although knowledge management is a sprouting arena of concepts, its prominence is quite significant at a time when generational shifts are taking place in the workplace coupled with the current global economic problems/recession causing retrenchments, cost saving calls and streamlining of operations and the productive labour force and the increased mobility of the younger generation of employees, strategic attempts

at managing knowledge must be, therefore, of high priority to organisations.

This study has established that an organisation committed to knowledge management practices (KMP) and knowledge process capability (KPC) within its ever-shifting workforce demographics will better preserve its organisational knowledge. But, having a knowledge management strategy should be augmented by creating a diagnostic process that includes examining current and projected workforce demographics, trends, determining knowledge that is critical to the company's success and developing an integrated plan. Organisations use knowledge management practices for not only creating new knowledge but also enabling new and existing knowledge to be applied in all organisational activities and processes (Appolloni *et al*, 2014).

The results of the empirical investigation confirmed a positive effect of the practices and processes of knowledge management on organisational performance. These outcomes can be used to motivate the improvement of knowledge management practices and processes of the surveyed organisations. “The ability to develop and leverage the value of such intangible assets comprises a core competency for organisations, particularly those providing professional services” (Halawi, Aronson & McCarthy, 2005:75).

Overall, these results propose that although the individual knowledge management components collectively determine the knowledge management capabilities of an organisation, not all are directly linked to organisational performance as seen from the statistical figures on knowledge process capability (KPC) versus knowledge management practices (KMP). This is also consistent with the resource-based view which suggests that only a subgroup of appropriately leveraged capabilities of an organisation reflect direct contributions to the performance of the company. Spanos and Lioukas (2011:183) argue that although any well-formulated strategy in an organisation should have effects that provide the necessary conditions for high performance, above average effects that come from unique resources and capabilities such as knowledge resources are needed for sustainability.

Potential applications include human knowledge capital development, knowledge mapping, the introduction of knowledge teams, cross-functional working, business process restructuring initiatives, greater emphasis on collaboration, and the introduction of more formal and informal channels for knowledge sharing. As a principle of corporate culture, it is inevitable to synchronise the organisational knowledge management requirements with the employees' personal goals that are expressed in the form of increased opportunities and capacity to learn (Mwila, 2013).

Finally, it is argued that the knowledge management conceptual model presented in this study is a valuable preliminary point to gain deeper insights into knowledge management components and their relationship to organisational performance. Despite the claims for a relationship between knowledge management and organisational performance, few researchers have actually proven the nature of this association.

In this study, a positive influence of knowledge management on organisational performance has been examined and proven. However, without proper integration Weber (2007) concluded that the knowledge management approach will fail to produce the desired results. Hamid (2008) is of the opinion that in order to contribute to performance, knowledge has to be updated continuously. This will bring revision and change in processes, which will help keep the competitive advantage in place. Weber (2007) identified knowledge management as an equation built around humans, processes and technology.

Drawing from the results of this study, it can further be argued that investing in the institutionalisation of knowledge management in a firm is indeed a worthy knowledge management strategy in today's ever changing business environment and competitive landscape where demand and effect of knowledge is essential for the future success of the organisation. Hofer-Alfeis (2003) contends that due to improvements in knowledge management, the race for seeking a competitive edge through knowledge increases at an even

faster rate. Since the organisation's employees are reservoirs of enormous amounts of institutional knowledge important for an organisation's survival, firms that can successfully acquire and disseminate this knowledge to the right employees can establish sustainable organisational performance.

#### **7.4 PRACTICAL IMPLICATIONS OF RESULTS**

Knowledge management is not an incident or a technology system but a long term and continuous initiative. It is about classifying and categorising knowledge as a core competency in the organisation. The following recommendations are proposed specifically to enhance the successful institutionalisation of knowledge management.

- 1) So as to avoid a cultural shock and suspicions due to a sudden change and ensure that employees adjust easily when knowledge management is implemented, it is important at the onset to make known the purposes and collective goal of knowledge management. The knowledge management goals of each organisation would vary according to the needs of that particular organisation but would pivot around the knowledge process capability, i.e. knowledge acquisition (KAC), knowledge dissemination (KDI) and being responsive to knowledge (RTK) and knowledge management practices (KMP).
- 2) To start with, it may be of benefit for the managers in the construction and engineering sector to select a small number of knowledge process capability measures and initiatives that are within the reach of the organisation's business processes, cultural readiness and funding constraints. Part of the evidence gathered from this study, (see section 6.3.2), suggest that time constraints encountered by the participants resulted in their inability to engage in knowledge dissemination or knowledge management practices.
- 3) Construction and engineering organisations A to E may find it useful to complete a knowledge management maturity guide as per Table 7.1 as a method of assessing their current levels of knowledge process



capability and knowledge management practices. As a planning tool, the knowledge management maturity guide could also facilitate short and long term knowledge management strategy identification.

**Table 7.1: Knowledge management maturity guide**

<b>KM success factors</b>	<b>Not Applicable</b>	<b>Introductory</b>	<b>Intermediate</b>	<b>Advanced</b>
Training programs				
Knowledge architecture				
Network of experts				
Knowledge dissemination				
Knowledge strategy				
Trust				
Organisational structure				
Business process engineering				
Knowledge acquisition				
Knowledge storage				
Knowledge identification				
Organisational culture				
Support & commitment of CEO				
Responsiveness to				

knowledge				
Pilot				
Knowledge audit				

Adapted from Kruger and Johnson (2011)

- 4) Construction and engineering organisations in South Africa should consider investing some of their time in workshops and meetings on knowledge management, invest time and money in creating bulletins board, skill directories, form alliances with international professional associations and get connected to electronic/physical forums that engage in collaborative thinking.
- 5) The organisations are also encouraged to pay particular attention to the people, processes and structures in order to invest in information and communication technologies that support their knowledge management initiatives.
- 6) Construction and engineering companies A to F should provide opportunities for employees' professional development and should encourage life-long education and training, particularly in those areas that would improve on the employees' skills or expand their areas of specialisation.
- 7) Knowledge management in the construction and engineering organisations should not only seek to manage internal efficiencies of the companies but should also extend to managing knowledge about customers, their industry, skills and expertise of employees and knowledge about third parties.
- 8) Taking into account that the companies hardly find time for anything other than the pursuit of profit generating activities, the success of knowledge management institutionalisation will depend on a user friendly interface that would require little time off for the employees in extensive training or readiness manuals.

## 7.5 RECOMMENDATIONS REGARDING FURTHER RESEARCH

Given the findings and analysis presented here from the empirical research, it is recommended that future studies should carry out investigations into the influence of geography and the peculiarities thereof that might have an influence on the outcome of the study.

It is also recommended that further studies be committed to more investigations on knowledge management elements that affect performance.

Other aspects of knowledge management that would require further work are its measurability and the lead times that are required before the effects of the institutionalised knowledge management can be realised.

It would also be quite informative, probably from a separate study, if the terms of employee engagement would be explored including the effects of the affirmative action and demographic transformation efforts prevailing in South Africa on the management of knowledge. That area of study is outside the scope of this research but it is envisaged that, for example, if the employees are engaged on a contract basis based on the availability of projects, this could have an adverse effect on the employees' opinions about the organisation and its performance among other things.

It would also be interesting to investigate knowledge management in a demographically compliant organisation and reflect its link to organisational performance. This would be equivalent to asking the question 'do BEE compliant organisations manage knowledge better than the non-compliant companies'.

Finally, a different methodological approach is also recommended from the one that was used in this study, just in case it might yield a different insightful outcome. This would include perhaps an experimental, longitudinal study with a random sample also involving a larger sample than the one used in this

study. Other considerations might include having a sample drawn from multiple industries rather than a single industry.

## 8 LIST OF REFERENCES

- Aaker, D. A. 1989. Managing assets and skills: The key to sustainable competitive advantage. *California Management review*, 31(2), 91–106.
- Aaronson, J. & McCarthy, R. (2004), *Knowledge Management at GE: Technology Transformation in Action*. The University of Georgia, Athens.
- Accentuate Ltd. 2008 - 2012. *Annual report*. [Online] Available: <http://www.accentuateltd.co.za> (Accessed 28 October 2013).
- Acedo, F. J., Barroso, C., & Galan, J. L. 2006. The resource based theory: Dissemination and main trends. *Strategic Management Journal*, 27, 621–636.
- Aharoni, Y. 1993. In search for uniqueness: Can firm specific advantages be evaluated? *Journal of Management Studies*, 30(1), 31–49.
- Ajmal, M.M. and Koskinen, K.U. 2008. Knowledge transfer in project-based organisations: an organisational culture perspective. *Project Management Journal*, 39 (1): 7-15.
- Ajmal, M., Helo, P. & Kekale, T. 2010. Critical factors for knowledge management in project business, *Journal of Knowledge Management*, 14(1), 156-168.
- Akhavan, P., Mostafa, J. and Fathian, M. 2006. Critical success factors of knowledge management systems: a multi-case analysis. *European Business Review*, 18(2), 97-113.
- Al-Alawi, A. I, Al-Marzooqi N. Y. and Mohammad, Y. F. 2007, Organisational culture and knowledge sharing: critical success factors, *Journal of Knowledge Management*, 22(4), 22-42.

Alavi, M. & Leidner, D.E. 2001. Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues, *MIS Quarterly*, 25(1), 107-136.

Alavi, M. and Tiwana, A. 2003. Knowledge management: The information technology dimension, In *Handbook of Organisational Learning and Knowledge Management*, M. Easterby-Smith and M. A. Lyles (eds.), Blackwell Publishing, United Kingdom, 2003, 104-121.

Alhammad, F. Al Faori S. Suleiman A. H. L. 2009. Knowledge Sharing In The Jordanian Universities. *Journal of Knowledge Management Practice: 10(3)*

Allee, V. 2003. *The Future of Knowledge, Increasing Prosperity through Value networks*. Amsterdam. Boston. Butterworth-Heinemann.

Almeida, P., Phene, A. and Grant, R. 2003. Innovation and knowledge management: Scanning, sourcing and integration, In *The Blackwell handbook of organisational learning and knowledge management*, M. Easterby-smith and M. A. Lyles (eds.), Blackwell Publishing, Oxford, UK.

Amaratunga, D. Baldry, D. Sarsha, M. & Newton, R. 2002. Quantitative and qualitative research in the built environment: application of mix research approach. *Work Study*, 51(1), 17-31.

Ambrosini, V. & Bowman, C. 2008. Surfacing Tacit Sources of Success. *International Small Business Journal*. 26(4); 403-431.

American Productivity & Quality Center (APQC). 2002. *Measuring the Impact of Knowledge Management*, Consortium Learning Forum, Best Practice Report.

Antonacopoulou, E.P. 2006. Modes of Knowing in Practice: The Relationship between Learning and Knowledge Revisited. In B. Renzl B. & K. Matzler & H. Hinterhuber (Eds.), *The Future of Knowledge Management* London: Palgrave.

Apolloni, A., Mavisu, M. & Ozeren, E. 2014. Knowledge management practices and related benefits in Turkish manufacturing firms. *International Journal of Intelligent Enterprise*, 2(2/3), 169-195.

Argote, L., McEvily, B. & Reagans, R. 2003. Managing Knowledge in Organisations: An Integrative Framework and Review of Emerging Themes. *Management Science*, 49:4, 571-82.

Austro Group Ltd, 2008-2012. *Annual report*. [Online] Available: <http://www.austrogrouplimited.co.za> (Accessed 28 October 2013).

Aveng. 2008 - 2012. *Annual report*. [Online] Available: <http://www.aveng.co.za> (Accessed 28 October 2013).

Babbie, E. 2001. *The practice of social research*. 11<sup>th</sup> ed. Belmont, CA: Thomson Wadsworth.

Bagorogoza, J.K. de Waal, A.A, van den Herik, H.J. and van de Walle, B.A. 2011. Improving organisational performance through knowledge management: The case of financial institutions in Uganda. The 1<sup>st</sup> Annual MSM Research Conference, 11-12 November, Working Paper No. 2011/18.

Barney, J. B. 2001a. Is the resource-based 'view' a useful perspective for strategic management research? Yes. *Academy of Management Review*, 26: 41-56.

Barney, J.B. 2001b. Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management*, 27: pp. 643-650.

Barney, J.B. 2007. *Gaining and sustaining competitive advantage, 3rd edition*. Upper Saddle River, NJ: Pearson Education.

Barney, J. B. & Arian, A.M. 2001. The resource – based view: Origins and implications. *The Blackwell handbook of strategic management*. Malden, MA: Blackwell Publishers, 124-188.

Barney, J.B. & Hesterly, W.S. 2008. *Strategic Management and Competitive Advantage. Concepts and cases*, 2nd edition, Prentice Hall.

Barney, J. B. & Mackey, T. B. 2005. Testing resource based theory. *Research Methodology in Strategy and Management* (Vol. 2, pp. 1–13). London: Elsevier Ltd.

Bartol, K. and Srivastava, A. 2002, Encouraging knowledge sharing: The role of organisational rewards, *Journal of Leadership and Organisation Studies*, 9(1), 64-76.

Basil Read, 2008-2012. Annual Report. [Online] Available: <http://www.basilread.co.za> (Accessed 28 October 2012).

Beccera-Fernandez, I., Gonzalez, A., & Sabherwal, R. 2004. *Knowledge management challenges, solutions and technologies*. Upper Saddle River. NJ. Pearson-Prentice Hall.

Bernam, S.L. Down, J. & Hill, C. 2002. Tacit knowledge as a source of competitive advantage in the National Basketball Association. *Academy of Management Journal*, 45(1), 13–31.

Bhatt, G.D. 2000. Information dynamics, learning and knowledge creation in organisations. *The Learning Organisation Journal*, 7( 2) 89-98.



- Bhatt, G. 2001. Knowledge management in organisations: Examining the interactions between technologies, techniques and people. *Journal of Knowledge Management*, 5 (1): 68-75.
- Bishop, J. Bouchlaghem, D. Glass, J. and Matsumoto, I. 2008. Ensuring the effectiveness of a knowledge management initiative. *Journal of Knowledge Management*, 12(4): 16-29.
- Bonache, J., Brewster, C. & Suutari, V. 2001. Expatriation: A developing research agenda. *International business review*, 43:1, 17.
- Bontis, N. 2001. Assessing Knowledge Assets: a review of models used to measure intellectual capital. *International Journal of Management Reviews*, 3(1), 41-60.
- Botha, D.F. 2004. Towards an instrument for surveying knowledge management practices. *South African Journal of Business Management* 36(1):1-6.
- Botha, D.F. and Fouché B. 2002. Knowledge management practices in the South African business sector: preliminary findings of a longitudinal study. *South African Journal of Business Management* 33(2):13-19.
- Calo, T. 2008. Talent Management in the Era of the Aging Workforce: The Critical Role of Knowledge Transfer. *Public Personnel Management*. 37 (4). 403 - 416.
- Cardy, R.L. & Selvarajan, T.T. 2005. Competencies: Alternative frameworks for competitive advantage. Kelly School of business, Indiana University, *Business Horizons*, (2006) 49, 235 – 245.

Carmelli, A. 2001. High and low performance firms: Do they have differing profiles of perceived core intangible resources and business environment? *Technovation*, 21, 661–671.

Carpenter, M. A. and Saunders, W. G. 2009. *Strategic management: A dynamic perspective*, 2<sup>nd</sup> Edition, Prentice Hall, Upper Saddle River, New Jersey.

Cennamo, L. & Gardner, D. 2008. Generational Differences in Work Values, Outcomes and Person-organisation Value Fit. *Emerald Group Publishing Limited*. 23(8).

Chakravarthy, B., McEvily, S., Doz, Y., and Rau, D. 2003. Knowledge management and competitive advantage, In *The Blackwell handbook of organisational learning and knowledge management*, M. Easterby-smith and M. A. Lyles (eds.), Blackwell Publishing, Oxford, UK.

Chartered Institute of Personnel and Development (CIPD), 2008. *Performance Management: An Overview, Factsheet*.

Chauvel, D. & Despres, C. 2002. A review of survey research in knowledge management 1997-2001. *Journal of Knowledge Management*, 63(3), 207-223.

Chiva, R. & Alegre, J. 2005. Organisational learning and organisational knowledge. *Management Learning*. 36 (1) 49-68.

Choi, B. & Lee, H. 1999. Business Process-based Knowledge Management, *Knowledge management Symposium*. 261-291.

Chong, S.C. and Choi, Y.S. 2005. Critical factors in the successful Implementation of Knowledge management. *Journal of knowledge Management Practice*, 6.

- Chowdhury, M.S. 2006. Human behaviour in the context of training: An overview of the role of learning theories as applied to training and development, *Journal of knowledge management*. 7 (2).
- Christensen, P. 2007. Knowledge Sharing: moving away from obsession with best practices. *Journal of knowledge management*, 11(1), 36-47.
- Chun, M., Sohn, K., Arling, P., & Granados, N.F. 2008. Systems theory and knowledge management systems: The case of Pratt-Whitney Rocketdyne, *proceedings of the 41st Hawaii International Conference on Systems Sciences*, 1-10.
- CIDB (Construction Industry Development Board). 2004. *SA construction industry status report*. Pretoria: Department of Public Works.
- Cockburn, I. M., Henderson, R. M. & Stern, S. 2000. Untangling the origins of competitive advantage. *Strategic Management Journal*, 21, 1123–1145.
- Codrington, G. & Grant-Marshall, S. 2004. *Mind the gap*, Penguin Group, London.
- Collins, C. C., & Porras, J. I. 1994. *Built to last: Successful habits of visionary companies*, New York, Harper Business.
- Commission for Employment Equity Annual Report (CEE), 2009-2010. *10<sup>th</sup> Annual Report*. [Online] Available [www.labour.gov.za](http://www.labour.gov.za).
- Connelly, C.E. & Kelloway, E.K. 2003. Predictors of employees' perceptions of knowledge sharing culture. *Leadership & Organisation Development Journal*, 24(5), 294-301.
- Cooper, D.R. & Schindler, P.S. 2006. *Business research methods*. 9<sup>th</sup> ed. New York:McGraw-Hill.

Covey, S.R. 2004. *The 8th Habit from Effectiveness to Greatness*. London: Simon & Schuster UK Ltd.

Engineering News and Mining Weekly, 2015. Construction: A review of South Africa's Construction sector. *Creamer Media's Research Channel Africa*. 30 January.

Creswell, J.W. 2008. *Research design: qualitative, quantitative, and mixed methods approaches*. 3<sup>rd</sup> ed. Thousand Oaks: Sage.

Dainty, A. R., Cheng, Mei-I., & Moore, D. R. 2003. Redefining performance measures for construction project managers: An empirical examination. *Construction Management and Economics*, 21(2), 209–218.

Dancey, C. P. and Reidy, J. 2008. *Statistics without maths for psychology: Using SPSS for Windows*, 4<sup>th</sup> ed. Harlow: Prentice Hall.

Darroch, J. 2003. Developing a measure of Knowledge management Behaviours and Practices. *Journal of Knowledge Management*, 7(5), 41–54.

Darroch, J., and McNaughton, R. 2003. Beyond market orientation: Knowledge management and the innovativeness of New Zealand firms, *European Journal of Marketing*, 37(3/4), 572-593.

Darroch, J. 2005. Knowledge management, innovation and firm performance, *Journal of Knowledge management*. 9(3), 101-115.

Davel, R. and Snyman, M.M.M. 2005. Influence of corporate culture on the use of knowledge management technologies. *South African Journal of Information Management*, 7(2).

Davenport, T.H. & Prusak, L. 1998. *Working Knowledge*. Boston: Harvard Business School Press.

Davenport, H. T. & Völpe, C. S. C. 2001. The rise of knowledge towards attention management. *Knowledge Management*, 5(3): 10.

Davidson G., Lepeak, S. & Newman, E. 2007. The Impact of the Aging Workforce on Public Sector Organisations and Mission. *The International Public Management Association for Human Resources*.

Davies, M.B. 2007. *Doing a successful research project: using qualitative or quantitative methods*. New York: Palgrave Macmillan.

DeLong, D. 1997. Building the knowledge based organisation: how culture drives knowledge behaviours. *Working paper, Ernest & Young's Centre for Business Innovation*. Boston.

Department of the Navy (DON), 2005. *Metrics Guide for Knowledge Management Initiatives*, Marine Corps Communication-Electronics School (MCCES) Training Command. Standing Operating Procedure for the Knowledge Management Program.

Denzin, N. K., & Lincoln, Y. S. 2000. Introduction: The discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 1–28). Thousand Oaks, CA: Sage.

DePoy, E. & Gitlin, L.N. 2005. *Introduction to research: Understanding and applying multiple strategies*, 3<sup>rd</sup> ed. Elsevier Mosby, Missouri.

Despres, C. & Chauvel, C. 1999. Knowledge management(s), *Journal of Knowledge Management*, 3(2), 110–120.

Donate, M. J., and Sanchez de Pablo, J. D. 2015. The role of knowledge-oriented leadership in knowledge management practices and innovation. *Journal of Business Research*, 68, 360-370.

Dove, R. 1999. Knowledge management, response ability and the agile enterprise, *Journal of Knowledge Management*, 3(1), 18-35.

Drejer, A. 2000. Organisational learning and competence development. *The Learning Organisation*, 7(4). 206-220, MCB University Press.

Drejer, A. & Riis, J.O. 2000. *Competence Strategy* (in Danish), Børsens Forlag.

Du Plessis, T. and du Toit, A.S.A. 2005. Survey of information and knowledge management in South African law firms. *South African Journal of Information Management*, 7(1).

Dwyer, R.J. 2009. Prepare for the impact of the multi-generational workforce, *Transforming Government: People, Process and Policy*, 3(2), 101–110.

Earl, M. 2001. Knowledge Management Strategies: Toward Taxonomy, *Journal of Management Information Systems*. 18(1). 215-233.

Easterby-Smith, M., Thorpe, R. and Lowe, A. 2002. *Management Research: An Introduction*, London. Sage.

Easterby-Smith, M., & Lyles, M. A. 2003. *The Blackwell Handbook of Organisational Learning and Knowledge Management*.

Edward, T. & Rees, C. 2006. *International Human resource Management: Globalization, national systems and multinational companies*. London, Pearson Education Limited.

Eftekharzadeh, R. 2008. Knowledge Management Implementation in Developing Countries: An Experimental Study. *Review of Business*. 28(3), 44-58.

Edvinsson, L. & Malone, M.S. 1997. *Intellectual Capital: Realising Your Company's True Value by Finding its Hidden Brainpower*. New York: Harper Business.

Ensign, P.C. 2004. A resource based view of interrelationships among organisational groups in the diversified firm. *Strategic Change*, 13(3), 125–137.

Esofranki Limited, 2008:2012. *Annual report*. [Online] Available: <http://www.esofranki.co.za> (Accessed 28 October 2013).

Fahy, J. 2000. The resource-based view of the firm: Some stumbling blocks on the road to understanding sustainable competitive advantage. *Journal of European Industrial Training*, 24, 94–104.

Flemming, L., & Sorenson, O. 2000. *Science as a map in Technological search*. Manuscript, Harvard Business School, Boston, MA.

Fong, P. S.-W., Hills, M. J. & Hayles, C. S. 2007. Dynamic Knowledge Creation through Value Management Teams. *Journal of Management in Engineering*, 23(1), 40-49.

Foss, N.J., 1998. The resource-based perspective: An assessment and diagnosis of problems. *Scandinavian Journal of Management*, 14(3), 133-149.

Foss, N. J. & Knudsen, T. 2003. The resource based tangle: Towards a sustainable explanation of competitive advantage. *Managerial and Decision Economics*, 24(4), 291–307.

Fourie, D.J. 2012. The use of performance management for effective governance in Public Administration. *Administration Publica*. 20(4), 124–138.

Fox , W.& Bayat, M.S. 2007. *A guide to managing research*. Cape Town: Juta.

Franco, A. M. and Filson, D. 2006. Spin-outs: Knowledge Diffusion Through Employee Mobility. *The Rand Journal of Economics*, 37(4), 841-860.

Ganesh, D. B. 2000. Information dynamics, learning and knowledge creation in organisations. *Learning Organisation*, 7(2): 10.

Gareth-Mayer, E. 2006. Statistics in Psychology Research. *Johns Hopkins University, Boomborg School of Public Health*.

Gavetti, G. and Levinthal, D.E. 2000. Looking Forward and Looking Backward: Cognitive and Experiential Search. *Admin. Science Quarterly*. 45 113–137.

Gephart, M., Marsick, V., Van Buren, M. and Spiro, M. 1996. 'Learning Organisations Come Alive,' *Training and Development*, 50(3).

Gichuru, P. and Tobin, P.K.J. 2004. Problems encountered diffusing tacit knowledge at Eli Lilly SA. *South African Journal of Information Management*, 6(4).

Gibbert, M. 2006. Generalising about uniqueness: An essay on an apparent paradox in the resource based view. *Journal of management Inquiry*, 15(2), 124–134.

Gold, A.H., Malhotra, A. & Segars, A.H. 2001. Knowledge management: An organisational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185-214.



- Gooderham, P. 2007. Enhancing knowledge transfer in multinational corporations: a dynamic capabilities driven model. *Knowledge Management research and practice*, 5(19).
- Gouthier, M. & Schmid, S. 2003. Customer and customer relationships in service firms: The perspective of the resource based view. *Marketing Theory*, 3(1), 119–143.
- Grandori, A., & Soda, G. 2006. A Relationship Approach to Organisational Design. *Industry and Innovation*, 13, 151–172.
- Grant, G.G. & Shahsavarani, N. 2004. A Socio-technical View of Knowledge Creation and Storage in Organisations, *Proceedings of the 4<sup>th</sup> International Management Conference*.
- Greiling, D. 2005. Performance management in the public sector: the German experience. *International Journal of Productivity and Performance Measurement*. 54 (7), 554.
- Griffiths, D.A. 2011. Knowledge & Learning At The New Frontier: A Case Study In An Emerging Market. *Journal of Knowledge Management Practice*, 12(1).
- Grix, J. 2002. Introducing Students to the Generic Terminology of Social Research. *Politics Studies Association*. 22(3). 175-186.
- Grossman, M. & McCarthy, R. 2005. Qualitative approaches to knowledge management assessment. *Issues in Information System*, 6(2), 90-95.
- Grover, V. & Davenport, T.H. 2001. General perspectives on knowledge management: Fostering a research agenda. *Journal of Management Information Systems*, 18(1), 3-4.

Group 5. 2008:2012. *Annual report*. [Online] Available: <http://www.g5.co.za> (Accessed 28 October 2013).

Gupta, A.K., and Govindrajana, V. 2000. Knowledge management's social dimension: Lessons from Nucor Steel, *Sloan Management Review*, 42(1), 71-80.

Gursoy, D., Maier, T.A. & Chi, C.G., 2007, Generational differences: An examination of work values and generational gaps in the hospitality workforce, *International Journal of Hospitality Management* 27(3), 448–458.

Haggie, K. and Kingston, J. 2003. Choosing Your Knowledge Management Strategy. *Journal of Knowledge Management Practice*.

Halawi, L., Aronson, J. and McCarthy, R. 2005. Resource-Based View of Knowledge Management for Competitive Advantage. *The Electronic Journal of Knowledge Management*. 3(2), 75-86.

Hall, R. 1993. A Framework linking intangible resources and capabilities to sustainable competitive advantage. *Strategic Management Journal*, 14, 607–618.

Hallam, G. & Lee, J. 2008. NeXus: An Investigation into The LIS Workforce In Australia, *Australian Library and Information Association*.

Hamid, A.Z. 2008. Identifying Knowledge and Creating Knowledgeable Employees. *Journal of Knowledge Management Practice*. 9(2).

Henning, E. 2005. *Finding your way in qualitative research*. Pretoria. Van Schaik.

Hitt, M. A., Bierman, L., Shimizu, K. & Kochhar, R. 2001. Direct and moderating effects of human capital on strategy and performance in

- professional service firms: A resource-based perspective. *Academy of Management Journal*, 44(1), 13–28.
- Hitt, M. A. Ireland, R. D. & Hoskisson, R. E. 2005. *Strategic management: Competitiveness and globalization*, 6th ed. Versailles, KY: South-Western.
- Ho, C. 2009, The relationship between knowledge management enablers and performance, *Industrial Management & Data Systems*, 109(1), 98-117.
- Hofer-Alfeis, J. 2003. Effective Integration of Knowledge Management into the Business starts with a top-down Knowledge Strategy. *Journal of Universal Computer Science*. 9(7), 719-728.
- Holbrook, J.A.D., & Hughes, L.P. 1998. Innovation in Enterprises in British Columbia: Measurement of regional systems of innovation. In J. de la Mothe (Ed.), *Local and Regional Systems of Innovation*. Amsterdam: Kluwer Academic Press.
- Holt, D.T., Bartczak, S.E., Clark, S.W. and Trent, M.R. 2004. The development of an instrument to measure readiness for knowledge management: In: R. Sprague (ed.), *Proceedings of the 37th Hawaii International Conference on System Sciences*, (IEEE) Press, Big Island.
- Hoopes, D.G., Madsen, T.L. & Walker, G. 2003. Guest Editors' introduction to the special issue: Why is there a resource-based view? Toward a theory of competitive heterogeneity. *Strategic Management Journal*, 24, 889-902.
- Howe, N. & Strauss, W., 2007, The next 20 years: How customer and workforce attitudes will evolve, *Harvard Business Review* 85(7/8), 41–52.
- Hult, G.T.M., Ketchen Jr., D.J. & Nichols Jr., E.L. 2003. Organizational learning as a strategic resource in supply management. *Journal of Operations Management*, 21, 541–556.

Huseman, R. and Goodman, J. 1999. *Leading with Knowledge*. London: Sage.

Husted, K. and Michailova, S. 2002. *Diagnosing and fighting knowledge sharing hostility*. *Organisational Dynamics*, 31(1), 60-73.

Invicta Holdings Ltd, 2008:2012. *Annual report*. [Online] Available: <http://www.invictaholdings.co.za> (Accessed 28 October 2013).

Ivers, J. 1998. Bringing out brilliance: enabling knowledge creation in the Notes/Domino environment. *Enterprise Solutions*. November/December, 24-27.

Izunwanne, P.C. 2011. A Taxonomical Account of Knowledge Creation in Organisations: Research Directions. *Journal of Knowledge Management Practice*, 12 (1).

Jashapara, A. 2011. *Knowledge Management: An Integrated Approach*, 2<sup>nd</sup> edition. Prentice hall. Pearson Education.

Jelinek, M. 1979. *Institutionalising Innovation: A Study of Organisational Learning Systems*, Praeger Publishers, New York, NY.

Jennex, M.E. and Olfman, L. 2004. Assessing knowledge management success/ effectiveness models. *Proceedings of the 37th Hawaii international conference on system sciences*. Retrieved February 18th, 2008, from, [http://ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?arnumber=1265571](http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=1265571).

Johnson, G. Scholes, K. & Whittington, R. 2008. *Exploring Corporate Strategy, Texts & Cases*. 8<sup>th</sup> Edition, Printice Hall.

Johnson, V. 2002. Assessing organisational knowledge creation theory in collaborative R. *International Journal of Innovation Management*, 6: 387.

Joshi, K.D. & Sarker, S. 2006. Examining the Role of Knowledge, Source, Recipient, Relational, and Situational Context on Knowledge Transfer among Face-to-Face ISD Teams. *Proceedings of the 390th Hawaii International Conference on System Sciences*. Hawaii, 4-7 January. [Online] Available from <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1579592&isnumber=33367&tag=1> [Accessed 28.09.2009]

Kalid B. S. and Mahmood B. K. 2010. Using Stories to Share Knowledge: A Malaysian Organisation Case Study, *Journal of Knowledge Management Practice*, 11(1).

Kaplan S, Schenkel A, Von Krogh G, & Weber C. 2001. *Knowledge-Based Theories of the Firm in Strategic Management: A Review and Extension*, MIT Sloan Working 4216(01).

Kay, J. 1999. Money from Knowledge. *Science and Public Affairs*.4 (1) 12-13.

Kennedy, M.M. 2002. Managing change: Understanding the demographics of the evolving workforce, *Proceedings of the Annual Convention of the AAEP 2002*, 48, 467-470.

Kianto, A., Ritala, P., Spender, J.C. & Vanhala, M. 2014. The interaction of intellectual capital assets and knowledge management practices in organizational value creation. *Journal of Intellectual Capital*, 15(3). 362 - 375

Kim, T. H., Lee, J. N., Chun, J. U. & Benbasat. I. 2014. Understanding the effect of knowledge management strategies on knowledge performance: A contingency perspective. *Information and Management*. 51, 398-416.

Kennedy, P. W. & Dresser, S. G. 2005. Creating a competency based workplace. *Benefits and Compensation Digest*, 42(2), 20- 23.

King, A.W. 2007. Disentangling inter-firm and intra-firm causal ambiguity: A conceptual model of causal ambiguity and sustainable competitive advantage. *Academy of Management Review*, 32 (1), 156-178.

King, W. R. 2008. Questioning the conventional wisdom: culture-knowledge management relationships. *Journal of Knowledge Management*, 12(3), 35-47.

Kiple, D., Lewis, A. & Helm, R. 2008. Achieving Strategic Advantage and Organisational Legitimacy for Small and Medium Sized NFPs Through the Implementation of Knowledge Management. *The Business Renaissance Quarterly Fall*, 3(3), 21-42.

Kok, J.A. 2003. Role of leadership in the management of corporate knowledge. *South African Journal of Information Management*, 5(3).

Kok, A. 2007. Intellectual Capital Management as Part of Knowledge Management Initiatives at Institutions of Higher Learning. *The Electronic Journal of Knowledge Management*. 5(2), 181–192.

Kolb, D. 1984. *Experimental Learning*, Prentice-Hall, Englewood Cliffs, NJ.

Kosilov, A. 2010. Improving Organisation Performance with a Knowledge Management System. *International Atomic Energy Agency School of Nuclear Knowledge Management*. Presented to the Trieste, Italy. 23–27 August.

Kotzé, T. 2008. *Referencing in academic document: Official guidelines of the Department of Marketing and Communication Management*. 5<sup>th</sup> ed. Department of Marketing and Communication Management: University of Pretoria.

Kreitz, P.A. 2008. Best practices for managing organisational diversity, *The Journal of Academic Librarianship* 34(2), 101–120.

- Kruger, C.J. 2009. *Knowledge Management Maturity from a Strategic/Managerial perspective*. PhD thesis in Information Technology.
- Kruger, C. J. & Johnson, R.D. 2011. Is there a correlation between knowledge management maturity and organizational performance? *VINE*, 41(3), 265–295.
- Kruger, C.J. & Johnson, R.D., 2013, Knowledge management according to organisational size: A South African perspective, *SA Journal of Information Management* 15(1), 1-11.
- Kruger, C.J. and Snyman, M.M.M. 2005a. Formulation of a strategic knowledge management maturity model. *South African Journal of Information Management*, 7(2).
- Kruger, C.J. and Snyman, M.M.M. 2005b. Determining the value of knowledge management. *Mousaion* 23(2):165-179.
- Kulkarni, U.R., Ravindran, S. & Freeze, R. 2006. A knowledge management success model: Theoretical development and empirical validation, *Journal of management information systems*. 23(3), 309-347.
- Kumar, R. 2005. *Research methodology: a step by step guide for beginners*. 2<sup>nd</sup> ed. London: SAGE.
- Kyles, D. 2009. *Managing Your Multigenerational Workforce: It Takes Time, Talent, Tact and Perseverance, But the End Product can be a Great Place to Work with a Wonderful Talent Pool*. All Business.com ([www.allbusiness.com](http://www.allbusiness.com)).
- Lahaie, D. 2005. The Impact of Corporate Memory Loss, What Happens When a Senior Executive Leaves. *Leadership in Health Services*, 18(3), 35-48.

- Lampbell, J. & Shamsie, J. 2003. Capabilities in motion: New organisational forms and the reshaping of the Hollywood movie industry. *The Journal of Management Studies*, 40(8), 2189–2210.
- Lancaster, L.C. & Stillman, D. 2002. *When generations collide: who they are. Why they class. How to solve the generational puzzle at work*, HarperCollins, New York.
- Lang, J.C. 2001. Managerial concerns in knowledge management, *Journal of Knowledge Management*, 5(1), 43-57.
- Lee, H., & Choi, B. 2000. Knowledge Management Enablers, Processes, and Organisational Performance: An Integration and Empirical Examination. *Journal of Management Information Systems*, 20(1), 179-228.
- Lee, H. & Choi, B. 2003. Knowledge Management Enablers, Processes, and Organisational Performance: An Integrative View and Empirical Examination. *JMIS: Journal of Management Information Systems*, 20(1), 179–228.
- Leedy, P.D. & Ormrod, J.E. 2005: 2010. *Practical research: Planning and design*. 8<sup>th</sup>/9<sup>th</sup> ed. Upper Saddle River, NJ: Pearson.
- Lesser, E. 2006. *The Maturing Workforce-managing the Crisis Before it Hits*. [Online] Available from <http://www.astd.org/LC/2006/>. [Accessed] 2009-10-27.
- Lewis, J. 2003. *Design issues*. In: Ritchie, J. & Lewis, J. (ed.) *Qualitative research practice: a guide for social science students and researchers*. London. SAGE.
- Li, Z. & Zhu, T. 2009. Study on the Influence Mechanism of Social Capital to Informal Knowledge Transfer among Individuals. *Proceedings of the 2009 International Symposium on Web Information Systems and Applications (WISA'09)*, Academy Publisher, Oulu, Finland, 355-358.



Liebowitz J. 2000. *Building Organizational Intelligence: A Knowledge Management Primer*. CRC Press.

Liebowitz, J & Chen, Y. 2001. Developing knowledge sharing proficiencies, *Knowledge Management Review*, U.K: Melcrum Publishing.

Lin, Z. 2000. Organisational restructuring and the impact of knowledge transfer. *The Journal of Mathematical Sociology*, 24 (2), 129–149.

Lindgren, R. Stenmark, D. & Ljungberg, J. 2003. Rethinking competence systems for knowledge-based organisations. *European Journal of Information Systems*, 12(1), 18–29.

Lyles, M.A. and Salk, J.E. 1996. Knowledge acquisition from foreign parents in international joint ventures: an empirical examination in the Hungarian context, *Journal of International Business Studies*, 27(5), 877-903.

Lynch R. 2009. *Strategic Management*, 5<sup>th</sup> edition. Pearson Education Limited.

MacGregor, K. 2008. South Africa: Challenges of equity, ageing expansion. *S.A. University World News*, 57.

Magnier-Watanabe, R. M. & Senoo, D. 2008. Organisation characteristics as prescriptive factors of knowledge management initiatives. *Journal of Knowledge Management*, 12(1), 21-36.

Makore, S. and Eresia-Eke C.E. 2014. The Role of Knowledge Management in Organisational Performance, *Proceedings of the 15<sup>th</sup> European Conference on Knowledge Management (ECKM2014)*, 4-5 September, Santarem, Portugal.

Malhotra, Y. 2000. Knowledge Management for E-Business Performance: Advancing Information Strategy to Internet Time. *Information Strategy: The Executive's Journal*, 5-16.

Mansfield, R. S. 1996. Building competency models: Approaches for HR professionals. *Human Resource Management*, 35(1), 7–18.

Martin, B. 2000. Knowledge Management within the Context of Management: An Evolving Relationship. *Singapore Management Review*, 22(2), 17-36.

Martin, V. A. & Beaumont, 2005. Cultivating knowledge sharing through the relationship management maturity model. *The Learning Organisation*, 12 (4), 340–354.

Massey, A.P. & Montoya-Weiss, M.M. 2006. Unraveling The Temporal Fabric Of Knowledge Conversion: A Model Of Media Selection. *MIS Quarterly*, 30, 99–114.

Mbhalati, O. J. 2012. The Genesis of the Knowledge – Based View. *Journal of Knowledge Management Practice*, 13(2), 1-10.

McDermott, R., & O'Dell, C. 2001. Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management*, 5(1), 76-85.

McQuade, E., Sjoer, E., Fabian, P., Nascimento, J., & Schroeder, S. 2007. Will You Miss me When I'm Gone?: A Study of Potential Loss of Company Knowledge and Expertise as Employees Retire. *Journal of European Industrial Training*, 31(9), 758.

McEvily, S. K., & Chakravarthy, B. 2002. The persistence of knowledge-based advantage: An empirical test for product performance and technological knowledge. *Strategic Management Journal*, 23(4), 285-305.

Meihami, B. and Meihami, H. 2014. Knowledge management a way to gain a competitive advantage in firms (evidence of manufacturing companies). *International Letters of Social and Humanistic Sciences*, 3, 80-91.

Metaxiotis K, Ergazakis K & Psarras J. 2005. Exploring the World of Knowledge Management: Agreements and Disagreements in the Academic/ Practitioner Community. *Journal of Knowledge Management* 9 (2), 6-18.

Michalism, M. D. Kline, D. M. & Smith, R. D. 2000. Intangible strategic assets and firm performance: A multi-industry study of the resource-view. *Journal of Business Strategies*, 17(2), 93 – 117.

Miles, M. & Huberman, A. 1994. *Qualitative data analysis*. Thousand Oaks: SAGE.

Miller, K. 2002. Knowledge Inventories and Managerial Myopia. *Strategic Management Journal*, 23, 689-706.

Mills, A.M. & Smith, T.A. 2011. Knowledge management and organisational performance: a decomposed view. *Journal of Knowledge Management*, 15(1), 156–171.

Minbaeva, D. 2007. Knowledge transfer in Multi-national Corporations. *Management international review*, 47(4): 16.

Mingers, J. 2008. Management Knowledge and Knowledge Management: realism and forms of truth. *Knowledge Management Research and Practice*, 6 (1), 14.

Mintzberg, H. Lampbell, J. Quinn, J.B. & Ghoshal, S. 2003. *The Strategy Process, Concepts contexts and cases*. 4<sup>th</sup> Edition, Pearson Education.

Mitchell, R. & Boyle, B. 2010. Knowledge Creation Measurement Methods. *Knowledge Management*, 14(1): 15.

Mitchell, R., Nicholas, S. & Boyle, B. 2009. The Role of Openness to Cognitive Diversity and Group Processes in Knowledge Creation. *Small Group Research*, 40(5): 535-54.

Moffett, S. McAdam, R. & Parkinson, S. 2003. An empirical analysis of knowledge management applications. *Journal of Knowledge Management*, 7(3): 6-26.

Mouton, J. 2001. *How to succeed in your Master's and Doctoral studies: a South African guide and resource book*. Pretoria: Van Schaik Publishers.

Mullins L.J. 2010. *Management and Organisational Behaviour*, Ninth edition, Prentice Hall: Pearson.

Murray & Roberts Construction, 2008:2012. *Annual report*. [Online] Available: <http://www.construction.murrob.com> (Accessed 28 October 2013).

Mwanje, J. 2001. *Issues in social research: social science research methodology series module 1*. Ethiopia: Organisation for Social Science Research in Eastern and Southern Africa, Addis Ababa.

Mwila, N. K. 2013. Focus on Organisational Memory as an Enabler and Constrainer of Knowledge management. *Journal of Knowledge Management Practice*. 14(1).

Myers, M. 1997. Quarterly research in information systems. *MIS Quarterly*, 21: 241-242.

Nag, R.; Hambrick, D.C. and Chen, M-J. 2007. What is strategic management, really? Inductive derivation of a consensus definition of the field. *Strategic Management Journal*, 28:935-955.

Ndlela, L., & du Toit, A. 2001. Establishing a knowledge management programme for competitive advantage in an enterprise. *International journal of information management*, (21), 151-165.

Neergaard, C. 1994. *Creating a learning organisation*, PhD thesis, Department of Production, Aalborg University.

Nevo, D., Benbasat, I., & Wand, Y. 2009. *The Wall Street Journal*. Retrieved November 2, 2009, from <http://online.wsj.com/article/SB10001424052970203946904574302032097910314.html>

Newbert, S. L. 2008. Empirical research on the resource based view of the firm: An assessment and suggestions for the future research. *Strategic Management Journal*, 28(2), 121–146.

Nguyen, H. N. and Mohamed, S. 2011. Leadership behaviours, organisational culture and knowledge management practices: An empirical investigation. *Journal of Management Development*, 30(2), 206-221.

Nickerson, J. A. and Zenger, T. R. 2004. A Knowledge-Based Theory of the Firm—The Problem-Solving Perspective. *Organization Science*, 1–16.

Noe, R. 2008. *Employee Training and Development*. New York: McGraw-Hill/Irwin.

Nonaka, I. 1994. A Dynamic Theory of Organisational Knowledge Creation. *Organisation Science* 5(1), 14-37.

Nonaka, I., Konno, N. & Toyama, R. 2000. 'SECI, BA and leadership: a unified model of dynamic knowledge creation.' *Long range planning*, 33, 29.

Nonaka, I. & Takeuchi, H. 1995. *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press, New York.

Novkovic, S., 2007. 'R&D, innovation and networking: Strategies for cooperative survival. Series: Advances in the Economic Analysis of Participatory & Labor-Managed Firms, vol. 10', in T. Kato (ed.), *Cooperative firms in global markets: Incidence, liability and economic performance*, 205–232.

Okunoye, A. & Karsten, H. 2002. Where the global needs the local; variation in enablers in the knowledge management process. *Journal of Global Information Technology Management*, 5 (3), 12-31.

Orange, G., Burke, A. and Boam, J. 2000. The facilitation of cross-organisational learning and knowledge management to foster partnering within the UK construction industry. [Online] Available: <http://is.lse.ac.uk/b-hive> (Accessed 21 September 2013).

Oltra, V. 2005. Knowledge management effectiveness factors: the role of HRM. *Journal of Knowledge Management*, 9(4), 70-86.

O'Shanassy, T. 2008. Sustainable competitive advantage or temporary competitive advantage: Improving understanding of an important strategy construct, *Journal of Strategy and Management* 1(2), 168-180.

Parise, S. Cross, R. & Davenport, T. 2006. Strategies for Preventing Knowledge-loss Crisis. *MIT Sloan Management Review*. 47(4), 31-38.

Patton, J.R. 2007. Metrics for Knowledge-Based Project Organisations. *SAM Advanced Management Journal*, 72(1), 33-43.

Paton, N. 2008. Manager at Work: Organisations Ignore the Transfer of Knowledge. *The Edge* Singapore. Retrieved September 9, 2009 from [www.lexisnexis.com](http://www.lexisnexis.com).

Pemberton, J.D. & Stonehouse G.H. 2000. Organizational Learning and Knowledge Assets - An Essential Partnership. *The Learning Organization* 7(4), 184-193.

Petrafi, M.A. & Barney, J.B. 2003. Unravelling the resource based tangle. *Managerial and Decision Economics*, 24(4), 309–323.

Piktialis, D. & Greenes, K. 2008. Bridging the Gaps: How to Transfer Knowledge in Today's Multigenerational Workplace. *Research Technology Management*, 51(6), 69-70.

Pillania, R.K. 2005. New Knowledge Creation, Scenarion in Indian Industry. *Global Journal of Flexible Systems Management*, 6, 49–57.

Pillania & Rajesh K., 2008. Knowledge Management for High Performance: Indian Industry Perspective. *Productivity*, 47(2), 35-48.

Ponterotto, J.G. 2005. Qualitative research in Counseling Psychology: a primer on research paradigms and philosophy of science. *Journal of Counseling Psychology*, 52(2), 126-136.

Ponterotto, J. G., & Grieger, I. 1999. Merging qualitative and quantitative perspectives in a research identity. In M. Kopala & L. A. Suzuki (Eds.), *Using qualitative methods in psychology* 49–62. Thousand Oaks, CA: Sage.

Powell, R. & Silipigni, L. 2004. *Basic research methods for Librarians*. London: Libraries unlimited, 4<sup>th</sup> edition, Westport, Connecticut.

Prahalad, C.K. and Hamel, G. 1990a. *Competing for the Future*, Harvard Business School Press, Cambridge and Boston, MA.

Prahalad, C. K., & Hamel, G. 1990b. 'The Core Competence of the Corporation.' *Harvard Business Review*, 68 (3), 79-91.

Priem, R. L. and Butler, J. E. 2001a. Is the resource-based 'view' a useful perspective for strategic management research? *Academy of Management Review*, 26: 22-40.

Priem, R. L. and Butler, J. E. 2001b. Tautology in the resource-based view and the implications of externally determined resource value: Further comment. *Academy of Management Review*, 26: 57-66.

Probst, G., Raub, S. & Romhardt, K. 2000, *Managing Knowledge- Building Blocks for Success*, West Sussex: John Wiley & Sons, Ltd.

Raduan, C. R., Jegak, U., Haslinda, A. & Alimin, I.I. 2009. Organisational resources, capabilities, systems, competitive advantage and performance, *Research Journal of international studies*.

Raft A., and Lord M. 2002. Acquiring new technologies and capabilities: a grounded model of acquisition implementation. *Organization Science*, 13 (4), 420-441.

Ramsey, M, & Barkhuizen, N. 2011. Organisational design elements and competencies for optimising the expertise of knowledge workers in a shared services centre. *SA Journal of Human Resource Management*, 9(1).



Rastogi, P. 2000. Knowledge Management and Intellectual Capital: The New Virtuous Reality of Competitiveness. *Human Systems Management*, 19(1), 39-49.

Rašula, J., Bosilj Vukšić, V. & Indihar Štemberger, M. 2008. The Integrated Knowledge Management Maturity Model. *Zagreb International Review of Economics & Business*, 9(2), 47-62.

Raubex Group Ltd, 2008:2012. *Annual report*. [Online] Available: <http://www.raubex.co.za>, (Accessed 28 October 2013).

Ray, G., Barney, J. B. & Muhanna, W. A. 2004. Capabilities, business processes and competitive advantage: Choosing the dependant variable in empirical tests of the resource based view. *Strategic management Journal*, 25, 23–37.

Reich, B. H., Gemino, A. & Sauer, C. 2014. How knowledge management impacts performance in projects: *An empirical study*. *International Journal of Project Management*, 32 590–602

Remenyi, D., Money, A., Price, D., & Bannister, F. 2002. *The Creation of Knowledge through Case Study research*. Presented at the Third European Conference on Knowledge Management, Trinity College, Dublin.

Rezgui, Y. 2001. Review of information and knowledge management practice state of the art in the construction industry. *The Knowledge Engineering Review Journal*, 16(2): 125-142.

Right Management, 2010. *Organisational Effectiveness, Discovering How to Make It Happen*, [Online] Available from [www.right.com](http://www.right.com). [Accessed 2012-09-14].

Ritchie, J. 2003. *The applications of qualitative research methods*. In : Ritchie, J. & Lewis, J. (ed.) *Qualitative research practice: a guide for social science students and researchers*. London. SAGE.

Robbins, S.P. and Coulter 2007. *Management*, 9<sup>th</sup> Ed. Pearson International Edition.

Roos, J. Roos, G. Dragonetti, N.C. & Edvinsson, L. 1997. *Intellectual Capital: Navigating the New Business Landscape*, London, Macmillan Press.

Roth, J. 2003. Enabling knowledge creation: Learning from an R&D organisation. *Knowledge management*, 7(1): 16.

Rouse, M.J., & Daellenbach, U.S. 2002. More thinking on research methods for the resource based perspective. *Strategic Management Journal*, 23, 963 – 967.

Rubenstein-Montano, R., Liebowitz, J., & McCaw, D. 2001. Smart vision: A knowledge management methodology. *Journal of Knowledge Management*, 5(4), 300-310.

Santusos, M. and Surmacz, J. 2004. *The ABC of Knowledge Management*. [Online] Available from <http://www.cio.com/research/knowledge/edit/kmabcs.html> [Accessed 2011-04-14].

Sarah, R. and Haslett, T. 2003. *Learning is a process which changes the state of knowledge of an individual or organisation?*. Monash University Working Paper, 72/03 December, 1-14. Retrieved: 16th February 2008. <http://www.buseco.monash.edu.au/mgt/research/working-papers/2003/wp72-03.pdf>

- Sayers, R.M., 2006, 'Australia's changing workplace: a generational perspective', Doctoral thesis, Royal Melbourne Institute of Technology University, Melbourne.
- Saunders, M., Lewis, P. & Thornhill, A. 2007. *Research methods for business students*. 4<sup>th</sup>/5<sup>th</sup> ed. Harlow, Essex: Pearson.
- Schein, E.H. 1990. 'Organisation culture', *American Psychologist*, February.
- Schapke, S., Menzel, K. and Scherer, R. 2002. *Towards organisational memory systems in the construction industry*. Dresden: Institute of Applied Computer Science in Civil Engineering.
- Schoenherr, T., Griffith, D.A., and Chandra, A. 2014. Knowledge Management in Supply Chains: The Role of Explicit and Tacit Knowledge. *Journal of Business Logistics*, 2-35.
- Shannak, R.O. 2009. Measuring Knowledge Management Performance. *European Journal of Scientific Research*. 35(2): 242-253.
- Shenton, A. 2004. Strategies for ensuring trust worthiness in qualitative research projects. *Education for Information*. (22), 63-75.
- Sin, C. H. Goh, G. G. & Eze, C. U. 2009. Knowledge Management Enablers Toward Successful New Product Development: A Case Study In A Semiconductor Manufacturing Firm. *Journal of Knowledge Management Practice*, 10(1), 4.
- Singh, S., Chan, Y.E., & McKeen, J.D. 2006. Knowledge Management Capability and Organisational Performance: A Theoretical Foundation. *Submitted to OLKC 2006 Conference at the University of Warwick, Coventry on 20th - 22nd March*.

Sirmon, D.G., Hitt, M.A. and Ireland, R.D. 2007. Managing firm resources in dynamic environments to create value: looking inside the black box. *Academy of Management Review*, 32(1), 273-292.

Skryme, D. & Amidon, D. 1998. New Measures of success. *Journal of Business Strategy*, 20-24.

Slagter, F. 2007. Knowledge Management among the Older Workforce. *Journal of Knowledge Management*. 11(4) 82-96.

Southon, G. & Todd, R. 1999. Knowledge Management: A Social Perspective. Proceedings of the KNOW'99. Sydney.

Spanos, Y. E. & Lioukas, S. 2011. An examination into the causal logic of rent generation: contrasting Porter's competitive strategy framework and the Resource-based perspective. *Strategic Management Journal*, 22(10), 907-934.

Spurgin, E. W. 2004. The goals and merits of a business ethics competency exam. *Journal of Business Ethics*, 50(3), 279–288.

Squier, M. & Snyman, R. 2004. Knowledge management in three financial organisations: A case study. *Aslib Proceedings, New Information Perspectives*, 56(4), 95-111.

Stats SA. 2007. *Mid-year population estimates. Statistical release: P0302*, Statistics South Africa, Pretoria.

Statistics SA. 2005. *Statistical release P5001: construction industry, 2004*. [Online] Available: <http://www.sajim.co.za/www.statssa.gov.za> (Accessed 1 April 2013).

Stats SA. 2014. *Quarterly Labour Force Survey. Statistical release: P0211* - Statistics South Africa, Pretoria.

Stevens, R. H. 2010. Knowledge management in a multigenerational workforce: challenges and opportunities presented by older workers. *Indian Journal of Economics and Business*, 9(1).

Strack, R., Baier, J. & Fahlander, A. 2008. Managing Demographic Risk. *Harvard Business Review*, 86(2); 119-128.

Stross, R. E. 1996. Microsoft's big advantage - hiring only the super-smart. *Fortune*, 134(10), 159–162.

Sveiby, K. E. 2001. A Knowledge Based Theory of the Firm to Guide in Strategy Formulation. *Journal of Intellectual Capital*, 2(4) 344-350.

Snyman, M.M.M. and Kruger, C.J. 2004. The interdependency between strategic management and strategic knowledge management. *Journal of Knowledge Management* 8(1), 5-19.

Teece, D. 1998. Capturing value from knowledge assets: the new economy, markets for know-how and intangible assets. *California Management Review*, 40(3), 55-79.

Theriou, N. G., Aggelidis, V. & Theriou, G. N. 2009. A Theoretical Framework Contrasting the Resource-Based Perspective and the Knowledge-Based View. *European Research Studies*, 12(3), 177-190.

Thomas, J., Kellog, W. & Erickson, T. 2001. The knowledge management puzzle: Human and social factors in knowledge management. *IBM system Journal*, 40(4), 863-884.

Thompson, J. & Martin, F. 2010. Strategic Management: Awareness and change, 6<sup>th</sup> edition. South Western Cengage.

- Tiwana, A. 2002. *The Knowledge Management Toolkit: Orchestrating IT, Strategy, and Knowledge Platforms*. 2<sup>nd</sup> edition, Prentice Hall PTR, Upper Saddle River, NJ.
- Tobin, P.K.J. & Franze, M.H. 2005. Organisational structure and knowledge management: a case study. *Mousaion* 23(2), 149-164.
- Tobin, P.K.J. & Magenuka T., P. 2007. Knowledge management and JSE-listed construction sector companies. *Bloomberg Business Week. Mousaion* 24(1), 96-118.
- Tobin, P.K.J. and Snyman, M.M.M. 2004. World-class knowledge management: a proposed framework. *South African Journal of Information Management*, 6(3).
- Tobin, P.K.J. & Volavsek, P. 2006. Knowledge management measurement in South African organisations. *Mousaion* 24(1), 96-118.
- Tounkara, T. 2014. Increasing Transferability of Tacit Knowledge with Knowledge Engineering Methods. *The Electronic Journal of Knowledge Management*, 11(3), 268-279.
- Tyler, B. B. 2001. The complementarity of cooperative and technological competencies: A resource-based perspective. *Journal of Engineering and technological Management*, 18(1), 1–27.
- U. S. Bureau of Labour Statistics. 2009. Labour Force Statistics from the Current Population Survey. [Online] Available from: <http://www.bls.gov/cps/cpsdisability.htm> [Accessed] 2009.10.27.
- Vaaler, B. R. 2005. Codifying competencies. Law firm partnership and benefits report, *Law Journal Newsletters*.

Van den Berg, H.A. 2002. Models of Intellectual capital Valuation: A Comparative Evaluation. [online] Available: <http://business.queensu.ca/knowledge/consortium2002/ModelsofICValuation.pdf>

Van den Berg, H. and Snyman, M.M.M. 2003. Managing tacit knowledge in the corporate environment: communities of practice. *South African Journal of Information Management*, 5(4).

Van der Walt, C., van Brakel, P.A. and Kok, J.A. 2004. Knowledge sharing via enterprise intranets – asking the right questions. *South African Journal of Information Management*, 6(2).

Vera, D., & Crossan, M. 2003. Organisational learning and knowledge management: Toward an integrative framework. *The Blackwell handbook of organisational learning and knowledge management*, Easterby-Smith, M. and Lyles, M.A. (eds.), Blackwell Publishing, Oxford, UK, 122-141.

Waal, A.A. de 2006. Performance Management and Management: Public and Private, ed. A. Neely, and M. Kennedy and A. Walters, Cranfield School of Management, 203-210.

Waal, A.A. de 2008. The role of Information Technology in the High Performing Organisation, white paper.

Wan, W.P., Hoskinsson, R.R., Short, J.C., and Yiu, D.W. 2010. Resource-Based Theory and Corporate Diversification : Accomplishments and Opportunities. *Journal of Management*, 37(5), 1335-1368.

Warne, L., Ali, I.M. & Pascoe, C. 2003. Team Building as a Foundation for Knowledge Management: Findings from Research into Social Learning in the Australian Defence Organisation. *Journal of Information & Knowledge Management*. 2(2), 93-106.

Wang, H. C. He, J. & Mahoney, J. T. 2009. Firm-Specific Knowledge Resources and competitive Advantage: Roles of economic and relationship-based employee governance mechanisms. *Strategic Management Journal*, 30(1), 1265-1285.

Wang, S., Noe, R. A. & Wang, Z. M. 2014. Motivating knowledge sharing in knowledge management systems: A quasi-field experiment. *Journal of management*, 40(4), 978-1009.

Watson, T. 2002. Goodnight, sweet prince. *Canadian Business*, 75(10), 77–78.

Weber, R. 2007. Knowledge Management in Call Centers. *European Journal of Knowledge Management*, 5(3), 333-346.

Wiscombe, J. 2002. CEO takes HR to prime time. *Workforce*, 81(13), 10.

Welman, C., Kruger, F. & Mitchell, B. 2005. *Research methodology*. 3<sup>rd</sup> ed. Cape Town: Oxford University Press, South Africa.

Wenger, E; McDermott, R, Snyder, W. 2002. Cultivating communities of practice: A guide to managing knowledge, Harvard Business School Press, Boston.

Westerman, J. & Yamamura, J. 2007. Generational Preferences for Work Environment Fit: Effects on Employee Outcomes. *Emerald Group Publishing Limited*. 12(2).

Westberg, P.B. and Sullivan, P.H. 1998. In search of a new paradigm. In: P.H. Sullivan, (Ed.), *Profiting from Intellectual capital: extracting value from innovation*. New York: Wiley and Sons.

Wiig, K.M. 1997. Integrating Intellectual capital and Knowledge Management, *Long Range Planning*, 30(3), 399-405.



- Wiig, K. 2004. *People-Focused Knowledge Management* . Butterworth-Heinemann, UK.
- Wilder, S. 1996. Generational Change and the niche for librarians. *The Journal of Academic Librarianship*, 22(5), 385–386.
- Wilson Bayly Holmes Ovcon Ltd, 2008:2012. *Annual report*. [Online] Available: <http://www.wbho.co.za>, (Accessed 28 October 2013).
- Wong, K.Y. & Aspinwall, E. 2004. Is Knowledge Management Equivalent to Information technology? *Proceedings of the 4<sup>th</sup> European Conference on Knowledge Management*, Oxford University, Oxford, 989-997.
- Wong, K.Y. & Aspinwall, E. 2005. An Empirical study of the Important Factors for Knowledge Management Adoption in the SME Sector. *Journal of Knowledge Management*, 9(3), 64-82.
- Yang, J. 2007. The impact of knowledge sharing on organisational learning and effectiveness, *Journal of Knowledge Management*, 11(2), 83-90.
- Yang, J. 2008. Managing Knowledge for quality assurance: an empirical study. *International Journal of Quality and Reliability Management*, 25(2), 109-121.
- Yeh, Y.J. Lai, S.Q. & Ho, C.T. 2006. Knowledge management enablers: A case study. *Industrial Management & Data Systems*, 106(6): 793-810.
- Yew, K. W. and Aspinwall, E. 2005. Characterizing Knowledge Management in the Small Business Environment. *Journal of Knowledge Management*. 8(3).
- Yin, R. K. 2003. *Case Study research Design and Methods* (3rd ed), Thousand Oaks, CA: Sage.

Zollo M and Winter SG. 2002. Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science*, 13(3), 339-351.

**APPENDIX A**  
**Data collection instrument – The Questionnaire**

Questionnaire no.....

Code.....

For office use

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## THE ROLE OF KNOWLEDGE MANAGEMENT IN ORGANISATIONAL PERFORMANCE

Dear respondent

Thank you for your willingness to complete this survey. The purpose of this survey is to understand the role of knowledge management in organisational performance in South African companies. This is an anonymous and confidential survey and therefore you cannot be identified and the answers you provide will be used for research purposes only.

Please answer all the questions. There are no right or wrong answers.

### Part 1 – Personal profile

1. What is your level of education? Please tick the appropriate answer.

						For office use		
Matric 1	Bachelors 2	Honours 3	Masters 4	Doctorate 5	Other- Specify. 6		V1	

2. For how long have you been with this organisation?

	V2	
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3. Please specify your level within the company structure.

1.Operational	2.Middle management	3.Senior management	V3	
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4. For how many years have you worked in the construction/engineering industry?

	V4	
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### Part 2 – Knowledge management practices

5. Please tick the box with your suitable response.

5a. Does your organisation have a formal knowledge management programme in place?	Yes	No		V5	
5b. Does your company have a written knowledge management policy?	Yes	No		V6	

6. To what extent do you agree/disagree with the following statements?

**Questionnaire no.....**

Code.....

For office use

Knowledge/Experience/Contacts	Strongly Disagree	Disagree	Neutral	Agree	Strongly	For office use	
a) My knowledge (education) is useful at work.						V7	
b) My knowledge is useful for the work of other colleagues.						V8	
c) My work colleagues are aware of my knowledge.						V9	
d) My experience is useful at work.						V10	
e) My colleagues at work benefit from my experience.						V11	
f) My work colleagues are aware of my experience.						V12	
<i>My personal business contacts are useful at work</i>						V13	
	<b>For Office Use</b>						
g) My personal business contacts are useful for						V14	

other work colleagues.									
h) My colleagues are aware of my personal business contacts.							V15		

7. In your opinion, to what extent do the following statements apply to your organisation?

<b>Knowledge acquisition</b>	Strongly	Disagree	Neutral	Agree	Strongly	<b>For Office Use</b>			
<i>KAF1: Organisation is sensitive to information about changes in the market place</i>									
a) We are quick to detect changes in our customers' preferences							V16		
b) Information about our competitors is collected by more than one department							V17		
<i>KAF2: Organisation works in partnership with international customers</i>									
c) We meet with customers at least once a year to find out what products/services they will need in future							V18		
d) We often acquire new ideas through export activities							V19		
<i>KAF3: Organisation gets information from market surveys</i>									
e) Our organisation does a lot of market research							V20		
f) We survey end-users at least once a year to assess the quality of our products/services							V21		
<i>KAF4: Organisation values employees attitudes &amp; opinions</i>									
g) Employees are surveyed regularly to assess their attitudes towards work							V22		
h) There are regular staff appraisals where staff needs are also discussed							V23		
i) Employees are encouraged to attend training seminars and conferences							V24		

j) Employees are encouraged to undertake university & polytechnic courses							V25		
k) We have regular meetings with employees							V26		
<i>KAF5: Organisation has a well-developed financial reporting system</i>									
l) We know exactly how much each of our products/services cost us							V27		
m) We analyse the contribution of our products/services							V28		
n) We have good financial information on our organisation							V29		

8. To what extent do you agree/disagree with the following statements?

<b>Knowledge dissemination</b>	Strongly	Disagree	Neutral	Agree	Strongly	<b>For Office Use</b>			
<i>KDF1: Knowledge is disseminated on the job</i>									
a) Our work space is set up to make it easy for people to talk to each other							V30		
b) We encourage people with similar interests to work together to solve a problem							V31		
c) We frequently step back & reflect on what went well/wrong in aspects of our business							V32		
<i>KDF2: Use of specific techniques to disseminate knowledge</i>									
d) Techniques such as quality circles are frequently used in our organisation							V33		
e) Our organisation actively encourages mentoring or coaching							V34		
f) We often write case notes on successful & unsuccessful products & processes							V35		
<i>KDF3: Organisation uses technology to disseminate knowledge</i>									
g) We often use video conferencing							V36		
h) We often use teleconferencing							V37		

i) We make good use of GroupWare such as Lotus Notes to share information on products & processes							V38		
<i>KDF4: Market information is freely disseminated</i>									
j) There are regular meetings between departments to discuss market trends							V39		
k) A customer information database that is easy to access is kept							V40		
l) Marketing people frequently spend time with technical department people discussing customers' future needs							V41		
<i>KDF5: Organisation prefers written communication</i>									
m) A large number of written reports circulate in our organisation							V42		
n) We often update policy & procedure manuals							V43		
o) Employees are expected to provide feedback to others whenever they attend conferences, exhibitions or seminars							V44		

9. In your opinion, to what extent do the following statements apply to your organisation?

<b>Responsiveness to Knowledge</b>	Strongly	Disagree	Neutral	Agree	Strongly	<b>For Office use</b>
<i>KRF1: Responds to customers</i>						
a) We immediately respond to customers if they are dissatisfied with the quality of our product or service						V45
b) We usually respond to changes in customer needs						V46
c) We are quick to respond to customer complaints						V47
d) We are quick to respond to concerns raised by employees						V48
<i>KRF2: Responds to competitors</i>						



e) When something happens to a competitor the whole organisation knows about it quickly							V49		
f) We are quick to implement strategies in response to significant changes in our competitors' pricing models							V50		
g) If a major competitor launches an intensive campaign targeted at our customers, we implement a response immediately							V51		
<i>KRF3: Organisation is flexible &amp; opportunistic</i>									
h) We often change our procedures for doing things							V52		
i) We often change the range of products/services that we offer							V53		
j) We frequently change our marketing strategies							V54		
<i>KRF4: Responds to technology</i>									
k) We manage to keep up to date with technological developments that could affect our business							V55		
l) Information about new technological developments that might affect our business is circulated quickly							V56		
m) We periodically review the likely effect of changes in technology on our customers							V57		

### Part 3: Organisational performance

10. Please indicate the extent to which the following are true of your organisation.

<b>Performance</b>	<b>Strongly</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly</b>	<b>For Office Use</b>
<i>KPF1: Comparative performance</i>						
a) Compared with the industry average, we are						V58

more profitable									
b) Compared with the industry average, we have a greater market share							V59		
c) Compared with the industry average, we are growing more rapidly							V60		
<i>KPF2: Internal Performance</i>									
d) In general, our organisation is performing better than it did 12 months ago.							V61		
e) In general, our organisation is performing better than it did 5 years ago							V62		
f) Over the past 12 months, our organisation has met its performance objectives							V63		
g) Over the past 5 years our organisation has met its performance objectives							V64		

**APPENDIX B**  
**- Informed consent form -**



Faculty of Economic and  
Management Sciences

**Dept. of Business Management**

**Combined Letter of Introduction and Informed consent for participation  
in an academic research study**

**THE ROLE OF KNOWLEDGE MANAGEMENT IN ORGANISATIONAL  
PERFORMANCE**

Research conducted by:

Mr. S. Makore (11303205)

Cell: 076 339 2249

Dear Respondent

You are invited to participate in an academic research study conducted by Stanford Makore a Doctoral student from the Department of Business Management at the University of Pretoria.

The purpose of the study is to determine the role of knowledge management in organisational performance.

Please note the following:

- This study involves an anonymous survey. Your name will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give.

- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than 15 minutes of your time.
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.
- Please contact my supervisor, Dr C.E. Eresia-Eke (e-mail address: Chuks.Eresia-Eke@up.ac.za; cell phone number 073 236 7729) if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

---

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**Respondent's signature**

**Date**

**APPENDIX C**  
**Rating System Capturing Sheet**

## QUESTIONNAIRE: RATING SYSTEM CAPTURING SHEET

### Part 2: Points allocated

**Yes – award 1 point**

**No – no points awarded**

	Yes	No		
5a. Does your organisation have a formal knowledge management programme in place?	1	0		V5
5b. Does your company have a written knowledge management policy?	1	0		V6

**Strongly Disagree – award 1 point**

**Disagree – award 2 points**

**Neutral – award 3 points**

**Agree – award 4 points**

**Strongly Agree – award 5 points**

Knowledge/Experience/Contacts	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	For office use	
a) My knowledge (education) is useful at work.	1	2	3	4	5		V7
b) My knowledge is useful for the work of other colleagues.	1	2	3	4	5		V8
c) My work colleagues are aware of my knowledge.	1	2	3	4	5		V9

d) My experience is useful at work.	1	2	3	4	5		V10	
e) My colleagues at work benefit from my experience.	1	2	3	4	5		V11	
f) My work colleagues are aware of my experience.	1	2	3	4	5		V12	
a) My work colleagues are aware of my experience.	1	2	3	4	5		V12	
My personal business contacts are useful at work	1	2	3	4	5		V13	
	<b>For Office Use</b>							
b) My personal business contacts are useful for other work colleagues.	1	2	3	4	5		V14	
c) My colleagues are aware of my personal business contacts.	1	2	3	4	5		V15	

<b>Knowledge acquisition</b>	<b>Strongly</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly</b>	<b>For Office Use</b>		
<i>KAF1: Organisation is sensitive to information about changes in the market place</i>								
a) We are quick to detect changes in our customers' preferences	1	2	3	4	5		V16	
b) Information about our competitors is collected by more than one department	1	2	3	4	5		V17	
<i>KAF2: Organisation works in partnership with international customers</i>								
c) We meet with customers at least once a year to find out what products/services they will need in future	1	2	3	4	5		V18	
d) We often acquire new ideas through export activities	1	2	3	4	5		V19	
<i>KAF3: Organisation gets information from market surveys</i>								
e) Our organisation does a lot of market research	1	2	3	4	5		V20	
f) We survey end-users at least once a year to assess	1	2	3	4	5		V21	



the quality of our products/services									
<i>KAF4: Organisation values employees attitudes &amp; opinions</i>									
g) Employees are surveyed regularly to assess their attitudes towards work	1	2	3	4	5		V22		
h) There are regular staff appraisals where staff needs are also discussed	1	2	3	4	5		V23		
i) Employees are encouraged to attend training seminars and conferences	1	2	3	4	5		V24		
j) Employees are encouraged to undertake university & polytechnic courses	1	2	3	4	5		V25		
k) We have regular meetings with employees	1	2	3	4	5		V26		
<i>KAF5: Organisation has a well-developed financial reporting system</i>									
l) We know exactly how much each of our products/services cost us	1	2	3	4	5		V27		
m) We analyse the contribution of our products/services	1	2	3	4	5		V28		
n) We have good financial information on our organisation	1	2	3	4	5		V29		

<b>Knowledge dissemination</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>For Office Use</b>			
<i>KDF1: Knowledge is disseminated on the job</i>									
a) Our work space is set up to make it easy for people to talk to each other	1	2	3	4	5		V30		
b) We encourage people with similar interests to work together to solve a problem	1	2	3	4	5		V31		
c) We frequently step back & reflect on what went well/wrong in aspects of our business	1	2	3	4	5		V32		
<i>KDF2: Use of specific techniques to disseminate knowledge</i>									

d) Techniques such as quality circles are frequently used in our organisation	1	2	3	4	5		V33	
e) Our organisation actively encourages mentoring or coaching	1	2	3	4	5		V34	
f) We often write case notes on successful & unsuccessful products & processes	1	2	3	4	5		V35	
<i>KDF3: Organisation uses technology to disseminate knowledge</i>								
g) We often use video conferencing	1	2	3	4	5		V36	
h) We often use teleconferencing	1	2	3	4	5		V37	
i) We make good use of GroupWare such as Lotus Notes to share information on products & processes	1	2	3	4	5		V38	
<i>KDF4: Market information is freely disseminated</i>								
j) There are regular meetings between departments to discuss market trends	1	2	3	4	5		V39	
k) A customer information database that is easy to access is kept	1	2	3	4	5		V40	
l) Marketing people frequently spend time with technical department people discussing customers' future needs	1	2	3	4	5		V41	
<i>KDF5: Organisation prefers written communication</i>								
m) A large number of written reports circulate in our organisation	1	2	3	4	5		V42	
n) We often update policy & procedure manuals	1	2	3	4	5		V43	
o) Employees are expected to provide feedback to others whenever they attend conferences, exhibitions or seminars	1	2	3	4	5		V44	

Responsiveness to Knowledge	Strongly	Disagree	Neutral	Agree	Strongly	For Office use	
<i>KRF1: Responds to customers</i>							
a) We immediately respond to customers if they are dissatisfied with the quality of our product or service	1	2	3	4	5		V45
b) We usually respond to changes in customer needs	1	2	3	4	5		V46
c) We are quick to respond to customer complaints	1	2	3	4	5		V47
d) We are quick to respond to concerns raised by employees	1	2	3	4	5		V48
<i>KRF2: Responds to competitors</i>							
e) When something happens to a competitor the whole organisation knows about it quickly	1	2	3	4	5		V49
f) We are quick to implement strategies in response to significant changes in our competitors' pricing models	1	2	3	4	5		V50
g) If a major competitor launches an intensive campaign targeted at our customers, we implement a response immediately	1	2	3	4	5		V51
<i>KRF3: Organisation is flexible &amp; opportunistic</i>							
h) We often change our procedures for doing things	1	2	3	4	5		V52
i) We often change the range of products/services that we offer	1	2	3	4	5		V53
j) We frequently change our marketing strategies	1	2	3	4	5		V54
<i>KRF4: Responds to technology</i>							
k) We manage to keep up to date with technological developments that could affect our business	1	2	3	4	5		V55
l) Information about new technological developments that might affect our business is circulated quickly	1	2	3	4	5		V56
m) We periodically review the likely effect of changes in technology on our customers	1	2	3	4	5		V57

### Part 3: Organisational performance

Performance	Strongly	Disagree	Neutral	Agree	Strongly	For Office Use		
<i>KPF1: Comparative performance</i>								
a) Compared with the industry average, we are more profitable	1	2	3	4	5		V58	
b) Compared with the industry average, we have a greater market share	1	2	3	4	5		V59	
c) Compared with the industry average, we are growing more rapidly	1	2	3	4	5		V60	
<i>KPF2: Internal Performance</i>								
d) In general, our organisation is performing better than it did 12 months ago.	1	2	3	4	5		V61	
e) In general, our organisation is performing better than it did 5 years ago	1	2	3	4	5		V62	
f) Over the past 12 months, our organisation has met its performance objectives	1	2	3	4	5		V63	
g) Over the past 5 years our organisation has met its performance objectives	1	2	3	4	5		V64	

## APPENDIX D: INTERVIEW SCHEDULE OF SEMI-STRUCTURED INTERVIEWS

	Questions
Part 1 Personal profile	What is your level of education?
	For how long have you been with this organisation?
	What is your level within the company structure?
	For how many years have you worked in the construction and engineering industry?
	What are the major causes of staff mobility in the construction and engineering sector?
Part 2 Knowledge Management practices	What are the pre-condition for employment with the regards to the following (1) education (knowledge), (2) experience and (3) personal business contacts at work and for work colleagues?
	Is there awareness amongst colleagues regarding your (1) education (knowledge), (2) experience and (3) personal business contacts?
Knowledge acquisition	KAF1: Organisation is sensitive to information about changes in the market place (customers, competitors)?
	KAF2: Organisation works in partnership with international customers (products, new ideas-exports)?
	KAF3: Organisation gets information from market surveys?
	KAF4: Organisation values employees' attitudes & opinions?
	KAF5: Organisation has a well-developed financial reporting system?
Knowledge dissemination	KDF1: Is knowledge disseminated on the job?
	KDF2: Which specific techniques are used to disseminate knowledge by your organisation?
	KDF3: Does your organisation use technology to disseminate knowledge?
	KDF4: Is market information freely disseminated?
	KDF5: Organisation prefers written communication?
Responsiveness to knowledge	KRF1: Organisation responds to customers?
	KRF2: Organisation responds to competitors?
	KRF3: Organisation is flexible & opportunistic?
	KRF4: Organisation responds to technology?

## APPENDIX E: SUMMARY OF METHODOLOGIES AND KEY FINDINGS

Article	Nature of Study	Method of Study	School of KM (see Earl, 2001)	Performance Type	Theoretical Foundation	Key Finding(s)
(Allard and Holsapple, 2002)	Non empirical	N/A	Engineering,	Competitive advantage, Innovation	I/O economics	Taking a KM view, a knowledge chain model is suggested to gain competitive advantage in e-commerce.
(Beckett, et al., 2000)	Non empirical	N/A	Engineering,	Competitive advantage		Develops a framework with three KM strategies – acquisition, retention, exploitation, to gain competitive advantage.
(Berawi, 2004)	Non empirical	N/A	Engineering, Organizational	Competitive advantage		KM affects competitive advantage through its effect on quality management.
(Bhatt, 2001)	Non empirical	N/A	Organizational	Competitive advantage		In order to gain competitive advantage from KM, organization ought to treat KM within the context of technological and social system.
(Braganza, et al., 1999)	Non empirical	N/A	Engineering	Competitive advantage		KM affects competitiveness through innovation
(Chakravarthy, et al., 2003)	Non empirical	N/A	Strategic, Commercial	Competitive advantage		Identifies that there are three KM activities –knowledge protection, knowledge leverage and knowledge accumulation. No knowledge base can lead to sustainable advantage unless organizations continuously create new knowledge. There is also a paradox associated with the three KM activities. For instance aggressive attempts at leveraging knowledge can inhibit knowledge accumulation because the later may typically not offer financial returns in the short run whereas the former often does.
(Choi and Lee, 2003)	Empirical	Survey	Organizational, System	General performance		There are four style of KM – human oriented, passive, system oriented and dynamic. The dynamic style of KM leads to better corporate performance
(Chuang, 2004)	Empirical	Survey	Strategic	Competitive advantage	Resource based view	The study builds KM capability from four KM resources – technical, human, cultural, and structural. The KM capability is related to competitive advantage.
(Civi, 2000)	Non empirical	N/A	Strategic, Commercial	Competitive advantage		Organizations must build a strategy around their KM so that it is reflects their competitive strategy.
(Clarke and Turner, 2004)	Empirical	Case study	Strategic	Competitive advantage	I/O economics	It is argued that the RBV view of KM is limited because it emphasizes knowledge that must be protected and unique. But some organizations in Australia build competitive advantage by building alliances and relationships. Thus, KM needs a broader perspective than just RBV.
(Darroch and McNaughton, 2003)	Empirical	Survey, Secondary	Strategic	Market and Internal	RBV	Organizations with KM orientation outperformed organizations with market orientation.

Article	Nature of Study	Method of Study	School of KM (see Earl, 2001)	Performance Type	Theoretical Foundation	Key Finding(s)
(DeTienne and Jackson, 2001)	Non empirical	N/A	Commercial, Organizational	General performance	Organization learning	KM will provide performance benefits only if organizations develop strategies for filtering knowledge, strengthening corporate philosophy, and facilitating effective communication.
(Francisco and Guadamillas, 2002)	Empirical	Case study	Strategic	Innovation		KM allows Irizar (a company in Spain) to continuously innovate. Firm culture plays a significant role at the company.
(Gloet and Terziovski, 2004)	Empirical	Survey	Organizational, Systems	Innovation		KM when implemented with human resource management practices and IT practices lead to higher innovation within an organization.
(Gold, et al., 2001)	Empirical	Survey	Engineering, Organizational, Strategic	General performance		A capability model of KM is built and it is shown that knowledge infrastructure capabilities and knowledge processes capabilities impact organizational performance. Organizations must mobilize new knowledge faster and efficiently to gain advantage.
(Gupta and Govindrajana, 2000)	Empirical	Case study	Organizational	Competitive advantage		Develops an idea of KM value chain. The focus of the paper is on primary activities of the value chain.
(Holsapple and Jones, 2004)	Non empirical	N/A	Engineering,	Competitive advantage	I/O economics	The idea of KM value chain is extended with a focus on the secondary activities of the chain.
(Holsapple and Jones, 2005)	Non empirical	N/A	Engineering,	Competitive advantage	I/O economics	The effect of KM on organizational performance is contingent upon various firm level and organizational level contingencies. KM is divided into three processes – knowledge development, knowledge utilization and knowledge capitalization. Each process has its own contingencies factors and performance outcomes
(Kalling, 2003)	Empirical	Case study	Systems	General performance		The study shows that KM enablers effect KM processes, which in turn effect organizational performance through intermediate impacts
(Lee and Choi, 2003)	Empirical	Survey	Organizational, Engineering	Market and financial		Develops an idea of knowledge value chain (KVC) and suggests that competitive advantage comes from the way organization performs each knowledge activity in the (KVC)
(Lee and Yang, 2000)	Non empirical	N/A	Engineering	Competitive advantage	I/O economics	KM is positively correlated to performance.
(Liu, et al., 2004)	Empirical	Survey	Engineering	General performance		KM should be applied within a defined context. At Nortel, KM was applied to new product development process which led to significant improvements in product innovation.
(Massey, et al., 2002)	Empirical	Case study	Commercial, Engineering, Organizational, Strategic	Product innovation		A theoretical model is developed and tested show that KM allows organizations to innovate
(McAdam, 2000)	Empirical	Survey	Organizational, Systems	Innovation		



Article	Nature of Study	Method of Study	School of KM (see Earl, 2001)	Performance Type	Theoretical Foundation	Key Finding(s)
(Sabherwal and Becerra-Fernandez, 2003)	Empirical	Survey	Organizational	Perceived Effectiveness measures at individual, group and organizational levels	Organization learning	Using Nonaka and Takeuchi's SECI model, the study shows that socialization and combination effects organizational effectiveness. The study also shows individual effectiveness affects group effectiveness, which in turn effects organizational effectiveness
(Salazar, et al., 2003)	Empirical	Case study	Systems	Competitive advantage		KM has enabled smaller pharmaceutical and biotechnology firms to compete and gain competitive advantage.
(Schulz and Jobe, 2001)	Empirical	Survey	Systems, Strategic	General performance		The paper develops four strategies for KM – codification, tacitness, focused and unfocused. The results suggest that focused strategy results in superior firm performance.
(Sher and Lee, 2004)	Empirical	Survey	Strategy	Dynamic capabilities		KM affects dynamic capabilities, which in turn effects firm's competitive advantage
(Tsai and Shih, 2004)	Empirical	Survey	Strategy	Market and financial		The relationship between marketing KM and business performance is mediated by marketing capabilities.
(Tumer and Bettis, 2002)	Empirical	Experimental	Strategic	Effectiveness and efficiency		Knowledge integration strategy outperforms knowledge redundancy strategy



## APPENDIX F

### PUBLISHED RESULTS FOR JSE LISTED CONSTRUCTION COMPANIES

*(Sources not placed directly under the financials for anonymity purposes)*

Accentuate Ltd. 2008 - 2012. *Annual report*. [Online] Available:  
<http://www.accentuateltd.co.za> (Accessed 28 October 2013).

Austro Group Ltd, 2008-2012. *Annual report*. [Online] Available:  
<http://www.austrogrouplimited.co.za> (Accessed 28 October 2013).

Aveng. 2008 - 2012. *Annual report*. [Online] Available: <http://www.aveng.co.za>  
(Accessed 28 October 2013).

Basil Read, 2008-2012. *Annual Report*. [Online] Available:  
<http://www.basilread.co.za> (Accessed 28 October 2012).

Esofranki Limited, 2008:2012. *Annual report*. [Online] Available:  
<http://www.esofranki.co.za> (Accessed 28 October 2013).

Group 5. 2008:2012. *Annual report*. [Online] Available: <http://www.g5.co.za>  
(Accessed 28 October 2013).

Invicta Holdings Ltd, 2008:2012. *Annual report*. [Online] Available:  
<http://www.invictaholdings.co.za> (Accessed 28 October 2013).

Murray & Roberts Construction, 2008:2012. *Annual report*. [Online] Available:  
<http://www.construction.murrob.com> (Accessed 28 October 2013).

Raubex Group Ltd, 2008:2012. *Annual report*. [Online] Available:  
<http://www.raubex.co.za>, (Accessed 28 October 2013).

Wilson Bayly Holmes Ovcon Ltd, 2008:2012. *Annual report*. [Online] Available:  
<http://www.wbho.co.za>, (Accessed 28 October 2013).

# Consolidated statements of financial position

as at 31 August



Notes	GROUP			COMPANY		
	2010 R'000	Restated 2009 R'000	Restated 2008 R'000	2010 R'000	Restated 2009 R'000	Restated 2008 R'000
<b>ASSETS</b>						
<b>Non-current assets</b>	<b>273 403</b>	281 819	290 093	<b>254 020</b>	254 064	301 882
Plant and equipment	43 597	51 064	55 760	–	–	15 024
Goodwill	229 742	229 742	228 029	–	–	–
Deferred taxation	64	1 013	6 304	64	108	–
Investment in subsidiaries	–	–	–	253 956	253 956	286 858
<b>Current assets</b>	<b>372 160</b>	412 972	559 365	<b>146 765</b>	188 959	231 471
Inventories	254 053	336 110	414 416	–	–	97 134
Trade and other receivables	75 160	70 773	142 354	2 165	86	27 198
Taxation receivable	557	3 856	136	–	–	–
Loans receivable	–	–	–	104 168	188 873	107 049
Cash and cash equivalents	42 390	2 233	2 459	40 432	–	90
<b>Total assets</b>	<b>645 563</b>	694 791	849 458	<b>400 785</b>	443 023	533 353
<b>EQUITY AND LIABILITIES</b>						
<b>Capital and reserves</b>	<b>545 705</b>	539 832	505 433	<b>352 982</b>	371 450	392 204
Share capital	4	4	4	4	4	4
Share premium	322 103	322 103	308 003	322 103	322 103	308 003
Shares to be issued	–	–	14 778	–	–	14 778
Accumulated profits	223 598	217 725	182 648	30 875	49 343	69 419
<b>Non-current liabilities</b>	<b>3 805</b>	10 812	9 061	<b>3 426</b>	6 851	5 247
Interest-bearing liabilities	–	1 370	3 453	–	–	–
Interest-free liabilities	3 426	6 851	4 613	3 426	6 851	4 613
Deferred taxation	379	2 591	995	–	–	634
<b>Current liabilities</b>	<b>96 053</b>	144 147	334 964	<b>44 377</b>	64 722	135 902
Current portion of interest-bearing liabilities	–	600	559	–	–	–
Current portion of interest-free liabilities	3 426	3 426	15 534	3 426	3 426	16 926
Trade and other payables	62 730	35 076	201 486	1 168	3 177	39 976
Provisions	–	–	1 394	–	–	1 394
Taxation payable	4 629	5 400	42 993	4 000	2 975	4 366
Bank overdraft	25 268	99 645	72 998	35 783	55 144	73 240
<b>Total equity and liabilities</b>	<b>645 563</b>	694 791	849 458	<b>400 785</b>	443 023	533 353
Number of shares in issue	431 413 384	431 413 384	425 927 491	–	–	–
Weighted average number of shares	431 413 384	431 413 384	428 220 774	–	–	–
Net asset value	545 705	539 832	505 433	–	–	–
Goodwill	229 742	229 742	228 029	–	–	–
Tangible net asset value	315 963	310 090	277 404	–	–	–
Net asset value per share (cents)	126,5	125,1	118,0	–	–	–
Tangible net asset value per share (cents)	73,2	71,9	65,1	–	–	–

# Consolidated statements of financial position

as at 31 August

	Notes	GROUP		COMPANY	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
<b>ASSETS</b>					
<b>Non-current assets</b>					
Plant and equipment	2	43 043	38 018	108	159
Goodwill	3	95 544	229 742	–	–
Loans receivable	8	–	482	473	315
Deferred taxation	4	14 063	8 717	2 062	4 284
Investment in subsidiaries	5	–	–	253 956	253 956
		<b>152 650</b>	<b>276 959</b>	<b>256 599</b>	<b>258 714</b>
<b>Current assets</b>					
Inventories	6	197 117	177 869	–	–
Trade and other receivables	7	105 384	76 025	106	5 845
Taxation receivable		4 537	1 465	–	–
Loans to group companies	8	–	–	82 711	71 069
Cash and cash equivalents	9	34 415	48 988	49	1 843
		<b>341 453</b>	<b>304 347</b>	<b>82 866</b>	<b>78 757</b>
<b>Total assets</b>		<b>494 103</b>	<b>581 306</b>	<b>339 465</b>	<b>337 471</b>
<b>EQUITY AND LIABILITIES</b>					
<b>Equity</b>					
<b>Equity attributable to equity holders of parent</b>					
Stated capital/share capital and share premium	10	295 497	295 701	295 497	295 701
Accumulated profits		66 997	221 409	42 275	36 747
		<b>362 494</b>	<b>517 110</b>	<b>337 772</b>	<b>332 448</b>
Non-controlling interest		(1)	–	–	–
		<b>362 493</b>	<b>517 110</b>	<b>337 772</b>	<b>332 448</b>
<b>Liabilities</b>					
<b>Non-current liabilities</b>					
Finance lease obligation	11	5 263	–	–	–
Provisions	14	12 291	–	–	–
		<b>17 554</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Current liabilities</b>					
Loan from group company	8	–	–	674	–
Interest-free liabilities	12	–	3 426	–	3 426
Trade and other payables	13	110 559	60 662	1 019	1 597
Taxation payable		7	108	–	–
Finance lease obligation	11	2 523	–	–	–
Provisions	14	967	–	–	–
		<b>114 056</b>	<b>64 196</b>	<b>1 693</b>	<b>5 023</b>
<b>Total liabilities</b>		<b>131 610</b>	<b>64 196</b>	<b>1 693</b>	<b>5 023</b>
<b>Total equity and liabilities</b>		<b>494 103</b>	<b>581 306</b>	<b>339 465</b>	<b>337 471</b>

# Consolidated statements of comprehensive income

for the year ended 31 August



	Notes	GROUP		COMPANY	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
<b>Revenue</b>	15	<b>417 531</b>	387 102	<b>6 185</b>	9 165
Cost of sales and services		(289 374)	(258 271)	–	–
<b>Gross profit</b>		<b>128 157</b>	128 831	<b>6 185</b>	9 165
Other income		4 523	1 877	–	–
Operating expenses		(141 066)	(133 479)	(5 466)	(7 815)
Onerous lease expense effect		(8 647)	–	–	–
Impairment of goodwill		(134 198)	–	–	–
<b>Operating (loss)/profit</b>	16	<b>(151 231)</b>	(2 771)	<b>719</b>	1 350
Interest received	17	6 015	6 804	8 008	11 427
Interest paid	18	(4 065)	(3 942)	(1 028)	(1 634)
<b>(Loss)/profit before taxation</b>		<b>(149 281)</b>	91	<b>7 699</b>	11 143
Taxation (expense)/income	19	(5 132)	6 348	(2 171)	3 357
<b>(Loss)/profit for the year</b>		<b>(154 413)</b>	6 439	<b>5 528</b>	14 500
Other comprehensive income		–	–	–	–
<b>Total comprehensive (loss)/income</b>		<b>(154 413)</b>	6 439	<b>5 528</b>	14 500
<b>Total comprehensive (loss)/income attributable to:</b>					
Owners of the parent		(154 412)	6 439	5 528	14 500
Non-controlling interest		(1)	–	–	–
		<b>(154 413)</b>	6 439	<b>5 528</b>	14 500
<b>(Loss)/profit attributable to:</b>					
Owners of the parent		(154 412)	6 439	5 528	14 500
Non-controlling interest		(1)	–	–	–
		<b>(154 413)</b>	6 439	<b>5 528</b>	14 500
<b>Earnings per share</b>					
<b>Per share information</b>					
(Loss)/earnings per share (cents)	29	(39,06)	1,5	–	–
Headline (loss)/earnings per share (cents)	29	(5,26)	1,6	–	–
Dividends per share (cents)		–	2,0	–	–
Capital distribution declared out of share premium (cents)		–	2,0	–	–

## Company B : Published Financial Statements

	2012# R'000	2011# R'000	2010 R'000	2009 R'000	2008 R'000
<b>INCOME STATEMENT</b>					
Revenue	6 834 146	6 230 456	5 389 769	4 662 492	3 474 831
Contracting	6 608 258	6 000 764	5 196 208	4 421 007	3 205 224
Other	225 888	229 692	193 561	241 485	269 607
Contracting and other costs	(5 768 021)	(5 044 751)	(4 237 060)	(3 766 044)	(2 794 383)
Other administrative and operating overheads*	(902 422)	(651 556)	(522 838)	(283 435)	(220 229)
Depreciation and impairment of fixed assets	(307 488)	(267 039)	(221 325)	(183 197)	(145 038)
Other income/(expenses)	25 230	24 621	252	(578)	(1 844)
Amortisation of intangible assets	(1 990)	(10 785)	(39 303)	(20 488)	(4 947)
<b>Operating (loss)/profit</b>	<b>(120 545)</b>	<b>280 946</b>	<b>369 495</b>	<b>408 750</b>	<b>308 390</b>
Impairment of goodwill	–	(32 403)	–	–	–
Net finance (costs)/income	(77 133)	(36 007)	619	3 019	(12 314)
<b>(Loss)/profit before share of associates</b>	<b>(197 678)</b>	<b>212 536</b>	<b>370 114</b>	<b>411 769</b>	<b>296 076</b>
Share of (losses)/profits from jointly controlled entities	(4 285)	(2 957)	1 662	–	–
Share of profits/(losses) from associates	49 097	6 708	(188)	10	85
<b>(Loss)/profit before taxation</b>	<b>(152 866)</b>	<b>216 287</b>	<b>371 588</b>	<b>411 779</b>	<b>296 161</b>
Taxation	(16 235)	(81 580)	(119 370)	(140 869)	(90 319)
<b>Net (loss)/profit for the year</b>	<b>(169 101)</b>	<b>134 707</b>	<b>252 218</b>	<b>270 910</b>	<b>205 842</b>
<b>Net (loss)/profit for the year attributable to:</b>					
<b>Equity shareholders of the company</b>	<b>(170 384)</b>	<b>140 979</b>	<b>260 753</b>	<b>274 270</b>	<b>204 516</b>
Non-controlling interests	1 283	(6 272)	(8 535)	(3 360)	1 326
<b>Net (loss)/profit for the year</b>	<b>(169 101)</b>	<b>134 707</b>	<b>252 218</b>	<b>270 910</b>	<b>205 842</b>
<b>STATISTICS</b>					
(Loss)/earnings per share (cents)	(136,54)	113,88	210,63	317,15	265,44
Diluted (loss)/earnings per share (cents)	(136,54)	113,88	210,63	316,49	262,12
Headline (loss)/earnings per share (cents)	(130,84)	139,65	209,25	333,12	267,04
Diluted (loss)/headline earnings per share (cents)	(130,84)	139,65	209,25	332,43	263,71
Dividend per share (cents)	–	30,00	42,00	58,00	50,00
Interest cover (times)	(1,16)	4,04	5,39	7,82	6,57
Operating margin (%)	(1,76)	4,51	6,86	8,77	8,87
*The following non-recurring charges have been included in "Other administrative and operating overheads" in the current year:					
Provision for Competition Commission	65 000				
Share-based payment	60 539				
Write down of development land	26 607				
	<b>152 146</b>				

# Includes the combined results of continued and discontinued operations.

	2012# R'000	2011# R'000	2010 R'000	2009 R'000	2008 R'000
<b>STATEMENT OF FINANCIAL POSITION</b>					
<b>ASSETS</b>					
<b>Non-current assets</b>	<b>2 016 019</b>	2 152 469	1 854 008	1 742 164	960 792
Property, plant and equipment	1 272 127	1 166 213	873 390	781 855	761 470
Intangible assets	412 689	799 995	843 183	832 667	143 907
Other non-current assets	331 203	186 261	137 435	127 642	55 415
<b>Current assets</b>	<b>2 598 877</b>	2 680 501	2 430 905	2 442 783	1 515 927
Inventories	81 236	42 857	47 700	18 890	25 940
Development land	402 375	398 686	351 938	280 718	54 734
Contract debtors and retentions	883 617	1 308 188	898 323	813 170	448 967
Other current assets	152 962	214 733	121 394	83 966	42 529
Cash and cash equivalents	1 078 687	716 037	1 011 550	1 246 039	943 757
Non-current assets held for sale	773 540	66 767	92 558	–	–
	<b>5 388 436</b>	4 899 737	4 377 471	4 184 947	2 476 719
<b>EQUITY AND LIABILITIES</b>					
Capital and reserves	1 799 554	1 814 820	1 708 885	1 500 916	789 552
Non-controlling interests	24 768	22 901	6 404	(1 212)	2 521
<b>Non-current liabilities</b>	<b>376 266</b>	592 847	439 156	500 465	348 150
Interest-bearing borrowings	314 187	519 234	337 658	350 852	264 249
Other borrowings	13 250	19 649	26 188	79 357	38 811
Other non-current liabilities	48 829	53 964	75 310	70 256	45 090
<b>Current liabilities</b>	<b>2 992 185</b>	2 469 062	2 219 938	2 184 778	1 336 496
Trade and other payables	1 120 153	1 079 938	970 223	997 903	688 906
Amounts due to customers	1 079 113	513 315	583 399	484 581	335 894
Interest-bearing borrowings	562 980	508 071	339 733	369 464	135 936
Other current liabilities	198 086	305 430	293 689	308 596	175 760
Bank overdraft	31 853	62 308	32 894	24 234	–
Liabilities directly associated with non-current assets classified as held for sale	195 663	107	3 088	–	–
	<b>5 388 436</b>	4 899 737	4 377 471	4 184 947	2 476 719
<b>STATISTICS</b>					
Number of ordinary shares in issue ('000)	131 686	123 798	123 798	123 798	86 472
Number of "A" ordinary shares in issue ('000)	33 608	–	–	–	–
Net asset value per share (cents)	1 366,55	1 465,95	1 380,38	1 212,39	913,07
Tangible net asset value per share (cents)	1 053,16	819,74	699,29	539,79	746,65
Current ratio (times)	0,87	1,09	1,10	1,12	1,13
Return on shareholders' interests (%)	(9,43)	8,00	16,25	23,95	41,62
Return on total average tangible assets (%)	(2,66)	7,36	11,87	17,08	17,08
Average price per share (cents)	1,216	1,265	1,270	2,475	2,475
Debt equity ratio (times)*	0,18	0,29	0,21	0,29	0,38

\* Debt equity ratio is calculated using total non-current borrowings.



## Company C : Published Financial Statements

# TEN-YEAR FINANCIAL REVIEW

30 JUNE 2012

ALL MONETARY AMOUNTS ARE EXPRESSED IN MILLIONS OF RANDS	IFRS restated*									SA GAAP	
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	
<b>SUMMARISED STATEMENTS OF FINANCIAL PERFORMANCE*</b>											
<b>Revenue</b>	<b>35 406</b>	30 535	27 851	30 006	23 290	15 364	9 289	8 083	8 424	10 111	
(Loss)/profit before interest and taxation	<b>(161)</b>	(678)	1 535	2 557	1 792	1 128	515	356	405	628	
Net interest (expense)/income**	<b>(248)</b>	(194)	(122)	111	87	38	34	16	10	(66)	
(Loss)/profit before taxation	<b>(409)</b>	(872)	1 413	2 668	1 879	1 166	549	372	415	562	
Taxation expense	<b>(245)</b>	(196)	(414)	(575)	(482)	(299)	(168)	(120)	(27)	(76)	
(Loss)/profit after taxation	<b>(654)</b>	(1 068)	999	2 093	1 397	867	381	252	388	486	
Income/(loss) from equity accounted investments	<b>143</b>	86	15	2	9	(107)	1	78	114	97	
(Loss)/profit from discontinued operations	<b>(81)</b>	(666)	215	243	657	36	179	163	-	-	
Non-controlling interests	<b>(144)</b>	(87)	(131)	(320)	(349)	(94)	(49)	(30)	(25)	(9)	
<b>(Loss)/profit attributable to owners of Murray &amp; Roberts Holdings Limited</b>	<b>(736)</b>	(1 735)	1 098	2 018	1 714	702	512	463	477	574	
<b>SUMMARISED STATEMENTS OF FINANCIAL POSITION</b>											
Non-current assets	<b>7 323</b>	4 658	5 268	5 464	4 835	3 953	3 389	2 547	2 422	2 082	
Current assets	<b>14 048</b>	13 997	14 960	17 235	16 118	8 836	6 797	5 475	3 671	4 211	
Goodwill	<b>437</b>	435	554	490	488	206	147	48	5	10	
Deferred taxation assets	<b>634</b>	470	343	305	208	16	52	34	33	-	
<b>Total assets</b>	<b>22 442</b>	19 560	21 125	23 494	21 649	13 011	10 385	8 104	6 131	6 303	
Equity attributable to owners of Murray & Roberts Holdings Limited	<b>5 887</b>	4 221	6 203	5 581	4 865	3 637	3 086	3 067	2 603	2 485	
Non-controlling interests	<b>1 215</b>	1 100	974	1 053	960	178	108	97	54	13	
Total equity	<b>7 102</b>	5 321	7 177	6 634	5 825	3 815	3 194	3 164	2 657	2 498	
Non-current liabilities	<b>1 596</b>	1 873	2 383	1 447	1 290	1 103	1 028	890	734	713	
Current liabilities	<b>13 744</b>	12 366	11 565	15 413	14 534	8 093	6 163	4 050	2 740	3 092	
<b>Total equity and liabilities</b>	<b>22 442</b>	19 560	21 125	23 494	21 649	13 011	10 385	8 104	6 131	6 303	

\* IFRS restated numbers are only for continuing operations whereas SA GAAP numbers are for both continuing and discontinued operations.

\*\* Includes currency conversion effects on offshore treasury funds in 2003.



# RATIOS AND STATISTICS

30 JUNE 2012

ALL MONETARY AMOUNTS ARE EXPRESSED IN MILLIONS OF RANDS	IFRS restated*								SA GAAP	
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
<b>EARNINGS</b>										
(Loss)/earnings per share (cents)**										
– Basic	(214)	(530)	336	618	521	216	152	131	135	163
– Diluted	(214)	(528)	335	612	510	212	149	129	133	159
Headline (loss)/earnings per share (cents)**										
– Basic	(246)	(456)	308	616	507	297	149	134	143	168
– Diluted	(246)	(454)	307	609	496	293	146	132	140	163
Dividends per share (cents)	–	–	105	218	196	116	60	45	45	53
Dividend cover	–	–	2,9	2,8	2,5	2,5	2,4	2,9	3,1	3,1
Interest cover***	4,1	4,4	7,6	7,2	6,7	10,2	6,7	6,5	8,2	7,0
<b>PROFITABILITY</b>										
PBIT on revenue (%)***	4,1	4,2	8,1	8,5	7,7	7,3	5,5	4,4	5,0	6,3
PBIT on average total assets (%)***	6,9	6,4	10,1	11,3	10,3	9,6	5,6	5,0	6,8	9,9
Attributable profit on average ordinary shareholders' funds (%)***	17,1	5,7	29,1	38,6	40,3	20,9	16,7	16,0	19,0	22,4
<b>PRODUCTIVITY</b>										
Per R1 000 of revenue:										
Payroll costs (Rand)	395	317	291	314	330	287	316	336	216	188
Total average assets (Rand)	593	666	801	752	744	761	995	881	738	634
Value created (Rm)****	15 202	10 076	11 665	13 699	10 996	6 073	4 129	3 600	2 606	2 913
Value ratio****	1,05	1,00	1,33	1,39	1,40	1,31	1,30	1,33	1,43	1,53
<b>FINANCE</b>										
As a percentage of total equity										
Total interest bearing debt	31	44	45	54	35	36	40	32	30	38
Total liabilities	216	268	194	254	272	241	225	156	133	153
Current assets to current liabilities	1,02	1,13	1,29	1,12	1,11	1,10	1,10	1,35	1,34	1,36
Operating cash flow (Rm)	(2 290)	334	691	1 559	3 116	1 935	598	663	289	356
Operating cash flow per share (cents)	(515)	101	208	470	939	583	180	200	87	107
<b>OTHER</b>										
Weighted average ordinary shares in issue (millions)**	382,7	367,8	367,8	367,8	367,8	367,8	367,8	367,8	367,8	367,8
Weighted average number of treasury shares (millions)**	39,2	40,3	41,3	42,1	38,7	42,0	30,0	15,2	15,3	15,6
People – 30 June****	44 710	42 422	40 413	38 981	45 654	33 466	23 867	23 904	13 149	15 827
<b>DEFINITIONS</b>										
Dividend cover	Diluted headline (loss)/earnings per share divided by dividend per share			Value ratio		Value created as a multiple of payroll cost				
PBIT	Profit before interest and taxation			Net asset value (NAV)		Ordinary shareholders' equity				
Interest cover	PBIT divided by interest expense			Average		Arithmetic average between consecutive year-ends				

\* IFRS restated numbers are only for continuing operations, whereas SA GAAP numbers are for both continuing and discontinued operations.

\*\* Weighted average ordinary shares in issue have been adjusted in the prior years due to the rights offer made to shareholders in April 2012.

\*\*\* The above calculations are based on normalised profits of R1,4 billion (2011: R1,3 billion; 2010: R2,2 billion).

\*\*\*\* Includes continuing and discontinued operations.

## **Company D : Published Financial Statements**

### *Group income statement*

for the year ended 29 February 2008

	Notes	2008 R	2007 R
Revenue	20	2 135 778 031	1 190 860 142
Cost of sales	23	(1 616 112 151)	(964 438 063)
<b>Gross profit</b>		<b>519 665 880</b>	<b>226 422 079</b>
Other income	21	18 979 346	15 811 940
Other gains/(losses) – net	22	3 075 679	(11 019 291)
Administrative expenses	23	(110 438 956)	(36 710 215)
<b>Operating profit</b>		<b>431 281 949</b>	<b>194 504 513</b>
Finance income	24	12 996 916	16 814 914
Finance costs	24	(27 986 271)	(12 296 390)
Finance (costs)/income – net	24	(14 989 355)	4 518 524
Share of profit of associates	7	478 480	6 258 820
<b>Profit before taxation</b>		<b>416 771 074</b>	<b>205 281 857</b>
Taxation expense	25	(121 152 553)	(66 423 518)
<b>Profit for the year</b>		<b>295 618 521</b>	<b>138 858 339</b>
<b>Attributable to:</b>			
Equity holders of the company		294 150 140	85 335 234
Minority interest	15	1 468 381	53 523 105
		<b>295 618 521</b>	<b>138 858 339</b>
Basic earnings per share (cents)	29	180,9	85,3
Diluted earnings per share (cents)	29	178,4	85,3

The notes on pages 42 to 72 are an integral part of these group financial statements.

# Group balance sheet

at 29 February 2008

	Notes	2008 R	2007 R
<b>ASSETS</b>			
<b>Non-current assets</b>			
Property, plant and equipment	5	668 364 912	290 398 357
Intangible assets	6	198 939 016	16 533 580
Investment in associates	7	2 670 759	14 629 758
Deferred income tax assets	18	9 283 041	4 634 946
Trade and other receivables	10	401 787	–
<b>Total non-current assets</b>		<b>879 659 515</b>	<b>326 196 641</b>
<b>Current assets</b>			
Inventories	8	50 439 686	17 628 617
Construction contracts in progress	9	73 644 341	44 263 883
Trade and other receivables	10	368 676 796	258 686 325
Current income tax receivable		12 054 823	17 077 177
Cash and cash equivalents	11	660 233 434	83 266 639
<b>Total current assets</b>		<b>1 165 049 080</b>	<b>420 922 641</b>
Non-current assets held for sale	12	2 472 076	–
<b>Total assets</b>		<b>2 047 180 671</b>	<b>747 119 282</b>
<b>EQUITY</b>			
Share capital	13	1 725 268	1 432 782
Share premium	13	1 830 852 682	1 282 167 325
Other reserves	14	(1 156 813 647)	(1 174 084 740)
Retained earnings		457 979 152	196 254 978
<b>Equity attributable to equity holders of company</b>		<b>1 133 743 455</b>	<b>305 770 345</b>
Minority interest in equity	15	2 785 655	1 517 273
<b>Total equity</b>		<b>1 136 529 110</b>	<b>307 287 618</b>
<b>LIABILITIES</b>			
<b>Non-current liabilities</b>			
Borrowings	16	249 069 699	89 208 131
Provisions for liabilities and charges	17	7 954 770	658 000
Deferred income tax liability	18	113 897 357	52 511 816
<b>Total non-current liabilities</b>		<b>370 921 826</b>	<b>142 377 947</b>
<b>Current liabilities</b>			
Trade and other payables	19	318 623 885	246 006 662
Borrowings	16	143 856 259	37 014 819
Current income tax liabilities		77 229 574	8 494 173
Bank overdrafts	11	20 017	5 938 063
<b>Total current liabilities</b>		<b>539 729 735</b>	<b>297 453 717</b>
<b>Total liabilities</b>		<b>910 651 561</b>	<b>439 831 664</b>
<b>Total equity and liabilities</b>		<b>2 047 180 671</b>	<b>747 119 282</b>

The notes on pages 42 to 72 are an integral part of these group financial statements.

## GROUP INCOME STATEMENT

for the year ended 29 February 2012

	Notes	2012 R'000	2011 R'000
Revenue	19	5 032 625	4 545 974
Cost of sales	22	(4 257 404)	(3 645 552)
<b>Gross profit</b>		<b>775 221</b>	900 422
Other income	20	14 429	27 665
Other gains/(losses) – net	21	4 818	(18 934)
Administrative expenses	22	(263 006)	(246 595)
<b>Operating profit</b>		<b>531 462</b>	662 558
Finance income	23	29 353	30 422
Finance costs	23	(41 388)	(43 875)
Finance costs – net	23	(12 035)	(13 453)
<b>Profit before income tax</b>		<b>519 427</b>	649 105
Income tax expense	24	(178 230)	(202 096)
<b>Profit for the year</b>		<b>341 197</b>	447 009
<b>Attributable to:</b>			
Owners of the parent		331 247	443 405
Non-controlling interest	14	9 950	3 604
		<b>341 197</b>	447 009
Basic earnings per share (cents)	28	179,5	241,5
Diluted earnings per share (cents)	28	178,5	240,3

The notes on pages 47 to 95 are an integral part of these group financial statements.

## GROUP STATEMENT OF FINANCIAL POSITION

at 29 February 2012

	Notes	2012 R'000	2011 R'000
<b>ASSETS</b>			
<b>Non-current assets</b>			
Property, plant and equipment	5	1 353 753	1 276 133
Intangible assets	6	757 629	761 445
Deferred income tax assets	17	17 940	45 047
Trade and other receivables	10	404	585
<b>Total non-current assets</b>		<b>2 129 726</b>	<b>2 083 210</b>
<b>Current assets</b>			
Inventories	8	153 157	126 333
Construction contracts in progress and retentions	9	296 382	244 116
Trade and other receivables	10	1 164 508	948 367
Current income tax receivable		17 862	14 192
Cash and cash equivalents	11	624 919	594 914
<b>Total current assets</b>		<b>2 256 828</b>	<b>1 927 922</b>
<b>Total assets</b>		<b>4 386 554</b>	<b>4 011 132</b>
<b>EQUITY</b>			
Share capital	12	1 845	1 845
Share premium	12	2 179 613	2 179 613
Other reserves	13	(1 142 401)	(1 156 847)
Retained earnings		1 670 355	1 510 726
<b>Equity attributable to owners of the parent</b>		<b>2 709 412</b>	<b>2 535 337</b>
Non-controlling interest	14	19 468	9 276
<b>Total equity</b>		<b>2 728 880</b>	<b>2 544 613</b>
<b>LIABILITIES</b>			
<b>Non-current liabilities</b>			
Borrowings	15	263 112	231 905
Provisions for liabilities and charges	16	23 066	18 058
Deferred income tax liabilities	17	229 612	236 038
<b>Total non-current liabilities</b>		<b>515 790</b>	<b>486 001</b>
<b>Current liabilities</b>			
Trade and other payables	18	899 807	712 789
Borrowings	15	215 690	245 654
Current income tax liabilities		26 387	17 498
Provisions for liabilities and charges	16	–	4 577
<b>Total current liabilities</b>		<b>1 141 884</b>	<b>980 518</b>
<b>Total liabilities</b>		<b>1 657 674</b>	<b>1 466 519</b>
<b>Total equity and liabilities</b>		<b>4 386 554</b>	<b>4 011 132</b>

The notes on pages 47 to 95 are an integral part of these group financial statements.

## Company E : Published Financial Statements

### STATEMENT OF COMPREHENSIVE INCOME

for the year ended 30 June 2010

	Note	GROUP		COMPANY	
		Audited 30 June 2010 R'000	Audited 30 June 2009 R'000	Audited 30 June 2010 R'000	Audited 30 June 2009 R'000
Revenue	23	305 496	298 036	2 943	4 219
Cost of sales		(151 524)	(156 830)		
Gross profit		153 972	141 206	2 943	4 219
Other income		1 189	4 118	2 176	18
Other operating expenses		(129 005)	(123 697)	(116)	(41)
Earnings before interest, tax, depreciation and amortisation	24	26 133	21 627	5 003	4 196
Depreciation and amortisation		(6 482)	(5 181)	-	-
Profit before interest and taxation		19 651	16 446	5 003	4 196
Finance costs	26	(4 069)	(5 878)	(3 848)	(5 129)
Profit before tax		15 582	10 568	1 155	(933)
Income taxation expense	33	(3 339)	(1 118)	(222)	(421)
Profit for the year		12 243	9 450	933	(1 354)
Other comprehensive income for the year					
Gains and losses on property revaluation		315	315		
Taxation related to components of other comprehensive income		52	52		
Other comprehensive income for the year net of taxation		367	367		
Attributable to:					
Equity holders of the parent		12 610	9 816		
Weighted average number of shares in issue		101 843 234	101 625 172		
Earnings per share (cents)					
Earnings per share (cents)	37	12,02	9,30		
Diluted earnings per share (cents)	37	12,02	9,30		
Headline earnings per share (cents)	37	11,95	9,30		
Diluted headline earnings per share (cents)	37	11,95	9,30		
Interim dividends per share (cents)		2	-		
Final dividend per share (cents)		2	-		

## CONSOLIDATED STATEMENT OF FINANCIAL POSITION

as at 30 June 2010

	Note	GROUP		COMPANY	
		2010 R'000	2009 R'000	2010 R'000	2009 R'000
<b>Assets</b>					
Non-current assets					
Property, plant and equipment	3	37 153	39 592	-	-
Goodwill	4	96 290	96 290	-	-
Intangible assets	5	2 440	2 387	-	-
Deferred taxation	10	3 512	3 317	-	-
Investment in subsidiaries	6	-	-	138 397	138 397
		139 395	141 586	138 397	138 397
<b>Current assets</b>					
Inventories	12	46 994	48 034	-	-
Other financial assets	8	368	367	368	368
Current tax receivables	33	3 013	4 907	84	84
Operating lease asset	11	-	38	-	-
Trade and other receivables	13	57 230	50 942	592	596
Cash and cash equivalents	14	1 170	900	105	-
Loans to group companies	7	-	-	22 050	28 229
		108 775	105 188	23 199	29 277
<b>Total assets</b>		<b>248 170</b>	<b>246 774</b>	<b>161 596</b>	<b>167 674</b>
<b>Equity and liabilities</b>					
<b>Equity</b>					
Equity attributable to equity holders of parent					
Capital and reserves					
Share capital	15	124 916	125 075	132 579	130 584
Reserves		10 557	10 871	138	138
Retained earnings		43 984	33 584	1 341	2 630
		179 459	169 530	134 058	133 352
Non-controlling interest		-	13	-	-
<b>Total equity</b>		<b>179 459</b>	<b>169 543</b>	<b>134 058</b>	<b>133 352</b>
<b>Non-current liabilities</b>					
Other financial liabilities	17	14 500	20 446	14 250	19 950
Finance lease obligations	18	233	646	-	-
Deferred taxation	10	2 915	3 100	-	-
		17 648	24 192	14 250	19 950
<b>Current liabilities</b>					
Other financial liabilities	17	6 006	6 066	5 700	5 700
Finance lease obligations	18	433	533	-	-
Trade and other payables	22	37 304	39 196	541	773
Operating lease liability	11	1 040	588	-	-
Current tax payable	33	526	187	-	-
Bank overdraft	14	5 756	6 469	5 756	6 460
Loans from group companies	7	-	-	1 291	1 439
		51 065	53 039	13 288	14 372
<b>Total liabilities</b>		<b>68 713</b>	<b>77 231</b>	<b>27 538</b>	<b>34 322</b>
<b>Total equity and liabilities</b>		<b>248 170</b>	<b>246 774</b>	<b>161 596</b>	<b>167 674</b>
Net asset value per share (cents)					
		162	160	-	-
Tangible net asset value per share (cents)					
		73	67	-	-

# Statement of comprehensive income

for the year ended 30 June 2012

	Note	Group		Company	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
<b>Continuing operations</b>					
Revenue	19	282 671	249 930	697	3 251
Cost of sales		(133 940)	(113 556)	–	–
Gross profit		148 731	135 834	697	3 251
Other income		1 525	250	536	2 530
Operating expenses		(133 646)	(120 786)	(292)	(169)
Operating profit	20	16 610	15 298	941	5 612
Investment revenue		–	165	–	–
Impairment of assets	22	–	(70 836)	(9 556)	(68 655)
Finance costs	23	(2 297)	(2 942)	(2 269)	(2 852)
Profit/(loss) before tax		14 313	(58 315)	(10 884)	(65 895)
Income tax	24	(4 345)	(3 738)	–	(222)
<b>Profit/(loss) from continuing operations</b>		<b>9 968</b>	<b>(62 053)</b>	<b>(10 884)</b>	<b>(66 117)</b>
<b>Discontinued operations</b>					
Loss from discontinued operations	14	(2 488)	(12 554)	–	–
<b>Profit/(loss) for the year attributable to owners of the parent</b>		<b>7 480</b>	<b>(74 607)</b>	<b>(10 884)</b>	<b>(66 117)</b>
<b>Other comprehensive income:</b>					
Gains on property revaluation		786	355	–	–
Taxation related to components of other comprehensive income		181	62	–	–
<b>Other comprehensive income for the year net of tax</b>		<b>967</b>	<b>417</b>	<b>–</b>	<b>–</b>
<b>Total comprehensive income/(loss) attributable to owners of the parent</b>		<b>8 447</b>	<b>(74 190)</b>	<b>(10 884)</b>	<b>(66 117)</b>
Earnings/(loss) per share (cents)	35	7,19	(71,58)		
Earnings/(loss) per share from continuing operations (cents)	35	9,58	(59,53)		
Loss per share from discontinued operations (cents)	35	(2,39)	(12,04)		
Headline earnings/(loss) per share (cents)	35	9,79	(3,51)		
Headline earnings per share from continuing operations (cents)	35	9,47	8,53		
Diluted earnings/(loss) per share (cents)	35	7,13	(69,92)		
Diluted headline earnings/(loss) per share (cents)	35	9,66	(3,43)		



# Statement of financial position

as at 30 June 2012

	Note	Group		Company	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
<b>ASSETS</b>					
<b>Non-current assets</b>					
Property, plant and equipment	3	45 078	48 348	–	–
Goodwill	4	34 928	34 928	–	–
Intangible assets	5	535	1 169	–	–
Investments in subsidiaries	6	–	–	60 186	69 743
Other financial assets	8	4 057	–	–	–
Deferred tax	10	2 803	2 940	–	–
		87 401	87 385	60 186	69 743
<b>Current assets</b>					
Inventories	11	44 522	41 360	–	–
Loans to group companies	7	–	–	5 071	5 661
Other financial assets	8	4 378	368	2 597	368
Current tax receivable		1 377	2 647	84	84
Trade and other receivables	12	43 220	34 918	592	592
Cash and cash equivalents	13	21 709	15 729	1 265	15 632
		115 206	95 022	9 609	22 337
Assets of disposal group	14	–	16 281	–	–
<b>Total assets</b>		<b>202 607</b>	<b>198 688</b>	<b>69 795</b>	<b>92 080</b>
<b>EQUITY AND LIABILITIES</b>					
<b>Equity</b>					
Share capital	15	126 077	125 555	132 580	132 580
Reserves		23 139	23 924	139	139
Accumulated loss		(23 981)	(32 428)	(77 883)	(66 999)
<b>Total equity</b>		<b>125 235</b>	<b>117 051</b>	<b>54 836</b>	<b>65 720</b>
<b>Liabilities</b>					
<b>Non-current liabilities</b>					
Other financial liabilities	17	2 850	8 550	2 850	8 550
Deferred tax	10	4 199	5 247	–	–
		7 049	13 797	2 850	8 550
<b>Current liabilities</b>					
Loans from group companies	7	–	–	6 124	11 726
Other financial liabilities	17	5 700	6 007	5 700	5 700
Current tax payable		385	551	–	–
Finance lease obligation		–	269	–	–
Operating lease liability		1 718	794	–	–
Trade and other payables	18	38 315	31 999	285	384
Bank overdraft	13	24 205	21 496	–	–
		70 323	61 116	12 109	17 810
Liabilities of disposal group	14	–	6 724	–	–
<b>Total liabilities</b>		<b>77 372</b>	<b>81 637</b>	<b>14 959</b>	<b>26 360</b>
<b>Total equity and liabilities</b>		<b>202 607</b>	<b>198 688</b>	<b>69 795</b>	<b>92 080</b>

## Company F : Published Financial Statements

# FIVE-YEAR FINANCIAL REVIEW

	2012	2011	2010	2009	2008
	R'000	R'000	R'000	R'000	R'000
<b>Consolidated statements of income</b>					
Revenue	1 771 692	1 366 433	1 857 817	1 414 722	1 017 480
Cost of sales	(1 549 955)	(1 204 988)	(1 361 041)	(981 829)	(745 546)
Gross profit	221 737	161 445	496 776	432 893	271 934
Other operating income	1 705	3 654	3 937	1 631	1 651
Operating expenses	(90 786)	(116 033)	(111 661)	(108 601)	(90 087)
Profit before interest, depreciation and taxation	132 656	49 066	389 052	325 923	183 498
Depreciation, impairments and amortisations	(79 510)	(65 489)	(83 478)	(92 473)	(30 391)
Profit/(loss) before interest and taxation	53 146	(16 423)	305 574	233 450	153 107
Finance costs	(73 233)	(54 371)	(93 106)	(78 279)	(28 171)
Finance income	49 726	23 703	63 281	55 600	32 883
Profit/(loss) before taxation	29 639	(47 091)	275 749	210 771	157 819
Taxation	(11 423)	6 330	(78 108)	(67 389)	(41 817)
Profit/(loss) for the year	18 216	(40 761)	197 641	143 382	116 002
Headline earnings/(loss) reconciliation:					
Profit/(loss) for the year	18 216	(40 761)	197 641	143 382	116 002
Loss/(profit) on disposal of property and equipment	5 830	4 609	5 396	(39)	(714)
Gain on disposal of subsidiary	–	(3 654)	–	–	–
Impairment of assets	–	2 032	–	11 944	–
Headline earnings/(loss)	24 046	(37 774)	203 037	155 287	115 288
Earnings per share					
Basic earnings/(loss) per share (cents)	4,7	(13,9)	69,4	56,9	51,7
Diluted earnings/(loss) per share (cents)	4,7	(13,8)	68,6	54,1	50,7
Headline earnings/(loss) per share (cents)	6,2	(12,9)	71,3	61,7	51,3
Dividend per share (cents)	–	–	15,0	15,0	20,0

Consolidated statements of financial position	2012 R'000	2011 R'000	2010 R'000	2009 R'000	2008 R'000
<b>Assets</b>					
<b>Non-current assets</b>	<b>1 151 181</b>	966 187	999 551	987 520	386 415
Property, plant and equipment	737 312	565 775	596 429	588 545	262 741
Intangible assets	88 226	90 117	93 737	113 022	94 529
Goodwill	305 715	305 715	305 715	280 173	26 468
Financial assets held at fair value through profit or loss	1 291	–	–	–	–
Deferred tax assets	18 637	4 580	3 670	5 780	2 677
<b>Current assets</b>	<b>665 288</b>	498 164	648 273	875 972	398 524
Inventories	20 622	16 983	14 827	11 379	7 224
Non-current asset held-for-sale	3 293	–	–	–	–
Other investments	–	420	6 762	14 269	–
Taxation	15 617	3 855	9 952	4 699	3 527
Trade and other receivables	529 103	413 768	499 869	572 800	271 914
Cash and cash equivalents	96 653	63 138	116 863	272 825	115 859
<b>Total assets</b>	<b>1 816 469</b>	1 464 351	1 647 824	1 863 492	784 939
<b>Equity and liabilities</b>					
<b>Share capital and reserves</b>	<b>937 432</b>	703 156	808 028	619 577	389 664
Share capital and premium	592 045	389 449	396 956	339 078	213 587
Equity compensation reserve	16 188	14 444	8 253	3 917	2 361
Foreign currency translation reserve	(21 395)	(33 188)	(14 296)	14 651	6 683
Accumulated profits	350 594	332 451	417 115	261 931	167 033
<b>Non-current liabilities</b>	<b>316 658</b>	195 562	405 711	470 080	133 791
Secured borrowings	179 911	84 516	275 031	370 603	85 169
Post-retirement benefits	1 806	1 657	1 665	1 587	8 106
Deferred tax liabilities	134 941	109 389	129 015	97 890	40 516
<b>Current liabilities</b>	<b>562 379</b>	565 633	434 085	773 835	261 464
Current position of secured borrowings	105 923	241 527	121 677	147 664	21 304
Taxation	15 872	9 953	6 644	84 358	26 781
Bank overdraft	3 047	–	–	–	–
Provisions	16 350	3 213	21 087	31 118	15 559
Trade and other payables	421 187	310 940	284 677	510 695	197 840
<b>Total equity and liabilities</b>	<b>1 816 469</b>	1 464 351	1 647 824	1 863 492	784 939
Number of ordinary shares in issue ('000)	395 185	302 162	302 162	289 496	247 904
Weighted average number of ordinary shares ('000)	386 731	293 763	284 743	251 780	224 560
Diluted weighted average number of shares ('000)	386 731	293 763	294 555	288 038	254 380
Net asset value per share (cents)	241,5	238,9	275,6	223,2	160,3
Net tangible asset per share (cents)	168,5	142,1	177,5	121,2	121,4

## Company G

### Financial Summary

	F2010 vs. F2009	2010 Audited	2009 Audited	2008 Audited
Revenue – Rm	↓ (6%)	11 338	12 090	8 900
Operating profit – Rm*	↑ 10%	877	797	636
Fully diluted EPS – Rand <i>(incl. impairment of Construction Materials)</i>	↓ 47%	2,56	4,86	3,79
Fully diluted HEPS – Rand <i>(incl. pension fund surpluses; before impairment)</i>	↑ 10%	5,61	5,08	3,98
Core Fully diluted HEPS – Rand <i>(excl. impairment and pension fund adjustments)</i>	↑ 2%	5,24	5,16	4,21
Dividends per share – cents <i>(4.0 x covered by Core EPS of R5.50)</i>	↑ 5%	137	130	105
<b>Healthy cash position</b>				

\* Excluding fair value and impairment adjustments

## Income statement

Rm	% Change	2010 Audited	2009 Audited	2008 Audited
Revenue	(6%)	11 338	12 090	8 900
Operating profit *	10%	877	797	636
Operating margin%		7.7%	6.6%	7.1%
Impairment of property, plant and equipment		(326)	-	-
Other income – net		15	16	111
Profit before interest and taxation	(30%)	566	813	747
Finance income/(costs)		28	(31)	(82)
Profit before taxation	(24%)	594	782	665
Effective tax rate %		43%	29%	31%
Profit from continuing operations	(40%)	336	557	457
Loss from discontinued operations		(22)	(23)	(28)
Net income	(41%)	314	534	429

\* Excluding fair value adjustments, impairment adjustments and income /(loss) from associates

## Condensed consolidated income statement

for the year ended 30 June 2012

R'000	AUDITED	
	2012	Restated 2011
<b>Revenue – continuing operations</b>	<b>8 783 378</b>	8 772 765
Operating profit before fair value adjustments	263 881	556 714
Fair value adjustments relating to investment in service concessions	56 652	33 160
Fair value adjustments relating to investment properties – net	10 865	2 419
Fair value adjustment relating to investment in property developments	–	13 265
<b>Operating profit</b>	<b>331 398</b>	605 558
Share of profit of associates	1 163	820
Finance cost	(79 487)	(66 595)
Finance income	75 687	103 555
<b>Profit before taxation</b>	<b>328 761</b>	643 338
Taxation	(106 032)	(208 777)
<b>Profit after taxation from continuing operations</b>	<b>222 729</b>	434 561
Loss for the year from discontinued operations	(452 841)	(593 605)
<b>Loss for the year</b>	<b>(230 112)</b>	(159 044)
Allocated as follows:		
Equity shareholders of Group Five Limited	(278 405)	(218 107)
Non-controlling interest	48 293	59 063
	(230 112)	(159 044)
<b>Loss per share – [Rand]</b>	<b>(2,88)</b>	(2,27)
<b>Fully diluted loss per share – [Rand]</b>	<b>(2,88)</b>	(2,27)
<b>Earnings per share from continuing operations – [Rand]</b>	<b>1,81</b>	3,91
<b>Fully diluted earnings per share from continuing operations – [Rand]</b>	<b>1,80</b>	3,71

## Statistics

as at 30 June 2012

	AUDITED	
	2012	Restated 2011
<b>Number of ordinary shares</b>	<b>96 600 761</b>	96 004 779
- Shares in issue	110 645 521	121 477 858
- Less: Shares held by share trusts	(14 044 760)	(25 473 079)
Weighted average shares ('000s)	96 545	96 114
Fully diluted weighted average shares ('000s)	96 946	101 137
Loss per share – R	(2,88)	(2,27)
Headline earnings per share – R	1,16	3,26
Fully diluted loss per share – R	(2,88)	(2,27)
Fully diluted headline earnings per share – R	1,15	3,10
Earnings per share from continuing operations – R	1,81	3,91
Headline earnings per share from continuing operations – R	1,78	3,89
Fully diluted earnings per share from continuing operations – R	1,80	3,71
Fully diluted headline earnings per share from continuing operations – R	1,77	3,69
Dividend cover (based on earnings per share)	-	-
Dividends per share (cents)	36,0	72,0
- Interim	22,0	52,0
- Final	14,0	20,0
Net asset value per share – R	18,72	22,38
Net debt to equity ratio	-	-
Current ratio	1.2	1.1



## Company H

	2013 Rm	2012 Rm	2011 Rm	2010 Rm	2009 Rm
<b>CONDENSED CONSOLIDATED STATEMENT OF FINANCIAL POSITION</b>					
Investment property	71	-	-	-	-
Property, plant and equipment	6 789	6 666	6 021	5 146	5 062
Goodwill and other intangibles <sup>1</sup>	1 609	1 549	1 481	1 085	1 093
Equity-accounted investments	144	105	92	117	108
Available-for-sale investments	70	146	131	94	12
Deferred tax assets	1 347	998	1 019	982	612
Inventories	2 780	2 467	2 066	2 027	1 598
Receivables <sup>2</sup>	13 052	9 925	8 132	6 863	6 321
Cash and bank balances	4 551	5 203	5 611	7 828	7 910
<b>Total assets</b>	<b>30 413</b>	<b>27 059</b>	<b>24 553</b>	<b>24 142</b>	<b>22 716</b>
Deferred tax liabilities	319	299	832	655	240
Payables <sup>3</sup>	11 629	10 407	7 751	10 008	10 251
Provisions	3 029	2 171	2 761	892	859
Borrowings and other liabilities <sup>4</sup>	1 531	928	83	170	170
Bank overdrafts	600	343	211	197	309
<b>Total liabilities</b>	<b>17 108</b>	<b>14 148</b>	<b>11 638</b>	<b>11 922</b>	<b>11 829</b>
Non-controlling interests	12	10	(3)	5	21
<b>Total equity</b>	<b>13 305</b>	<b>12 911</b>	<b>12 915</b>	<b>11 917</b>	<b>10 886</b>
<b>CONDENSED CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME</b>					
<b>Revenue</b>	<b>51 704</b>	<b>40 886</b>	<b>34 324</b>	<b>33 981</b>	<b>33 772</b>
<b>Operating earnings before other gains and losses</b>	<b>627</b>	<b>504</b>	<b>1 490</b>	<b>2 091</b>	<b>2 079</b>
Other gains and losses	-	31	(14)	(13)	49
<b>Operating earnings after other gains and losses</b>	<b>627</b>	<b>535</b>	<b>1 476</b>	<b>2 078</b>	<b>2 128</b>
Earnings from available-for-sale investments	41	37	35		59
Share of (loss) / earnings from equity-accounted investments	(12)	41	(7)	61	67
<b>Net operating earnings</b>	<b>656</b>	<b>613</b>	<b>1 504</b>	<b>2 139</b>	<b>2 254</b>
Finance and transaction expenses	(162)	(76)	(59)	(17)	(42)
Finance earnings	132	189	312	472	698
<b>Earnings before taxation</b>	<b>626</b>	<b>726</b>	<b>1 757</b>	<b>2 594</b>	<b>2 910</b>
Taxation	(167)	(203)	(584)	(722)	(809)
<b>Earnings for the period</b>	<b>459</b>	<b>523</b>	<b>1 173</b>	<b>1 872</b>	<b>2 101</b>
<b>Other comprehensive earnings for the period:</b> Items that may be subsequently recycled through earnings					
Exchange differences on translation of foreign operations	196	485	209	1	(266)
Movement in insurance and other reserves	(2)	(12)	-	-	-
<b>Total comprehensive earnings for the period</b>	<b>653</b>	<b>996</b>	<b>1 382</b>	<b>1 873</b>	<b>1 835</b>
<b>Earnings for the period attributable to:</b>					
Equity holders of the parent	466	521	1 177	1 873	2 091
Non-controlling interests	(7)	2	(4)	(1)	10
<b>Other comprehensive earnings for the period</b>	<b>459</b>	<b>523</b>	<b>1 173</b>	<b>1 872</b>	<b>2 101</b>
<b>Total comprehensive earnings attributable to:</b>					
Equity holders of the parent	659	993	1 386	1 874	1 827
Non-controlling interests	(6)	3	(4)	(1)	8
	<b>653</b>	<b>996</b>	<b>1 382</b>	<b>1 873</b>	<b>1 835</b>
<b>Determination of headline earnings</b>					
Profit for the year attributable to equity holders of the parent	466	521	1 177	1 873	2 091
Headline earnings adjustment	-	(26)	14	13	(40)
<b>Headline earnings</b>	<b>466</b>	<b>495</b>	<b>1 191</b>	<b>1 886</b>	<b>2 051</b>



**CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME**  
for the year ended 30 June 2010

	Note	2010 Rm	2009 Rm	2010* USDm	2009* USDm
<b>Revenue</b>	14	<b>33 981,1</b>	33 771,7	<b>4 457,7</b>	3 823,5
Cost of sales		<b>28 462,3</b>	28 068,9	<b>3 733,7</b>	3 177,8
<b>Gross profit</b>		<b>5 518,8</b>	5 702,8	<b>724,0</b>	645,7
Operating expenses		<b>2 347,5</b>	2 671,1	<b>307,9</b>	302,4
<b>Operating profit before depreciation and amortisation</b>		<b>3 171,3</b>	3 031,7	<b>416,1</b>	343,3
Depreciation	1	<b>1 062,6</b>	935,4	<b>139,4</b>	105,9
Amortisation of intangibles		<b>17,0</b>	17,0	<b>2,2</b>	1,90
<b>Operating profit before non-trading items</b>		<b>2 091,7</b>	2 079,3	<b>274,5</b>	235,5
Non-trading items	18	<b>(13,1)</b>	48,6	<b>(1,7)</b>	5,5
<b>Net operating profit</b>		<b>2 078,6</b>	2 127,9	<b>272,8</b>	241,0
Share of profits and losses from associates and joint ventures	3	<b>60,9</b>	67,2	<b>8,0</b>	7,6
Income from investments	16	<b>471,6</b>	756,9	<b>61,9</b>	85,7
<b>Operating income</b>		<b>2 611,1</b>	2 952,0	<b>342,7</b>	334,3
Finance cost	17	<b>17,2</b>	41,6	<b>2,3</b>	4,7
<b>Profit before taxation</b>		<b>2 593,9</b>	2 910,4	<b>340,4</b>	329,6
Taxation	19	<b>721,6</b>	809,0	<b>94,7</b>	91,6
<b>Profit for the year</b>		<b>1 872,3</b>	2 101,4	<b>245,7</b>	238,0
<b>Other comprehensive income/(loss) for the year:</b>					
Exchange differences on translation of foreign operations		<b>43,3</b>	(266,2)	<b>5,7</b>	(30,1)
<b>Total comprehensive income for the year</b>		<b>1 915,6</b>	1 835,2	<b>251,4</b>	207,9
<b>Profit for the year attributable to:</b>					
Equity holders of Aveng Limited		<b>1 872,9</b>	2 090,9	<b>245,7</b>	236,7
Non-controlling interests		<b>(0,6)</b>	10,5	<b>(0,1)</b>	1,1
<b>Profit for the year</b>		<b>1 872,3</b>	2 101,4	<b>245,6</b>	237,8
<b>Total comprehensive income attributable to:</b>					
Equity holders of Aveng Limited		<b>1 916,2</b>	1 826,8	<b>251,4</b>	206,8
Non-controlling interests		<b>(0,6)</b>	8,4	<b>(0,1)</b>	1,1
		<b>1 915,6</b>	1 835,2	<b>251,3</b>	207,9
<b>Determination of headline earnings</b>					
Profit for the year attributable to equity holders of Aveng Limited		<b>1 872,9</b>	2 090,9	<b>245,7</b>	236,7
Non-trading items net of taxation	20	<b>13,1</b>	(40,3)	<b>1,7</b>	(4,6)
<b>Headline earnings</b>	20	<b>1 886,0</b>	2 050,6	<b>247,4</b>	232,1
<b>EARNINGS PER SHARE (cents)</b>					
Earnings	20	<b>480,3</b>	538,8	<b>63,0</b>	61,0
Headline earnings	20	<b>483,6</b>	528,5	<b>63,4</b>	59,8
Diluted earnings	20	<b>441,3</b>	487,0	<b>57,9</b>	55,1
Diluted headline earnings	20	<b>444,4</b>	477,6	<b>58,3</b>	54,1
<b>DIVIDEND PER SHARE (cents)</b>		<b>145,0</b>	145,0	<b>19,0</b>	16,4
<b>NUMBER OF SHARES (millions)</b>					
In issue	8	<b>396,0</b>	396,0	<b>396,0</b>	396,0
Weighted average	20	<b>390,0</b>	388,0	<b>390,0</b>	388,0
Diluted weighted average	20	<b>424,4</b>	429,4	<b>424,4</b>	429,4

\*Provided for information purposes only. The current and comparative US Dollar figures do not form part of the statutory financial statements.

**CONSOLIDATED STATEMENT OF FINANCIAL POSITION**

as at 30 June 2010

	Note	2010 Rm	2009 Rm	2010* USDm	2009* USDm
<b>ASSETS</b>					
<i>Non-current assets</i>					
Property, plant and equipment	1	5 146,1	5 062,2	671,6	650,4
Goodwill and other intangibles	2	1 085,5	1 093,0	141,7	140,4
Investment in associates and joint ventures	3	116,8	107,5	15,2	13,7
Available-for-sale investments	4	94,1	11,8	12,3	1,5
Deferred tax	5	981,7	612,2	128,1	78,7
		<b>7 424,2</b>	<b>6 886,7</b>	<b>968,9</b>	<b>884,7</b>
<i>Current assets</i>					
Inventories	6	2 027,2	1 597,7	264,6	205,3
Trade and other receivables	7	6 862,9	6 320,9	895,6	812,1
Cash and cash equivalents	21.8	7 827,9	7 909,9	1 021,5	1 016,2
		<b>16 718,0</b>	<b>15 828,5</b>	<b>2 181,7</b>	<b>2 033,6</b>
<b>TOTAL ASSETS</b>		<b>24 142,2</b>	<b>22 715,2</b>	<b>3 150,6</b>	<b>2 918,3</b>
<b>EQUITY AND LIABILITIES</b>					
<i>Capital and reserves</i>					
Share capital	8	19,5	19,5	2,5	2,5
Share premium	9	1 981,0	1 981,0	258,5	254,5
Non-distributable reserves		(77,0)	(125,5)	(10,0)	(16,1)
Distributable reserves	10	10 290,9	8 990,1	1 343,0	1 155,0
<i>Total equity attributable to owners of the parent</i>		<b>12 214,4</b>	<b>10 865,1</b>	<b>1 594,0</b>	<b>1 395,9</b>
Non-controlling interests		5,4	21,0	0,7	2,7
<i>Total equity</i>		<b>12 219,8</b>	<b>10 886,1</b>	<b>1 594,7</b>	<b>1 398,6</b>
<i>Non-current liabilities</i>					
Interest-bearing borrowings	11.1	28,4	118,5	3,7	15,2
Deferred tax	12	655,1	239,9	85,5	30,8
		<b>683,5</b>	<b>358,4</b>	<b>89,2</b>	<b>46,0</b>
<i>Current liabilities</i>					
Trade and other payables	13	10 720,4	10 768,3	1 399,0	1 383,5
Interest-bearing borrowings	11.1	338,5	360,5	44,2	46,3
Taxation payable	21.5	180,0	341,9	23,5	43,9
		<b>11 238,9</b>	<b>11 470,7</b>	<b>1 466,7</b>	<b>1 473,7</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>24 142,2</b>	<b>22 715,2</b>	<b>3 150,6</b>	<b>2 918,3</b>

\* Provided for information purposes only. The current and comparative US Dollar figures do not form part of the statutory financial statements.

	2013 Rm	2012 Rm	% change	2013 USDm	2012 USDm
<b>Financial results</b>					
Revenue	51 704	40 886	27	5 847	5 303
Operating earnings before other gains and losses	627	504	24	72	65
Net operating earnings	656	613	7	76	79
Headline earnings	466	495	(6)	57	65
<b>Ordinary share performance (cents per share)</b>					
Headline earnings	124,6	128,1	(3)	14,1	16,6
Diluted headline earnings	115,9	119,8	(3)	13,1	15,5
Dividend paid	–	60,0	n/a	–	7,8
<b>Cash flow</b>					
Operating free cash flow	(1 531)	(900)	70	(173)	(117)
<b>Exchange rate</b>					
Rand to USD – Closing rate	9,88	8,21	20		
– Average rate	8,84	7,71	15		
Rand to AUD – Closing rate	9,03	8,41	7		
– Average rate	9,08	8,01	13		

	2013	2012
<b>Environmental</b>		
Carbon emissions (tCO <sub>2</sub> e)	576 574	585 869
<b>Safety</b>		
Lost time injury frequency rate (LTIFR)	0,24	0,24
<b>People</b>		
CSI spend (Rm)	19	12

## Consolidated statement of comprehensive income

for the year ended 30 June 2012

	Note	2012 Rm	2011 Rm
<i>Revenue</i>	14	40 885,5	34 323,6
Cost of sales		36 051,3	28 989,8
<b>Gross profit</b>		<b>4 834,2</b>	5 333,8
Operating expenses		2 814,5	2 718,6
<b>Operating profit before depreciation and amortisation</b>		<b>2 019,7</b>	2 615,2
Depreciation	1	1 478,7	1 100,9
Amortisation of intangibles	2	36,9	24,2
<b>Operating profit before non-trading items</b>		<b>504,1</b>	1 490,1
Non-trading items	18	30,7	(13,8)
<b>Net operating profit</b>		<b>534,8</b>	1 476,3
Share income/(loss) from associates and joint ventures	3	41,4	(7,6)
Income from investments	16	225,9	346,9
<b>Operating income</b>		<b>802,0</b>	1 815,6
Finance cost	17	75,7	58,5
<b>Profit before taxation</b>		<b>726,3</b>	1 757,1
Taxation	19	203,1	583,7
<b>Profit for the year</b>		<b>523,2</b>	1 173,4
<b>Other comprehensive income for the year:</b>			
Exchange differences on translation of foreign operations		472,4	209,3
<b>Total comprehensive income for the year</b>		<b>995,6</b>	1 382,7
<b>Profit for the year attributable to:</b>			
Equity holders of Aveng Limited		520,8	1 177,2
Non-controlling interests		2,4	(3,8)
<b>Profit for the year</b>		<b>523,2</b>	1 173,4
<b>Total comprehensive income attributable to:</b>			
Equity holders of Aveng Limited		992,6	1 386,5
Non-controlling interests		3,0	(3,8)
		<b>995,6</b>	1 382,7
<b>Determination of headline earnings</b>			
Profit for the year attributable to equity holders of Aveng		520,8	1 177,2
Non-trading items net of taxation	20	(26,3)	13,8
<b>Headline earnings</b>	20	<b>494,5</b>	1 191,0
<b>EARNINGS PER SHARE (cents)</b>			
Earnings	20	134,9	302,9
Headline earnings	20	128,1	306,4
Diluted earnings	20	126,1	283,3
Diluted headline earnings	20	119,8	286,6
<b>DIVIDEND PER SHARE (cents)</b>	20	<b>60,0</b>	145,0
<b>NUMBER OF SHARES (millions)</b>			
In issue	8	389,8	393,0
Weighted average	20	386,0	388,7
Diluted weighted average	20	412,9	415,5

## Consolidated statement of financial position

as at 30 June 2012

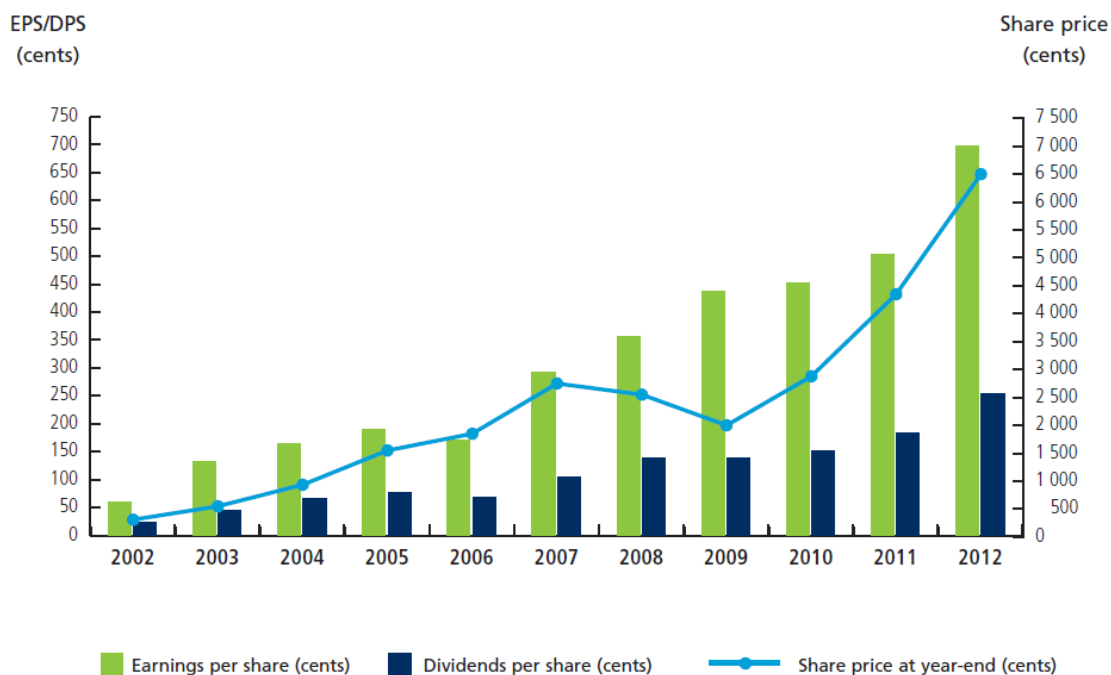
2011 USDm	2012 USDm		Note	2012 Rm	2011 Rm
		<b>ASSETS</b>			
		<i>Non-current assets</i>			
886,7	<b>811,7</b>	Property, plant and equipment	1	<b>6 664,4</b>	6 020,6
218,1	<b>188,6</b>	Goodwill and other intangibles	2	<b>1 548,5</b>	1 481,0
13,5	<b>13,2</b>	Investment in associates and joint ventures	3	<b>108,3</b>	91,8
19,3	<b>17,4</b>	Available for sale investments	4	<b>142,8</b>	131,3
150,1	<b>167,2</b>	Deferred tax	5	<b>1 372,7</b>	1 019,2
<b>1 287,7</b>	<b>1 198,1</b>			<b>9 836,7</b>	8 743,8
		<i>Current assets</i>			
304,4	<b>300,5</b>	Inventories	6	<b>2 467,0</b>	2 066,5
1 197,7	<b>1 271,9</b>	Trade and other receivables	7	<b>10 442,2</b>	8 132,0
826,4	<b>633,7</b>	Cash and cash equivalents	21.8	<b>5 202,5</b>	5 611,0
<b>2 328,5</b>	<b>2 206,1</b>			<b>18 211,7</b>	15 809,5
<b>3 616,2</b>	<b>3 404,2</b>	<b>TOTAL ASSETS</b>		<b>27 948,4</b>	24 553,4
		<b>EQUITY AND LIABILITIES</b>			
		<i>Capital and reserves</i>			
2,8	<b>2,3</b>	Share capital	8	<b>18,8</b>	19,3
274,5	<b>172,4</b>	Share premium	9	<b>1 415,8</b>	1 863,9
19,8	<b>73,5</b>	Non-distributable reserves	10	<b>602,4</b>	134,5
1 605,5	<b>1 323,3</b>	Distributable reserves		<b>10 864,4</b>	10 900,7
<b>1 902,6</b>	<b>1 571,5</b>	<i>Total equity attributable to owners of the parent</i>		<b>12 901,4</b>	12 918,4
(0,4)	<b>1,2</b>	Non-controlling interests		<b>10,2</b>	(2,5)
<b>1 902,2</b>	<b>1 572,7</b>	<b>TOTAL EQUITY</b>		<b>12 911,6</b>	12 915,9
		<i>Non-current liabilities</i>			
7,1	<b>91,2</b>	Borrowings	11.1	<b>748,5</b>	48,1
122,6	<b>82,1</b>	Deferred tax	12	<b>673,7</b>	832,3
<b>129,7</b>	<b>173,3</b>			<b>1 422,2</b>	880,4
		<i>Current liabilities</i>			
1 524,0	<b>1 565,1</b>	Trade and other payables	13	<b>12 849,8</b>	10 347,7
36,2	<b>63,7</b>	Borrowings	11.1	<b>523,1</b>	245,9
24,1	<b>29,4</b>	Taxation payable	21.5	<b>241,7</b>	163,5
<b>1 584,3</b>	<b>1 658,2</b>			<b>13 614,6</b>	10 757,1
<b>3 616,2</b>	<b>3 404,2</b>	<b>TOTAL EQUITY AND LIABILITIES</b>		<b>27 948,4</b>	24 553,4

## Company I

# Financial highlights

for the year ended 31 March 2012

	2012 R'000	2011 R'000	2010 R'000	2009 R'000	2008 R'000	2007 R'000	2006 R'000	2005 R'000	2004 R'000	2003 R'000	2002 R'000
Revenue	5 599 464	4 533 801	3 968 872	4 523 535	3 335 496	2 663 398	1 907 754	1 937 593	2 069 163	1 907 317	1 352 311
Operating profit before finance costs, interest and dividends received	634 585	505 493	453 293	497 356	360 379	281 229	197 843	231 957	229 451	230 123	122 405
Profit for the year	514 628	426 222	365 389	362 812	300 856	217 724	125 165	108 507	99 631	96 502	45 991
Equity attributable to the equity holders	1 952 337	1 611 265	1 442 966	1 206 055	1 025 591	886 161	716 296	365 075	312 339	343 665	268 783
Dividends per share (cents)	254	183	151	138	138	104	68	77	66	45	24
Earnings per share (cents)	698	504	453	437	356	292	170	190	164	133	60
Diluted earnings per share (cents)	652	480	441	437	354	288	169	190	160	130	58
Share price at the year-end (cents)	6 500	4 350	2 879	2 000	2 550	2 750	1 850	1 550	935	550	310



# Income statements

for the year ended 31 March 2009

	Notes	GROUP		COMPANY	
		2009 R'000	2008 R'000	2009 R'000	2008 R'000
Revenue		4 523 535	3 335 496	-	-
Cost of sales		(3 417 181)	(2 500 814)	-	-
<b>Gross profit</b>		<b>1 106 354</b>	<b>834 682</b>	<b>-</b>	<b>-</b>
Selling, administration and distribution costs		(608 998)	(474 303)	563	740
<b>Operating income before finance costs, interest and dividends received</b>	4	<b>497 356</b>	<b>360 379</b>	<b>563</b>	<b>740</b>
Finance costs	5	(382 719)	(209 147)	(30)	(19)
Dividends received from subsidiaries		-	-	122 404	57 877
Dividends received		134 270	135 717	49 548	50 541
Interest received	6	225 845	76 553	68	30
<b>Income before taxation</b>		<b>474 752</b>	<b>363 502</b>	<b>172 553</b>	<b>109 169</b>
Taxation	7	(111 940)	(62 646)	(567)	(978)
<b>Profit for the year</b>		<b>362 812</b>	<b>300 856</b>	<b>171 986</b>	<b>108 191</b>
<i>Attributable to:</i>					
Equity holders of the parent		312 812	263 365	171 986	108 191
Minority interest		50 000	37 491	-	-
		362 812	300 856	171 986	108 191
<b>Dividends per share (cents)</b>	8	<b>138</b>	<b>138</b>		
<b>Earnings per share (cents)</b>	9	<b>437</b>	<b>356</b>		
<b>Diluted earnings per share (cents)</b>	9	<b>437</b>	<b>354</b>		



# Balance sheets

as at 31 March 2009

	Notes	GROUP		COMPANY	
		2009 R'000	2008 R'000	2009 R'000	2008 R'000
<b>ASSETS</b>					
<b>Non-current assets</b>					
Property, plant and equipment	10	228 997	154 996	-	-
Interests in subsidiaries	11	-	-	502 264	502 264
Investments	12	1 195 100	1 195 303	443 000	443 000
Goodwill	13	242 491	219 087	-	-
Other intangible assets	14	11 158	11 327	-	-
Financial assets	15	232 512	218 273	-	-
Long-term receivable	16	1 527 875	1 350 000	-	-
Deferred taxation	18	57 177	34 794	-	-
		<b>3 495 310</b>	<b>3 183 780</b>	<b>945 264</b>	<b>945 264</b>
<b>Current assets</b>					
Loans to subsidiaries	17	-	-	254 481	122 558
Inventories	19	1 645 913	1 073 812	-	-
Trade and other receivables	20	688 106	728 082	7 008	7 302
Taxation prepaid		50 340	5 384	-	-
Bank balances and cash	33	125 061	225 175	11 134	31 809
		<b>2 509 420</b>	<b>2 032 453</b>	<b>272 623</b>	<b>161 669</b>
<b>TOTAL ASSETS</b>		<b>6 004 730</b>	<b>5 216 233</b>	<b>1 217 887</b>	<b>1 106 933</b>
<b>EQUITY AND LIABILITIES</b>					
<b>Capital and reserves</b>					
Ordinary share capital	21	3 724	3 724	3 724	3 724
Share premium	22	282 715	282 715	282 715	282 715
Treasury shares	23	(94 247)	(49 393)	-	-
Share appreciation reserve		33 294	14 024	-	-
Revaluation reserve		8 194	8 194	-	-
Foreign currency translation reserve		(449)	2 630	-	-
Retained earnings		972 824	763 697	810 180	745 446
<b>Equity attributable to the equity holders</b>		<b>1 206 055</b>	<b>1 025 591</b>	<b>1 096 619</b>	<b>1 031 885</b>
Minority interest		130 196	92 147	-	-
<b>TOTAL EQUITY</b>		<b>1 336 251</b>	<b>1 117 738</b>	<b>1 096 619</b>	<b>1 031 885</b>
<b>Non-current liabilities</b>					
Long-term borrowings	24	2 846 638	2 546 389	688	688
Financial liabilities	25	236 434	218 273	-	-
Deferred taxation	18	13 276	12 147	-	-
		<b>3 096 348</b>	<b>2 776 809</b>	<b>688</b>	<b>688</b>
<b>Current liabilities</b>					
Trade and other payables	26	1 191 155	1 204 499	2 440	2 324
Provisions	27	103 410	62 742	-	-
Tax liabilities		14 935	31 309	34	34
Loan from subsidiary	28	-	-	117 541	71 495
Shareholders for dividends		565	507	565	507
Current portion of long-term borrowings	24	5 546	7 325	-	-
Bank overdrafts and bankers' acceptances	33	256 520	15 304	-	-
		<b>1 572 131</b>	<b>1 321 686</b>	<b>120 580</b>	<b>74 360</b>
<b>TOTAL LIABILITIES</b>		<b>4 668 479</b>	<b>4 098 495</b>	<b>121 268</b>	<b>75 048</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>6 004 730</b>	<b>5 216 233</b>	<b>1 217 887</b>	<b>1 106 933</b>

# Statements of Comprehensive income

for the year ended 31 March 2012

	Notes	Group		Company	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
Revenue		5 599 464	4 533 801	-	-
Cost of sales		(3 933 434)	(3 169 438)	-	-
<b>Gross profit</b>		<b>1 666 030</b>	<b>1 364 363</b>	<b>-</b>	<b>-</b>
Selling, administration and distribution costs		(1 031 445)	(858 870)	(3 515)	5
<b>Operating profit (loss) before finance costs, interest and dividends received</b>	4	<b>634 585</b>	<b>505 493</b>	<b>(3 515)</b>	<b>5</b>
Finance costs	5	(598 354)	(545 242)	-	(13)
Dividends received from subsidiaries		-	-	760 431	132 170
Dividends received from financial investments		327 871	312 727	46 848	48 548
Share of profits of associate	17	1 022	871	-	-
Interest received	6	219 076	177 405	253	175
<b>Profit before taxation</b>		<b>584 200</b>	<b>451 254</b>	<b>804 017</b>	<b>180 885</b>
Taxation	7	(69 572)	(25 032)	(593)	(668)
<b>Profit for the year</b>		<b>514 628</b>	<b>426 222</b>	<b>803 424</b>	<b>180 217</b>
<b>Other comprehensive income</b>					
Profit on treasury shares utilised to settle share appreciation rights		15 670	-	-	-
Profit on disposal of treasury shares to directors		9 303	-	-	-
Gain on change in control in subsidiaries		21 347	-	-	-
Exchange differences on translating foreign operations		4 763	(833)	-	-
<b>Total comprehensive income for the year</b>		<b>565 711</b>	<b>425 389</b>	<b>803 424</b>	<b>180 217</b>
<i>Profit attributable to:</i>					
Owners of the Company		491 596	354 155	803 424	180 217
Non-controlling interest		23 032	72 067	-	-
		<b>514 628</b>	<b>426 222</b>	<b>803 424</b>	<b>180 217</b>
<b>Total comprehensive income attributable to:</b>					
Owners of the Company		542 255	353 630	803 424	180 217
Non-controlling interest		23 456	71 759	-	-
		<b>565 711</b>	<b>425 389</b>	<b>803 424</b>	<b>180 217</b>
<b>Dividends per share (cents)</b>	24	<b>254</b>	<b>183</b>		
<b>Earnings per share (cents)</b>	8	<b>698</b>	<b>504</b>		
<b>Diluted earnings per share (cents)</b>	8	<b>652</b>	<b>480</b>		

# Financial position

as at 31 March 2012

	Notes	Group		Company	
		2012 R'000	2011 R'000	2012 R'000	2011 R'000
<b>ASSETS</b>					
<b>Non-current assets</b>					
Property, plant and equipment	9	391 018	353 953	-	-
Investment in subsidiaries	16	-	-	502 264	502 264
Investment in associate	17	2 112	2 190	-	-
Financial investments	10	3 040 681	2 963 484	360 602	422 683
Goodwill	11	358 408	304 746	-	-
Other intangible assets	12	58 198	57 707	-	-
Financial asset	13	208 257	249 230	-	-
Finance lease receivables	14	2 633	433	-	-
Long-term receivables	15	490 886	260 992	-	-
Deferred taxation	7.1	84 997	69 940	-	-
		<b>4 637 190</b>	<b>4 262 675</b>	<b>862 866</b>	<b>924 947</b>
<b>Current assets</b>					
Loans to subsidiaries	18	-	-	938 964	237 750
Inventories	19	2 084 662	1 381 615	-	-
Trade and other receivables	20	869 184	698 526	6 837	7 293
Current portion of finance lease receivables	14	1 315	299	-	-
Current portion of financial investments	10	124 290	97 998	46 072	36 326
Current portion of long-term receivables	15	-	1 201	-	-
Taxation prepaid		1 694	14 150	-	-
Bank balances and cash	34	641 091	432 403	743	9 717
		<b>3 722 236</b>	<b>2 626 192</b>	<b>992 616</b>	<b>291 086</b>
<b>TOTAL ASSETS</b>		<b>8 359 426</b>	<b>6 888 867</b>	<b>1 855 482</b>	<b>1 216 033</b>
<b>EQUITY AND LIABILITIES</b>					
<b>Capital and reserves</b>					
Ordinary share capital	21	3 706	3 724	3 706	3 724
Share premium	22	272 320	282 715	272 320	282 715
Treasury shares	23	(93 931)	(119 809)	-	-
Share appreciation reserve		51 330	54 979	-	-
Revaluation reserve		5 025	5 025	-	4 814
Foreign currency translation reserve		(2 335)	(6 674)	-	-
Retained earnings		1 716 222	1 391 305	1 571 043	918 814
<b>Equity attributable to the equity holders</b>		<b>1 952 337</b>	<b>1 611 265</b>	<b>1 847 069</b>	<b>1 210 067</b>
Non-controlling interest		59 321	243 584	-	-
<b>SHAREHOLDERS' EQUITY</b>		<b>2 011 658</b>	<b>1 854 849</b>	<b>1 847 069</b>	<b>1 210 067</b>
<b>Non-current liabilities</b>					
Long-term borrowings	26	4 078 225	3 391 948	688	688
Guaranteed repurchase liabilities	25	5 011	9 347	-	-
Financial liabilities	27	210 577	251 819	-	-
Deferred taxation	7.1	4 767	6 248	-	784
		<b>4 298 580</b>	<b>3 659 362</b>	<b>688</b>	<b>1 472</b>
<b>Current liabilities</b>					
Trade and other payables	28	1 687 826	1 111 487	6 189	2 647
Provisions	29	114 640	93 237	-	-
Tax liabilities		26 328	13 052	684	690
Loan from subsidiary	30	-	-	-	420
Shareholders for dividends		2 262	7 062	852	737
Current portion of long-term borrowings	26	157 585	122 290	-	-
Current portion of guaranteed repurchase liabilities	25	5 464	3 781	-	-
Bank overdrafts	34	55 083	23 747	-	-
		<b>2 049 188</b>	<b>1 374 656</b>	<b>7 725</b>	<b>4 494</b>
<b>TOTAL LIABILITIES</b>		<b>6 347 768</b>	<b>5 034 018</b>	<b>8 413</b>	<b>5 966</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>8 359 426</b>	<b>6 888 867</b>	<b>1 855 482</b>	<b>1 216 033</b>

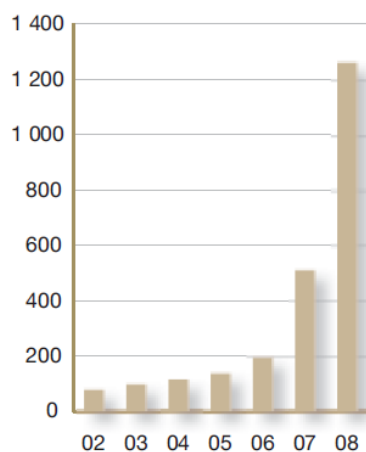
## Company J

# financial highlights

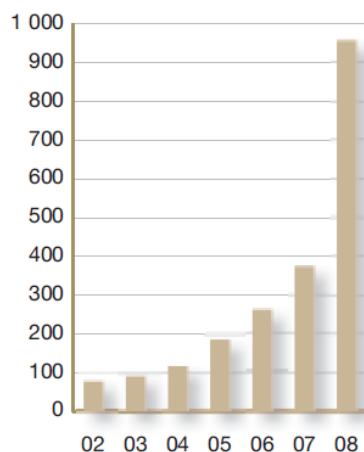
	2008	2007	% change
<b>Group summary (R'000)</b>			
Revenue	10 783 651	8 127 793	33
Operating profit	959 039	376 225	155
Total assets	7 895 982	4 308 626	83
Cash generated from operations	2 239 493	1 239 405	81
<b>Ordinary share performance (cents)</b>			
Earnings per share	1 303,2	500,4	160
Headline earnings per share	1 263,1	512,1	147
Dividends per share	242,0	121,0	100
Net tangible asset value per share	2 972,0	1 660,2	79
Closing share price	11 050,0	10 335,0	7
<b>Financial statistics and ratios</b>			
Operating margin	8,3	5,1	
Current ratio	1,1	1,0	



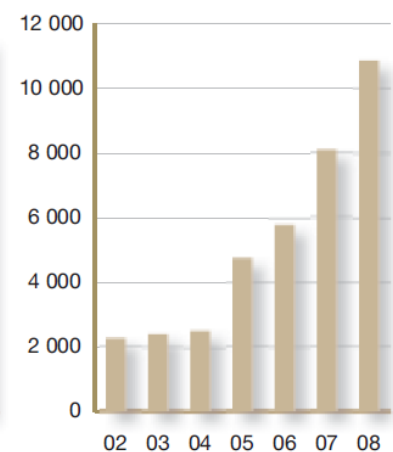
Headline earnings per share (cents)



Operating profit (Rm)



Revenue (Rm)



# group income statement

for the year ended 30 June 2008

	Notes	2008 R'000	2007 R'000
Revenue	16	10 783 651	8 127 793
Operating costs		(9 229 440)	(7 152 621)
Administrative costs		(649 383)	(559 295)
Operating profit before non-trading items		904 828	415 877
Impairment of goodwill	2	(18 994)	(10 731)
Share-based payment expense	27	(23 860)	(34 610)
Profit on partial-disposal of subsidiary		93 408	–
Fair value adjustments of financial assets	5	3 657	5 689
Operating profit	17	959 039	376 225
Share of (losses)/profits from associates	3	(20 710)	14 679
Investment income	18	162 744	72 230
Operating income		1 101 073	463 134
Finance costs	19	(20 338)	(16 831)
Profit before taxation		1 080 735	446 303
Taxation	20	(318 211)	(127 999)
Net profit		762 524	318 304
Attributable to			
Equity shareholders of Wilson Bayly Holmes-Ovcon Limited		716 169	276 180
Minority interests		46 355	42 124
Net profit		762 524	318 304
Weighted average number of shares (000)		54 956	55 190
Diluted weighted average number of shares (000)		55 118	55 190
Earnings per share (cents)		1 303,2	500,4
Diluted earnings per share (cents)		1 299,3	500,4
Dividend per share (cents)		242,0	121,0

# group balance sheet

as at 30 June 2008

	Notes	2008 R'000	2007 R'000
<b>ASSETS</b>			
<b>Non-current assets</b>			
Property, plant and equipment	1	1 041 071	752 137
Goodwill	2	98 600	86 421
Deferred taxation	13	210 705	100 442
Investments in associates	3	285 755	99 765
Derivative financial instruments	4	16 779	–
Other financial assets	5	90 781	86 206
<b>Current assets</b>		<b>6 152 291</b>	<b>3 183 655</b>
Inventories	6	193 093	152 584
Amounts due by customers	7	448 496	142 521
Trade and other receivables	8	2 434 782	1 619 535
Derivative financial instruments	4	38 399	–
Short-term investments	9	256 000	–
Cash and cash equivalents	29.5	2 781 521	1 269 015
<b>Total assets</b>		<b>7 895 982</b>	<b>4 308 626</b>
<b>EQUITY AND LIABILITIES</b>			
<b>Total equity</b>			
Shareholders' equity		1 731 904	1 002 702
Minority interests	11	83 429	78 702
<b>Non-current liabilities</b>		<b>264 798</b>	<b>177 530</b>
Long-term financial liabilities	12	141 942	117 232
Deferred taxation	13	122 856	60 298
<b>Current liabilities</b>		<b>5 815 851</b>	<b>3 049 692</b>
Excess billings over work done	7	1 927 875	823 282
Trade and other payables	14	2 743 673	1 655 972
Derivative financial instruments	4	20 774	–
Provisions	15	737 821	330 921
Taxation		381 111	238 953
Bank overdrafts	29.5	4 597	564
<b>Total equity and liabilities</b>		<b>7 895 982</b>	<b>4 308 626</b>

# CONSOLIDATED STATEMENT OF FINANCIAL PERFORMANCE

FOR THE YEAR ENDED 30 JUNE 2012

	Notes	2012 R'000	2011 R'000
<b>Revenue</b>	19	17 893 351	14 766 631
Operating costs		(15 896 926)	(12 815 172)
Administrative costs		(1 020 723)	(861 410)
<b>Operating profit before non-trading items</b>		975 702	1 090 049
Impairment of goodwill	4	(23 220)	(36 640)
Negative goodwill realised		-	374
Share-based payment expense	31	(10 420)	(32 418)
Profit on disposal of investment	20	41 982	57 921
Impairment of associate loans	5	-	(65 867)
Impairment of other loans		(9 398)	-
Fair value adjustments to financial assets		(80)	97
<b>Operating profit</b>	20	974 566	1 013 516
Investment income	21	195 029	224 727
Finance costs	22	(13 894)	(18 089)
Share of profits and losses in associates	5	(39 538)	(51 388)
<b>Profit before taxation</b>		1 116 163	1 168 766
Taxation	23	(403 003)	(380 000)
<b>Profit for the year</b>		713 160	788 766
<b>Profit attributable to:</b>			
Equity shareholders of Wilson Bayly Holmes-Ovcon Ltd		648 754	733 475
Non-controlling interests		64 406	55 291
<b>Profit for the year</b>		713 160	788 766
Weighted average number of shares ('000)		54 795	54 727
Diluted weighted average number of shares ('000)		55 092	55 237
Earnings per share (cents)		1 184,0	1 340,2
Diluted earnings per share (cents)		1 177,6	1 327,9
Dividend per share (cents)		352,0	330,0



# CONSOLIDATED STATEMENT OF FINANCIAL POSITION

AS AT 30 JUNE 2012

	Notes	2012 R'000	2011 R'000
<b>ASSETS</b>			
Property, plant and equipment	2	1 645 145	1 433 063
Investment property	3	12 829	-
Intangibles	4	460 063	390 467
Deferred taxation	15	218 419	92 712
Investment in associates	5	420 362	401 116
Listed and unlisted investments	7	21 358	20 016
Long-term receivables	8	169 799	123 936
<b>Total non-current assets</b>		<b>2 947 975</b>	<b>2 461 310</b>
Non-current assets held-for-sale	6	-	11 020
<b>Total non-current assets held-for-sale</b>		<b>-</b>	<b>11 020</b>
Inventories	9	182 912	230 313
Amounts due by customers	10	874 891	549 241
Trade and other receivables	11	4 028 986	3 052 884
Taxation		142 692	304 208
Cash and cash equivalents	33.3	3 068 884	2 882 772
<b>Total current assets</b>		<b>8 298 365</b>	<b>7 019 418</b>
<b>Total assets</b>		<b>11 246 340</b>	<b>9 491 748</b>
<b>EQUITY</b>			
Stated capital		28 625	28 625
Non-distributable reserves		243 067	143 566
Retained earnings		3 684 089	3 199 713
<b>Shareholders' equity</b>		<b>3 955 781</b>	<b>3 371 904</b>
Non-controlling interests	12	272 379	258 305
<b>Total equity</b>		<b>4 228 160</b>	<b>3 630 209</b>
<b>LIABILITIES</b>			
Interest-bearing borrowings	13	132 429	66 410
Other long-term financial liabilities	14	18 982	24 116
Deferred taxation	15	11 622	41 000
<b>Total non-current liabilities</b>		<b>163 033</b>	<b>131 526</b>
Excess billings over work done	10	1 925 184	1 237 105
Trade and other payables	16	3 403 864	2 740 713
Short-term portion of interest-bearing borrowings	13	79 392	39 870
Derivative financial instruments	18	2 193	-
Provisions	17	1 351 315	1 611 849
Taxation		93 199	84 083
Bank overdrafts	33.3	-	16 393
<b>Total current liabilities</b>		<b>6 855 147</b>	<b>5 730 013</b>
<b>Total liabilities</b>		<b>7 018 180</b>	<b>5 861 539</b>
<b>Total equity and liabilities</b>		<b>11 246 340</b>	<b>9 491 748</b>