

# **A FRAMEWORK FOR KNOWLEDGE MANAGEMENT**

**MARLIZE BREEDT**

A dissertation submitted in partial fulfilment of the  
requirements for the degree of

**MASTER OF ENGINEERING  
(INDUSTRIAL ENGINEERING)**

in the

**FACULTY OF ENGINEERING  
UNIVERSITY OF PRETORIA**

September 2000



**'By 1999, knowledge management will generate as much hype, consulting revenues, misunderstanding and genuine business value as business process re-engineering'**

**Gartner Group**

## DISSERTATION SUMMARY

**Title:** A Framework for Knowledge Management

**Author:** Marlize Breedt

**Supervisor:** Prof. ACJ van Rensburg

**Department:** Industrial- and Systems Engineering  
University of Pretoria

**Degree:** Master of Engineering (Industrial)

**Keywords:** Explicit knowledge, intangible assets, intellectual capital, knowledge assets, knowledge base, knowledge economy, knowledge management, knowledge repositories, learning-organisation, tacit knowledge

Transformation from the industrial age to the knowledge age introduces a new environment with new rules governing business. In this knowledge economy, competitive advantage primarily depends on the quality of the organisation's knowledge assets and on the ability to leverage these assets. Currently, the market place attempts to measure these capabilities or intangible assets of the organisation. This is evident in the high discrepancy found between the market value and book value of organisations. A balanced portfolio of intellectual capital can be obtained through the management of the organisation's capacity to identify and solve problems in order to retain the learning and avoid 're-inventing the wheel' in the future.

The changes in the market place mentioned above are imperative to the need to manage the company's knowledge assets and place an emphasis on the importance of knowledge management. Knowledge management implies the ability to manage and utilise the intellectual assets of the company. This is possible by providing an infrastructure to capture and filter useful knowledge and to make it available to enhance the effectiveness of the organisation's decision-making process.

Aside from the explicit or codified knowledge sources of the company, the wealth of the company's knowledge resides within the tacit thoughts and experience of knowledge workers. This creates a challenge, as tacit knowledge assets are difficult to manage. It is influenced by the willingness to share knowledge and the time constraints experienced by knowledge workers, which depends on the organisational culture and on the existence of trust relationships. In

addition, the quality of knowledge transfer is highly dependent on the level of face-to-face contact between different parties.

The framework for a knowledge management initiative involves a holistic integration of the strategic, process, technology and people dimensions of the organisation to enable the intellectual assets of the organisation.

The *strategic* component of a knowledge management initiative, relates to the strategic direction of the business unit, i.e. knowledge creation or –retention focus. This includes determining the business objectives and strategic benefit of a knowledge management initiative. The *people* component refers to the organisation's culture maturity and preparedness for a knowledge management initiative. The management style, reward practices and corporate value system also exert an influence on the organisation-wide willingness to create and share knowledge.

A knowledge management initiative incorporates new *processes* to enable the knowledge creation, preservation and re-use capability of the organisation. This includes new roles and responsibilities for the management and maintenance of knowledge assets. The *technology* considerations of knowledge management address the need for a corporate memory while considering that knowledge workers have a limited capacity to attend to information triggers. This requires innovative system solutions that provide relevant information to users.

The phased implementation approach of a knowledge management initiative includes steps such as establishing a knowledge management strategy, developing a common understanding among staff and assessing the organisation's knowledge needs. In addition, it includes the development of measures to indicate the success of the initiative and the development of the infrastructure required to enable knowledge management.

Finally, the prime directive of knowledge management is to create and maintain superior knowledge by making it available at point-of-need and enabling a learning-organisation culture for the future.

## SAMEVATTING VAN VERHANDELING

**Titel:** A Framework for Knowledge Management

**Outeur:** Marlize Breedt

**Leier/Promotor:** Prof. ACJ van Rensburg

**Departement:** Bedryfs-en-Sisteen Ingenieurswese  
Universiteit van Pretoria

**Graad:** Magister in Ingenieurswese (Bedryfs)

**Sleuteltermes:** Eksplisiete kennis, intellektuelekapitaal, implisiete kennis, kennisbestuur, kennisdatabasis, kennisekonomie, kennishulpbronne, leergierige organisasie, nie-tasbare bates

Transformasie vanaf die Inligtings-era na die Kennis-era skep 'n nuwe sake-omgewing met nuwe besigheidsreëls. Die kompeterende voorsprong in die kennisekonomie is geleë in die kwaliteit van die organisasie se kennishulpbronne en die vermoë om hierdie bates suksesvol te benut. Huidiglik plaas die aandelemark 'n premie op die intrinsieke waarde van organisasies wat bekend staan as nie-tasbare bates. Die merkbare verskil in die markwaarde en die boekwaarde van tegnologie-aandele is 'n bewys hiervan. 'n Gebalanseerde portefeule van intellektuelekapitaal kan slegs gehandhaaf word indien die vermoë ontwikkel word om probleme op te los en 'n 'geheue' ontwikkel word rondom leerervarings.

Bogenoemde faktore skep die behoefte om die organisasie se kennis te bestuur en plaas die klem op die nuwe dissipline van kennisbestuur. Kennisbestuur behels die vermoë om die intellektuele bates van die organisasie te bestuur deur waardevolle kennis te filtreer, te stoor en instand te hou. Sodoende kan kennis in die organisasie beskikbaar gestel word waar dit benodig word en uiteindelik die effektiwiteit van besluitneming in die organisasie verbeter.

Behalwe vir eksplisiete kennisbronne is die grootste waarde van die organisasie se kennis in die implisiete gedagtes en ervarings van kenniswerkers gesetel. Die uitdaging verbonde aan kennisbestuur is in die feit dat implisiete kennisbronne moeilik is om te bestuur. Die grootste rede hiervoor is dat die kultuur van die organisasie bepaal tot watter mate vertrouensverhoudings bestaan in die organisasie en hoe gewillig kenniswerkers is om hul kennis te deel. Nog 'n faktor is die feit dat die kwaliteit van kennisoordrag afhanklik is van aangesig-tot-aangesig kontak.

Die raamwerk vir kennisbestuur behels 'n gebalanseerde integrasie van die strategiese-, proses-, tegnologie- en personeeldimensies van die organisasie ten einde die ontwikkeling van intellektuelekapitaal in staat te stel.

Die *strategiesekomponent* van kennisbestuur hou verband met die strategiese rigting van die besigheid, met ander woorde 'n kennisskepping- of kenniskodifiseringsfokus. Dit sluit die bepaling van die besigheidsdoelwitte en die identifisering van die strategiese voordele van so 'n kennisbestuurinisiatief in. Die *menskomponent* hou verband met die volwassenheid van die organisasie se kultuur en sy gereedheid vir 'n kennisbestuurinisiatief. Die bestuurstyl, beloningspraktyke en waardestelsel van die organisasie het ook 'n direkte impak op die gewilligheid van werknemers om kennis te ontwikkel en te deel.

'n Kennisbestuurinisiatief inkorporeer nuwe *besigheidsprosesse* ten einde die organisasie se kennisontwikkeling-, beskerming- en hergebruikvermoëns daar te stel. Dit behels nuwe rolle en verantwoordelikhede rondom kennisbatabestuur en instandhouding. Die *tegnologiese-oorwegings* van kennisbestuur adresseer die behoefte vir 'n organisasie-wye geheue en neem in ag dat kenniswerkers 'n beperkte kapasiteit het om aandag te skenk aan inligtingprikkel. Dit vereis innoverende stelsel-oplossings wat alleenlik relevante inligting aan gebruikers beskikbaar stel.

Die benadering tot kennisbestuurinisiatiewe behels fases soos onder andere die ontwikkeling van 'n gemeenskaplike begrip rondom kennisbestuur en die versameling van inligtingbehoefte in die organisasie ten einde 'n kennisbestuurstrategie te ontwikkel en te implimenteer. Verder behels dit die ontwikkeling van metingskriteria wat kan dien as 'n indikasie van die sukses van so 'n inisiatief en die ontwikkeling van tegnologie om die kennisbestuurvermoë van die organisasie te ondersteun.

Die primêre oogmerk van kennisbestuur is om hoë kwaliteit kennis te ontwikkel en instand te hou, dit beskikbaar te stel by die punt-van-behoefte en om 'n leergierige-organisasie-kultuur te vestig vir die toekoms.

## ACKNOWLEDGEMENTS

The author would like to take the opportunity to thank the following people whose assistance proved invaluable with this research project:

- My husband Mr. WJ Breedt, for his long hours of endless patience and support
- Prof. Antonie van Rensburg for acting as my study leader and initiating so many opportunities
- Miss. Sonja van Rooyen for providing assistance and feedback on the written document
- Mr. Gerald Kruger for valuable information on the topic of knowledge management
- Mr. Jurgens Pieterse, for frequently providing enthusiastic assistance in establishing an understanding of the concepts of Knowledge Management
- The managers of Persetel Q Data Business Consulting (Pty) Ltd for the opportunities that enabled this research
- All the members of Persetel Q Data Business Consulting (Pty) Ltd who were so willing to share their knowledge and contacts in the field of knowledge management

## TABLE OF CONTENTS

DISSERTATION SUMMARY .....	III
SAMEVATTING VAN VERHANDELING.....	V
ACKNOWLEDGEMENTS .....	VII
TABLE OF CONTENTS.....	VIII
LIST OF FIGURES.....	XII
LIST OF TABLES.....	XIV
ABBREVIATIONS.....	XV
GLOSSARY .....	XVI
<b>1. INTRODUCTION TO THE RESEARCH SUBJECT.....</b>	<b>2</b>
1.1 INTRODUCTION.....	2
1.2 THE KNOWLEDGE MANAGEMENT SCENARIO .....	2
1.3 RESEARCH APPROACH.....	4
1.4 PURPOSE OF RESEARCH.....	4
1.5 DOCUMENT LAYOUT .....	5
<b>2. KNOWLEDGE MANAGEMENT IN CONTEXT.....</b>	<b>7</b>
2.1 DRIVERS FOR KNOWLEDGE MANAGEMENT.....	7
2.1.1 <i>Emergence of the Knowledge Era</i> .....	7
2.1.2 <i>Economics of Cyberspace</i> .....	9
2.1.3 <i>Globalisation</i> .....	10
2.1.4 <i>Digitisation</i> .....	10
2.1.5 <i>Customer Intimacy</i> .....	11
2.1.6 <i>Free Information</i> .....	12
2.1.7 <i>Role of Information Technology (IT)</i> .....	12
2.1.8 <i>Costly Knowledge Reinvention</i> .....	13
2.2 THE IMPLICATIONS OF KNOWLEDGE MANAGEMENT IN SOUTH AFRICA .....	13
2.3 CONCLUSION.....	14



<b>3.</b>	<b>THE THEORY OF KNOWLEDGE MANAGEMENT.....</b>	<b>16</b>
3.1	THE KNOWLEDGE ASSET.....	16
3.1.1	<i>Knowledge vs. Information.....</i>	<i>16</i>
3.1.2	<i>Knowledge vs. Traditional Assets.....</i>	<i>18</i>
3.1.3	<i>Knowledge in the Organisation.....</i>	<i>18</i>
3.1.4	<i>Knowledge Forms.....</i>	<i>19</i>
3.1.5	<i>Knowledge Process.....</i>	<i>20</i>
3.2	THE KNOWLEDGE ORGANISATION.....	20
3.3	KNOWLEDGE MANAGEMENT.....	22
3.3.1	<i>Knowledge Management Purpose.....</i>	<i>22</i>
3.3.2	<i>Knowledge Management Objectives.....</i>	<i>22</i>
3.3.3	<i>Knowledge Management Defined.....</i>	<i>23</i>
3.3.4	<i>Knowledge Base.....</i>	<i>24</i>
3.4	INTELLECTUAL CAPITAL.....	25
3.4.1	<i>Classification of Intellectual Capital.....</i>	<i>26</i>
3.4.2	<i>Managing Intellectual Capital.....</i>	<i>31</i>
3.5	KNOWLEDGE MANAGEMENT CONCEPTS.....	32
3.5.1	<i>Learning Organisation.....</i>	<i>32</i>
3.5.2	<i>Learning Process [25].....</i>	<i>33</i>
3.5.3	<i>The Organisational Development Perspective.....</i>	<i>34</i>
3.5.4	<i>Knowledge Management Roles and Responsibilities.....</i>	<i>35</i>
3.6	CONCLUSION.....	37
<b>4.</b>	<b>KNOWLEDGE MANAGEMENT FRAMEWORK.....</b>	<b>38</b>
4.1	STRATEGIC COMPONENT.....	39
4.1.1	<i>Different Strategies for Managing Knowledge('Direction').....</i>	<i>39</i>
4.1.2	<i>Knowledge Management Approach [7].....</i>	<i>41</i>
4.1.3	<i>Knowledge Management Objectives.....</i>	<i>42</i>
4.2	PEOPLE COMPONENT.....	43
4.2.1	<i>Human Factor.....</i>	<i>43</i>
4.2.2	<i>Structured Approach to the People Component.....</i>	<i>44</i>

4.2.3	<i>Techniques to Manage the Soft Issues of Knowledge Management</i> .....	52
4.3	PROCESS COMPONENT.....	53
4.3.1	<i>Knowledge Management Process</i> .....	53
4.4	TECHNOLOGY COMPONENT.....	61
4.4.1	<i>Need for Knowledge Management Technology</i> .....	61
4.4.2	<i>Knowledge Management Technology Architecture</i> .....	62
4.4.3	<i>Characteristics of Knowledge Management Technology Architecture</i> .....	66
4.4.4	<i>Current and Future Technologies</i> .....	67
4.5	CONCLUSION.....	69
<b>5.</b>	<b>KNOWLEDGE MANAGEMENT IMPLEMENTATION</b> .....	<b>71</b>
5.1	SUCCESSFUL KNOWLEDGE MANAGEMENT PROJECTS .....	71
5.2	KNOWLEDGE MANAGEMENT IMPLEMENTATION APPROACH.....	72
5.3	FUTURE DEVELOPMENT OF KNOWLEDGE MANAGEMENT.....	73
5.4	KNOWLEDGE MANAGEMENT IMPLEMENTATION PHASES .....	75
5.5	PHASE 1 – ESTABLISH A COMMON KNOWLEDGE MANAGEMENT VISION.....	76
5.6	PHASE 2 - CREATE A COMMON LANGUAGE / UNDERSTANDING (TOP-DOWN) .....	77
5.7	PHASE 3 - GATHER INFORMATION ON COMPANY KNOWLEDGE NEEDS (BOTTOM-UP).....	78
5.8	PHASE 4 - DEVELOP AND EXECUTE THE KNOWLEDGE MANAGEMENT STRATEGY .....	79
5.8.1	<i>Knowledge Management Strategy</i> .....	79
5.8.2	<i>Knowledge Management Project Strategy</i> .....	79
5.8.3	<i>Intellectual Capital Driven Strategy</i> .....	80
5.9	PHASE 5 - DEVELOP MEASURES TO INDICATE THE SUCCESS OF THE INITIATIVE .....	81
5.10	PHASE 6 - DEVELOP INFRASTRUCTURE TO ENABLE KNOWLEDGE MANAGEMENT.....	81
5.10.1	<i>Messaging Technology</i> .....	82
5.10.2	<i>Co-ordination Technology</i> .....	82
5.10.3	<i>Collaboration Technology</i> .....	83
5.10.4	<i>Knowledge Management Technology</i> .....	84
5.10.5	<i>Infrastructure Implementation Requirements</i> .....	84
5.11	PHASE 7 - ESTABLISH A KNOWLEDGE RENEWAL PROCESS .....	85
5.12	CONCLUSION.....	86

<b>6. CONCLUSION.....</b>	<b>88</b>
6.1 THE CRITICAL SUCCESS FACTORS OF KNOWLEDGE MANAGEMENT .....	89
6.2 RISKS OF IMPLEMENTING KNOWLEDGE MANAGEMENT .....	90
6.3 FURTHER RESEARCH POSSIBILITIES .....	91
6.4 RECOMMENDATIONS .....	92
<b>7. BIBLIOGRAPHY .....</b>	<b>95</b>
<b>APPENDIX .....</b>	<b>100</b>
A. 1 KNOWLEDGE AUDIT INTERVIEW.....	100
A. 2 KNOWLEDGE AUDIT QUESTIONNAIRE / SURVEY .....	107
A. 3 INTELLECTUAL CAPITAL MEASURES .....	110
A. 4 KNOWLEDGE MANAGEMENT CASE-STUDIES.....	115
A. 5 DOCUMENT MANAGEMENT SOFTWARE .....	121
1. <i>Enterprise Document Management Software (EDM)</i> .....	121
2. <i>Full text Retrieval software (26%)</i> .....	123
3. <i>Viewer/Publisher Software (20.5%)</i> .....	124
4. <i>Workflow</i> .....	125
5. <i>Push Technologies</i> .....	125
6. <i>Integrated Document and Output Management (IDOM)</i> .....	125

## LIST OF FIGURES

<i>Figure 1: Projected Knowledge Management Life Cycle</i> .....	3
<i>Figure 2: Document Layout</i> .....	5
<i>Figure 3: Emergence of the Skill-Based Economy</i> .....	8
<i>Figure 4: Knowledge Creation Cycle</i> .....	17
<i>Figure 5: Different Organisational Forms</i> .....	19
<i>Figure 6: Sources of Information</i> .....	20
<i>Figure 7: Knowledge Value Chain</i> .....	20
<i>Figure 8: Knowledge Organisations in the Service Industry</i> .....	21
<i>Figure 9: Balance Sheet of the Knowledge Organisation</i> .....	26
<i>Figure 10: Intellectual Capital</i> .....	27
<i>Figure 11: The Classification of Corporate Assets</i> .....	28
<i>Figure 12: Components of a Learning Organisation</i> .....	33
<i>Figure 13: The Social Learning Cycle</i> .....	34
<i>Figure 14: Knowledge Management Framework</i> .....	38
<i>Figure 15: Interaction between Technology, People, Process and Strategy</i> .....	39
<i>Figure 16: Different Knowledge Management Strategies</i> .....	40
<i>Figure 17: Soft vs. Hard Factors of Knowledge Management</i> .....	44
<i>Figure 18: Change Management Approach for Knowledge Management</i> .....	45
<i>Figure 19: Management Style</i> .....	47
<i>Figure 20: Knowledge Management Process Diagram</i> .....	54
<i>Figure 21: Knowledge Creation</i> .....	55
<i>Figure 22: Business Object Knowledge Cube</i> .....	57
<i>Figure 23: Knowledge Categories on Intangible Assets</i> .....	58
<i>Figure 24: Application of Knowledge</i> .....	60
<i>Figure 25: Information Overflow</i> .....	62
<i>Figure 26: Conceptual Knowledge Management Technology Architecture</i> .....	63
<i>Figure 27: Components of the Knowledge Management Repository</i> .....	64

Figure 28: Physical Knowledge Management Technology Architecture..... 66

Figure 29: Knowledge Management Implementation Approach..... 72

Figure 30: Knowledge Management Development Phases..... 73

Figure 31: Knowledge Management Implementation Phases ..... 76

Figure 32: MTN Intellectual Capital Strategy ..... 80

Figure 33: The Classification of Knowledge Management Technology..... 81

Figure 34: Socialising Matrix..... 84

Figure 35: Proposed Knowledge Management Life Cycle..... 88

Table 5.1  
Table 6.1  
Table 7  
Table 8  
Table 9

## LIST OF TABLES

Table 1: Different Classifications of Intellectual Capital.....	26
Table 2: Culture Factors .....	45
Table 3: Business Perspective.....	46
Table 4: Knowledge Management Incentives .....	51
Table 5: Retrieval Phase.....	74
Table 6: Knowledge Connectivity Phase .....	74
Table 7: Coordinated Enterprise Phase.....	75
Table 8: Full Text Retrieval Ware .....	124
Table 9: Comparison between JAVA and HTML Technology.....	127

## ABBREVIATIONS

Abbreviation	Description
BPR	Business Process Reengineering
CKO	Chief Knowledge Officer
COE	Centre of Excellence
DMA	Document Management API
DMS	Document Management System
EDM	Enterprise Document Management Software
EAI	Enterprise Application Integration
GIS	Geographical Information System
HTML	Hypertext Markup Language
IDOM	Integrated Document and Output Management
IR	Information retrieval
KB	Knowledge Base
KM	Knowledge Management
OCR	Optical Character Recognition
ODMA	Open Document Management API
PDF	Portable Document Format
TQM	Total Quality Management
WAN	Wide Area Network

## GLOSSARY

Term	Description
<b>Community of Interest</b>	"A group of professionals, informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge." [32]
<b>Customer Capital (External Structure)</b>	Relationships with customers and suppliers, brand names, trademarks and reputation, or 'image' in the market.
<b>Human Capital (Personnel Competence)</b>	The people assets of an organisation. It includes owners, employees, contractors, suppliers, and all other people who collectively bring to the firm their skills, know-how, and individual abilities. Human Capital is one of the three major elements comprising Intellectual Capital.
<b>Intellectual Property</b>	The codified, tangible or physical described knowledge assets over which the organisation may assert ownership rights and which can be legally protected by law, e.g. patents, trade marks, trade secrets, copyrights, and products or services.
<b>Intellectual Capital</b>	The intellectual material that can be used to create value such as the internal and external structure as well as personnel competence of the organisation. It is also referred to as the intangible assets which is reflected in the difference between the organisation's market value and book value.
<b>Knowledge</b>	The understanding, know-how and expertise produced by combining experience with data and information in a tacit and explicit form.
<b>Knowledge Management</b>	The systematic management of vital knowledge and its associated processes of creating, gathering, organising, distribution, and using. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout and appropriately applied an organisation.
<b>Knowledge Worker</b>	Employees who are actively involved in the process of using technology for collecting data, analysing information, communicating knowledge and acting on it.
<b>Organisational Capital (Internal Structure)</b>	The physical and technical infrastructure, concepts, models and patents that are owned by the organisation and used to support the human resources, the corporate culture as well as the internal networks of the organisation.