The relevance of knowledge management in the public sector: the measure of knowledge management in government

ME la Grange

Assignment presented in partial fulfilment of the requirements for the degree of Master of Philosophy (Information and Knowledge Management) at the University of Stellenbosch

Supervisor: Mr C.H. Maasdorp
April 2006
Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature: ……………………………………………………

Date: ………………………………………………………
Abstract

The knowledge economy has provided an imperative for Knowledge Management in the private sector. It can therefore be said that the KM value proposition is achieving competitive advantage through the creation, sharing and active utilisation of knowledge resources. The measurement of intangibles has similarly received significant attention in the private sector in an effort to provide a more holistic view of company value. Various measurement- and valuation models are discussed. The question is subsequently raised whether KM has any validity in the public sector taking public- and private sector differences into account. The government mandate is explored, particularly in the South African context, and two public sector drivers for KM is identified, namely the organisational- and national imperatives. Finally, an integrated framework for KM measurement in the public sector is proposed based on the dual role of KM in government.
Abstrak

Die kennis ekonomie het die bestaansreg van Kennis Bestuur in die privaat sektor verseker. Kennis Bestuur fokus hoofsaaklik daarop om maatskappye in staat te stel om kompeterende voordeel te behaal deur die skep van-, toegang tot- en aktiewe gebruik van kennis hulpbronne te verseker. Die meting van kennis hulpbronne het dus ook aansienlik aandag ontvang in die privaat sektor in 'n poging om 'n akkurate prentjie te skets van 'n maatskappy se waarde. Verskeie modelle vir die meting- en valuering van kennis hulpbronne word bespreek. Teen hierdie agtergrond onstaan die vraag egter of Kennis Bestuur hoegenaamd bestaansreg het in die openbare sektor. Die regering se mandaat word ondersoek, veral in die Suid-Afrikaanse konteks, en twee dryfvere vir Kennis Bestuur in die openbare sektor word geïdentifiseer naamlik die ondernemings- en nasionale dryfvere. Ter afsluiting, word 'n geïntegreerde model vir die meting van Kennis Bestuur in die openbare sektor voorgestel.
Contents

Declaration ................................................................................................................................. i
Abstract ..................................................................................................................................... ii
Abstrak ..................................................................................................................................... iii
Contents .................................................................................................................................... iv
Figures ....................................................................................................................................... v
Tables ........................................................................................................................................ v
Introduction ............................................................................................................................... 1
1. The Knowledge Management Imperative................................................................. 3
  1.1 The Knowledge Economy ............................................................................................... 3
  1.2 Intangible assets ............................................................................................................. 5
    1.2.1 Measurement of intangible assets ........................................................................... 7
       a) The Skandia Navigator ................................................................................................. 8
       b) The Intangible Assets Monitor .................................................................................. 11
       c) The IC Index ............................................................................................................. 14
       d) The IC Audit Model .................................................................................................. 15
  1.3 The Knowledge Management discipline ....................................................................... 18
    1.3.1 The development of management theory ............................................................... 18
    1.3.2 The development of KM theory ............................................................................. 20
  1.4 The Knowledge Management Value Proposition .................................................... 23
    1.4.1 Knowledge creation .................................................................................................. 24
       a) Socialisation ............................................................................................................... 25
       b) Externalisation .......................................................................................................... 26
       c) Combination ............................................................................................................. 26
       d) Internalisation .......................................................................................................... 27
    1.4.2 Management implications ....................................................................................... 28
  2 Knowledge Management in the Public Sector ............................................................ 31
    2.1 The Validity of Knowledge Management in Government ....................................... 32
      2.1.1 The organisational imperative for KM in government ........................................ 33
      2.1.2 The national imperative for KM in government .................................................... 40
  3 Measuring public sector knowledge management ..................................................... 45
    3.1 Overview of KM measurement models for the public sector ................................... 45
      3.1.1 The Knowledge Assessment Matrix .................................................................. 46
      3.1.2 The Science, Technology and Industry Scoreboard ......................................... 47
      3.1.3 Global Competitiveness Report .......................................................................... 51
      3.1.4 National Knowledge Assets Measurement Model ............................................ 52
    3.2 Developing a KM measurement model for government ........................................... 55
      3.2.1 Valid measurement .............................................................................................. 55
      3.2.2 The integrated KM measurement framework for the public sector .................... 57
Conclusion ............................................................................................................................ 64
Bibliography .......................................................................................................................... 67
Figures

Figure 1: Skandia Navigator ...................................................................................................... 9
Figure 2: Skandia's Classification of Intellectual Capital........................................................ 11
Figure 3: The IC Index’ Classification of Intellectual Capital.................................................. 14
Figure 4: The IC Audit’s Classification of Intellectual Capital................................................. 16
Figure 5: National Knowledge Assets Classification .............................................................. 52
Figure 6: Framework for the Integrated Model ....................................................................... 58
Figure 7: Integrated model intellectual capital classification .................................................. 60

Tables

Table 1: Skandia Navigator Measures ..................................................................................... 10
Table 2: Sveiby’s Intangible Assets Monitor ........................................................................... 13
Table 3: IC Index Measures .................................................................................................... 15
Table 4: Characteristics of tacit- and explicit knowledge ....................................................... 25
Table 5: Knowledge Assessment Matrix Measures ................................................................. 47
Table 6: STI Scoreboard Measures ......................................................................................... 48
Table 7: SOCAT Measures ..................................................................................................... 50
Table 8: Growth Competitiveness Index Measures ................................................................. 51
Table 9: National Knowledge Assets Measures ..................................................................... 53
Table 10: Integrated Model Measures ..................................................................................... 63
Introduction

With each successive change in the economic system, the means of production and value creation changed accordingly. In the agricultural economy, value was derived from the land. During the industrial age, value was created from factories utilising resources such as labour and capital. In the information economy, value was created from information. Since the beginning of the 21st century and the collapse of the dot com era, we have subsequently seen the development of the knowledge economy (Standfield, 2002:10).

The knowledge economy has had a significant impact on the way that companies do business. Faced with the increasing knowledge intensity of products and services, fast paced change and global competition, companies have had to focus on their intangible resources to drive increased financial returns and competitive advantage.

The mere availability of knowledge however does not simply translate into superior performance and IBM is a good case in point. According to Boisot (1998:92) IBM spent more on knowledge creation than any other company with an investment in R&D of more than $25 billion between 1988 and 1992. By the mid 1990’s however, IBM still succeeded in losing two-thirds of its 1987 market share. Knowledge Management theory is therefore to a large extent an attempt to define the nature of knowledge and to indicate how firms can derive value from their knowledge resources.

The strong ties between the private sector with its bottom line imperatives and KM is therefore quite apparent, even more so when taking into consideration the significant emphasis placed on intangible accounting and the valuation of knowledge assets. As Carrillo (2002:1) puts it: “The business-driven origins of KM have earned it citizenship in corporate environments.”

In the past many management theories have migrated from the private- to the public sector. Examples of management theories that have found application in the public sector include total quality management, reengineering and balanced scorecards (McAdam & Reed, 2000:317). Similarly, there has been growing interest in Knowledge Management in government and especially in the US the lead has been taken by defence-, intelligence- and revenue administration agencies in implementing
KM programs. In addition, a fair amount of academic literature deals with the subject of KM in government. The literature however mostly assumes the relevancy of KM in government and provides limited motivation for a KM imperative in the public sector.

The government mandate does indeed differ significantly from the private sector objectives of profitability and increased market share. In stark contrast, government is not concerned with competitors, making a profit or ensuring high returns for investors. Rather, its focus is on social welfare and growth, the delivery of essential services to citizens and effective administration.

Taking into consideration therefore the strong private sector drivers of Knowledge Management, the question arises whether KM has any relevancy in the public sector and if so, what form the value proposition of KM in government would take and how it can be measured.

To provide answers to this question, the following aspects will be addressed:

- The nature of the knowledge economy and intangible assets
- The measurement and valuation of intangibles
- The development of Knowledge Management theory
- The traditional Knowledge Management value proposition
- The public sector objectives and drivers for KM
- Challenges to public sector KM
- Measurement of KM in government

A literature study of relevant management- and knowledge management literature will be undertaken to determine the development of KM application in the private sector and to investigate the validity of KM in government. In addition, a framework for measuring KM in the public sector will be developed.
1. The Knowledge Management Imperative

1.1 The Knowledge Economy

Economic systems change in response to the changing needs of consumers and societal resources. Society has therefore experienced a number of economic revolutions, from the agricultural revolution to the industrial- and information revolutions.

The Information Economy of the 1980’s developed in large part due to the development of computing and communications technology and this is exemplified by the explosive growth of the Internet. Over the first decade of its existence the Internet remained a specialist network, but whereas in 1989 there were 159 000 Internet hosts worldwide, ten years later the number had increased to more than 43 million (Houghton & Sheehan, 2000:2).

In economic terms, the Information Age was characterised by the ability to store, manipulate and transmit large quantities of information at low cost. The collapse of the global information technology sector may be said to have rung in the end of the Information Revolution and the 1990’s have subsequently seen the rise of the Knowledge Economy. In each of these shifts, the source of value creation changed, first from the land to factories, then to information and subsequently to intangible resources (Standfield, 2002:7-10).

The evolution brought about by the knowledge economy is clearly demonstrated by two phenomena, firstly the disparity between companies’ market valuation and their capital assets and secondly, the growing knowledge intensity of economic activities.

Amrit Tiwana (2000:24, 25) cites the example of Microsoft which ranked 137th on the Fortune 500 in 1998, with $12 billion in sales and $14 billion in assets. This seems almost negligible compared to Ford’s $155 billion annual sales and $280 billion in hard assets. The picture changes however, when looking at Microsoft’s market valuation at a staggering $375 billion. In comparison, Ford does not even feature under the top fifteen U.S companies ranked according to market valuation. This disparity between market valuation and a company’s hard assets, is said to
demonstrate the value assigned by the market to a firm’s intangible assets, namely their intellectual capital, brand recognition, patents, research-and-development etc.

The second phenomenon is the growing knowledge intensity of economic activities as evidenced by international trade figures. This includes the knowledge intensity of individual goods and services and their growing economic importance. This is demonstrated by the rapid increase in knowledge intensive exports. From 1970 to 1977, the knowledge intensity of world manufactured exports remained constant, but since then it has showed a steady increase from an index value of 0.71 in 1977 to 1.04 in 1995 (Houghton & Sheehan, 2000:3).

The knowledge economy however, poses a significant challenge to companies as the rules which were previously taken for granted, do not seem to apply anymore. As knowledge is replacing traditional resources such as land, labour and capital intangibles are becoming a significant source of value. Products and business processes are becoming more and more knowledge intensive and knowledge itself has become an important product. The very nature of knowledge as a resource has even in some industries changed the traditional law of diminishing returns.

The knowledge economy has also changed the way companies view their staff. In the past, companies were ownership based as they owned their resources. This situation has however changed to a large extent, as companies cannot own their employee’s knowledge. The value of staff has therefore also greatly increased, from previously being seen as relatively low to being now viewed as absolutely critical to a company’s success.

In addition, the characteristics of labour have changed. During the industrial age workers created value through physical activity whereas in the knowledge economy, employees hardly exert any physical effort at all. Value is created by means of the knowledge, skills, expertise and experience of staff.

This has brought about a significant change in the way that companies manage their employees and in organisational structures. Predominately hierarchical structures characterised by control and top-down management is being challenged by the view of organisations as complex adaptive systems. In a parallel development a shift has taken place from specialisation and a strict division of labour, to encouraging redundancy and the multiskilling of employees through strategic rotation.
Lastly, globalisation has resulted in local markets being significantly impacted by changes in international markets. The increased pace of change has also effected the strategic focus of companies. Incremental improvement is therefore no longer sufficient as continual innovation is required to maintain competitive advantage (Standfield, 2002:38, 39; Andriessen, 2004:4-6).

1.2 Intangible assets

In the knowledge economy, it is recognised that intangible assets have replaced traditional resources as the basis of competition between firms and that the management of these resources have become a key competitive differentiator. The implication is therefore that intangibles are recognised as a non-monetary source of wealth creation. As such, intangibles have value, involve inputs and outputs and can be measured and managed (Andriessen, 2004:62).

The knowledge economy and the accompanying importance of intangible assets in company profitability and competitive advantage, indicates very clearly the strong ties between knowledge management and the private sector. Indeed, the prominence of intangible assets in the private sector has given rise to efforts within the knowledge management domain and elsewhere to devise measurement- and valuation models specifically targeted at intangibles or knowledge assets.

In light of this, the objective of the following section is to define the concept of an asset, to distinguish between intangible- and intellectual capital assets and to examine the unique nature of knowledge which makes it challenging to manage.

An asset is defined as a stock or resource controlled by an enterprise as a result of past events and from which future economic benefits or services is expected to flow for a specific and predictable time period (Boisot, 1998:3; Andriessen, 2004:63).

In the literature, the terms intangible- and intellectual assets are often used interchangeably and it is therefore important to distinguish between them.
Intellectual assets may be seen as a broader concept than intangible assets and is quite often split into categories, most commonly into human-, relational- and structural capital.

Human capital is defined as the knowledge, skills and experience of a company’s employees which they take with them when they leave at the end of the day. It may include aspects such as motivation, capacity for innovation, creativity, teamwork, flexibility, tolerance of ambiguity and education.

Relational capital refers to the firm’s external relationships with customers, suppliers, partners and stakeholders and their perceptions of the company. Aspects of relational capital include the image of the company, customer satisfaction and loyalty, commercial power and negotiating position.

Structural capital is defined as the knowledge that remains within the company and consists of routines, policies and procedures, systems, databases and organisational culture. Some of these may be legally recognised and protected and as such become the intellectual property of the firm, such as patents, trademarks, copyright etc. (Starovic & Marr, 2003:6; Hall, 1999:183).

Intangible assets is seen as a subset of intellectual capital as it is classified as an asset according to accounting standards and as such, is allowed on a company’s balance sheet (Starovic & Marr, 2003:6). The International Accounting Standards Board therefore defines intangible assets as “an identifiable non-monetary asset without physical substance held for use in the production or supply of goods or services, for rental to others or for administrative purposes” (Andriessen, 2004:63). As such, intangible assets are limited to the structural capital components of intellectual capital.

Knowledge assets however, do not conform to the definition of traditional assets and many of the challenges associated with the knowledge economy are tied up in the nature of knowledge assets themselves.

Knowledge differs quite substantially from traditional assets such as land, labour and capital and according to Boisot (1998:2), the failure to correctly conceptualise the nature of knowledge assets, condemns both companies and entire economies to failure. Some of these differences are indicated below:
As knowledge is an intangible asset, it does not have physical form and cannot be seen or touched.

Knowledge cannot be owned by a company; as a matter of fact, employees now own the means of production.

Knowledge cannot be measured directly as is the case with tangible assets.

Knowledge does not diminish with use, but rather increases.

Knowledge can be used simultaneously without loss of value.

Knowledge does not depreciate over time in a predictable fashion.

Financial transactions cannot accurately reflect the value of knowledge.

Knowledge creates future value.

The cost associated with its production is different from traditional goods, i.e. the development cost may be very high but the reproduction and transmission costs are low (Houghton & Sheehan, 2000:13; Standfield, 2002:45-47).

The above listed characteristics of knowledge clearly indicate that traditional management theories and practices aimed at managing traditional assets are not sufficient or effective in the knowledge economy. The growing importance of the knowledge management discipline in the private sector and its impact on management theory in general, is therefore indicated. Last named will be investigated in more detail later.

As market valuation is increasingly influenced by non-material assets, the measurement of intangibles is receiving attention. Shareholders are finding it more and more difficult to assess how their capital is being invested and since the Enron and WorldCom scandals, the focus is on transparent reporting. In addition, companies need a thorough understanding of how it creates value and the measurement of intellectual capital is therefore a priority from an organisational strategic planning perspective (Probst, Raub & Romhardt: 1999:246; Starovic & Marr, 2003:4, 5).

1.2.1 Measurement of intangible assets

As traditional accounting measures cannot cater for intangibles, a fair number of models have been developed that attempt to account for intangible assets and both
Malhotra (2003:9-12) and Andriessen (2004:57) lists in excess of twenty such models.

The beginnings of intangible accounting can be traced back to the development of the French Tableau de Bord (dashboard) and is seen as the precursor of the American Balanced Scorecard developed by Kaplan and Norton (Marr, Schiuma & Neely, 2004:555, Bourguignon & Malleret, 2001:2, Andriessen, 2004:104).

The Balanced Scorecard was developed in a study supported by KPMG and was one of the early attempts to develop an integrated performance measurement system for management. It represents four perspectives on company activity namely, customers, finance, internal business processes and learning and growth. It is this last perspective that makes the link to knowledge management (Probst, Raub & Romhardt, 1999:250).

The shortcoming of the Balanced Scorecard is however that it does not focus on intellectual assets per se, but on linking the strategic objectives of the organisation to various relevant competencies. A number of models have therefore been developed that focus on the measurement of intangible- and intellectual assets. Some examples of these include the Skandia Navigator, the Intangible Assets Monitor, the IC Index and the IC Audit Model (Marr, Schiuma & Neely, 2004:551). Each of these will be discussed in more detail below.

**a) The Skandia Navigator**

Skandia is a Swedish financial services company and views itself as a knowledge management pioneer. Prompted by the difference between their market- and book value, the company realised the importance of better understanding, managing and measuring their intellectual capital. The company produced its first internal intellectual capital report in 1985 and the first IC addendum to their financial reports, based upon the model developed by Edvinsson and Malone, in 1997 (Malhotra, 2003:6; Bontis, 2001:44). The “Balanced Report on Intellectual Capital” is now published every six months and in addition to financial measures, it includes customer-, process-, people- and renewal and development indices (Probst, Raub & Romhardt, 1999:253). This is represented by Skandia as follows:
Figure 1: Skandia Navigator
These five focus areas consist of up to ninety-one (91) intellectual capital measures plus seventy-three (73) traditional measures and an example of the measures are indicated below (Marr, Schiuma & Neely, 2004:557, Bontis, 2001:46):

<table>
<thead>
<tr>
<th>Financial Focus</th>
<th>Customer Focus</th>
<th>Human Focus</th>
<th>Process Focus</th>
<th>Renewal And Development Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total expenses</td>
<td>Satisfied customer index</td>
<td># of employees</td>
<td>Average response time</td>
<td># of new products</td>
</tr>
<tr>
<td>Premium income</td>
<td>Premium income</td>
<td>Decision support index</td>
<td>Discounted calls</td>
<td>Premium from new products</td>
</tr>
<tr>
<td>Gross contribution</td>
<td>New sales</td>
<td># of job training days</td>
<td>Average handling time for</td>
<td>Partial of GUI activities</td>
</tr>
<tr>
<td>Total expense ratio</td>
<td>Market share premiums</td>
<td>Annual staff turnover</td>
<td>completed cases</td>
<td># of IT development hours</td>
</tr>
<tr>
<td>Admin expense ratio</td>
<td>Customer barometer</td>
<td># of managers with</td>
<td>Average length of unmatched</td>
<td>Average age of patents</td>
</tr>
<tr>
<td>Cash-flow, insurance</td>
<td>Lapse rate</td>
<td>advanced degrees</td>
<td>payments</td>
<td></td>
</tr>
<tr>
<td>Statutory results</td>
<td>Sales efforts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on net assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Skandia Navigator Measures
The model divides the company's intellectual capital into human capital and other intangible assets embedded in the organisation itself, referred to as structural capital. Structural capital consists of customer- and organisational capital that in turn is divided into innovation- and process capital. This breakdown of intellectual capital can be represented as follows (Marr, Schiuma & Neely, 2004:556; Malhotra, 2003:7):

![Skandia's Classification of Intellectual Capital](image)

The Skandia Navigator is seen as a success story by many and, although in slightly different form, companies such as Dow Chemicals, Hewlett-Packard and Canon has followed their example (Roos & Roos, 1997:415).

**b) The Intangible Assets Monitor**

The Intangible Assets Monitor (IAM) was developed by Karl-Erik Sveiby and is based on three categories of intangible assets, namely External Structure, Internal Structure and Competence (Sveiby, 1998:4).
External structure refers to customers, suppliers and external stakeholders and the measures attempt to indicate amongst other how good the company is at entering new segments and to what extent customers contribute to the expertise and image of the organisation. It also includes brand names, trademarks and the reputation of the firm.

Internal structure refers to support staff and activities aimed at supporting the internal structure of the organisation. Measures in this category provide an indication of the company’s investment in new systems and methods – which in traditional accounting is seen as a cost - and how good the organisation is at innovation.

Competence, the last of the three intangible assets covered by the IAM, refers to the professionals who are directly involved in client work and include their skill, education, experience and values. Measures of competence attempt to indicate the level of professional skill and experience within the organisation, the value added and professional turnover. The Competence Index takes individual performance assessments into account and may be calculated as follows: Level x Performance or Years in Profession x Seniority x Level of Education (Sveiby, 2001:3).
The indicators attempt to measure change and knowledge flows and consist of growth, renewal/innovation, efficiency/utilisation and risk/stability measures and are represented by Sveiby (2001:2) as follows:

<table>
<thead>
<tr>
<th>External Structure</th>
<th>Internal Structure</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators of Growth</strong>&lt;br&gt;Organic growth</td>
<td><strong>Indicators of Growth</strong>&lt;br&gt;Investment in IT&lt;br&gt;Investment in internal Structure</td>
<td><strong>Indicators of Growth</strong>&lt;br&gt;Competence index&lt;br&gt;Number of years in profession&lt;br&gt;Level of education&lt;br&gt;Competence Turnover</td>
</tr>
<tr>
<td><strong>Indicators of Renewal/Innovation</strong>&lt;br&gt;Image enhancing customers&lt;br&gt;Sales to new customers</td>
<td><strong>Indicators of Renewal/Innovation</strong>&lt;br&gt;Organisation enhancing customers&lt;br&gt;Proportion of new production/services&lt;br&gt;New processes implemented</td>
<td><strong>Indicators of Renewal/Innovation</strong>&lt;br&gt;Competence-enhancing customers&lt;br&gt;Training &amp; education costs&lt;br&gt;Diversity</td>
</tr>
<tr>
<td><strong>Indicators of Efficiency/Utilisation</strong>&lt;br&gt;Profitability/customer&lt;br&gt;Sales/customer&lt;br&gt;Win/loss index</td>
<td><strong>Indicators of Efficiency/Utilisation</strong>&lt;br&gt;Proportion of support staff</td>
<td><strong>Indicators of Efficiency/Utilisation</strong>&lt;br&gt;Proportion of professionals&lt;br&gt;Leverage effect&lt;br&gt;Value added/employee&lt;br&gt;Value added/professional&lt;br&gt;Profit/employee&lt;br&gt;Profit/professional</td>
</tr>
<tr>
<td><strong>Indicators of risk/stability</strong>&lt;br&gt;Satisfied customers index&lt;br&gt;Proportion of big customers&lt;br&gt;Age structure&lt;br&gt;Devoted customers ratio&lt;br&gt;Frequency of repeat orders</td>
<td><strong>Indicators of risk/stability</strong>&lt;br&gt;Values/attitudes index&lt;br&gt;Age of the organisation&lt;br&gt;Support staff turnover&lt;br&gt;Rookie ratio&lt;br&gt;Seniority</td>
<td><strong>Indicators of risk/stability</strong>&lt;br&gt;Professionals turnover&lt;br&gt;Relative pay&lt;br&gt;Seniority</td>
</tr>
</tbody>
</table>

Table 2: Sveiby's Intangible Assets Monitor
c) The IC Index

The IC Index was developed by Roos et al in 1997 and laid the groundwork for his development of the Holistic Value Approach (HVA). The IC Index attempts to assess intellectual capital holistically by incorporating intellectual capital indicators into a single index (Bontis, 2001:47).

The IC Index divides intellectual capital into human- and structural capital. Human capital is further divided into competence, attitude and intellectual agility while structural capital is divided into relationship- and organisational capital as well as renewal and development. This classification can be represented as follows (Marr, Schiuma & Neely, 2004: 558):

![Figure 3: The IC Index' Classification of Intellectual Capital](image)

In a study by Roos and Roos (1997:416) intellectual capital categories were identified most suited to the companies comprising the study. Companies are therefore able to select categories based on their organisational strategy.
Once these have been identified, the specific indicators associated with each of the categories need to be determined by the company in question. The selection should be based on a “value scheme” that indicates significant sources of value to the company. Once the indicators have been selected, they need to be weighted and summarised into a single index. According to Marr et al (2004:558) the selection of measures should be based on the characteristics of the industry the company operates in and the weighting of each should relate to the relative importance of each measure in creating value for the organisation.

The following table provides an example of possible measures for specific categories (Roos & Roos, 1997:418; 420):

<table>
<thead>
<tr>
<th>Intellectual Capital Category</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capital</td>
<td>Personnel turnover</td>
</tr>
<tr>
<td></td>
<td>Training budget as % of turnover</td>
</tr>
<tr>
<td></td>
<td>% of employees rotating to and/or from partners</td>
</tr>
<tr>
<td>Relationship capital</td>
<td>Customer complaint rate</td>
</tr>
<tr>
<td></td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td></td>
<td>Increase in # of contacts</td>
</tr>
<tr>
<td></td>
<td>Change in capital provided by investors</td>
</tr>
<tr>
<td>Renewal and development capital</td>
<td>Change in average sales cycle</td>
</tr>
<tr>
<td></td>
<td>% turnover from new products</td>
</tr>
<tr>
<td></td>
<td>R&amp;D Budget</td>
</tr>
</tbody>
</table>

Table 3: IC Index Measures

As the IC Index only reflect indexed values it is ideal for tracking changes with regards to intellectual capital and therefore indicates changes in the future earnings potential of the company (Bontis, 2001:49).

d) The IC Audit Model

The IC Audit Model was developed by Brooking (1996) and attempts to identify yardsticks for intellectual assets by determining the ideal state of each aspect of an asset.

The model views intellectual capital as consisting of market-, human-, intellectual property- and infrastructure assets. Market assets are defined as market-related intangibles such as brands, contracts, customers, licensing agreements etc. Human-
centred assets refer to the knowledge of employees and include aspects such as expertise, creativity and problem solving capability. Intellectual property assets refer to patents, copyright etc while infrastructure assets include technologies, methodologies and processes which enable the company to function (Marr, Schiuma & Neely, 2004: 559). This structure can be represented as follows:

![Diagram](image)

Figure 4: The IC Audit’s Classification of Intellectual Capital

Brooking recommends a six-step process to audit intellectual capital (Andriessen, 2004:107):

- Identify the objectives of the audit, the domain and possible constraints as well as the transition that the company will have to undergo
- Identify the company’s intangibles as well as each asset’s set of aspects
- Determine the optimal state of each aspect which will act as a yardstick
- Select the appropriate audit method for each type of asset
- Complete the actual audit
- Capture the results of the audit in a database and calculate the outcome by comparing the current state with the target values indexed on a scale from 0 to 5

The IC Audit provides 30 methods for auditing various types of intangible assets and 158 questions covering a range of aspects. Once the audit has been completed, three approaches are suggested to calculate a monetary value for the intellectual capital. The first is the cost-based approach whereby the value of the asset is
determined by what the cost would be of replacing such an asset. The second method is referred to as the market-based approach where the value of the asset is ascertained by what the market valuation is, or i.e. the value the asset will attain in the open market. The third and last method, namely the income-based approach places a valuation on an asset based on its estimated ability to generate income.

As is apparent from these suggested approaches, Brooking’s IC Audit model is very externally focussed and aimed at determining a monetary value for intellectual capital assets. These approaches prove to be problematic however as there is no effective market for intellectual capital and such assets are by their very nature not easily transferable (Marr, Schiuma & Neely, 2004:559).

Roos and Roos (1997:415) quote Einstein as saying that what can be measured is not always important and what is important is not always measurable. In the knowledge economy, it is being asserted that intangible assets are the only true source of competitive advantage and the private sector is therefore faced with the imperative to manage, and therefore measure, their intellectual capital.

It has been demonstrated that significant inroads have been made in developing mechanisms whereby companies can report on their intangible assets and many companies are indeed following this route. This is illustrated by the International Intangible Management Standards Institute which compiles an index of the 500 largest companies by intangible value listed on US stock exchanges, known as the KNOWCORP 500. If one accepts that we have entered into a knowledge economy, then it is not a surprise to find that companies with higher intangible value are performing better than their traditional counterparts. According to the International Intangible Management Standards Institute, the KNOWCORP 500 companies employed 35.94% more employees and generated 34.76% more sales in March 2002 compared to the S&P 500 (Standfield, 2002:17).

The development of the knowledge economy and the focus on intellectual capital as the only true source of value creation for companies, clearly demonstrates the Knowledge Management imperative. There has therefore been a significant growth in Knowledge Management theory since the early 1990’s in an attempt to formalise the approach to managing intangible resources.
1.3 The Knowledge Management discipline

1.3.1 The development of management theory

As indicated in the previous section, the knowledge economy and the very nature of knowledge assets themselves contribute to the management challenges faced by companies today. Management theories and tools therefore developed to cater for the new challenges and requirements.

This phenomenon is not unique to the emergence of the knowledge economy. During the industrial age for example, management utilised tools such as double-entry accounting dating from the eighteenth century to manage their most important resources, namely land, labour and capital.

The following section will examine the development of management theory and how it has been impacted by the knowledge economy. It will attempt to show how we have not only seen the development of knowledge management as a separate discipline but how management theory as a whole has become knowledge based.

From the 1960's management theory was dominated by the positioning view of competitive advantage. It was believed that the competitive position of companies was rooted in their ability to respond to external industry factors. Industry structure and competitor behaviour therefore dictated company strategy and the inner workings of the company were viewed as almost irrelevant compared to the external environment (Boisot, 1998:181). In addition, resources were assumed to be uniformly distributed across industries and easily accessible by all the industry participants. The role of management was therefore to combine products and markets taking into consideration bargaining power, entry barriers and potential substitute products or services (Roos & Roos, 1997:414).

This view is epitomised by Michael Porter's five forces model published in his 1980 book entitled Competitive Strategy. According to Porter, company strategy is shaped by five competitive forces, namely the bargaining power of suppliers, the bargaining power of customers, the threat of new entrants in the industry segment, threat of substitute products or services and the positioning of existing industry competitors.
Porter described three generic strategies for achieving competitive advantage within an industry, namely cost leadership, differentiation and focus. These strategies are based on two beliefs: one, that competitive advantage is the goal of any strategy and secondly, that a firm must define the type of competitive advantage it seeks to attain and the scope within which it will be attained (Applegate, 1999:66).

After the 1980’s however, this theory was challenged by what was later referred to as the Resource-Based View of the Firm (RBV). It built on the earlier work of Edith Penrose and Philip Selznick in the 1950’s and postulated that the differences in competitive position between industry participants are in fact due to differences in internal resources. The RBV was placed firmly on the management map with the publication of Prahalad and Hamel’s 1990 article entitled “The core competence of the corporation” (Boisot, 1998:181,182).

To be a source of sustained competitive advantage, resources and competencies have to display the following characteristics:

- Customer value creation: It delivers a clear and valued benefit to customers
- Scarcity: it is rare compared to the competition
- Difficult to imitate or substitute
- It is organisation wide and can be applied across all the company’s product offerings and in different markets
- It appreciates with use and is the result of an organisational learning process
- It cannot be traded and therefore has to be developed in-house (Roos & Roos, 1997:414; Boisot, 1998:182).

According to Roos & Roos (1997:414), knowledge seems to be the only resource to pass this test and coupled with the core competencies of the firm, it provides a source of differentiation and indviduation that, if utilised appropriately, results in competitive advantage for the firm (Boisot, 1998:184).

The resource-based view of the firm subsequently led to competence-based strategies, organisational memory, analyses of knowledge-based strategy and ultimately to the knowledge-based view of the firm (Tuomi, 2002:77).
1.3.2 The development of KM theory

The interest in Knowledge as a concept is not a recent phenomenon. Polanyi, for example, referred to tacit- and explicit knowledge as early as the late 1950's (Stacey: 2001:13). Knowledge Management (KM) as a discipline however, is still relatively new. According to Snowden (2002:2) and Tuomi (2002:69) KM can be said to have originated in the early 1990’s with Nonaka and Takeuchi’s SECI model of knowledge conversion, published first in 1991 and again in 1995 in a landmark article entitled “The Knowledge-Creating Company." This "newness" of KM as a management philosophy is also very apparent from practitioner’s need to define their respective KM views before a meaningful discussion about the concept can commence (Leong-Hong, 2001:81).

The development of KM is recognised as having gone through three distinct phases (Snowden: 2002:2-3; Tuomi, 2002:77-79). During the fist phase, KM was rooted in the information processing paradigm, with the focus on the effective and efficient management of information in support of business decision making. This came during a time when significant progress was being made in the development of information- and database management systems and the objective was therefore to capture, store and share discreet bits of data and information. This phase was characterised by a lack of appreciation of individual’s knowledge and experience as evidenced by the fervour of reengineering and ensuing retrenchments.

The second phase commenced with the publication of Nonaka and Takeuchi’s work in the 1990’s which criticised especially Western managers for their narrow view of knowledge. They espoused the concepts of the knowledge spiral (Nonaka, 1998:21) which sees the conversion of tacit- and explicit knowledge as well as the SECI model of knowledge creation (Nonaka, Toyama & Byosière: 2001:493).

Nonaka attempted to demonstrate that Western management theory focussed almost exclusively on the management of information rather than on the creation of tacit knowledge. He attempted to redirect attention to the conditions that will stimulate the creation of knowledge, such as building and energising “ba”, providing individuals with the necessary autonomy, introducing creative chaos and redundancy as well as establishing a knowledge culture of mutual trust and commitment.
Second generation mainstream authors however, still interpreted Nonaka’s work from within the information processing paradigm and misunderstood the emphasis being placed on the value of tacit knowledge. Subsequently, the following three aspects were focussed on:

- The conversion into explicit knowledge to enable the management and measurement of knowledge assets
- Human resource management founded on individual skills- and competency management
- Continued reengineering of processes to increase knowledge worker productivity

The third generation may be viewed as a paradigm shift from mainstream KM. Stacey (2001) poses that mainstream epistemology is based on incorrect assumptions about the nature of knowledge from which specific prescriptions are made. These prescriptions include:

- That attention is to be focussed on explicit knowledge as tacit knowledge is difficult to manage
- Tacit knowledge is to be managed by managing employees
- Information technology is to be used to store and share information
- Intellectual capital should be measured
- Articulation of explicit knowledge in the form of manuals, models, prototypes etc.
- Hiring of specialists
- Setting of stretch targets and performance management
- Management of training activities as well as the quality of the training process

The third generation questions these assumptions and prescriptions however and differ from the mainstream on two important counts. Firstly, that tacit- and explicit knowledge is not two distinctive types of knowledge but rather inseparable components of knowledge and that the conversion of one into the other is therefore impossible (Stacey, 2001:35).

Secondly, knowledge is not seen as a physical object but rather as a process of relating. Third generation authors question the very idea of being able to manage knowledge (Snowden, 2002:3) and Stacey (2001:220) therefore asserts that
“knowledge cannot be grasped, owned by anyone or traded in any market…it is not only impossible to manage knowledge, even asking the question makes no sense.”

Snowden (2002:3) attempts to mitigate Stacy’s radical stance by asserting that second generation KM shouldn’t necessarily be abandoned but that its limitations need to be understood. This he founds on the view that knowledge is paradoxically both a “thing” and a “flow” and views knowledge transfer from the perspective of context and individual sense-making.

According to Tuomi (2002:79), the implications of third generation KM will be an increased focus on KM processes which will be incorporated into the organisational structure and a realisation that knowledge potential will only be realised through action and that knowledge creation implies social revolution.
1.4 The Knowledge Management Value Proposition

For any discipline or theory to be relevant, it requires a field of application. For knowledge management theory, this has historically been the corporate field (Noeth, 2004:22). As Carrillo (2002:1) so eloquently puts it: “The business-driven origins of KM have earned it citizenship in corporate environments.”

Since the development of the knowledge economy at the beginning of the 21st century, companies are increasingly compelled to take cognisance of their intellectual capital in order to ensure their profitability and competitive advantage.

According to the traditional value chain developed by Michael Porter, a company generates competitive advantage through a value generating chain of activities. The objective is to generate a level of value for customers that exceed the cost associated with the activities, thus generating a profit margin for the company. According to Sveiby (2001:4) however, the value chain becomes obsolete if one accepts that the organisation creates value from the transfer and conversion of knowledge. This he refers to as the Value Network of the organisation. The test of value creation remains consistent however, i.e. whether customers are willing to pay for a product or service under competitive circumstances (Rastogi, 2002:234).

As Malhotra (2003:5) points out though, the mere availability of knowledge to a company does not automatically lead to value creation. Rather, value has to be extracted from knowledge by means of human action and interaction. The value proposition of the Knowledge Management discipline therefore lies in how this is to be achieved.

Taking into consideration the third generation KM stance that the management of knowledge as an object proves problematic due to its unique characteristics, the current focus of knowledge management is on the creation and acquisition of new knowledge, the sharing of knowledge, the exploitation of knowledge and the implementation of knowledge processes. This is echoed by Rastogi (2002:232) when he defines knowledge management as the “continual endeavour to learn, acquire, create, develop, share, use and apply knowledge in support of the firm’s customer value proposition, competitive logic and integrated activity system.”
The next section will examine the knowledge management value proposition for business by indicating how value is derived from knowledge creation. Nonaka’s theory of knowledge creation will be discussed as well as the implications it has for management, including changes to management style and organisational structure as well as methods to encourage and support knowledge creation.

1.4.1 Knowledge creation

The volatility of the external environment and the rapid rate of change companies’ face, preclude the continual reuse of existing knowledge. For companies to ensure sustainable levels of growth significant emphasis has to be placed on the creation of new knowledge (Noeth, 2004:24) and this reality then also forms the foundation of Nonaka’s work. He draws upon the success of Japanese companies such as Honda, Canon, NEC and Sharp, which he ascribes to the stimulation of knowledge creation and an emphasis on innovation (Nonaka, 1998:21).

At the heart of Nonaka’s theory of knowledge creation is the distinction between tacit- and explicit knowledge. Explicit knowledge is defined as knowledge which is capable of being expressed in language, which can be formalised in documents and procedures and that can therefore be stored and shared. Tacit knowledge on the other hand is closely tied to the individual, is highly personal and is difficult to formalise and communicate. It includes subjective intuition, hunches, skills, know-how and mental models, i.e. an individual’s perception of the world and his/her role in it, formed through experience (Nonaka, Toyama & Byosiere, 2001:494).
The following table indicates the characteristics of tacit- and explicit knowledge respectively:

<table>
<thead>
<tr>
<th>Explicit Knowledge</th>
<th>Tacit Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Can be expressed in formal and systematic language</td>
<td>• Difficult to formalise and is rooted in action</td>
</tr>
<tr>
<td>• Is objective</td>
<td>• Is highly subjective</td>
</tr>
<tr>
<td>• Can be easily processed, stored and shared</td>
<td>• Difficult to communicate and share</td>
</tr>
<tr>
<td>• Is based on past experience</td>
<td>• Is based on rationality</td>
</tr>
<tr>
<td>• Is context free; sanitised</td>
<td>• Is context specific</td>
</tr>
</tbody>
</table>

Table 4: Characteristics of tacit- and explicit knowledge

According to Nonaka (Nonaka, 1998:28-31; Nonaka, Toyama & Byosiere, 2001:495-498) knowledge creation within an organisation occurs due to the conversion of these two types of knowledge. Referred to as the SECI process, knowledge is seen to be converted by means of four processes, namely Socialisation (tacit – tacit), Externalisation (tacit – explicit), Combination (explicit – explicit) and Internalisation (explicit – tacit). These processes take place on all levels of the organisation, forming what Nonaka refers to as the knowledge spiral, whereby the scale of conversion is amplified from the individual level to communities, departments or sections, across the organisation and even spanning organisational boundaries to include entities such as suppliers, customers and competitors.

a) Socialisation

Socialisation refers to the direct sharing of tacit knowledge between individuals and is most commonly achieved through observation and imitation during joint activities. According to Nonaka et al (2001:495) apprenticeship is the quintessential example of socialisation, as the apprentice does not learn by studying textbooks but through observation and practice.

Socialisation is however limited in the enterprise wide benefit it provides. Even though individuals do acquire tacit knowledge from each other, they do not gain any systematic understanding of their own knowledge. In addition, it isn’t easily accessible to the organisation as a whole and is difficult to manage (Nonaka, 1998:28).
To stimulate socialisation, it is essential to expose staff to challenging tasks and experiences and to foster a culture of trust and knowledge sharing. The effectiveness of socialisation is also highly dependent on a shared context and similar levels of expertise. As Snowden (2002:4) points out, experts typically resent engaging in knowledge exchanges below their own level of expertise.

b) Externalisation

Externalisation takes place when an individual articulates his/her tacit knowledge in an explicit form, allowing it to be shared across the organisation. It is also an important element of innovation as years of experience can lead to the development of a new, ground breaking solution.

Methods to support externalisation include, according to Nonaka et al (2001:495), the use of metaphor, analogies and models to assist in making abstract ideas and concepts more concrete and understandable. Opportunity for creative dialogue therefore has to be created.

The drawback of externalisation is however the cost associated with the codification of tacit knowledge and the level of abstraction required. When knowledge has to be shared with a large number of people of varying levels of expertise, the cost of codification may be high and the abstraction relatively low (Snowden, 2002:4). This will negatively impact on the value creation achieved by the externalisation process.

c) Combination

Combination refers to the synthesizing of discreet bits of explicit knowledge into a new, integrated form of explicit knowledge (Nonaka, 1998:28). This is a typical example of the whole being greater than the parts.

Even though Nonaka points out that combination does not really extend the existing knowledge base, it can indeed be argued that new knowledge is created as specific insight is required to synthesize the new entity which may give rise to new insights or practices.
According to Nonaka et al (2001:497) the process of combination consists of three phases. Firstly, explicit knowledge is obtained from within or externally to the organisation and combined into a new whole. Secondly, the new explicit knowledge is distributed across the organisation and lastly, is processed or broken down again into actionable components.

The application of various technology solutions such as databases and corporate intranets can contribute significantly to the combination process.

d) Internalisation

The value of explicit knowledge is realised through the process of internalisation, where individuals assimilate explicit knowledge into their own tacit knowledge base. This is typically achieved through practice and the application of explicit knowledge. When this tacit knowledge is subsequently shared with others, it leads to another cycle of knowledge creation, referred to earlier as the knowledge spiral (Nonaka et al, 2001:497).

Internalisation can be fostered through training programs, experimenting and simulations.

The concept of knowledge conversion is further expanded to the context within which each of these processes take place as well as the specific knowledge assets which act as inputs and outputs of the conversion process. Nonaka therefore proposes a three layered model of knowledge creation that consists of a) the SECI model of knowledge conversion, b) the Japanese concept of “ba” and c) knowledge assets.

As tacit knowledge is closely linked to context, Nonaka introduced the concept of “ba,” which he views as the foundation of knowledge creation. Ba is roughly translated as context and refers to the context in which knowledge is created. It can therefore refer to a physical-, virtual or mental space. Nonaka further identifies four kinds of ba that supports a particular process within the SECI model, namely originating-, dialoguing-, systemising- and exercising ba (Nonaka et al, 2001:499).

The last aspect of Nonaka’s three layered model, refers to knowledge assets as being the input and output of the knowledge creation process and identifies four...
types of knowledge assets, namely experiential-, conceptual-, systemic- and routine knowledge assets.

1.4.2 Management implications

To stimulate and enable the knowledge creation process there are specific managerial and organisational implications. As Nonaka (1998:36) points out, it is the “how” of knowledge creation which includes the required structures and practices.

Nonaka et al (2001:505) criticises the traditional top-down and bottom-up management models and proposes a middle-up-down model which stresses the importance of all employees in the organisation in the process of knowledge creation. The role of top management is to define the organisational vision that directs organisational knowledge creation. At Honda, senior management are even seen as “romantics who go in quest of the ideal” (Nonaka, 1998:41). In addition, they need to define the standards by which the value of knowledge creation can be determined. These standards are not to be solely financial, but need to incorporate qualitative indicators such as to what extent new knowledge supports the organisational vision.

The role of middle management is viewed as facilitating the knowledge creation process and they have to translate the vision into concrete and actionable concepts. The commitment to the overarching vision by the organisation as a whole is essential to knowledge creating activity. This is demonstrated by Mazda, whose commitment to the development of the rotary engine was so strong, that they viewed it as their fate, helping them to overcome various setbacks to finally produce the RX-7 (Nonaka, 1998:43).

To encourage and support knowledge creation, a number of strategies are suggested. The first is building and energising Ba, i.e. providing both the physical space and opportunity, or context, for employees to collaborate and create new knowledge. To merely provide the opportunity however is not enough. Ba should be energised by fostering the necessary conditions through autonomy, creative chaos, redundancy and culture.
To stimulate knowledge creation it is important to provide all staff with the right to act as autonomously as possible and self-organising- and cross-functional teams are important methods of achieving autonomy in organisations.

Creativity and innovation is dependent on employees questioning the norm and what is generally accepted. Fluctuation and creative chaos gives rise to the breakdown of accepted norms and routines and may be caused by changes in the organisational environment or when an organisation faces a specific crisis. It can also be created intentionally by providing staff with challenging objectives and a sense of urgency.

Redundancy refers to the intentional overlapping of information, functions and responsibilities which encourages frequent interaction. Teams may be constructed of competing groups to ensure a variety of perspectives on a problem and to finally arrive at a “best” solution. Redundancy also includes the principle of strategic rotation where staff is required to fill a number of positions and roles to gain a thorough understanding of the business.

Lastly, an organisational culture of mutual trust and respect is essential to knowledge creation. In addition, commitment to the vision of the organisation requires a selfless attitude where personal agendas have no place (Nonaka, 1998:36-45; Nonaka et al, 2001:508-513).

The Knowledge Economy is characterised by the recognition that knowledge- or intellectual assets have replaced natural resources and now form the basis of competition between firms. It has been indicated however that the mere availability of knowledge is not sufficient to ensure a company’s success. Rather, the focus must be on the creation of knowledge and extracting value from knowledge assets and it is in this that the knowledge management value proposition for business lies.

Although we have seen the development of various management theories over the years, all focussed on improving management efficiency and competitiveness, few are so directly linked to a change in the economic system as in the case of Knowledge Management. And although many management theories have subsequently evolved to the public sector, Knowledge Management may be said to have a particularly strong link to the private sector. This correlation between KM and the bottom line is demonstrated by the strong focus on intangible accounting.
Against this background the question arises whether KM has any relevancy in the public sector. The following section will therefore examine the validity of KM in government and two imperatives for KM will be identified. In addition, the measurement of knowledge assets in the public sector will be reviewed and an integrated model will be developed based on the identified KM imperatives.
2 Knowledge Management in the Public Sector

Public administration refers to the way in which the state is organised and managed to produce and deliver public goods. Similar to changes in management theory, various schools of thought on public administration emerged during the previous century, the latest focussing on citizen-centred, responsive and flexible government (NPI, 2004:9). Many of the current approaches have been influenced by the US New Public Management (NPM) program.

The NPM actively advocates that public organisations should import managerial processes from the private sector in an effort to emulate their success, stressing aspects such as cost efficiency and client- and results orientation (NPI, 2004:1). Many management theories and practices have therefore made their way from the private- to the public sector, albeit slowly at times, and examples of these include total quality management (TQM), reengineering and the balanced scorecard (McAdam & Reed, 2000:317).

Cong and Pandya (2003:28) proceed to mention however, that critics of the NPM argue that public- and private sector differences are so great that business practices simply cannot be transferred across. The authors list differences in human resource policies and practices, the handling of ethical issues and decision making processes.

There are indeed differences between the public- and private sectors. Whereas the private sector is only accountable to its shareholders, the public sector has many stakeholders including citizens, local government, private companies, lobbyists, unions and many more. These responsibilities are considerably more complex to manage. In addition, the private sector is based on competition and retaining competitive advantage. In light of government’s not-for-profit orientation however, the public sector is not faced with a battle for survival. Their focus is rather to protect, and improve, service delivery to citizens (Cong & Pandya, 2003:30; Motseniqos & Young, 2002:1; de Gooijer, 2000:304).

In light of the differences between the private- and public sectors, the question arises whether KM has any application in, or relevancy to, government. This question will be addressed in the following sections.
2.1 The Validity of Knowledge Management in Government

Government’s mandate differs from private sector objectives almost as much as day and night. Company directors are solely concerned about maximising profits, ensuring high returns for investors and sustaining competitive advantage. This is quite evident from company vision- and mission statements which almost always include market share and/or financial targets.

The government mandate however, is based on social responsibility and ensuring a better life for all its citizens. This is reflected in Nelson Mandela’s opening address to parliament when he expressed the following vision (NPI, 2004:24):

"My government’s commitment to create a people-centred society of liberty binds us to the pursuit of the goals of freedom from want, freedom from hunger, freedom from deprivation, freedom from ignorance, freedom from suppression and freedom from fear. These freedoms are fundamental to the guarantee of human dignity. They will therefore constitute part of the centrepiece of what this government will seek to achieve, the focal point on which our attention will be continuously focused. The things we have said constitute the true meaning, justification and purpose of the Reconstruction and Development Programme without which it would lose all legitimacy."

Wiig (2000:2) identifies four objectives of government, namely:

- Effective services and functions to implement the public agenda
- A stable, just, orderly and secure society
- Acceptable level of quality of life, and
- A prosperous society

It light of these objectives it becomes apparent that for government to deliver on its mandate, it has to ensure both the continued economic viability of the country and to govern responsibly by ensuring the efficiency and effectiveness of public administration.

Both aspects of this duality has relevancy for KM in the public sector. On the one hand, the role of KM in improving productivity, efficiency and effectiveness have
already been clearly indicated in the private sector and on the other, the knowledge economy is a growing reality that needs to be taken into account to ensure economic development and national prosperity.

Malhotra (2003:1) quotes a 1998 World Development Report as follows: “For countries in the vanguard of the world economy, the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the standard of living – more than land, than tools, than labour.” The World Bank continues by stating: “It is generally understood that countries that are rich in knowledge assets and intellectual capital fare better in terms of higher levels of growth and development” and continues “knowledge assets represent the fount of a nation’s competences and capabilities that are deemed essential for economic growth, human development and quality of life.”

The vast majority of academic literature dealing with KM in the public sector view the role of KM in government from an organisational perspective and as such, as much the same as in the private sector. This view addresses government objectives focussing on aspects such as efficiency, effectiveness and productivity. It does not however, address the economic and social objectives of government which arguably constitutes the lion share of its responsibilities.

As the knowledge economy will have a significant impact not only on the success of private companies but also on the development of national economies and growth, the value proposition of KM from a national perspective should also be taken into account. It will therefore be argued that KM has two imperatives in government and these will be referred to here as the organisational- and national KM imperatives.

2.1.1 The organisational imperative for KM in government

Most of the literature dealing with the role of KM in government, views KM as a management discipline that has some application in government departments.

Motseniqos and Young (2002:1) is a case in point when they state that although knowledge management will assume a different shape in the public sector, the driving forces behind KM in government is quite consistent with that of the private
sector. This view is supported by Wiig (2000:6) when he states that “Knowledge Management practice must ultimately be the responsibility of each public agency.”

The public sector is indeed beginning to recognise the importance of KM and especially US defence- and intelligence, as well as revenue generating agencies, has initiated KM programs. According to the *State of the Knowledge Industry Progress Report for government* completed in 2000, almost 90% of government agencies were aware of KM and more than 60% were experimenting with KM and implementing KM initiatives (Leong-Hong, 2001:81).

The expected benefits of KM listed by government respondents in a survey by the IDC, correspond to a large extent to those of the private sector and includes enhanced collaboration, capturing and sharing of best practices, providing e-learning, improving productivity and minimising redundant effort (Motseniqos & Young, 2002:2,4).

In South Africa, significant emphasis is also placed on the transformation of the public service to ensure service delivery of the highest standard to citizens. This is based on various policies, including the Constitution, the White Paper on the Transformation of the Public Service, the Employment Equity Act and the Public Finance Management Act (NPI, 2004:2).

This reality is reflected in the objectives of the new Public Service which includes the following (RSA, 1995):

- Provision of services of an excellent quality
- Development and the reduction of poverty
- Goal and performance orientation
- Cost effective and efficient
- Integrated, coordinated and decentralised
- Transparent, honest and accountable

All is not plain sailing however and the Whitepaper on the Transformation of Public Service (RSA, 1995) identifies specific challenges facing the public service in South Africa. These include, amongst other, the lack of service delivery, centralised control and top-down management, lack of accountability and transparency, low productivity,
demotivated staff, fear of change, poorly defined roles and responsibilities, lack of coordination, a rule-bound culture, lack of skills and financial constraints.

To ensure the focus on service delivery in South African government, the eight principles of Batho Pele has been adopted. These include (NPI: 2004:28):

- Consultation: Citizens should be consulted about the level and quality of the public services they require and, wherever possible, should be given a choice about the services that are offered.
- Service Standards: Citizens should be told what level and quality of public service they will receive so that they are aware of what to expect.
- Courtesy: Citizens should have equal access to the services to which they are entitled.
- Information: Citizens should be given full, accurate information about the public services to which they are entitled.
- Openness and transparency: Citizens should be told how national and provincial departments are run, how much they will cost and who is in charge.
- Redress: If the promised standard of service is not delivered, citizens should be offered an apology, a full explanation, and a speedy and effective remedy. When complaints are made, citizens should receive a sympathetic, positive response.
- Value for money: Public service should be provided economically and efficiently in order to give citizens the best possible value for money.

For KM to have an organisational imperative in government, it needs to support most, if not all, of the principles listed above. This is indeed illustrated in the following drivers and benefits for KM in government as indicated by the KM literature (Taylor, 2004:25, 30, 31; McKinnon, 2005:S3; Moore, 2005:S2):

- Increased accountability: Citizen participation and awareness has increased and government is more accountable than ever, especially for taxpayer money. The private sector can often keep their mistakes under wraps, but government is always open to public enquiries and exposure in the press.
- Access to information: Legislation is putting government under pressure to make information available to the public on request. Most Western governments have had some form of Freedom of Information legislation for
years while the private sector has only recently been obligated to disclose information under legislation such as Sarbanes-Oxley in the US.

- National security: Especially in the US, fears over national security have increased the importance of intelligence and the sharing of information across departmental boundaries. In 2004 for example, a presidential executive order was issued to the Department of Homeland Security, the Justice Department and Defence Information Systems to share information.
- Operational- and cost efficiency: Government departments are under pressure to reduce paperwork and eliminate inefficient administration commonly referred to as red tape
- Performance management and measurement: The overarching requirement in government is to monitor the degree to which state objectives are being met and to eliminate the distortion of performance indicators
- Seamless service delivery: e-government initiatives focus on delivering an increasing range of services and improving communication to, and with, citizens. In addition, improved service quality is also receiving attention.
- Knowledge intensity of many government products and services
- Information security and privacy and the protection of data

From the above mentioned advantages and drivers for KM in the public sector, it becomes clear that KM has a significant contribution to make on an organisational level. The implementation of KM programs in government is however often fraught with difficulty. A number of challenges exist, some of which is more unique to the public sector than others. Even though KM has received attention in the public sector, limited awareness and understanding of KM still exists and according to Cong and Pandya (2003:25) the public sector is falling behind with regards to KM implementation. What follows is a brief overview of some of the inhibiting factors experienced in government organisations.

Many of the constraints being experienced by the public sector relates to an organisational culture that is not conducive to knowledge sharing. Government employees are often seen as resisting change while demonstrating high levels of complacency and inertia. Government employees quite often view KM as a management responsibility and not something that each and every employee should take responsibility for. An empirical study of a public organisation in Malaysia found that only 48.3% of employees believed that managing knowledge should be part of everyone’s job (Syed-Ikhsan & Rowland, 2004:96).
In addition, a rule-based culture quite often predominates in government organisations. High value is placed on compliance and employees are conditioned to follow procedure. This is not conducive to innovation and an entrepreneurial spirit. Knowledge sharing is also limited as employees still believe that knowledge is power. Especially individuals who are intent on climbing the career ladder may view sharing their knowledge as putting themselves at a disadvantage. This situation is exacerbated by limited opportunity to provide staff with financial incentives to participate in knowledge sharing. Other alternatives such as the conferment of expert status on employees therefore have to be identified (Taylor, 2004:29).

Government departments are still typically hierarchical and bureaucratic in nature which inhibits communication and knowledge sharing- and transfer and slows down decision making. The complexity of government organisations also leads to the distributed nature of expertise and therefore inhibits knowledge sharing. Alex Bennet, the former Chief Knowledge Officer for the US Department of the Navy, for example estimated the department to consist of nearly 1 million people in 2002 and to include a significantly larger support network inside and outside of government. This indicates the scale and complexity that many government departments have to deal with (Chatzkel, 2002:435).

High staff-turnover, frequent transfer of staff between departments and retirement makes knowledge retention difficult. The 2003 Clinger-Cohen study of federal IT staff in the US found for example that 76% of surveyed managers were over the age of 40, with the majority aged between 45 and 50 (McKinnon, 2005:S3). This is not only the case in the US as in Finland it is estimated that nearly half of all civil servants will have left between 2001 and 2011 (Cong & Pandya, 2003:29).

Knowledge Management is quite often disadvantaged by the inherently political nature that government initiatives take, lacking consistency and therefore having varying impact. Government is unfortunately often guilty of launching an endless stream of new initiatives that impact very negatively on staff morale. It is therefore necessary for government to demonstrate some constancy of purpose and not to overload staff with a multitude of “different initiatives with confusing labels” (Taylor, 2004:32).
Government initiatives are also very susceptible to a general economic downturn which means that less tax revenue is generated for government spending. This has a negative impact on spending budgets and with increasing budget cutbacks, government departments are usually asked to do more with fewer resources.

A significant amount of government information is confidential which negatively effects government departments’ access to each other’s information and knowledge. Personal privacy legislation is also placing significant pressure on government to ensure the security of information and to restrict access to authorised individuals (McKinnon, 2005:S4).

Taylor (2004:30) points out that whereas most government- and private sector organisations are very comfortable with examining their successes, they find it more difficult to examine failures. This is even more the case in the public sector though where high levels of accountability and media scrutiny may inhibit staff from acknowledging problems. This severely limits the opportunity to learn from failure and an environment therefore needs to be created where staff feels safe to own up to mistakes.

According to Motseniqos & Young (2002:2) another significant constraint in the adoption of KM in government is a lack of suitable metrics to measure the success of KM initiatives or changes in the knowledge base. The authors quote a survey of government respondents which found that 76% did not have measures in place to evaluate the success or otherwise of their KM programs. This may partly be attributed to government not being held to metrics in the same way as in the private sector.

Similarly to the private sector, government also seem to be making the mistake of equating KM with technology implementation and emphasising information processing. Spending on solutions such as content management, collaborative applications, search engines, enterprise portal solutions, workflow, imaging, GIS, tracking, correspondence management and data capturing are on the increase. According to the IDC government sector spending on KM services will reach $257.4 million in 2006 (Motseniqos & Young, 2002: 3,4).

Against this background of challenges facing public sector KM initiatives, it is not surprising to find that all too many implementations fail to deliver on expectations.
This has undoubtedly contributed to KM being viewed by many as a management fad. Certain critical success factors (CSF’s) therefore need to be taken into account when implementing KM programs and the most important of these will be discussed (Leong-Hong, 2001:90-97; Wiig, 2000:4).

As mentioned before, cultural differences between the private- and public sectors seem to be a major challenge to successful KM implementation in government. Although culture may be the most difficult aspect to assess or change, it will significantly influence the success of a KM initiative.

A knowledge-supportive culture may be described as open, willing to learn and change, ethical, respectful and mutually supportive, willing to share and having a common goal. To foster such a culture it is essential to give staff sufficient autonomy to make decisions, to improvise and to do what they see is necessary as quickly as possible. In addition, understanding the current organisational culture will assist the KM practitioner greatly in understanding how the KM program should be tailored to improve its chances of success. For example, in an organisation where staff tends not to share their knowledge, a new reward- and performance management system may be considered to measure and reward knowledge sharing.

Closely tied to culture is promoting leadership. As previously indicated commitment is absolutely crucial to successful knowledge creation and Knowledge Management programs. This refers both to the commitment of staff as well as management, who needs to provide visible and public support to the KM initiative. Ideally, someone in top management should champion the KM cause to convey that the organisation is serious about KM and that it is there to stay. Top management support also translates into the funds and resources required for the KM program.

A comprehensive Knowledge Management strategy needs to be defined covering all the relevant aspects, including organisation, people, process and technology. It is essential to clearly demonstrate how the KM strategy supports the organisational strategy and objectives. Clearly formulated policies and procedures should be implemented and enforced to formalise the KM program in the organisation. Governance should also be adhered to in the way in which the KM program itself is managed. Measures should be defined to evaluate the success of the KM initiative and communicated appropriately to top management.
To be successful it is essential to communicate and market the KM strategy, policies, procedures and performance measures to employees. All the stakeholders need to understand what the KM program is about and what it is trying to achieve. It is therefore important to communicate the objectives and expected benefits to all levels of the organisation. Unrealistic expectations should however be managed very carefully as it may damage the credibility of the KM program in the long run.

Even though it should be stressed that information- and communications technology (ICT) does not constitute KM, it is an important enabler. ICT can enable collaboration, especially within a geographically dispersed organisation. It plays a significant role in the capture, storage and dissemination of information and in supporting new work practices.

Lastly, the KM program need to identify the knowledge assets of the organisation, how it is being used and how it can be better exploited. A data- or information orientation must be avoided and an ideal balance between security and confidentiality requirements and knowledge sharing need to be maintained.

From the above it is clear that even though there are many challenges facing KM initiatives targeted at the organisational level in government, the benefits can be overwhelming including operational- and cost efficiencies as well as performance and delivery improvements. In the next section, we will be examining the second imperative for KM in government, namely the national imperative.

### 2.1.2 The national imperative for KM in government

While addressing performance measurement in the public sector, the National Productivity Institute (2004:13) states that if the profit motive has a parallel in the public sector, it is the impact of public sector interventions on society. Government has a pivotal role to play in developing national economies to participate competitively in the global, knowledge economy.

Growth and economic development are therefore key objectives of government and a high quality public sector need to support the development of sound economic policy. In a global economy, competition plays as an important role in the public sector as in the private and it is the responsibility of government to enable and support national
competitiveness. The OECD defines competitiveness as “the degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over time (NPI, 2004:17).

In measuring global competitiveness, the International Institute for Management Development (IMD) indicates the following performance indicators for government:

- National debt
- Government expenditure
- Fiscal policies
- State efficiency
- State involvement
- Justice
- Security

The importance of national competitiveness is reflected in the number of international surveys ranking countries according to their competitiveness, including surveys by the OECD, the World Economic Forum and the International Institute for Management Development.

In South Africa, the commitment to growth and development was indicated by the adoption of the Growth, Employment and Redistribution (GEAR) framework in 1996 which focuses on the following:

- Budget reform
- Deficit reduction
- Competitive exchange rates
- Consistent monetary policy
- Relaxation of exchange controls
- Tariff reduction
- Tax incentives to stimulate investment
- Collective bargaining system
- Expansion of trade and investment flows
- Stable and coordinated policies (NPI, 2004:26)
With the development of the knowledge economy a trend seems to be emerging where countries are polarising rather than converging in economic terms, i.e. rich countries are getting richer whereas poor countries are only getting poorer. Some economists suggest however that the growth of the knowledge economy will lead to a proliferation of material, firms and activities at all points which will eliminate market monopolies (Houghton & Sheehan, 2000:15). If one considers however that an existing knowledge base or framework contributes, or may even be essential, to the utilisation and creation of new knowledge, this phenomenon appears credible. As an OECD report notes: “Sectoral human capital formation and innovative effort can be read as a mutually reinforcing and cumulative process which can have a lasting effect on industrial performance.”

This is supported by the UK Department of Trade and Industry (1998:10) when they note that traditional economic growth theory saw progress flowing with little cost from the leaders to those lagging behind and that they could catch up by simply applying best demonstrated practice. The evidence has however proved the contrary, namely that even the economies of advanced nations are converging slowly, if at all, and that catch-up is therefore not an automatic process.

If this is indeed the case, it has a significant impact on developing economies and places pressure on governments to not only manage their own organisational knowledge assets but also the country’s national knowledge assets.

A number of national governments have realised the impact of the emerging knowledge economy and has reacted to it, as evidenced by their approach to economic policy. These countries include amongst others the United Kingdom, the United States, Canada, Denmark and Finland (DTI, 1998:2).

To ensure that a country remains competitive in the knowledge economy and to manage its national knowledge assets effectively, policy directives are required to encourage innovation, entrepreneurship, technical and scientific development and increased competitive ability. The ideal environment must be created for private enterprise to flourish and according to the UK DTI (1998:4;10) this includes:

- A stable financial and economic environment
- A supportive business and social environment that respects and fosters enterprise and are responsive to change
- Good access to markets
- Technology and available infrastructure
- Flexible and highly skilled workforce

To achieve this, government need to focus on developing specific capabilities including the development of well functioning capital markets and creating viable and competitive industry structures. The economy need to develop strong institutions with high quality human skills to ensure productive capacity. Key priorities should therefore be to develop an appropriately skilled workforce and to ensure the necessary environment and support for innovation and entrepreneurship.

At the heart of people development is firstly to ensure access to social services and amenities such as clean water and sanitation, electricity, road infrastructure and access to information- and communications technology. Subsequently, the transformation of the workforce can be supported by providing broad-based formal education, establishing incentives for both companies and individuals to engage in life-long learning and to ensure a match between labour supply and demand.

To stimulate enterprise and innovation, fundamental research should be supported by providing public funding for research and development and promoting the flow of knowledge between science and industry (Carrillo, 2002:22). To capitalise on innovation, the capacity should be created to exploit scientific- and technological expertise. Not only should there be a quick uptake of new technology, but to boost trade, exports will have to transform from primary-, or natural resource products to knowledge intensive products and services (Houghton & Sheehan, 2000:17).

In terms of creating a suitable environment for innovation, regulatory reform is essential. It has been demonstrated that productivity greatly increases with privatisation, entry liberalisation, the promotion of private governance and increased competition. In addition, foreign direct investment should be attracted. With the relaxation of trade and investment barriers, it is essential to create an attractive business environment and to provide flexible investment opportunities (NPI, 2004:22,40).

The national imperative for KM in government is founded on the belief that the knowledge economy will not only effect the success of companies in the private sector, but that it will also have far reaching effects on whole economies and
national prosperity and growth. This is clearly indicated by the increasing polarisation of economies in the knowledge economy.

For government to therefore ensure economic growth and development in such a globalised and competitive environment, it is essential that attention is given to the creation and exploitation of national knowledge assets.

If one accepts the two KM imperatives in government and therefore the validity of KM in the public sector, the question arises what the role of measurement should be and whether the measurement models used in the private sector context is applicable in the public sector. These questions will be addressed in the following section.
3 Measuring public sector knowledge management

The objectives of KM measurement in the private sector are threefold; firstly, to demonstrate the value of a company to the market and the growth in the organisational knowledge base; secondly, for the firm to assess how effective it is in managing its knowledge against stated knowledge management objectives and lastly, for the firm to assess how its KM initiatives compare to best demonstrated practice.

As was amply demonstrated before, there has been a proliferation of KM measurement models, most of which is specific to the private sector and has limited application in the public sector (de Gooijer, 2000:303).

In the previous section, two KM imperatives were identified for government, namely the organisational- and national imperatives. It is being argued that government needs to address both these perspectives when implementing Knowledge Management. As such, a measurement model will be required that cater for both these perspectives.

3.1 Overview of KM measurement models for the public sector

Although not as prolific as in the private sector, a number of models have been developed that caters for national knowledge measurement. Examples of these include the World Bank’s Knowledge Assessment Matrix, the OECD’s Science, Technology and Industry Scoreboard, the United Nations’ Economic Commission for Europe Model, the European KM Forum Assessment Model, the Economist Intelligence Unit’s e-readiness rankings, the Indices and Indicators of National Knowledge Assets proposed by Malhotra et al etc. (Malhotra, 2003:13-25). In addition, many models exists that measure national competitiveness and organisations such as the Institute of Management Development and the World Economic Forum reports on global competitiveness.
3.1.1 The Knowledge Assessment Matrix

The Knowledge Assessment Matrix (KAM) was developed by the World Bank and provides a methodology to review world development data and can be used by national economies for benchmarking purposes (Malhotra, 2003:13). The 2005 KAM consists of eighty (80) measures divided into seven areas, namely economic performance, economic incentives and institutional regime, governance, the innovation system, education and training, information infrastructure and gender equity (World Bank:2005).
Examples of the measures can be illustrated as follows:

<table>
<thead>
<tr>
<th>Performance</th>
<th>Economic Incentives</th>
<th>Governance</th>
<th>Innovation</th>
<th>Education</th>
<th>ICT</th>
<th>Gender Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>Domestic credit to private sector</td>
<td>Regulatory quality</td>
<td>FDI as % of GDP</td>
<td>Adult literacy rate</td>
<td>Telephones</td>
<td>Females in workforce</td>
</tr>
<tr>
<td>Average annual GDP growth</td>
<td>Interest rate spread</td>
<td>Government effectiveness</td>
<td>Researchers in R&amp;D</td>
<td>Tertiary enrolment</td>
<td>Mobile phones</td>
<td>Female literacy rate</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>Exports as % of GDP</td>
<td>Political stability</td>
<td>R&amp;D expenditure</td>
<td>Education spending</td>
<td>Computers</td>
<td>Female tertiary enrolment</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Trade as % of GDP</td>
<td>Control of corruption</td>
<td>Manufacturing trade as % of GDP</td>
<td>Extent of staff training</td>
<td>Internet hosts</td>
<td>Gender development index</td>
</tr>
<tr>
<td>Employment in industry</td>
<td>Government budget balance as % of GDP</td>
<td>Press freedom</td>
<td>Patent applications granted</td>
<td>Emigration of professionals</td>
<td>E-government</td>
<td>Females in parliament</td>
</tr>
<tr>
<td>Employment in services</td>
<td>Gross capital formation as % of GDP</td>
<td>Rule of law</td>
<td>Availability of venture capital</td>
<td>% Professional and technical workers</td>
<td>ICT expenditure as % of GDP</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Knowledge Assessment Matrix Measures

3.1.2 The Science, Technology and Industry Scoreboard

The Science, Technology and Industry Scoreboard is published by the Organisation for Economic Cooperation and Development (OECD) and several reports relating to the development of knowledge economies has been produced by the organisation. According to Malhotra (2003:18) the OECD interprets inputs, rather than output, as representative of a knowledge-based economy and focuses on indicators such as higher education, expenditure on R&D and investment in software.
Examples of the measures can be illustrated as follows (OECD, 2005):

<table>
<thead>
<tr>
<th>R&amp;D and innovation</th>
<th>Human resources in science and technology</th>
<th>Patents</th>
<th>ICT</th>
<th>Knowledge flows and the global enterprise</th>
<th>Knowledge impact on productive activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic R&amp;D expenditure</td>
<td>R&amp;D personnel</td>
<td>Patent intensity</td>
<td>Investment in ICT</td>
<td>International trade</td>
<td>Income and productivity levels</td>
</tr>
<tr>
<td>Business R&amp;D</td>
<td>Researchers</td>
<td>ICT related patents</td>
<td>ICT sector employment</td>
<td>Foreign direct Investment</td>
<td>Labour productivity growth</td>
</tr>
<tr>
<td>Government R&amp;D budget</td>
<td>University graduates</td>
<td>Biotechnology patents</td>
<td>Internet hosts</td>
<td>Employment of foreign affiliates</td>
<td>International trade by technology intensity</td>
</tr>
<tr>
<td>Tax treatment of R&amp;D</td>
<td>Employment of university graduates</td>
<td>Geographic concentration of patents</td>
<td>Internet subscribers</td>
<td>Contribution of multinationals to value add and productivity</td>
<td>Contributions to the manufacturing trade balance</td>
</tr>
<tr>
<td>Scientific articles</td>
<td>Workforce in science and technology</td>
<td>Foreign ownership of domestic inventions</td>
<td>Volume of electronic commerce</td>
<td>Contribution of multinationals to productivity growth</td>
<td></td>
</tr>
<tr>
<td>Venture capital</td>
<td>International mobility of the highly skilled</td>
<td>Domestic ownership of foreign inventions</td>
<td>ICT trade</td>
<td>Technological balance of payments</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: STI Scoreboard Measures

Most development models exclude human- and social capital and focuses almost exclusively on economic indicators. In addition to the STI Scoreboard, the OECD therefore developed a Social Capital Assessment Tool (SOCAT) to improve the understanding of social capital; whereas human capital deal with the individual, social capital focuses on collective action and outcomes based on cooperation,
collaboration and coordination. The OECD defines social capital as “the institutions, relationships, attitudes and values that govern interactions among people and contribute to economic and social development” (Malhotra, 2003:20).

Social capital is divided into structural- and cognitive capital as well as collective action. Structural social capital includes government mandated structures and organisations, networks and associations. Cognitive social capital refers to the more subjective elements such as generally accepted norms of behaviour, shared values and trust.
The SOCAT measures can be illustrated as follows:

<table>
<thead>
<tr>
<th>Structural social capital</th>
<th>Cognitive social capital</th>
<th>Collective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership of local associations and networks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Density of membership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Diversity of membership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Participation in decision making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust and adherence to norms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Solidarity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Trust and Cooperation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Overall trust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Extent of trust in specific transactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Extent to which assistance is received from others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Conflict resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Extent of conflict</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Conflict avoidance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Contribution to common development goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Extent of harmonious relationships</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Extent of collective action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Type of collective action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Overall assessment of collective action</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: SOCAT Measures
3.1.3 Global Competitiveness Report

The Global Competitiveness Report developed by the World Economic Forum (WEF) is an attempt to measure national competitiveness and utilises the growth competitiveness index. The index consists of three component indices, namely the technology-, public institutions- and macroeconomic environment indices each of which is in turn divided into components. The indices are compiled of both survey- and quantifiable data (WEF, 2005).

The measures of the index can be illustrated as follows:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Public Institutions</th>
<th>Macroeconomic Environment</th>
<th>Government Waste Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation</td>
<td>Technology Transfer</td>
<td>ICT</td>
<td>Contracts and Law</td>
</tr>
<tr>
<td>Relative R&amp;D spend</td>
<td>Importance of FDI in R&amp;D</td>
<td>Internet penetration in schools</td>
<td>Independent judiciary</td>
</tr>
<tr>
<td>Adoption of new technology</td>
<td>Acquisition of new technology through foreign technology licensing</td>
<td>Quality of Internet Service Providers</td>
<td>Legal protection of wealth</td>
</tr>
<tr>
<td>Technical leadership</td>
<td>Collaboration on R&amp;D</td>
<td>Priority of ICT for government</td>
<td>Organised crime</td>
</tr>
<tr>
<td>Utility patents granted</td>
<td>Tertiary enrolment</td>
<td>Successful promotion of ICT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT regulation enforced</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Growth Competitiveness Index Measures
3.1.4 National Knowledge Assets Measurement Model

This measurement model was developed by Malhotra in an attempt to adopt a broader, more holistic view of national socio-economic growth and was based to some extent on the Skandia Navigator which incorporates tangible and intangible assets.

Malhotra (2003:23) classifies national knowledge assets on a high level into human- and structural capital. Structural capital in turn, is divided into market- and organisational capital and lastly, organisational capital is divided into process- and renewal and development capital.

This classification can be represented as follows:

Whereas financial indicators provide a view of an entity’s history and past performance, process- and market capital are indicators of the present state.
Renewal- and development capital in turn indicates to which extent the nation is prepared for the future.

The measures associated with each of the assets indicated above, can be represented as follows (Malhotra, 2003:25):

<table>
<thead>
<tr>
<th>Human Capital</th>
<th>Structural Capital</th>
<th>Organisational Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market Capital</td>
<td>Process Capital</td>
</tr>
<tr>
<td>Organisational training and development per capita</td>
<td>Number of foreign languages spoken</td>
<td>Computer literacy rates</td>
</tr>
<tr>
<td>Training participation rates</td>
<td>Volume of tourist traffic</td>
<td>Digital storage per Capita</td>
</tr>
<tr>
<td>Quality of education and standardised testing results</td>
<td>International awards</td>
<td>Paved roads per capita</td>
</tr>
<tr>
<td>Instruction time and length of school year</td>
<td>Immigrant inflow and outflow</td>
<td>Entrepreneurship and number of business start-ups</td>
</tr>
<tr>
<td>Ratio of student population at each level of completion</td>
<td>Students and scholarships in foreign schools</td>
<td>Venture capital funding</td>
</tr>
<tr>
<td></td>
<td>International exhibitions and conventions hosted</td>
<td>Availability and extent of software usage</td>
</tr>
</tbody>
</table>

Table 9: National Knowledge Assets Measures
Most of the measurement models discussed have been developed to compare various countries with regards to competitiveness and provides a good indication of the kind of measures that should be considered when attempting to evaluate a country’s development in the knowledge-based economy. The four crucial areas that should be included in such a measurement model are the following:

- Incentives for the use of existing and new knowledge
- An educated and skilled population
- Robust information- and structural infrastructure
- An innovation system of private firms, universities and government sponsored R&D

All the measurement models discussed this far however, is only applicable to either the organisational- or the national KM imperatives in the public sector. What will be attempted in the following section is to develop a framework for an integrated measurement model which will incorporate both these aspects of KM in government. When developing a measurement model it is essential to ensure the validity of the model and the next section will therefore start with reviewing a number of design factors that should be taken into account.
3.2 Developing a KM measurement model for government

3.2.1 Valid measurement

The value of a measurement model resides in its ability to determine as effectively and accurately as possible what is required. The validity of a measurement instrument is therefore defined as “the extent to which differences in scores...reflect true differences...on the characteristic we seek to measure, rather than constant or random errors” (Malhotra, 2003:16).

To ensure the usefulness of a measurement model, cognisance should therefore be taken of a number of design factors that can influence the validity of the proposed model.

The first factor to be taken into account is the objective or focus area of the measurement model. The central problem must be understood as well as the context in which the measurement model will be used. The objectives and all related concepts need to be clearly defined; for example, if the requirement is to measure the growth of intangible assets, it should be determined whether the quantity or quality of the growth is at issue in addition to defining what intangible assets are and identifying the intangible assets in question (Andriessen, 2004:125).

Secondly, care must be taken to ensure that the chosen indicators indeed measure what should be measured (Andriessen, 2004:116). In this regard, two aspects of validity need to be taken into account, namely construct validity and predictive validity. The first point of contention is using proxies as indicators of a desired outcome. An example would be to measure ICT investment as an indicator of the effective utilisation of structural resources. As ICT investment cannot reflect utilisation, the measure would therefore lack construct validity. Predictive validity comes into play when making assumptions about cause and effect relationships and is determined by how well the measure predicts an outcome. Malhotra (2003:18) warns against interpreting inputs rather than outputs. He cites the example of the OECD which equates spending on aspects such as education and R&D with knowledge creation. Such investment however only creates the potential for knowledge creation and would therefore have low construct validity.
The third aspect which must be considered is instances where multiple constructs and variables are used that overlap and interact with each other. If the same variance is captured multiple times it may inflate the result. It is therefore necessary to ensure that similar or identical measures across multiple constructs are minimised and that relationships between measures are clarified (Malhotra, 2003:17).

The fourth aspect refers to the use of different measurement units which can be problematic and should be carefully considered and explained. Malhotra (2003:17) for example raises a particular concern regarding per capita measures in national knowledge assessments. He quite rightly points out that these measures can provide a false view of development, particularly in countries with a significant variance between rich and poor.

Lastly, a distinction needs to be made between valuation- and measurement methods. The objective of a valuation model is to determine value and should therefore include yardsticks according to which value can be gauged. Without providing values that can act as a yardstick, the model is simply a measurement model (Andriessen, 2004:108).

When constructing a measurement model certain design steps should be considered, the first of which is to define the domain of application including the central problem and how the model will facilitate the stated objectives. Secondly, the requirements should be defined and Andriessen (2004:125) identifies four types of requirements, namely:

- Limiting conditions: These include environmental requirements or limitations
- Functional requirements: Refer to the results that need to be achieved and follows on from the problem definition
- Operational requirements: Refers to ease of use as indicated by the user group
- Design limitations: These set the boundaries for finding solutions to the stated problem

The third consideration is to identify appropriate measures. As indicated before, an over reliance on input based measures should be avoided and Malhotra (2003:28-29) indicate that a distinction should be made between input-, output-, performance- and process measures. These are briefly described as follows:
• Input measures: Inputs refer to facilitators that may be utilised in e.g. knowledge creation. Investment in education, training programs, R&D and technology are examples of inputs.

• Output measures: The effective utilisation of funds, technology and expertise is expected to result in tangible or intangible outputs and examples of these measures include start-up capital obtained, relationships established and certifications or awards received.

• Process measures: These indicators measure the utilisation of inputs, provide an indirect indication of knowledge flows and highlights problems with regards to the use and usability of resources. Examples of these measures include e.g. the amount of participation in communities of practice and the quality of the contributions made.

• Performance measures: These refer to the impact of inputs, processes and outputs and determine whether they are yielding valuable results. Possible measures include new ventures, quality of life improvements and increased income.

The fourth step is to identify yardsticks which define the ideal state of each measure to ensure that the final results can be easily interpreted and benchmarked against best demonstrated practice or international standards. Once this has been completed, the design phase can commence during which the new method is developed. Lastly, the method is evaluated against the requirements and this process may lead to changes to the method or even to the requirements (Probst, Raub & Romhardt:1999: 248-249; Andriessen, 2004:125-127).

3.2.2 The integrated KM measurement framework for the public sector

The validity of Knowledge Management in the public sector has been indicated by the identification of two KM imperatives in government, namely the organisational- and national imperatives. Though various measurement models exist that may cater for each of these imperatives individually, it will be attempted to develop an integrated framework that will provide a holistic view of intellectual capital in the public sector. The objective is not to provide a final, completed measurement model but rather to provide an indication of how such an integrated model may be developed. The suggested measures therefore do not indicate units of measurement
or yardsticks. When such a model is developed for application, the specific context needs to inform the objectives, factors, choice of measures, units of measurement and yardsticks. All validity aspects should then be taken into consideration to ensure the relevancy of the model to the specific situation and questions to be addressed.

The first step in the development of the integrated framework was to identify the objectives for each of the two imperatives. The following six objectives were therefore identified for the organisational- and national KM imperatives respectively:

- **Organisational**
  - Improved service delivery
  - Effective administration
  - Trusted

- **National**
  - Competitive and prosperous
  - Just and orderly society
  - Quality of life
  - Low reputational risk

Subsequently, the factors and intellectual capital categories were derived from the objectives which in turn provided an indication of the choice of measures. The following diagram represents the objectives and selected factors for each of the KM imperatives:

![Figure 6: Framework for the Integrated Model]
The objectives, factors and intellectual capital categories therefore form the framework for the development of the actual measurement model.

The intellectual capital categories identified for the integrated model mostly spans both the organisational- and national perspectives. According to this classification, intellectual capital consists of human-, structural- and environmental capital where human- and structural capital occur within both the organisational- and national domains and environmental capital is limited to the national domain.

Human capital refers to the knowledge, skills, expertise and ability of a nation and government departments or agencies respectively. Structural capital refers to enabling or supporting infrastructure and on the organisational level refers to policies and procedures, technology etc. while on the national level it may include road infrastructure, transportation, basic services, telecommunication etc. Structural capital in turn consists of relationship- and organisational capital. Organisational capital consists of innovation- and process capital. Innovation capital includes both research and development on a national level as well as innovative ability on an organisational level. Process capital is limited to the organisational domain and refers to the processes that enable both the creation and sharing of knowledge as well as efficient and effective administration and service delivery to citizens.

Environmental capital is limited to the national domain and consists of market- and institutional capital. Market capital refers to the competitive position of the country whereas institutional capital refers to the institutional environment in which companies have to function and include aspects such as national security and law enforcement.
The following diagram represents both the organisational- and national level intellectual capital structure being proposed:

![Figure 7: Integrated model intellectual capital classification](image-url)
The following table provides an indication of the possible measures per factor and intellectual capital category:

<table>
<thead>
<tr>
<th>Organisational Imperative</th>
<th>National Imperative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Capital</strong></td>
<td><strong>Human Capital</strong></td>
</tr>
<tr>
<td>Staff level of education</td>
<td>Expertise</td>
</tr>
<tr>
<td>Operational knowledge</td>
<td>Development</td>
</tr>
<tr>
<td>Training budget</td>
<td></td>
</tr>
<tr>
<td>Job training days</td>
<td></td>
</tr>
<tr>
<td>Courses attended</td>
<td>Retention</td>
</tr>
<tr>
<td>Annual staff turnover</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Structural Capital</strong></th>
<th><strong>Structural Capital</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Capital</strong></td>
<td><strong>Human Capital</strong></td>
</tr>
<tr>
<td>Level of automation</td>
<td>ICT</td>
</tr>
<tr>
<td>E-government</td>
<td></td>
</tr>
<tr>
<td>Number of computers</td>
<td>Investment in ICT</td>
</tr>
<tr>
<td>Increase in citizen</td>
<td>Support</td>
</tr>
<tr>
<td>touch points</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Structural Capital</strong></th>
<th><strong>Structural Capital</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Imperative</strong></td>
<td><strong>National Imperative</strong></td>
</tr>
<tr>
<td>Staff level of education</td>
<td>Expertise</td>
</tr>
<tr>
<td>Operational knowledge</td>
<td>Development</td>
</tr>
<tr>
<td>Training budget</td>
<td>Education</td>
</tr>
<tr>
<td>Job training days</td>
<td>Expertise utilisation and retention</td>
</tr>
<tr>
<td>Courses attended</td>
<td>Retention</td>
</tr>
<tr>
<td>Annual staff turnover</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Structural Capital</strong></th>
<th><strong>Structural Capital</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Capital</strong></td>
<td><strong>Human Capital</strong></td>
</tr>
<tr>
<td>Level of automation</td>
<td>ICT</td>
</tr>
<tr>
<td>E-government</td>
<td></td>
</tr>
<tr>
<td>Number of computers</td>
<td>Investment in ICT</td>
</tr>
<tr>
<td>Increase in citizen</td>
<td>Support</td>
</tr>
<tr>
<td>touch points</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational Imperative</td>
<td>National Imperative</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Relationship Capital</strong></td>
<td><strong>Relationship Capital</strong></td>
</tr>
<tr>
<td>Customer satisfaction rates</td>
<td>Positive perception of government by citizens</td>
</tr>
<tr>
<td>Corruption decrease</td>
<td>Trust worthiness</td>
</tr>
<tr>
<td><strong>Innovation Capital</strong></td>
<td><strong>Innovation Capital</strong></td>
</tr>
<tr>
<td>Number of hours of IT development</td>
<td>Technical innovation</td>
</tr>
<tr>
<td>Number of new products and services</td>
<td>Product innovation</td>
</tr>
<tr>
<td>Research budget</td>
<td>Investment</td>
</tr>
<tr>
<td><strong>Process Capital</strong></td>
<td><strong>Market Capital</strong></td>
</tr>
<tr>
<td>Average response/handling times</td>
<td>Efficiency</td>
</tr>
<tr>
<td>Number of customer transactions</td>
<td>Competitiveness</td>
</tr>
<tr>
<td>Reengineered processes</td>
<td>Development</td>
</tr>
<tr>
<td><strong>Fiscal policy</strong></td>
<td><strong>Fiscal policy</strong></td>
</tr>
<tr>
<td>Productivity levels</td>
<td>Labour market</td>
</tr>
<tr>
<td>Government investment</td>
<td>Unemployment</td>
</tr>
<tr>
<td>New business registrations per industry segment</td>
<td>Inflation</td>
</tr>
<tr>
<td>Contribution per industry segment to GDP</td>
<td>Industrial action</td>
</tr>
<tr>
<td>Trade balances in knowledge based industries</td>
<td>Foreign investment</td>
</tr>
<tr>
<td>Budget deficit</td>
<td>Central government foreign debt</td>
</tr>
<tr>
<td>Revenue target reached</td>
<td>Government spending on R&amp;D</td>
</tr>
<tr>
<td>Private sector spending on R&amp;D</td>
<td>Trademark applications</td>
</tr>
<tr>
<td>Patent applications</td>
<td>R&amp;D per industry segment</td>
</tr>
<tr>
<td>Organisational Imperative</td>
<td>National Imperative</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>Institutional Capital</td>
</tr>
<tr>
<td>Security</td>
<td>Crime rate</td>
</tr>
<tr>
<td>Law enforcement</td>
<td>Country risk rating</td>
</tr>
<tr>
<td></td>
<td>Social and political unrest</td>
</tr>
<tr>
<td></td>
<td>New laws passed</td>
</tr>
<tr>
<td></td>
<td>Judiciary independence</td>
</tr>
<tr>
<td></td>
<td>Cases brought to trial</td>
</tr>
</tbody>
</table>

Table 10: Integrated Model Measures

Taking into consideration the dual imperative for public sector KM which has been identified, an integrated measurement framework has been proposed. The objective of the model as demonstrated above is twofold, firstly to demonstrate the dualistic and yet complimentary nature of the organisational- and national imperatives. The intellectual capital categories identified for each of the imperatives are therefore largely similar, but the indicators differ significantly. Secondly, it provides an indication of how such a measurement model for government may be developed. It should therefore be customised based on the particular environment and specific objectives and requirements.
Conclusion

The 1990’s has seen the development of what has commonly been referred to as the knowledge economy. This is evidenced mainly by two phenomena, namely the disparity between company market valuation and capital assets and secondly, the growing knowledge intensity of economic activity.

The knowledge economy has had a significant impact on the way that companies do business. It is generally recognised that intangible assets have replaced traditional resources as the basis of competition between firms and both the management and measurement of intangibles have therefore received much attention.

In parallel with the changes in economic system, management theory also underwent telling changes. In the 1960’s for example, management theory was focussed on external industry factors as the determining factor in competitive advantage and practically ignored the internal aspects of the organisation in determining company strategy. After the 1980’s however, this theory was challenged by the resource-based view of the firm (RBV) which postulated that competitive advantage is actually due to differences in internal resources and competencies. RBV led to the development of competence-based strategies and ultimately to the knowledge-based view of the firm.

Against this backdrop the strong ties between Knowledge Management and the private sector becomes apparent and the KM value proposition is therefore founded on the profitability and competitive imperatives of business. In light of this the question arises whether KM has any relevancy in the public sector and similarly whether the measurement of knowledge resources in this environment makes any sense.

The migration of management theory from the private- to the public sector has been evidenced by the adoption of total quality management, reengineering exercises and the implementation of balanced scorecards etc. in government. Similarly, knowledge management has been receiving a fair amount of attention both in practice as well as in management- and knowledge management literature. The concern is however that knowledge management application in government is assumed to be largely similar to that of the private sector and the relevancy of KM is therefore taken for granted. Taking into consideration the differences between private- and public sector
objectives and the government mandate of social responsibility, this assumption has to be questioned however.

Wiig (2000:2) identifies four main objectives of government, namely:

- Effective services and functions to implement the public agenda
- A stable, just, orderly and secure society
- Acceptable level of quality of life, and
- A prosperous society.

From these objectives, it is apparent that government has a responsibility to ensure both internal, organisational efficiency in the delivery of services and the creation of a broader competitive economic environment that will support societal prosperity and growth. These two areas of responsibility give rise to what is referred to here as the organisational- and national knowledge management imperatives.

With regards to the organisational knowledge management imperative in the public sector it is indicated that the traditional value proposition of KM holds true even though government is faced with some unique challenges to successful KM implementation. Some of these drivers include operational- and cost efficiency, performance management and improved service delivery in addition to some government specific drivers such as increased accountability to citizens, freedom of information legislation and national security.

With regards to the national knowledge management imperative, it is indicated that government has the additional responsibility of ensuring national competitiveness in the new knowledge economy. Knowledge management therefore has the additional value proposition in the public sector of contributing to the identification and development of knowledge assets on a national level.

This role of government cannot be over emphasised as the knowledge economy has clearly shown that economies are polarising rather than converging and that the gap between developed- and developing countries are increasing exponentially rather than diminishing. Policy directives are therefore required to encourage innovation, entrepreneurship and technical- and scientific development on a national level to create the necessary environment for economic growth.
Having demonstrated the imperative for knowledge management in the public sector, the question is posed how relevant existing KM valuation- and measurement models are in the government context. Clearly, the organisational KM imperative does lend itself to some extent to existing models such as the Intangible Assets Monitor. These models are however inadequate with regards to the national KM imperative and models such as the Knowledge Assessment Matrix developed by the World Bank and various international competitiveness reports provide an indication of how KM measurement on a national level can be approached.

The gap that has however been identified is the incorporation of both the organisational- and national knowledge management foci in one measurement methodology. It has therefore been attempted to develop an integrated framework for KM measurement in the public sector. This framework is based on both the organisational- and national KM objectives and incorporates the intellectual capital categories of both.

In conclusion, it has been demonstrated that knowledge management has a clear value proposition for the public sector and that a KM imperative indeed exists to ensure successful delivery of the government mandate. In light of this, the need also exist for knowledge management measurement in the public sector. The integrated framework that was proposed by no means pretend to be a fully fledged measurement model but attempts to provide a methodology that may be further developed and customised based on specific objectives and requirements within the public sector.


Leong-Hong, B. 2001. Critical success factors in implementing knowledge management. In *Building knowledge management environments for*


