<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5.3 Employee development and learning</td>
<td>46</td>
</tr>
<tr>
<td>4.5.4 Employee recruitment</td>
<td>48</td>
</tr>
<tr>
<td>4.5.5 Employee retention</td>
<td>48</td>
</tr>
<tr>
<td>4.5.6 Appropriate reward systems</td>
<td>49</td>
</tr>
<tr>
<td>4.6 CONTINUOUS IMPROVEMENT</td>
<td>52</td>
</tr>
<tr>
<td>4.6.1 KM performance measurement</td>
<td>52</td>
</tr>
<tr>
<td>4.6.2 Benchmarking</td>
<td>55</td>
</tr>
<tr>
<td>4.7 KM PROCESSES</td>
<td>57</td>
</tr>
<tr>
<td>4.7.1 Process-based view to KM</td>
<td>57</td>
</tr>
<tr>
<td>4.7.2 Linking KM activities to business processes</td>
<td>58</td>
</tr>
<tr>
<td>4.8 KNOWLEDGE STRUCTURE AND CONTENT</td>
<td>59</td>
</tr>
<tr>
<td>4.8.1 Appropriate knowledge map or structure</td>
<td>59</td>
</tr>
<tr>
<td>4.8.2 Current and relevant content</td>
<td>61</td>
</tr>
<tr>
<td>4.9 TECHNICAL INFRASTRUCTURE</td>
<td>62</td>
</tr>
<tr>
<td>4.9.1 Building effective ICT infrastructure</td>
<td>62</td>
</tr>
<tr>
<td>4.9.2 Integration with current information systems</td>
<td>65</td>
</tr>
<tr>
<td>4.9.3 Effective use of software tools</td>
<td>65</td>
</tr>
<tr>
<td>5 Summary</td>
<td>68</td>
</tr>
<tr>
<td>6 References</td>
<td>70</td>
</tr>
</tbody>
</table>
1 Executive summary

Knowledge Management (KM) project implementation is a socio-technical challenge, which requires a fundamentally different outlook from previous projects of technologically driven innovation and will certainly depend on a holistic perspective where the organisation as a total system is considered. Understanding the implementation process through a holistic picture, will prevent any unpleasant surprises and will ensure and guide the change process to be embedded-in in a painless fashion.

This report examines and provides a detailed analysis of KM with respect to its implementation in the organisations. The study investigates market trends, levels of its current practice, levels of successes and failures and the factors associated with the implementation of the KM project. Moreover, the study presents a proposed model of successful implementation of KM project. In particular, the model helps by ensuring that the right focus is done in the right way, the holistic perspective means socio-technical considerations must be born in mind, and the expected benefits are evaluated and tracked through creating seamlessness and solid integration.

2 Introduction

Over the past decades, the world has been experiencing significant changes in which the need to acquire, utilise and share knowledge has become increasingly essential. While products and services continue to be the principal sources of wealth and remain the leading sectors in global markets, a new source of wealth creation is emerging, namely, the knowledge sector. Knowledge is rapidly becoming a major factor in the creation of wealth through the exploitation of intellectual capital or intangible assets, on a global scale.

The investigation of factors potentially affecting the success of KM implementation is of great importance, because the worldwide spending on KM services alone is forecast to increase from $4.6 billion in 2002 to $12.7 billion by 2005 according to the IDC research group. Moreover, many of the KM programmes failed (or exerted no significant impact on the adopting organisations) worldwide due to inability to consider many factors that contribute to the success of KM project implementation. A number of authors and practitioners have
established many studies regarding the KM implementation. Nevertheless, most of these studies have not covered a holistic approach for the KM implementation.

This report provides a review of the relevant literature from numerous fields of study associated with the essential issues of KM project implementation, and recognises the value of intangible assets. These cover the factors that affect a KM implementation based on a comprehensive analysis of KM literature combining with research studies and organisational experiences. Furthermore it proposes a holistic model for KM project implementation based on an extensive review of the factors and essential elements that contribute to success of KM project implementation

3 Critical Success Factors (CSFs) in KM implementation

A broad range of factors that can influence the success of KM implementation has been mentioned in the literature. For example, much has been stated about culture, information technology (IT) and leadership as important considerations for its accomplishment. An appropriate set of Critical Success Factors (CSFs) will help organisations to keep in mind the important issues that should be dealt with when designing and implementing a KM initiative. However, no holistic, systematic and integrative work exists on characterising a collective set of CSFs for implementing KM (Alsadhan et al., 2006).

3.1 What is a CSF?

CSFs can be defined as “areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation” (Rockart, 1979, p.85). Saraph et al. (1989) viewed them as those critical areas of managerial planning and action that must be practised in order to achieve effectiveness. In a more recent study, CSFs are described as “being necessary and sufficient for success: each factor is necessary, and the set of factors are sufficient” (Williams and Ramaprasad, 1996). According to Williams and Ramaprasad (1996), an individual factor may be identified as critical because it is frequently associated or highly correlated with success.
In terms of KM, they can be viewed as those activities and practices that should be addressed in order to ensure its successful implementation. These practices would either need to be nurtured if they already existed or be developed if they were still not in place.

### 3.2 Previous studies in KM implementation CSFs

Out of a review of the academic and practitioner literature regarding CSFs for KM implementation, the researcher found fifteen relevant studies. They are: (Davenport et al., 1998; Trussler, 1998; Liebowitz, 1999; Holsapple and Joshi, 2000; Jarrar and Zairi, 2000; Skyrme and Amidon, 2000; Soliman and Spooner, 2000; Armbrecht et al., 2001; Ryan and Prybutok, 2001; Goh, 2002; Alazmi and Zairi, 2003; Chourides et al., 2003; Egbu, 2004; Hung et al., 2005; Wong and Aspinwall, 2005). These studies will now be reviewed and their possible weaknesses highlighted.

Davenport et al. (1998) conducted an exploratory study on 31 KM projects in 24 companies, one of the aims being to determine the factors associated with their effectiveness. Eighteen projects were determined to be successful, five were considered failures, and eight were too new to be rated. Eight factors were identified that were common in successful KM projects. These factors are: senior management support; clearly communicated KMS purpose/goals; linkages to economic performance; multiple channels for knowledge transfer; motivational incentives for KM users; a knowledge friendly culture; a solid technical and organisational infrastructure; and a standard, flexible knowledge structure. However, since this was an exploratory study, it was agreed by Davenport et al. (1998) that linking the identified factors to the success of KM should be viewed as hypothesised, not proven. Moreover, factors such as KM measurements, employee involvement, trust, and learning and training were not covered.

In another study, Trussler (1998) has identified the following to be CSFs in knowledge sharing: leadership and senior management commitment; culture that supports knowledge sharing; creating incentives to contribute; training and learning; technical infrastructure; and metrics for contribution and usage. This study was not empirical and based only on lessons learned. Moreover, it did not cover all factors such as employee involvement and empowerment. Furthermore, it covered only the knowledge sharing or transfer stage.
Liebowitz (1999) proposed seven key ingredients in order to make KM successful in organisations. He suggested the need for a KM strategy with support from senior leadership, a chief knowledge officer (CKO) or equivalent, a KM infrastructure, knowledge ontologies and repositories, KM systems and tools, incentives to encourage knowledge sharing and a supportive culture. Specifically, important lessons learnt from firms who were early adopters of KM were used to support his propositions. Furthermore, it did not cover all factors such as employee empowerment and KM measurement.

Holsapple and Joshi (2000) investigated factors that influenced the management of knowledge in organisations through the use of a Delphi panel consisting of 31 recognized KM researchers and practitioners. They proposed three major classes of influences (managerial, resource and environmental), with different factors in each. Managerial influences comprised four main factors: coordination, control, measurement and leadership/top management support; resource influences consisted of: knowledge, human, material and financial resources; whereas environmental influences included: competition, markets, time pressure, governmental and economic climates, etc. They found leadership and top management support to be crucial. Resource influences such as having sufficient financial support, skill level of employees, and identified knowledge sources are also important. However, there was a lack of detailed inclusion of technology and culture as critical factors. For example, culture was not explicitly presented but was only included as a sub-concept under the knowledge resource factor. In the researcher’s opinion, culture is a very important consideration for KM and it should be represented as a factor, rather than as a sub-element of another. Other factors were also perceived to be missing such as knowledge infrastructure, communication, training, education, organisational planning, strategy setting, and reward issues.

Jarrar and Zairi (2000) conducted a global survey aimed at identifying the CSFs for the “effective internal transfer of best practices”. Overall, 227 organisations took part in the study and they came from 32 different countries. They identified the following CSFs: employee involvement, training, employee’s project ownership, and open communications. This study was limited in scope. It covered only the internal transfer of best practices. Moreover, hard factors and other important soft factors, such as top management support and leadership were not covered.
Based on the insights gleaned from the study of practices and experiences of leading companies in the USA and Europe, Skyrme and Amidon (2000) highlighted seven CSFs. These include a strong link to a business imperative, a compelling vision and architecture, knowledge leadership, a knowledge creating and sharing culture, continuous learning, a well-developed technology infrastructure and systematic organisational knowledge processes. However, factors such as KM measurements, top management support, and learning and training are not covered.

Soliman and Spooner (2000) looked at KM from an HRM perspective and indicated that there are eight CSFs in KM implementation, namely:

1. Alignment of KM with business directions
2. Identification of KM benefits
3. Choosing the appropriate KM programme
4. Implementing a know-how strategy
5. Creating supportive environments
6. Use of enabling technologies
7. Creating the KM team
8. Creating KM leadership

However, this study was based on lessons learned and experiences from leading firms and was not tested empirically. Moreover, factors such as KM measurements, top management support, and learning and training are not covered.

A survey study based on a questionnaire method was conducted by Rayn and Prybutok (2001) targeted at IT executives in USA firms. It aimed at specifying the CSFs in KM technologies adoption. They classified the CSFs into three main groups: organisational factors (such as organisational structure), environmental factors (such as market competition), and technological factors (such as ease of use and meeting user needs). They found that the organisational and technological factors are more important that the environmental ones. While this study was empirical, it did not cover other countries beside the USA. Moreover, it focused only on the technology aspects of KM. Furthermore, factors such as KM measurements, HRM, and learning and training were not covered.

Armbrecht et al. (2001) conducted a qualitative study on 19 leading USA, Canada, Europe, and South Africa companies (R&D Department) aimed at determining the factors for
successful innovation. They found the following factors: instilling goals/strategies; accessing tacit knowledge; providing search tools; promoting creativity; capturing new learning and building a supportive culture. This study was concentrating on the knowledge creation process and did not consider important factors such as knowledge structure and top management support.

Goh (2002) specified the CSFs in knowledge transfer. These factors are: technology; organisational culture; leadership practices and behaviours of senior managers; support structures (flat, rewards system, time); knowledge recipients (absorptive and retentive capacity) and consideration of knowledge types. This study was not empirical and was based only on lessons learned and anecdotes. Moreover, factors such as KM measurements and HRM were not mentioned. Furthermore, it covered only the knowledge transfer process.

Alazmi and Zairi (2003) have applied a triangulation approach combining qualitative and quantitative methods to study the CSFs in KM implementation at organisations in Kuwait and UK public sectors. They classified the CSFs into four main categories: top management commitment (e.g. knowledge structure, and appointing CKO), change management (e.g. culture and training/learning), KM processes (creating and sharing knowledge) and technology (e.g. network, communication). This study was limited in scope, in which it covered only the public sectors of two countries. Moreover, important factors such as top management support, HRM and KM measurements were not covered.

Various CSFs for successful KM implementation were identified by Chourides et al. (2003). They classified them into five organisational functional areas: strategy, human resource management (HRM), IT, quality and marketing. Their work was built upon an earlier questionnaire survey of the financial times stock exchange (FTSE) 100 companies as well as a review of existing literature to identify key practices and factors for adopting KM. The way in which their critical factors are presented are like “a list of things to do” rather than a set of CSFs. Besides this, certain critical factors such as “improve time to market skills” and “improve organisation velocity to respond to customer needs” are less appropriate. It can be argued that these are the things that organisations should do to improve their efficiency and customer satisfaction. They can be interpreted as the objectives or purposes of KM, not those that are vital for making KM a success.
Egbu (2004) constructed a quantitative study based on a postal questionnaire to UK construction companies (40 companies have participated) to determine the innovation success factors. He specified seven CSFs to successful innovations, namely: having a vision and an innovation strategy, an innovation supporting culture (including people issues, performance management, reward, risk management) and having an innovation champion, the ability to manage organizational knowledge (tacit and explicit) and build knowledge enhancing approaches, systems and technology, integrating the person and the team around the product and service. This study has concentrated on the innovation or knowledge creation process (or stage) and may not be applied to other stages. Moreover, it was carried out only on the UK and covered only construction companies and that restricts the generalisation of its results to other countries or industries.

Hung et al. (2005) carried out a survey study on 98 Taiwan pharmaceutical companies to assess the CSFs in adopting KM systems. They specified seven factors to be critical, namely: a benchmarking strategy and knowledge structure; organisational culture; employee involvement and training; leadership and the commitment of senior management; a learning environment and resource control; training and teamwork; and IT. This study was limited in scope, since it covered only the pharmaceutical industry in one country. Moreover, factors in HRM such as employee retention and empowerment, and KM measurement factor were not included.

A quantitative approach based on a questionnaire method was conducted by Wong and Aspinwall (2005) on SMEs of different sectors in UK, aiming at determining the CSFs in KM implementation. They specified the following eleven CSFs: management leadership and support; culture; strategy and purpose; resources; processes and activities; training and education; HRM; motivational aids; IT; organisational infrastructure; and measurement. However, that study was limited in scope, since it explored only the SMEs organisations in one country. Although the specified factors in this study are eminently sensible, it is believed that the success of KM is dependent on more aspects. A comprehensive set of factors is needed to give a more complete view of those that are necessary. Table 1 provides a comparative summary of some of the main issues of these studies.
## Table 1 Summary of literature review identifying critical factors influencing KM implementation

<table>
<thead>
<tr>
<th>Reference</th>
<th>Factors</th>
<th>Sector</th>
<th>Stage</th>
<th>Methodology</th>
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<tbody>
<tr>
<td>Davenport et al. (1998)</td>
<td>1. A knowledge-oriented culture</td>
<td>Large companies of different sectors in USA and Europe</td>
<td>All</td>
<td>Qualitative (case study)</td>
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<tr>
<td></td>
<td>2. Technical and organisational infrastructure</td>
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<td></td>
<td>3. Senior management support</td>
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<td></td>
<td>4. A link to economics or industry value</td>
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<td></td>
<td>5. Clarity of purpose and language</td>
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<td></td>
<td>6. Nontrivial motivational aids</td>
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<td></td>
<td>7. Knowledge structure</td>
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<td></td>
<td>8. Multiple channels for knowledge transfer</td>
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<tr>
<td>Trussler (1998)</td>
<td>1. Leadership and senior management commitment</td>
<td>Knowledge Sharing</td>
<td>All</td>
<td>Not empirical (Based on lessons learned and anecdotes )</td>
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<tr>
<td></td>
<td>2. Culture that supports knowledge sharing</td>
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<td></td>
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<td></td>
<td>3. Creating incentives to contribute</td>
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<td></td>
<td>4. Training and learning</td>
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<td></td>
<td>5. Technical infrastructure</td>
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<td></td>
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<tr>
<td></td>
<td>6. Metrics for contribution &amp; usage</td>
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<tr>
<td>Liebowitz (1999)</td>
<td>1. A KM Strategy with support from senior leadership</td>
<td>All</td>
<td>All</td>
<td>Not empirical (Based on lessons learned and anecdotes )</td>
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<tr>
<td></td>
<td>2. Need a CKO or equivalent</td>
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<td></td>
<td>3. A KM Infrastructure</td>
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<td></td>
<td>4. Need knowledge ontologies and knowledge repositories</td>
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<td></td>
<td>5. KM systems and tools</td>
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<td></td>
<td>6. Need incentives to encourage knowledge sharing</td>
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<td></td>
<td>7. Building a supportive culture</td>
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<tr>
<td>Holsapple and Joshi (2000)</td>
<td>Factors organised into 3 categories:</td>
<td>31 KM experts, researchers &amp; practitioner</td>
<td>All</td>
<td>Quantitative (Survey) (Delphi process)</td>
</tr>
<tr>
<td></td>
<td>1. Managerial influences</td>
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<td></td>
<td>2. Resource influences</td>
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<tr>
<td></td>
<td>3. Environmental influences</td>
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<td></td>
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<tr>
<td>Jarrar and Zairi (2000)</td>
<td>1. Involvements of all employees</td>
<td>Global, 227 firms from 32 countries</td>
<td>Internal</td>
<td>Quantitative (Survey)</td>
</tr>
<tr>
<td></td>
<td>2. Training</td>
<td></td>
<td>Transfer of best practices</td>
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<td></td>
<td>3. Ownership</td>
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<td></td>
<td>4. Open communication</td>
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<tr>
<td>Rayn and Prybutok (2001)</td>
<td>Factors classified into three main groups:</td>
<td>IT executive in USA firms</td>
<td>KM Technology Adoption</td>
<td>Quantitative (Survey)</td>
</tr>
<tr>
<td></td>
<td>1. Organisational factors</td>
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<td></td>
<td>2. Environmental factors</td>
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<tr>
<td></td>
<td>3. Technological factors</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Skyrme and Amidon (2000)</td>
<td>1. Link to a business imperative</td>
<td>Companies from different sectors in</td>
<td>All</td>
<td>Qualitative (case study)</td>
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<tr>
<td></td>
<td>2. Compelling vision/architecture</td>
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<td></td>
<td>3. Knowledge leadership</td>
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<td></td>
<td>4. Having a knowledge-creating and</td>
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# Knowledge Management Implementation Report

<table>
<thead>
<tr>
<th>Reference</th>
<th>Factors</th>
<th>Sector</th>
<th>Stage</th>
<th>Methodology</th>
</tr>
</thead>
</table>
| Soliman and Spooner (2000) | 1. Alignment of KM with business directions  
2. Identification of KM benefits  
3. Choosing the appropriate KM programme  
4. Implementing a know-how strategy  
5. Creating supportive environments  
6. Use of enabling technologies  
7. Creating the KM team  
8. Creating KM leadership | USA and Europe | All | Not empirical (Based on HRM perspective) |
| Armbrecht et al. (2001) | 1. Instil goals/strategies  
2. Access tacit knowledge  
3. Provide search tools  
4. Promote creativity  
5. Capture new learning  
6. Build a supportive culture | 19 leading USA, Canada, Europe, and South Africa firms (R&D Dep.) | Innovation Knowledge Creation | Qualitative (case study) |
| Goh (2002) | 1. Technology  
2. Organisational culture  
3. Leadership practices and behaviours of senior managers  
4. Support structures (flat, rewards system, time)  
5. Knowledge recipients (absorptive and retentive capacity)  
6. Considering types of knowledge | Knowledge Transfer | Knowledge Transfer | Not empirical (Based on lessons learned and anecdotes) |
| Alazmi and Zairi (2003) | Classified into 4 main categories:  
1. Top management commitment  
2. Change management  
3. KM processes  
4. Technology | Kuwait and UK public sectors | IT-Based | Triangulation |
| Chourides et al. (2003) | Classified into 5 main categories:  
1. Strategy  
2. HRM  
3. Information Technology  
4. TQM  
5. Marketing | FTSE 100 | All | Quantitative (Survey) |
| Egbu (2004) | 1. Having a vision and innovation strategy  
2. An innovation supporting culture  
3. Having an innovation champion  
4. The ability to manage organisational knowledge | 40 UK Construction | Innovation Knowledge Creation | Quantitative (Survey) |
3.3 Critique of the previous studies

The proposed success factors in the literature are fragmented and diversified, depending on the researchers’ background and interests. In addition, little attempt has been made to integrate all the success factors proposed by the KM researchers. As such, there is an absence of unifying theories on what critical factors that influence KM implementation success. Furthermore, a set of variables taken solely from one perspective might explain only a small proportion of how well the success factors contribute to the successful KM implementation in organisations. Moreover, the following points highlight the important gaps and weaknesses of previous studies in this topic:

- Some studies cover only part of the KM stages (processes)
- Some studies are not empirical and based only on lessons learned
- Studies are either qualitative or quantitative (except Alazmi and Zairi (2003))
- No global study (except Jarrar and Zairi (2000) that covered one aspect of KM)
- Some studies cover only soft factors
There is a need for a holistic and integrated study on KM Implementation that is:

- Global, so that results can be generalised
- Empirical: to learn from organisations’ experiences and practices in implementing KM projects
- Covering all stages and processes
- Using triangulation approach by combining quantitative and qualitative methods to gain an in depth and better understanding of the process of KM implementation in organisations
- To generate a generic model based on best practices covering soft and hard factors

4 Proposed taxonomy of KM implementation CSFs

The following analyses the KM implementation process by reviewing the relevant literature on both soft and hard factors that cause success of KM efforts. The factors listed below are distilled from various articles and empirical research on KM implementation. They were then categorised into a number of subgroups representing various dimensions of change related to KM implementation. These dimensions are used to build a model for KM implementation see Figure 1. The dimensions with their factors are listed in Table 2. This proposition is the result of a systematic effort that identifies the factors in a holistic, integrative and comprehensive manner.

Figure 1 A proposed framework for KM implementation
### Table 2 Taxonomy of CSFs in KM implementation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Factors</th>
</tr>
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</table>
| Top management competent          | 1. Support and commitment  
                                     | 2. Providing necessary resources and budget  
                                     | 3. Linking KM strategy to business objectives |
| Championship and evangelisation   | 1. KM champions and leaders  
                                     | 2. Communication  
                                     | 3. Building a business case  
                                     | 4. Effective use of consultants  
                                     | 5. KM strategy and vision  
                                     | 6. Starting with a pilot project |
| Culture                           | 1. Trust  
                                     | 2. Openness  
                                     | 3. Collaboration  
                                     | 4. Free time  
                                     | 5. Acceptance of knowledge sharing and reuse |
| Organisational infrastructure     | 1. Establishing KM roles and teams  
                                     | 2. Having a flat or network structure  
                                     | 3. Physical configuration  
                                     | 4. Community of practice |
| HRM                               | 1. Employee empowerment  
                                     | 2. Employee involvement  
                                     | 3. Employee learning and development  
                                     | 4. Employee recruitment and selection  
                                     | 5. Employee retention  
                                     | 6. Reward systems |
| Continuous improvement            | 1. KM performance measurement  
                                     | 2. Benchmarking |
| KM processes                      | 1. Process-based view to KM  
                                     | 2. Linking KM activities to business processes |
| Content and structure             | 1. Knowledge structure and map  
                                     | 2. Current and relevant content |
| Technical infrastructure          | 1. Building effective ICT infrastructure  
                                     | 2. Integration with current systems  
                                     | 3. Effective use of software tools |

#### 4.1 Top management competent

Sound top management processes ensure that KM efforts will be implemented in the most effective manner (Davenport et al., 1998; Chong et al., 2000; Yang and Wan, 2004; Lam and Chua, 2005; Chong, 2006). The most noticeable top management practices that directly influence the success of KM implementation are top management support and commitment, providing necessary resources, and linking KM strategy to business objectives.
4.1.1 Top management support and commitment

Top management support and active involvement during KM projects are crucial in establishing a fit between organisational strategic vision, performance objectives and cultural enablers (Chong et al., 2000). At its core, top management could show its commitment and support in a boundless and persistent way, including vocal support, speech, inaugural memo and wandering around different business units to invite impulsive idea generation and knowledge creation from all staff levels.

The inclusion of top management in the KM effort provides additional motivation for staff to share knowledge and increases the chance of success of the KM programme (Soliman and Spooner, 2000). McDermott and Dell (2001) cite many examples where well-designed KM tools and processes fail because people believed they were already sharing well enough and that top managers did not support it. Without the support of top-level managers, the success of KM activities is cumbersome (Civi, 2000).

An ever increasing role is played by top management to ensure that a knowledge-friendly culture is built in the organisation. Since only top management has the ability to shape the culture of the organisation, building and embedding a culture that knowledge sharing is power is critical to the successful deployment of a KM programme (Chong and Choi, 2005).

Another important role that top management must be involved in is to eliminate whatever constraints faced by the organisation when implementing a KM programme (Yang and Wan, 2004; Chong, 2006). Moreover, they should get involve and resolve any conflict that may
exist between project stakeholders (Lam and Chua, 2005). In particular, managerial enthusiasm for developing a KM project may blind them from seeing that different people and groups across the organisation may have different views on the real causes, goals or even need of such a project. In extreme cases, such differing assumptions may even jeopardise the project entirely. For instance, different groups with their own interests may use the new KM project to find long-expected excuses for accusing top management – or any other group or department in charge of the KM initiative – of having hidden goals (e.g. making certain knowledgeable people less indispensable) or rewarding the loyalty of a favourite department (e.g. the one that gets the responsibility to lead the KM project) (Chua and Lam, 2005). These kinds of situations harm the company as a whole, and certainly may imply negative perception and/or attitudes toward KM project success. Therefore, top management must take an utmost care for, not only not incurring into any gross contradictions or straightforward offences to anyone in the organisation, but also not appearing to be doing anything of such kind (Oltra, 2005).

Top management should acknowledge KM as a formal activity, and where appropriate, include it in individual work plans and performance objectives (Lam and Chua, 2005). It needs to truly believe in KM and communicate this to employees, which needs a great deal of emotional intelligence and empathy skills. Moreover, it has to anticipate others’ thinking by trying to understand alternative mindsets and frameworks of reference. It is important to be modest in formal statements but act consistently with them rather than being very ambitious in rhetoric terms but showing behaviours that do not meet such claims (Oltra, 2005).

A major aspect of top management commitment and support is that it should be ongoing and delivered in a practical and public way (Storey and Barnett, 2000). It should be uninterrupted through all implementation of KM projects (Wong, 2005). Such support and commitment could then be transformed into concerted efforts that would contribute to the success of KM programme (Davenport et al., 1998).
4.1.2 Providing necessary resources and budget

Successful KM implementation is dependent upon resources. Financial support is inevitably required if an investment in a technological system is to be made. Human resources are needed to coordinate and manage the implementation process as well as to take up knowledge-related roles. It is essential that board level members of the management team are willing to invest in knowledge (Chua and Lam, 2005). However, having support from the top-level management does not help much if funding is not provided for plan execution. It is important to understand that KM is a journey rather than a destination. Besides this, attention, according to Davenport and Volpel (2001) is one of the scarcest resources in many companies. They called for a need to focus on attention management as a key to successful KM.

Investment decisions in KM should be based on a sound consideration of resources, and not on the belief that it is “a nice to have” business programme (Wong and Aspinwall, 2005). In addition, proper budgeting of resources is crucial for KM (Bixler, 2002). Since it is difficult to trace the indirect impact of knowledge accurately, high-level executives, preoccupied with numbers and clear facts, are not always willing to allocate a budget for investment in KM (Guthrie, 2001). According to Chong (2006), a lack of commitment in budgeting and funding would be a major problem and barrier for effective KM implementation. A key issue for effective KM projects is to deal with their necessary resources. This implies understanding how they can be better acquired, allocated and managed for its success.

4.1.3 Linking KM strategy to business objectives

A clear understanding of the organisation’s mission and values would help ensure a right direction for the KM activities (i.e. creation, organisation, transfer, and application) (Filius et al., 2000). To ensure KM success, a KM strategy should be developed based on the overall business strategy to confirm that the KM goals are in congruence with the strategic goals of the firm or the enterprise business strategy (Davenport...
et al., 1998; Hansen et al., 1999; Zack, 1999; Sunassee and Sewry, 2002; Yahya and Goh, 2002; Lam and Chua, 2005; Wong and Aspinwall, 2005). Such congruence is essential for maximising KM success and hence organisational performance (Liebowitz, 1999). A KM strategy can thus be defined as a high-level plan that aims at supplying the organisation with the knowledge resources that it needs to carry out its vision and goals. As a result, the KM strategy must be closely aligned, integrated and linked to the overall business strategy, and must produce a tangible result to the organisation as a whole.

4.2 Championship and evangelisation

While in theory KM should be the responsibility of every employee, there is definitely a need for a senior member and steering committee within an organisation to champion the knowledge project (Chong et al., 2000). These champions act as role models of information sharing and interfaces regularly with staff, teams and stakeholders in review sessions and openly talk about successes and failures (Wong, 2005). They should for example, exhibit a willingness to offer their knowledge freely with others in the organisation, to continuously learn, and to search for new knowledge and ideas. It is vital that they model their behaviours and actions through deeds, not just words. By doing so, they can further influence other employees to imitate them and increase the propensity of employees to participate in KM (Wong, 2005). Moreover, they should demonstrate to employees how KM can improve individual and team performance and to maintain their morale.

Evangelisation of the value of KM activities to the employees was considered a significant aspect of KM programmes (Rumizen, 2002; Oliver and Kandadi, 2006). It means that the KM champions should consistently inform the employees about how KM can improve their performance and mutually benefit the organisation.

The most important champions’ practices that directly influence the success of KM implementation are strong leadership, effective communication, building a business case for KM, effective use of consultants, formulating KM strategy and vision and starting with a pilot project.
4.2.1 KM champions and leaders

KM project is a major change management problem that poses serious leadership challenges. In an effort to address these challenges, companies are beginning to assign a Chief Knowledge Officer (CKO) or equivalent (Director of Knowledge Management, Intellectual Capital Director, Chief Learning Officer (CLO), Knowledge Manager, etc.) at executive level with the responsibility to implement KM strategies and practices within the organisation (Moffett et al., 2003; Oliver and Kandadi, 2006). According to an Arthur D. Little study, 41% of the Fortune 500 companies already have a CKO or equivalent (Liebowitz, 1999). Many firms have devolved responsibility to an existing or new position. Some firms use a cross-functional team to develop KM processes while in others the CEO has taken the leading role (Soliman and Spooner, 2000). In fact, poor leadership quality has been identified as a threat to successful implementation of KM projects (Choi, 2000).

To be effective at KM it is imperative that leaders develop cooperation and implement consistent priorities across all functions in the organisation (Cormican and O’Sullivan, 2003). In essence, leaders establish the necessary conditions for effective KM (Holsapple and Joshi, 2000). Knowledge will not be well managed until some groups or teams within a firm have a clear responsibility for KM jobs and champion KM projects (Chong et al., 2000).

Leadership is responsible for creating the knowledge vision of the organisation, communicating that vision by setting clear objectives, prioritizing knowledge projects, setting knowledge strategy and building a culture that regards knowledge as a vital company resource (Davenport et al., 1998; Bixler, 2002; Pemberton, et al., 2002; Wong, 2005). Throughout the planning, building and implementing phases of a KM project, KM champions and leaders formally facilitate strategic planning sessions with the enterprise’s leadership, mission area leaders and cross-functional representation as well as customer focus...
groups. Moreover, they publicise KM success stories within the organisation (Chua and Lam, 2005)

The CKO needs to be the advocate for knowledge and learning. In many ways, the CKO should map expertise to skills in the organisation and mine for knowledge. Also, the CKO should be the designer and overseer of an organisation’s knowledge infrastructure, and take the leading role in the design and implementation of an organisation’s knowledge architectures (Lam and Chua, 2005). It is extremely helpful if the CKO has expertise in the disciplines of business reengineering, innovative IT, change management, as well as knowledge management (Liebowitz, 1999).

According to Lloyd (1996), the characteristics and challenges of the CKO/CLO should include:

- interpersonal/communication skills;
- passionate visionary leadership;
- business acumen;
- strategic thinking skills;
- championship of change with the ability to withstand ambiguity and uncertainty; and
- collaborative skills (this is a rare skill and is the ability to pull together people from different parts of the organisation to work as one team).

4.2.2 Communication

Communication of the value of KM activities to the employees, is a significant success factor of KM programmes (Bixler, 2002; Rumizen, 2002; Cormican and O’Sullivan, 2003; Oliver and Kandadi, 2006; Olla and Holm, 2006). The KM champions are responsible to educate employees on the importance of KM, not only to the bottom-line of the organisation, but also to its employees. Many KM strategies fail because the employees cannot see the benefits when they share knowledge. The KM champions in this case are responsible to build the trust in the employees on how KM benefits them. The human resource department should take the responsibility for teaching the change
in mindset required to implement KM (Yahya and Goh, 2002). The department must play a vital role by offering news, updates and training.

Top management should be actively involved in the evangelization process and convey that knowledge creation and sharing is highly valued in the organisation. They regularly identify and reward the employees who make valuable knowledge contributions to the organisation. Otherwise it can be considered as a minor issue and may not be given due diligence by middle and front-end managers.

KM evangelisation also covers the establishment of various communication channels to convey the significance, processes and achievements of KM (Oliver and Kandadi, 2006). Most of the organisations had regular internal magazines, journals and newsletters to spread this information. Moreover, public presentations and internal advertising campaigns can be used to carry out the message of the KM project importance. People who are actively contributing to the organisational knowledge, through communities of practice and other means, are made visible to the whole organisation through these channels.

As a way of establishing KM awareness, perhaps the organisation should first train a few of its employees from different departments on KM, and assign them to their respective departments to sell and evangelize the idea of KM (Chong and Choi, 2005).

**4.2.3 Building a business case for KM**

Implementing KM programmes within an organisation can be very costly, especially during the start-up phase (Soliman and Spooner, 2000). Therefore, looking at the business case for KM is essential to ensure buy-in and support from top management and that the organisation has in place a set of strategies suitable for the implementation of the KM effort. The primary elements of a KM business case are: how does it benefit us, tangibly and intangibly, and what will it cost us? That cost can be financial or the cost of risk (Diakoulakis et al., 2004). Measurable goals should be established.
prior to launching the KM project. Too often KM initiatives are introduced by a simplistic pull of fashion, without a rigorous preliminary estimation of the impact of such initiatives on bottom-end (operational, financial, etc.) performance. Sometimes it may be even wiser to promote KM in a subtler manner, without the introduction of a formal KM initiative. In this sense, effective knowledge-leveraging activities can be effectively embedded in existing practices and systems (Oltra, 2005).

It is imperative to the company to perform cost-benefit analysis of a KM project in terms of business value (Oltra, 2005). Clearly benefits of implementing KM efforts must be carefully discussed before a significant investment is made. It is essential to be clear about what the benefits would be for the organisation and what impact is expected on its strategies (Soliman and Spooner, 2000). There should be a clear conception of the KM problem and well-articulated set of KM requirements. Consequently, the type of needed content can be provided (Davenport et al., 1998). Hence, the organisation has to identify the needs of the KM before starting the project.

The company should begin by clearly defining its business issues and needs, and then determine whether KM can and should be a part of the solution. A good knowledge strategy needs to delineate clearly the resources to be dedicated to tacit and explicit knowledge management and should include strategies to improve knowledge sharing. Furthermore, KM strategies that are clearly linked to business objectives have a much greater likelihood of success.

A business case for KM projects should be based on the treatment of knowledge as a system of interconnecting internal capabilities (business enablers) of a company, such as social and cultural enablers, leaderships and human development tools, compensation schemes and technological infrastructures, with knowledge representing the understanding of the relationships and interactions between business assets. This helps ensure knowledge becomes more meaningful in the business context (Chong et al., 2000). A successful company should excel in managing the awareness and diffusion of these competencies among employees. The organisation should go in the business case if it intends to make a better and faster decision with KM implementation.
Many of the benefits of KM are intangible and difficult to quantify (Davenport et al., 1998). It was agreed that the benefits from KM programmes are clearly compelling and that it is important to conduct full-scale business analysis before choosing a KM project to suit an organisation (Soliman and Spooner, 2000). The benefits and impacts of KM initiative can be either a large one at the organisation-wide or limited to a particular process or function (Davenport et al., 1998). Moreover, benefits from KM projects involve money saved or earned. In addition, benefit calculations may also be indirect, perhaps through improvements in measures like cycle time, customer satisfaction, or even phone calls averted.

Stewart et al. (2000) argue that there are two types of investment costs in KM programmes. The first is operational costs (for example, the cost of putting resources into KMS). While the second, is the risk of spending too many resources on managing knowledge (for example, the size of the databases being developed may be extremely large, which incur increased overhead time and cost in maintaining these data). Chong et al. (2000), argue that an average investment cost in implementing KM projects is between 1.5 and 15 million dollars, which is dependent on the types of projects. This cost may seem substantial but the cost to an organisation of forgetting what key employees know or being unable to respond to clients' questions quickly, or making poor decisions based on insufficient knowledge, may be even extremely more.

According to Diakoulakis et al. (2004) the cost is generated in KM projects as investments in money and labour is needed for:

- knowledge capture, i.e. creation and moving of documents onto computer systems;
- adding value to knowledge through editing, packaging and pruning;
- developing knowledge categorisation approaches and categorising new contributions to knowledge;
- developing IT infrastructures and applications for the distribution of knowledge; and
- educating employees on the creation, sharing and use of knowledge.

### 4.2.4 Effective use of consultants

The effective use of consultants during KM project planning and implementation was considered a CSF by several researchers (Rumizen, 2002; Chua and Lam, 2005; Lam and
Chua, 2005). Consultants can bring to the organisation specialised skills, experience, and know-how that the organisation needs and it is both time-consuming and expensive for it to build internally (Chua and Lam, 2005). They can also provide a firm-wide view, encourage unity between members, and are usually neutral (Rumizen, 2002). Success of consultants in the KM project is determined by their level of experience in implementing similar projects in other organisations, as well as their ability to direct the KM efforts to areas of substantial benefits to the organisation. However, Lam and Chua (2005) warn from using multiple external consultants which may cause KM project to meander and create confusion.

4.2.5 Formulating a well-designed KM strategy and vision

Success in implementing a KM project within an organisation relies on a clear, well-designed KM strategy and an implementation approach tailored to the organisation and its constituents (Bixler, 2002; Wong and Aspinwall, 2005). KM strategy (some researchers refer to it as an approach, style, system or practice) is “the balancing act between the internal capabilities of the firm (strengths and weaknesses) and the external environment (opportunities and threats)” (Zack, 1999). Its formulation involves identifying and assigning value to the required KM initiatives. This provides the foundation for how an organisation can deploy its capabilities and resources to achieve its KM goals. It is an important guideline for prioritisation of KM investments (Gopal and Gagnon, 1995; Cormican and O’Sullivan, 2003).

In order to attach more significance to a KM strategy, it should support an imperative business issue of an organisation. A rational strategy helps to clarify the business case for pursuing KM, and steer the company towards becoming knowledge-based (Wong and Aspinwall, 2005). In addition, it provides the essential focus, as well as values for everyone in the organisation. Moreover, the KM strategy and approach should be documented and presented to senior management to ensure buy-in and alignment to organisational goals (Lam and Chua, 2005).
The emergence of KM strategy as the chief infrastructural capability also provides strong support for the adoption of a top-down approach of KM implementation. In other words, the starting point for KM is not some scattered initiatives, but rather a well-defined KM strategy (Horwitch and Armacost, 2002). Gopal and Gagnon (1995) put it succinctly when they maintain that effective KM starts with a strategy. Within a KM strategy, knowledge is recognised as an organisation's most valuable and under-used resource and places the intellectual capital at the centre of what an organisation does (Egbu, 2004). Furthermore, the strategy outlines the processes, the tools and infrastructure required for knowledge to flow effectively. Organisations must also be able to illustrate how knowledge can have a clear impact on measures such as cycle time, cost, quality, productivity and profitability (Cormican and O’Sullivan, 2003). Consequently, it is imperative that these strategies are linked to performance measures.

KM strategies can be developed based on different approaches: existing knowledge of organisation can be exploited or new knowledge can be acquired and developed (Fehér, 2003); personalisation or codification (Hansen et al., 1999); conservative or aggressive strategies (Zack, 1999). Earl (2001) organised the different approaches into schools. Independently of the used approach, KM strategy of an organisation has to appear in organisational and technical architecture (Zack, 1999).

Closely related to the notion of strategy, is the development of a compelling and shared vision for pursuing KM (Wong and Aspinwall, 2005). Without a clear and purposeful vision for the management of knowledge, organisations are compensating for knowledge losses in which the resulting costs may be substantial (Chong et al., 2000). It is essential that employees support this vision and believe that it will work. In addition, clear objectives, purposes and goals for KM projects need to be set (Storey and Barnett, 2000). They have to be clarified and understood by everyone involved (Oltra, 2005). To further expand this, the value proposition of KM has to be clearly laid down in order to create a passion among management and employees to accomplish it. In short, all the above elements need to be carefully developed before a substantial investment is made to initiate a KM effort.
KM strategies and initiatives can mainly be classified as codification (also called system) and personalisation (also called human) strategies (Hansen et al., 1999; Birkinshaw, 2001; Hicks et al., 2006). Codification strategy emphasizes explicit knowledge and involves putting the firm’s knowledge onto IT databases. Personalisation strategy, on the other hand, focuses on individual’s tacit knowledge and sharing through common interests. It involves building strong social networks. The way to decide on the best approach for each organisation is to know: the market; the profitable areas; and whether the organisation provides one-off solutions or the same solution repeatedly. If the organisation primarily provides clients with a repeat of earlier solutions, then it should emphasise the capture and automation of explicit knowledge. This means investing heavily in IT and less heavily in the “best” experts. On the other hand, if the enterprise specialises in finding solutions for one-off projects, then KM strategy should focus on tacit knowledge, i.e. hiring the best minds available.

Choi and Lee (2002) argue that companies should strike a right balance between the two strategies. More specifically, Hansen et al. (1999) recommend using the 80:20 rule, i.e. spending 80 per cent of resources on one approach and 20 per cent on the other. Moreover, Bierly and Chakrabarti (1996) found that organisations, which acquire and share knowledge by combining codification and personalisation strategies, tend to be more profitable. Furthermore, Jordan and Jones (1997) emphasize the balance between explicit and tacit knowledge based strategy for encouraging the development of more innovative knowledge. In addition, Zack (1999) states that organisations with an aggressive strategy, which integrates codification strategy with personalisation strategy, tend to outperform those of less aggressive strategy.

A company’s KM strategy should reflect its competitive strategy: how it creates value for customers, how that value supports an economic model, and how the company’s people deliver on the value and the economics. Also, competitive strategy must drive KM strategy. Executives must be able to articulate why customers buy a company’s product or services rather than those of its competitors. What value do customers expect from the company? How
does knowledge that resides in the company add value for customers? Civi (2000) argues that if a company does not have clear answers to those questions; it should not attempt to choose a KM strategy because it could easily make a bad choice.

According to Hansen et al. (1999), when an organisation considers developing a KM strategy it must know its market and must also find an answer to three important questions: What does the market want? What are the driving forces? And how may the enterprise can best provide answers? Moreover, the organisational strategy for KM should focus on two aspects: first, the knowledge should be demarcated according to the working scope of the organisation, and second, existing operating models should be transformed into knowledge-centric processes (Shankar et al., 2003).

Zack (1999) has advocated using the well known SWOT technique (strengths, weaknesses, opportunities and threats) as a tool to develop a knowledge mapping strategy specifically tailored to an organisation’s needs. He advises that knowledge-based SWOT analysis could lead to mapping knowledge resources and capabilities against strategy opportunities and threats, in order to understand advantage and weakness. Such an analysis can contribute to identifying knowledge gaps and pinpointing fundamental challenges, such as reducing errors or improving decisions (Fehér, 2003).

Wiig (1997) has identified five strategies that are used by organisations to implement KM projects. Some pursue knowledge as a business strategy, where the focus is on knowledge creation, capture, organisation, renewal, sharing, and use at each point of action. Second is the focus on intellectual asset management such as patents, technologies, structural knowledge assets, customer relations, operations, and management practices. A third method is to focus on a personal knowledge asset accountability strategy. Here, each employee is responsible for his/her own knowledge-related investments, renewal of knowledge, and sharing of knowledge assets within the employee's area of accountability. A fourth strategy is the knowledge creation strategy, with a focus on organisational learning, research and development, and employee motivation to innovate and learn. The fifth strategy is the knowledge transfer strategy. Here the emphasis is on systemic approaches to transferring knowledge, such as acquisition, organisation, restructuring, warehousing, and repackaging for distribution to the point of use.
A recent study conducted by PriceWaterhouseCoopers company (cited in (Soliman and Spooner, 2000)) suggests that in order to harness and amplify the know-how experience and expertise of employees, companies should implement the following strategy:

- focus only on what the business needs to know, i.e. become knowledge focused;
- make important knowledge visible, i.e. become knowledge visible (e.g. create and make explicit pathways to the experts and important wisdom within the company);
- pay attention to the vocabulary of knowledge, i.e. become knowledge defined (e.g. customers’ needs versus customer feedback);
- go beyond the company to tap knowledge from customers, suppliers and competitors, i.e. become a knowledge seeker;
- make it clear to employees that knowledge sharing is a core value for the company, i.e. become a knowledge culture;
- measure the results of the implementation of the knowledge management program, i.e. become a knowledge assessor;
- reward the sharing of expertise and intelligence, i.e. become knowledge exemplified.

The specific approach selected by an organisation for a KM strategy differs based on the individual business and its unique needs, and the value discipline that the organisation pursues, challenges it faces, and opportunities it wishes to act upon. Clearly strategies for implementing KM projects must be carefully developed and discussed before a significant investment is made. It is essential to be clear about what the benefits would be for the organisation and what impact is expected on its strategies.

### 4.2.6 Starting with a pilot project

Many researchers suggest a gradual approach for implementing KM initiatives by using pilot projects (Rumizen, 2002; Chua and Lam, 2005; Lam and Chua, 2005; Reinhardt, 2005; Oliver and Kandadi, 2006). The rational behind this approach is that the knowledge culture is slowly extended to the whole organisation through such pilot projects. Chua and Lam (2005) argue that teething problems (such as employee resistance to change and incapability to provide
costly resources) may plague the rollout of large scale KM project which could be avoided if a pilot phase is considered. Oliver and Kandadi (2006) extend this notion by suggesting that KM pilot projects should focus on functional divisions with positive attitudes such as the willingness to allocate time for KM activities.

Davenport et al. (1998) suggest that in the case of the absence of proactive top management support, KM project should only begin on a small scale, with objectives focused on improving the effectiveness of a single knowledge-oriented function or process. Thus, the pilot project establish the conditions necessary for subsequent projects to actually leverage knowledge and prove to the top management the potential benefits of utilising such project in large scale.

### 4.3 Knowledge-oriented culture

Any organisation implementing a KM project must appreciate that the most critical factor in the success of KM implementation is cultural acceptance (Oliver and Kandadi, 2006; Olla and Holm, 2006). Organisational culture is a set of beliefs, values, norms, assumptions and social customs, which provides an identity for the organisation, which in turn defines how the organisation runs and shows the way individuals act and behave in an organisation (Wong, 2005). It includes organisational purpose, criteria of performance, the location of authority, legitimate base of power, decision-making orientation, leadership style, compliance, evaluation and motivation (Chong, 2006). Walczak (2005) adds that organisational culture is formed and reinforced through the interrelated elements of strategy, structure, people and process.

The ideal corporate culture for KM is one where people within an organisation constantly and continuously pursue sharing, learning and knowing to enhance their job performance and improve their decision making capacity (McDermott and O'Dell, 2001). And then, propagate what they know throughout the organisation, and store it in the KM repository (Yang and Wan, 2004). According to Ribiere (2001), after having primarily focused efforts on information technology, practitioners are now realizing the importance of the soft aspects of KM initiatives.
It has been asserted that the success of KM is 90 per cent dependent on building a supportive culture (Liebowitz, 1999). Moreover, a recent study conducted by the American Productivity and Quality Center (APQC) shows that 40 companies are known to have corporate culture that supports knowledge sharing (McDermott and O'Dell, 2001). Furthermore, an international survey of the approaches adapted to KM in 500 companies reveals that 80 per cent of respondents cited “existing organisational culture” as a major barrier to the implementation of knowledge-based system (Chase, 1997). Similarly, another survey on 430 firms finds that a majority of respondents recognized that their internal cultures represent a major barrier to effective knowledge transfer, and that employees’ behavior would have to alter (Skyrme and Amidon, 2000).

According to McDermott and O'Dell (2001), organisations that successfully implement KM do not try to change their culture to fit their KM approach. Instead, they build their KM approach to fit their culture. Moreover, they make the visible artefacts of knowledge sharing - the events, language, Web sites - match the style of the organisation, even if they intend to lead it into new behaviour and approach. Projects that do not fit the culture probably will not thrive, so management needs to align its approach with its existing culture, or be prepared for a long-term culture change effort (Davenport et al., 1998). The importance of matching a KM project with the culture, style and core value of an organisation was also highlighted by (McDermott and O'Dell, 2001). According to Walczak (2005), smaller organisations, 200 or fewer employees, and newer entrepreneurial organisations will have an advantage in making the prescribed culture shift over larger and older organisations that have a long history of corporate culture and a more rigid managerial structure.

4.3.1 Trust

A culture of trust and confidence is required to encourage the application and development of knowledge within an organisation (Pemberton and Stonehouse, 2000; Soliman and Spooner, 2000; Moffett et al., 2003; Wong and Aspinwall, 2005). Without a high degree of mutual trust, people will be sceptical about the intentions and behaviours of others and thus, they will
likely withhold their knowledge (Chong and Choi, 2005). Building a relationship of trust and respect between individuals and groups and having a trustworthiness work environment will help to facilitate a more proactive and open knowledge sharing process (Yang and Wan, 2004). However, trust through facilitating social interactions is a long term strategy that requires managers to understand human behaviour and to change corporate culture. This process has some obstacles in some organisations in which their organisational cultures value individual achievement, competitiveness and hierarchy rather than sharing and collective achievement. As Buckman (1999) points out, creating and sharing knowledge are intangible activities that cannot be forced.

Knowledge is often considered a source of power, and hoarding it from others is not only expected but is often rewarded (Liebowitz, 1999). Additionally, the “Not Invented Here” syndrome is often evident in many organisations, so it may be difficult to get employees to use and apply expertise developed by someone else. Therefore, the emphasis on knowledge sharing is power will reduce the tendency on the employees’ side to hoard knowledge. Most importantly, there must be a belief embedded inside each and every employee that sharing knowledge is the only way to survive (Chong and Choi, 2005).

### 4.3.2 Openness

Another important factor of a supportive culture is openness whereby mistakes and past failure are openly shared and discussed without the fear of punishment (Davenport et al., 1998; Soliman and Spooner, 2000; Yahya and Goh, 2002). In this respect, reasonable mistakes and failures are not only tolerated but allowed and forgiven (Wong, 2005). Making mistakes should be viewed as an investment process in individuals because it can be a key source of the creation of a learning organisation (Yang and Wan, 2004).

A culture that is positively oriented toward knowledge is one that is highly values knowledge and encourages its creation, sharing and application (Wong, 2005). Moreover, it is the one
where learning on and off the job is highly valued, and where hierarchy takes a back seat to experience, expertise, and rapid innovation (Davenport et al., 1998). Furthermore, it is an innovative culture in which individuals are constantly encouraged to generate new ideas, knowledge and solutions (Goh, 2002). It is a culture which emphasises problem seeking and solving. However, the biggest challenge for most KM projects actually lies in developing such a culture (Wong, 2005).

4.3.3 Collaboration

One cultural aspect which is crucial for KM implementation is collaboration (Swan et al., 1999; Goh, 2002; Cormican and O’Sullivan, 2003; Wong and Aspinwall, 2005). Goh (2002) asserted that a collaborative culture is an important condition for knowledge transfer to happen between individuals and groups. This is because knowledge transfer requires individuals to come together to interact, exchange ideas and share knowledge with one another. Not only this, collaboration has been empirically shown to be a significant contributor to knowledge creation (Choi and Lee, 2003). By agreeing on common presumptions and analytical frameworks, employee can co-ordinate diverse sets of activities and solve organisational-wide complex problems (Bhatt, 2001).

Successful KM initiatives lie more on interpersonal interactions and social relationships than the technology itself (Yang and Wan, 2004). In effect, Davenport and Prusak (1998) claim tacit knowledge is normally ingrained in people’s brains; consequently, there is need for extensive personal contact, for example, through interaction, mentoring programmes, social events, networking and dialogue. It is in this way that tacit knowledge gets expressed, shared and augmented (Carter and Scarbrough, 2001; Lang, 2001). Filius et al. (2000) state an example that shows how the members of the organisations can learn from the informal gathering: “You meet someone at the coffee-machine and tell him/her about your problem. It happens quite often that the other one has a brilliant idea or knows someone who does.” According to Carter and Scarbrough (2001), informal conversations would often be worth several hours of training.
Collaboration facilitates the cross fertilisation of ideas. Communication among employees and with outsiders stimulates their performance. Thus, the better that members are connected with each other and with key outsiders the better the knowledge sharing which leads to better performance (Cormican and O’Sullivan, 2003). According to Hall (2001), knowledge creates knowledge when it is shared. Face-to-face setting on a regular basis is important (Davenport et al., 1998). In this situation, trust can be established, structures for knowledge developed, and difficult issues resolved. MIT researcher Tom Allen has found in many studies that scientists and engineers exchange knowledge in direct proportion to their level of face-to-face contact (Davenport et al., 1998).

Managers note that the development of an environment that promotes idea generation from all members is essential. In this view, much value is placed on employee participation and contribution in the idea generation and problem resolution process (Cormican and O’Sullivan, 2003). Only when there is cross-pollination of ideas could new ideas be developed. Such practice has been held by BP Amoco, whereby managers from different business units sit together to discuss new development opportunities (Yahya and Goh, 2002).

Effective dialogue within a KM team is essential if knowledge is to be embodied and disseminated (Demerest, 1997). Peters (1992) calls for “less formal meetings and a more effective flow of dialog in organisations”. Webber (1993) also views dialog among team members as a key part of KM: “Dialogue and conversations are the most important form of work. Conversations are the way knowledge workers discover what they know and share it with their colleagues”. Clearly the more languages staff speak the better their ability to acquire knowledge of customers and markets, especially in global markets (Bixler, 2002). The nature of the content can influence how much immediate shared context is required; some knowledge can only be communicated through dialogue, whereas other knowledge can be easily acquired through the exchange of documents with opportunities for reflection in between exchanges (Moffett et al., 2003). In some cases, a combination is appropriate. A document may serve to cover the basics and then the expert only needs to cover the fine points. In these cases, reading the document should be a prerequisite to contacting the expert to make the best use of everyone’s time.
4.3.4 Free time

Many firms have cultures which do not support KM practices. For example, if employees are accountable for their time and the reward system and promotions are decided on the basis of value-added performance (i.e. performance in adding value to products/services to the customer), it would be rare to find an employee who spends time on knowledge sharing projects if they are not recognised value-added activities. Similarly, if there were neither assessment nor credit given for knowledge management activities within the firm, knowledge management would always be at the bottom of in-trays, possibly never to be seen again (Soliman and Spooner, 2000). Moreover, organisations have to free up time for their employees to perform KM activities such as knowledge sharing (Soliman and Spooner, 2000; Storey and Barnett, 2000; Wong and Aspinwall, 2005; Oliver and Kandadi, 2006). Similarly, providing time and opportunities for people to learn is important (Martensson, 2000). Furthermore, it is also important to invest heavily in employee training and development as well as R&D to develop a knowledge-oriented culture (Liebowitz, 1999).

It is essential to allocate time for employee learning, collaborations, knowledge creation and sharing activities. It directly affects the development of knowledge culture. Krogh et al. (2000) also reported the importance of time allocation exemplifying 3M and Sencorp, where employees are allotted between 15 to 20 percent of their job time for new knowledge creation. Team leaders and middle managers play a significant role in allocating this crucial organisational resource to individual employees and (Oliver and Kandadi, 2006).

4.3.5 Acceptance of knowledge sharing and reuse

Another factor that may prohibit knowledge sharing and utilisation is that employees may perceive accessing other’s knowledge as a sign of inadequacy (Chua and Lam, 2005) or they think that they could not put their thumbprint on it (Liebowitz, 1999). Hence, the appropriateness and acceptance of knowledge sharing and reuse should be acknowledged by all employees (Oliver and Kandadi, 2006). At a large telecommunications firm, engineers had the ‘hero’ mentality, respecting only individual design achievements (Davenport et al., 1998).
Top engineers viewed it as a sign of weakness to use an existing design, an admission of not being able to do it themselves. Knowledge reuse in this case was frowned upon as a reflection of an individual’s own lack of creativity and innovation (Chua and Lam, 2005).

Employees should be willing and free to explore, and their knowledge creation activities are encouraged by executives (Davenport et al., 1998). They do not fear that sharing or codifying knowledge will cost them their jobs, advantage or status (Hislop, 2003). Individuals may feel that their knowledge is critical to maintaining their value as an employee, thus linking it directly to job security. Under these circumstances employees will be reluctant to share their knowledge with others.

### 4.4 Appropriate organisational infrastructure

A key aspect of the management of knowledge in organisations is the development of an organisational infrastructure to perform knowledge-oriented tasks. It involves the establishment of new roles and responsibilities, new skills, new relationships. Creating an organisational infrastructure to manage knowledge is by no means enough for success at KM, but it is an important ingredient of success (Davenport and Volpel, 2001).

This dimension consists of the following factors: establishing KM roles and teams, having a flat or network structure, physical structures that support knowledge-oriented culture and having a community of practice.

#### 4.4.1 Establishing KM roles and teams

Appropriate organisational infrastructure implies establishing a set of roles and teams to perform knowledge-related tasks (Davenport et al., 1998). Despite the fact that some existing functions within an organisation such as HRM and IT have already been working with knowledge issues, establishing a group of people with specific and formal responsibilities for KM is crucial (Wong, 2005). Roles within this team can either be devolved to existing positions or to new ones. Key project positions and skills requirements should be identified, and staff (such as knowledge editors, and knowledge network facilitators) should be recruited to those positions before the project formally begins (Chua and Lam, 2005).
Although these new roles and structures are expensive, they mean that any new project can take advantage of them for support and get up and running quickly (Davenport et al., 1998). Moreover, formal inclusion of KM duties in job design should be carried out (Bixler, 2002). That is functional roles should be attached to KM jobs or the KM roles should be embedded in the jobs of core functional areas such as manufacturing, sales, and customer service (Oliver and Kandadi, 2006). While large companies may have the resources to establish a team with multiple layers of roles for KM, SMEs will need to take a smaller scale approach (Wong, 2005).

Teams are groups of two or more people who interact and influence each other; are mutually accountable for achieving common objectives, and perceive themselves as a social entity within an organisation (Chong, 2006). Companies around the globe are discovering that teams potentially make more creative and informed decisions and coordinate work without the need for close supervision. As such, teams are replacing individuals as the basic building blocks of organisations (Choi, 2000).

Many researchers have recognized building effective KM teams and teamwork as one of the critical factors for successful KM implementation (Davenport et al., 1998; Choi, 2000; Civi, 2000; Soliman and Spooner, 2000; Ryan and Prybutok, 2001; Yahya and Goh, 2002; Moffett et al., 2003; Walczak, 2005; Chong, 2006). Teams are the units that actually carry out the work in many knowledge-intensive organisations (Chong, 2006). They are the ones that must access and apply distributed knowledge effectively (Ryan and Prybutok, 2001).

The development of knowledge teams composed of knowledge workers from cross-functional areas of the organisation is a first step towards developing a fully distributed knowledge transfer system (both vertical and horizontal) within the organisation (Walczak, 2005). They are more consistent with flatter, more flexible and more responsive organisations. Here work is organised around value adding processes or projects that are carried out by small, multi-skilled, self-managed teams (Chong et al., 2000). Furthermore, Knowledge teams should be created dynamically to take advantage of an organisation’s business opportunities or new business strategies (Walczak, 2005).
Cross-functional team members provide knowledge sharing from their knowledge team back to their original functional areas. In this case, organisations leverage individual talents into collective achievements through networks of people who collaborate (Swan et al., 1999; Bixler, 2002). As such, one of the most important tasks in successful KM implementation is to build self-organising and cross-functional teams to seize the right knowledge and present it in an easily accessible format (Chong, 2006). Moreover, organisational leaders must act as catalysts in building team-oriented organisations (Nonaka et al., 2000).

Teamwork is an essential source of the knowledge generation process (Choi, 2000). According to Demarest (1997), effective dialogue within a KM team is essential if knowledge is to be embodied and disseminated. Moreover, it is important to make sure that every member of the team is participating by talking and sharing their views and experiences (Yang and Wan, 2004). KM teams are required not only to improve the performance and standing of the enterprise but also to ensure the effectiveness of the KM programme (Soliman and Spooner, 2000). The more structured the implementation of the programme, the more likely it is to succeed.

A well-staffed team is crucial for successful implementation of KM (Civi, 2000). This is because knowledge that individuals possess may be difficult to articulate because it is so deeply embedded in routines and practices that are taken for granted (Chong, 2006). By creating teams, it allows organisations to apply diverse skills and experiences towards its processes and problem-solving (Choi, 2000). After all, the focus of business and KM application is on providing an environment in which knowledge workers of various disciplines can come together and create new knowledge (Binney, 2001).

It is important to build trust and meaningful relationships within the team members. This is because organisations with team oriented employees who trust one another are more successful at sharing knowledge than those who are merely technologically superior (Chong, 2006). Thus, fostering a spirit of teamwork based on trust is an essential factor for the successful implementation of KM in organisations.
4.4.2 Having a flat or network structure

Organisational structure with hierarchical bureaucracy leads to inefficiency, ineffectiveness, powerlessness and prohibiting sharing knowledge and expertise among employees and managers (Liebowitz, 1999). Hierarchical bureaucracy means every task is broken into simple parts, each has the responsibility of a different level of employees, and each defined by specific rules and regulations (Chong, 2006). It allow vertical knowledge transfer through typical chain-of-command, but inhibit horizontal knowledge transfer that must cross the organisation’s functional boundaries (Walczak, 2005). Moreover, it results in not only a rigid preoccupation with standard operating procedures, but also vertical chains of command and slow response as well which hinder knowledge sharing and innovation (Choi, 2000). Furthermore, the different levels making it harder to create a learning culture that facilitates the sharing of ideas and building of knowledge, its diffusion, co-ordination and control (Pemberton and Stonehouse, 2000).

For these reasons, flat and network organisational structures which foster cross-functional communication and where functional barriers are low, appear to facilitate KM more effectively (Pemberton and Stonehouse, 2000). Network structures also permit crossover of organisational boundaries and allow the sharing of organisational knowledge and, at the same time, assist in building new knowledge. This requires a new philosophy of management that encourages openness, reflectivity, and the acceptance of error and uncertainty (Cormican and O’Sullivan, 2003).

Organisational structure has often had the unintended consequence of inhibiting collaboration and sharing of knowledge across internal organisational boundaries to promote knowledge creation (Walczak, 2005). Creed and Miles (1996) also note that a hierarchical structure limits active knowledge sharing activities and communication between employees or between employees and supervisors. O’Dell and Grayson (1998) agree that organisational structures should be designed for flexibility (as opposed to rigidity) to encourage sharing and collaboration across boundaries within the organisation and across the supply chain. However, this effect can also be achieved by maintaining the formal hierarchical structure while adding the dimension of flexibility (Nonaka and Takeuchi, 1995). Nonaka and
Takeuchi (1995) indicate that a combination of a formal organisational structure and a non-hierarchical, self-organising organisational structure would improve knowledge creation and sharing capabilities.

The creation of a new KM corporate unit seems to be a right decision for KM success, especially when the existing departments could be incompetent for this purpose, engaged in perilous inconsistencies, linked with negative past experiences or could foster any kind of negative perceptions from employees thus jeopardizing KM efforts (Oltra, 2005).

### 4.4.3 Physical configuration

The physical configuration of the work environment including layout of offices and spaces for staff to meet informally is important to encourage exchange of ideas and share knowledge (Soliman and Spooner, 2000; Oliver and Kandadi, 2006). Structural characteristics such as, shared areas, cubicles with low dividers, glass walls and doors, open spaces and other informal meeting amenities (such as discussion rooms, internet cafes, common dining halls) can help people in the process of social networking and collaboration. Positioned presentation equipments, couches, whiteboards, notepaper and pens in these shared spaces assist and encourage employees to do useful organisational work during the informal gatherings. These physical characteristics can explicitly promote the development of a culture of openness and knowledge sharing among the employees and facilitate the flow of knowledge across the organisation.

### 4.4.4 Community of practice (CoP)

A complement to the practice of knowledge sharing, a new organisational form, called community of practice (CoP) has emerged where individuals with common professional goals and interests from different functional departments provide a natural focal point for organising and promoting knowledge in a particular area (Bukowitz and Williams, 2000; Wenger and Snyder, 2000). A CoP can be understood as a group or network within an organisation that shares a commitment to particular work practices or organisational issues.
(McDermott and O'Dell, 2001). From a KM perspective, it is regarded as site whereby organisational knowledge is created and shared (Soliman and Spooner, 2000). The sharing of knowledge is likely to take place through means such as story telling (Carter and Scarbrough, 2001). In addition, CoP is an important element within the knowledge organisation structure to enable knowledge team members to interact with members of other knowledge teams with similar interests and competencies and further promote inter-team knowledge sharing which leads to organisational performance improvement (Walczak, 2005). CoP can be both formal and informal. Formal CoP is generally based on projects while the informal one is based on subject expertise, skill set and professional competencies.

The term, communities of practice (CoPs) first coined by Lave and Wenger (1991) who describe it as, “an activity system that includes individuals who are united in action and in the meaning of action has for them and for a larger collective”. Encouraging the development of CoPs was seen as an effective way to launch KM programmes (Walczak, 2005). According to Oliver and Kandadi (2006), CoPs can play a significant role in resolving product issues, solving customer problems and assisting in the generation of sales. Furthermore, CoP helps to provide solutions to organisational problems, as well as to provide insight on new or innovative products and services (Chong, 2006). Some organisations have attempted to formalize these communities; Chrysler, for example, has created more than 100 communities in the new car design area, one for each major component of a car (Davenport and Volpel, 2001). The concept has been sufficiently successful that it is being extended into the much larger Daimler Benz organisation in Europe after the company’s merger with Chrysler.

Facilitating and promoting CoPs is seen as an important element of KM programmes (Oliver and Kandadi, 2006). The top management should facilitate the development of CoPs by providing necessary communication infrastructure such as knowledge portals, and amenities for virtual interaction and content management (Wenger and Snyder, 2000). Moreover, some CoPs may need financial resources and time for possible physical conferences and meetings between the members (Walczak, 2005). Furthermore, the KM champions should regularly recognise and value the employee participation in CoPs.
4.5 HRM

It is safe to claim that people are the main driver of KM since they are the sole originators of knowledge (Civi, 2000; Robertson and Hammersley, 2000; Soliman and Spooner, 2000; Storey and Barnett, 2000; Yahya and Goh, 2002; Hislop, 2003; Wong and Aspinwall, 2005; Alavi et al., 2006). Moreover, people factor is recognised as the key to driving KM from initiation to full implementation (Chan and Chau, 2005). As stated by Davenport and Volpel (2001), “managing knowledge is managing people; managing people is managing knowledge”. According to Yahya and Goh (2002) KM is actually an evolved form of human resource management (HRM), using IT as the supporting mechanism in the human interactions and collaborations process. The main tasks of HRM are to monitor, measure and intervene in construction, embodiment, dissemination and use of knowledge by the employees (Soliman and Spooner, 2000). HRM activities in regarding to KM implementation have to concentrate on the following: employee empowerment, employee involvement, recruitment and selection of valuable and appropriate employees, employee retention and the appropriate reward systems.

4.5.1 Employee empowerment

Empowerment refers to a feeling of control and self-efficacy that emerges when people are given power in a previously powerless situation (Chong, 2006). It means eliminating the bureaucratic controls and creating a sense of freedom so that people can commit all their talents and energies to accomplish their shared goals (Pickering and Matson, 1992). Empowered employees are given autonomy – the freedom, independence and discretion – over their work activities (Moffett et al., 2003). They are assigned work that has high levels of task significance – important to themselves and others. Empowered employees also have control over performance feedback that guides their work and also a feeling of self-efficacy; that is, they believe that they are capable of successfully completing the task (Bhatt, 2001).

Empowerment is a driver of knowledge creation. By empowering people, it gives them a sense of power and authority, thus giving them more room to innovate and explore new possibilities.
possibilities (Wong, 2005). Empirical study reveals that managers who distrust their subordinates and do not delegate often leave the employees demoralised (Honold, 1997). Moreover, individuals should also be permitted to query existing practice and to take actions through empowerment (Pemberton and Stonehouse, 2000). By empowering individuals, they will have more freedom and opportunities to explore new possibilities and approaches (Yahya and Goh, 2002).

Many researchers (Stonehouse and Pemberton, 1999; Choi, 2000; Soliman and Spooner, 2000; Bhatt, 2001; Yahya and Goh, 2002; Moffett et al., 2003; Chong, 2006) have regarded employee empowerment as one of the critical factors for KM implementation success. Verespej (1999) claims that the real advantages of KM implementation could not be realized without truly empowering the employees. If employees are to feel empowered, they need knowledge that will enable them to comprehend and contribute to the performance of the organisation (Duval, 1999). This is because when individuals are empowered, they begin to take extra responsibilities to solve organizational problems by learning new skills in their jobs (Duval, 1999), which will eventually lead to them being more competent.

Effective creation and sharing of knowledge will fail if employees do not have a sense of ownership in the overall aim of the organisational KM project. After all, most organisational knowledge comes from the expertise, learning and experience of their employees (Choi, 2000). Through empowerment, employers can value their employees’ expertise and help them communicate their knowledge by creating ways to capture, organise and share knowledge (Verespej, 1999).

Many teams are now working directly with their customers to design products for them. If the teams are not empowered, they would have to seek for their superior’s approval before they could inform their customers. In such a case, time and resources are wasted. In a study by Chong (2005), the respondents cited that their employers have given limited authority to them. The employees found it time and resource wasting when they are not allowed to make meaningful decisions on behalf of their organizations and customers. Thus, it can be concluded that employee empowerment is recognized as one of the critical implementation factors to the success of KM project.
4.5.2 Employee involvement

Employee involvement was recognized as one of the CSFs for KM implementation by numerous researchers (Stonehouse and Pemberton, 1999; Choi, 2000; Storey and Barnett, 2000; Bhatt, 2001; Ryan and Prybutok, 2001; Hislop, 2003; Moffett et al., 2003; Hung et al., 2005; Lam and Chua, 2005; Chong, 2006). It means allowing employees to involve in their own job design and evaluation of their own jobs. By doing this, the employees will be more committed towards using their knowledge for the general good of the organisation (Ryan and Prybutok, 2001). Further, organisations must realize that when employees are involved, they begin to think of the best ways of delivering best results in their jobs (Hislop, 2003). This is especially true in today’s business environment where customer becomes the central focus.

Storey and Barnett (2000) suggest that involvement and commitment of workers represents one of the key issues in relation to the management of knowledge workers. This is important because workers with high levels of organisational commitment are less likely to leave, are more likely to be highly motivated, and will probably be more willing to provide extra discretionary effort and be generally more willing to share their knowledge within the organisation. On the other hand, if employees are not involved and consulted in the KM project design and planning stages, this will lead to their knowledge requirements to be poorly understood and satisfied (Lam and Chua, 2005). Hence, the employees’ buy-in and commitment during the KM project implementation will not be granted (Hislop, 2003).

KM champions and HR people need to be information gatherers, in the sense that they should record any suggestions and feedback from any relevant employee – especially from line managers and core knowledge workers and transmit them to senior management, so they are taken into account for the KM strategy design (Oltra, 2005). This is important to be done prior to any formal announcement about the development of a formal KM project, since key project design issues can be crucially affected by the contents of the above mentioned upwards communication (Oltra, 2005). Beyond the obvious benefits of building a more accepted and bottom-up shaped KM strategy, employees would predictably gain self-confidence and involvement in the KM strategy.

If employees are not involved and consulted in the KM project design and planning stages, this will lead to their knowledge requirements to be poorly understood and satisfied.
4.5.3 Employee development and learning

Numerous studies have pointed out on the importance of employee development and learning to KM implementation success (Bixler, 2002; Yahya and Goh, 2002; Moffett et al., 2003; Chua and Lam, 2005; Hung et al., 2005; Wong and Aspinwall, 2005; Chong, 2006). Employee development is seen as a way to improve and enhance the personal value of individuals. The skills and competences of knowledge workers need to be continuously developed in order for them to produce valuable contributions to a company (Wong and Aspinwall, 2005). If not, as with other tangible assets, their value will depreciate. Hence, organisations have to provide appropriate professional development activities to their employees through training and education. Horak (2001) suggests that for effective KM, skills development should occur in the following areas: communication, soft networking, peer learning, team building, collaboration and creative thinking. Furthermore, Yahya and Goh (2002) show that training related to creativity, team building, documentation skills and problem solving have a positive impact on the overall KM process.

Yahya and Goh (2002) insist that if a company wants to become a truly knowledge-based organisation, it must start with quality training. This is true because in virtually every market, customers are demanding high quality, lower costs and faster cycle times. To meet these requirements, firms must continually improve their overall organisational performance. Rapid advances and technology and improved processes have been important factors helping businesses meet this challenge. However, the most important competitive advantage to any firm is its workforce – one that must remain competent through continuous training and development efforts. In a basic sense, organisational employees need to be aware of the needs to manage knowledge and to recognise it as a key resource for the viability of an organisation (Yahya and Goh, 2002). This issue can be addressed if proper basic training is provided to the employees. Through such training, they will have a better understanding of the concept of KM. It also helps to frame a common language and perception of how they define and think about knowledge. In addition, training employees to understand the importance and value of KM is also essential. Information cannot be turned
into something of business value if employees do not have the skills to put information into context (Chong et al., 2000).

Besides this, employees could be trained in using the KM system and other technological tools for managing knowledge (Wong and Aspinwall, 2005). This helps to ensure that they can utilise the full potential and capabilities offered by these tools. In addition, training for individuals to understand their new roles for performing knowledge-oriented tasks might be needed. Equally important is to equip them with the skills to foster creativity, innovation, and knowledge sharing. Moreover, training on issues related to organisational change is vital to support the transformation process in a company and its people (Yahya and Goh, 2002). This includes training on leadership, managing change and company mission and values. All these skills are crucial in initiating the KM process, and thus promoting proactive acquisition of knowledge, and the subsequent knowledge storing activity and knowledge transfer.

Organisational learning must be addressed with approaches such as increasing internal communications, promoting cross-functional teams and creating a learning community. Learning is an integral part of KM. In this context, learning can be described as the acquisition of knowledge or a skill through study, experience or instruction (Bixler, 2002). Enterprises must recognize that people operate and communicate through learning that includes the social processes of collaborating, sharing knowledge and building on each other’s ideas. Managers must recognize that knowledge resides in people, and knowledge creation occurs in the process of social interaction and learning. Unless people in organisations possess the learning capability to use knowledge creatively, a well-developed KM system cannot be directed at sustaining profitability (Hwang, 2003).

One of the most recent and popular training tools for KM is a corporate university. It is an educational organisation established and run by companies to provide total education to their workforce. It was found that approximately 40 percent of Fortune 500 companies have implemented such programmes (Sunoo, 1998). Since then, there have been more corporate universities being established all over the globe to support organisational learning efforts (Chong, 2006).
4.5.4 Employee recruitment

Many researchers consider employee recruitment as a CSF in KM implementation (Robertson and Hammersley, 2000; Soliman and Spooner, 2000; Davenport and Volpel, 2001; Hislop, 2003; Fehér, 2004; Wong and Aspinwall, 2005; Oliver and Kandadi, 2006). Effective recruitment of employees is crucial because it is through this process that knowledge and competences are brought into the organisation. Employees with the required knowledge and desired skills to fill knowledge gaps should be recruited (Davenport and Volpel, 2001). Furthermore, it is essential that companies enlist those who have the tendency and inclination for creating and sharing knowledge (Wong and Aspinwall, 2005). In addition, they must have a positive attitude towards team dynamics (Oliver and Kandadi, 2006).

Additionally, Hislop (2003) highlighted the significance of selection to focus on the ability of candidates to fit into the firm's culture or distinctive way of working rather than just matching them to a job specification. Moreover, the employees’ selection should be based on their willingness and ability to share knowledge and skills with others (Robertson and Hammersley, 2000). Hall (2001) also advocates that the employment of intrinsically motivated colleagues might be seen as an issue of recruitment and selection.

4.5.5 Employee retention

Another important CSF in KM implementation is employee retention (Robertson and Hammersley, 2000; Hislop, 2003; Wong and Aspinwall, 2005). A central issue in KM is how to retain valuable knowledge from being lost. This is where the function of employee retention gains its significance in KM. In order to retain employees to work for a company, it is important to provide opportunities for them to grow and to advance their career. HR policies and practices need to be designed to allow them to meet their personal aspirations (Brelade and Harman, 2001).

In addition, competitors will constantly be attempting to entice knowledge workers from their rivals, such is the scarcity of their skills and expertise (Hislop, 2003). Thus it is important to
preserve the employees’ loyalty to their organisations. This can be achieved by offering an encouraging working environment in which employees and knowledge workers feel comfortable and to foster job satisfaction among them (Robertson and Hammersley, 2000).

4.5.6 Appropriate reward systems

Several scholars note that reward systems should be in place to promote employees’ motivation for taking the time to generate new knowledge, share their knowledge, and help others outside their own divisions or functions (O’Dell and Grayson, 1998). Leonard (1995) argues that organisational reward systems can determine how knowledge is accessed and how it flows in organisations. If employees are not motivated to practise KM (i.e. create, share and apply knowledge), no amount of investment, infrastructure and technological intervention will make it effective. Hence, one of the key factors is to establish the right rewards, incentives, or motivational aids to encourage people to share and apply knowledge (Davenport et al., 1998; Trussler, 1998; Liebowitz, 1999; Robertson and Hammersley, 2000; Skyrme and Amidon, 2000; Carter and Scarbrough, 2001; Bixler, 2002; Alazmi and Zairi, 2003; Hislop, 2003; Iftikhar et al., 2003; Egbu, 2004; Hung et al., 2005; Oltra, 2005; Walczak, 2005; Wong and Aspinwall, 2005; Alavi et al., 2006; Chong, 2006; Oliver and Kandadi, 2006). Rewarding employees and giving incentives help to stimulate and reinforce the positive behaviours and culture needed for effective KM (Cormican and O’Sullivan, 2003; Oliver and Kandadi, 2006).

The reward systems should be aligned with the KM strategy (Carter and Scarbrough, 2001; Walczak, 2005). For example, in the codification-based KM strategy, managers need to develop a system that encourages people to write down what they know and to get those documents into the knowledge repository. On the other hand, companies that are following the personalisation approach need to reward people for sharing knowledge directly with other people (Hansen et al., 1999).

In order to build a knowledge-based organisation, it is critical to openly rewarding individuals and teams for sharing knowledge across an organisation when they capture team discussions and decisions, create a supportive environment for mentoring, document and share lessons...
learned, and make tacit knowledge explicit (Oltra, 2005). Reward systems should be focused on criteria such as knowledge sharing and contribution, teamwork, creativity and innovative solutions in solving daily problems (Wong and Aspinwall, 2005). Yahya and Goh (2002) state that such systems should reward risk-taking attitudes and emphasise group-based compensation.

One motivational strategy may be based on rewarding the development of knowledge that is subsequently utilised by other knowledge workers or knowledge teams (Walczak, 2005). Any knowledge that is externalised into explicit form or combined from one explicit encoding into a more useful format becomes eligible for a knowledge-use award, but the awards are based on subsequent use of the created explicit knowledge by other knowledge workers. A similar approach can be used to encourage the internalisation transfer of new knowledge by rewarding knowledge teams for incorporating explicit and tacit knowledge from other knowledge teams and groups into their knowledge team solutions. However, some employees may involve in knowledge activities because of the intrinsic drive for learning, personal contentment, peer recognition and self actualisation (Oliver and Kandadi, 2006).

Individuals sometimes are rewarded for possessing their knowledge, not for sharing it (Filius et al., 2000). If the reward system is based on internal competition, such as raises given out in zero-sum fashion and individual rewards, it creates a counter-collaborative organisational culture, whereby people always need to watch their backs to see who is doing them in (Pfeffer and Sutton, 1999; Walczak, 2005). This certainly makes knowledge sharing impossible to reach. If an organisation wants maximal profit from common knowledge, it has to choose sharing instead of shielding and it has to adjust its reward systems to this choice. In particular, rewarding employees with a focus on group performance will instigate a higher level of knowledge exchange between them. Hauschild et al. (2001) extended this notion by stating that employees will be more inclined to seek and contribute knowledge, if their incentives are based on goals that they can influence, but not achieve on their own. Linking rewards solely to individual performance or outcome which can result in competition will certainly be detrimental to a knowledge sharing culture.
The provision of both financial and non-financial (such as recognition) benefits could be incorporated into a reward system that supports KM (Lam and Chua, 2005; Walczak, 2005). However, indirect rewards such as appreciation and recognition play a greater role than the monetary incentives (Oliver and Kandadi, 2006). For example, Xerox France's KM implementation made excellent use of peer group dynamics as a way to encourage contribution and use of the knowledge sharing system. It was an honour when a maintenance tip is accepted by the review group and adopted by others (Trussler, 1998).

In addition, approaches to motivate employees and recognise their contributions could be tied to their annual job performance review (Davenport et al., 1998; Liebowitz, 1999). This implies treating KM practices as important criteria in an employee's performance evaluation and assessment system (Trussler, 1998). Companies like Andersen Consulting and Lotus evaluate their employees, as part of their annual job performance review, on how much (and the quality) of knowledge that they provide to the knowledge repositories and how they have applied the knowledge from these repositories (Liebowitz, 1999).

Finding new sources of motivation that are not trivial to increase participation in KM systems is a constant challenge (Davenport et al., 1998). Some organisations, for example, have given frequent flyer mileage to the first ‘x’ number of individuals to use their KM system (Liebowitz, 1999). Another possible technique is to acknowledge excellent performer in creating new work and thoughts through organisational newsletter. However, incentives and compensations can be given to encourage initial use of KM systems. For example, Buckman Labs initially offered monetary incentives to use their KM system (K’Netix). Gradually, the use of their K’Netix became a daily occurrence because the CEO would use it on a regular basis and the employees felt that it must have value if the CEO is using it. Additionally, over time, its use became part of the knowledge culture of the organisation (Liebowitz, 1999).

Reward structures and motivational approaches to encourage more effective knowledge behaviours should be long-term and tied in with the rest of the evaluation and compensation structure (Davenport et al., 1998; Liebowitz, 1999; Chong, 2006; Oliver and Kandadi, 2006). One way is to introduce a point system where contributors, users, evaluators of the knowledge and the contributors’ departments are rewarded when the knowledge posed on the repository is used, and when the knowledge is able to help other employees solving critical problems or
making complex decisions (Bukowitz and Williams, 2000). On the other hand, if a short-term reward structure is used, employees may game the system for the rewards (Chong, 2006). However, if incentives are short-term, they should be highly visible. For example, Texas Instruments created an annual “Not Invented Here But I Did It Anyway” award to acknowledge both those who borrow good ideas from within and outside the company, and also those who shared them (Davenport et al., 1998).

4.6 Continuous improvement

Another dimension for KM implementation is continuous improvement. It is important to understand that KM is a journey rather than a destination. The benefits, performance and impacts of KM implementation should be measured. Based on that, then necessary improvement should be carried out. Furthermore, there should be a constant benchmarking for best practices inside and outside the organisation.

4.6.1 KM performance measurement

Organisations are only beginning to look for ways to manage and measure the intangible or intellectual assets that are now recognised as important factors for their market value (Cormican and O’Sullivan, 2003). According to Bontis (2001), the intellectual assets of a firm include not only the employees’ know-how, but also its business processes and customer knowledge as well.

It follows that measures are needed to make knowledge visible, to codify it through documentation and electronic processing, and to share it among an organisation’s members. Zairi (1994) suggests that the function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations. Measurement acts like a data collection system that gives useful information about a particular situation or activity (Wong and Aspinwall, 2005). Measurement can include the monitoring of performance indicator, analysis of process effectiveness, questioning workers in the KM project (Fehér, 2004).
According to Ahmed et al. (1999), measuring KM is necessary in order to ensure that its envisioned objectives are being attained. Measurement enables organisations to track the progress of KM and to determine its benefits and effectiveness (Yahya and Goh, 2002; Fehér, 2004). Moreover, it enables organisations to assess the extent to which the KM project was achieving its objectives (Oltra, 2005). Basically, it provides a foundation for organisations to evaluate, compare, control and improve upon the performance of KM (Ahmed et al., 1999). Furthermore, only when employees realise how much they have achieved in KM practices, can they evaluate the effectiveness of their actions.

Many researchers have identified measuring KM benefits as a CSF in KM implementation (Edvinsson and Malone, 1997; Bukowitz and Williams, 2000; Bontis, 2001; Yahya and Goh, 2002; Alazmi and Zairi, 2003; Moffett et al., 2003; Wong and Aspinwall, 2005; Chong, 2006). In general, the most successful way to measure knowledge sharing is to trace the flow of knowledge among employees. The experience of Skandia demonstrates that the number of ideas generated in the online system and frequency of access are easy to measure (Edvinsson and Malone, 1997). Similarly, customer satisfaction levels can be measured through surveys and feedback mechanisms. In customer care, the number of complaints, the amount of time that it takes to resolve complaints and the length of customer contacts are also measurable. Although these measurements are simplifications of the real phenomenon, they are sometimes valuable proxies that contribute to providing a better understanding of knowledge flows.

KM should be seen not as expenditure for the organisation but as an investment that returns benefits (Lim et al., 1999). So, measurement is needed to demonstrate the value and worthiness of a KM initiative to management and stakeholders. Without such evidence, support and confidence from top management to sustain it will diminish. Benefits can be measured in terms of return on investment value.

Numerous indicators have been proposed for return on investment in KM but many focuses on attaching value to the IC that exists in the organisation (Bontis, 2001). The success of implementing KM can be measured through new product/service development, improved customer satisfaction, and increased customer loyalty (Liebowitz, 1999).
The adoption of indicators directly related to achievement, whether financial or not, would represent an advance (Wong and Aspinwall, 2005). A combination of lagging measurements, which relate to actual business outcomes and leading measurements, which are performance drivers that lead to outcomes, should be used in order to provide a more holistic approach to measuring KM (Ahmed et al., 1999; Chong, 2006). It is also possible to identify subjective, yet quantifiable, indicators such as the quality of a contribution as evaluated by its readers. However, one of the greatest challenges is the assessment of the value of individual knowledge and IC, chiefly because tacit knowledge is usually time- and context-specific (Bontis, 2001).

The management of knowledge resources involves the coordination of individuals who create, share, organise and apply knowledge. Measuring this management involves the tracing and documentation of the causal relationships between the application of knowledge and its creation and sharing. The real challenge lies in the fact that knowledge sharing does not always provide traceable information of added value (Bontis et al., 2000). Knowledge does not always lead directly to implementation or application but can have an indirect impact on effectiveness through the creation of better approaches or more effective work responses.

Effective KM improves the outcomes of an organisation and this improves competitiveness, market intelligence and decision-making. As all of these are crucial to the survival of an organisation, it is important to measure KM contribution with as much precision as possible (Edvinsson and Malone, 1997). Such measurement is a difficult task, in particular as knowledge is tacit, dynamic and made by human beings. However, it is possible to measure every item of knowledge as if it were property and, therefore, make a theoretical evaluation of the entire knowledge system (Guthrie, 2001). At the employees’ level, a comprehensive performance measurement system must be developed to capture the impact of knowledge on the individual and organizational performance (Bukowitz and Williams, 2000). While, at the organisational level, perhaps one effective way to start off is to use the balanced scorecard technique, proposed by Kaplan and Norton (1993, 2001) (focuses on learning and growth, internal business and customer perspectives) or Intangible Asset Monitor, proposed by Sveiby
(1997) (examines the competence of the personnel and the internal and external structures) to capture the tangible and intangible assets of a firm. Nevertheless, there is still no absolute method for measuring KM in an organisation (Gupta et al., 2000) and this is an area which is still being explored by academics and practitioners (Cormican and O’Sullivan, 2003).

A specific set of measurable success criteria should be drawn up before rollout of KM project. Such criteria might relate to the growth of the knowledge base or the level of usage of the KM system. Specific review points should be agreed where the KM champions are able to review the success of the project and, if needed, take corrective action (Chua and Lam, 2005). Moreover, performance measures must be aligned to KM strategies and goals and effectively communicated to all stakeholders in order to keep everyone focused in the same direction (Chong et al., 2000).

4.6.2 Benchmarking

Camp (1989) describes benchmarking as the systematic or ongoing process of searching for industry-wide best practices that lead to superior performance. “Benchmarking involves determining best practice guidelines for maximizing performance and guiding a company toward improved efficiency and effectiveness while reducing waste” (Goldberg and Godwin, 2004). Cook et al. (2004) claim that benchmarking activities positively force any business unit to continuously evolve and develop in order to survive and grow in a business environment facing global competition. It means emulating the ways things are done best, anywhere within or outside the firm, industry or sector and measuring organisational performance against that of a leading or knowledge-based organisation (Chong, 2006). Benchmarking determines how the leading organisation achieves those performance levels and uses the information as a basis for the organisation’s targets, strategies and implementation.

Benchmarking is a very well known management tool. It has played an important role in implementing KM and to gain competitive advantage (O'Dell and Grayson, 1998; Choi, 2000; Moffett et al., 2003). In addition, benchmarking is one of the most important and popular
tools for continuous improvement (Cook et al., 2004). Organisations should use benchmarking to regularly assess themselves against other companies with recognized good knowledge practices in order to identify performance gaps and areas for improvement (Chong et al., 2000). This allows companies to learn from and act on the knowledge of others (Storey and Barnett, 2000).

Many large firms have adopted benchmarking as a significant, systematic technique for measuring the companies’ performance toward its strategic goals (Chong, 2006). Since managing knowledge work effectively is becoming a necessity for functional area heads and department managers, once an organisation has benchmarked best practices, it is easier to apply the useful knowledge around the organisation (Davis, 1996). Day and Wendler’s (1998) study provides a practical implication for a wider view of KM benchmarking. They insist that it is necessary to develop knowledge strategy in order to capture, share and manage organisational knowledge correctly, and one of the knowledge strategies would be benchmarking.

Benchmarking has been one of the most effective tools for developing and improving KM as it is not limited just to process improvement or reuse (Hung et al., 2005). It extends far beyond and promotes both the growth and acceptance of a learning culture throughout the organisation (Chong, 2006). Furthermore, benchmarking efforts can often provide insights to an organisation into areas such as overall productivity; service quality; customer satisfaction; time to market in relation to other competitors; costs, profits and margins; distribution and relationships and relationship management; which impact its competitive advantage (Choi, 2000).

One interesting notion by O’Dell and Grayson (1998) is that an organisation should start the benchmarking process from within before looking outside. This is because there are usually existing best practices within different parts of the same company. Companies waste time and money solving the same problems repeatedly that have been solved in other offices or locations of the same company (O’Dell and Grayson, 1998). This is where the KM system should play its role. Employees must be encouraged to search within the system before they look for external information. A company prospers when employees are able to build knowledge on knowledge, resulted in wisdom (Chong, 2006) However, it is worth
remembering that benchmark will only provide a short-term competitive advantage to the benchmarking organisation. It should be treated as a guideline for the organisation to search for improvements or breakthroughs, through the innovative and creative capacity of the organisational members (Drew, 1997; Day, 1998; Chong, 2006).

4.7 KM processes

A critical issue in implementing KM projects is the preliminary preparation of the organisation to accept, adopt, and utilize new KM processes (Walczak, 2005). A KM process refers to something that can be done with knowledge in the organisation (Johannsen, 2000). Before it can be managed, knowledge must first be created and applied in an organisation (Yahya and Goh, 2002). The KM process demands interaction and involvement of people, technology and information.

4.7.1 Process-based view to KM

The execution of KM processes lies at the heart of creating a successful knowledge-based enterprise (Wong and Aspinwall, 2005). Thus, it is important that organisations adopt a process-based view to KM.

KM is largely regarded as a process involving various activities (also called stages or phases). Slight discrepancies in the delineation of the processes appear in the literature, namely in terms of the number and labelling of processes rather than the underlying concepts (Alavi and Leidner, 2001). These KM processes may vary depending on the organisation and the industry sector (Oliver and Kandadi, 2006). At a minimum, one considers the four basic processes of creating, organising, transferring, and applying knowledge (Demarest, 1997; Beckman, 1999; Alavi and Leidner, 2001; Choi and Lee, 2002; Scholl et al., 2004). These major processes can be subdivided, for example, into creating internal knowledge, acquiring external knowledge, storing knowledge in documents versus storing in routines (Teece, 1998) as well as updating the knowledge and sharing knowledge internally and externally. It is agreed that successful
KM demands the consideration of the whole life cycle of knowledge processes: creation, storage, transfer and application (Scholl et al., 2004).

In practical terms, there are four phases of KM. First, the organisation should create and get access to new knowledge from inside and outside its boundaries, as a means of updating and renewing its knowledge base. Second, systems are needed to organise and codify the knowledge of individuals so that it can be used by others. Third, the organisation should encourage individuals to interact – to work together on projects, or to share their ideas on an informal basis. A key insight from the KM movement is that most valuable knowledge is tacit. If ways can be found for transferring that knowledge to others in the firm, either through personal interaction or by recording it explicitly, then that knowledge becomes an asset of the firm, and a key source of advantage. Fourth, the organisation needs to apply and use the knowledge of its individuals to solve problems and make decisions. Applying these concepts involves three sets of tools: IT systems, formal and informal structures (like communities of practice) and specific KM tools (like transfer of best practice) (Birkinshaw, 2001).

**4.7.2 Linking KM activities to business processes**

Appropriate interventions and mechanisms need to be in place in order to ensure that KM processes are addressed in a systematic and structured manner. For instance, in knowledge sharing, technological networking tools should be supplemented with face-to-face discussion because the latter can provide a richer medium for transferring knowledge. Coordination of the KM processes to be performed is also crucial (Holsapple and Joshi, 2000). In addition, they should incorporated into employees' daily work activities and integrated into business processes so that they become common practices in an organisation and allow seamless flow of knowledge in the business life (Bixler, 2002; Wong and Aspinwall, 2005; Oliver and Kandadi, 2006). Furthermore, operational processes must align with the KM framework and strategy, including all performance metrics and objectives. Moreover, organisational processes should be defined to address how knowledge within the organisation can be acquired and captured in the KM repositories in a timely manner (Chua and Lam, 2005).
However, to accommodate KM activities in the business processes it is suggested to make incremental process changes rather than complete reengineering (Oliver and Kandadi, 2006). Total process reengineering, for KM, is viewed as a time consuming and complex task that can derail the KM efforts. Therefore, a continuous and incremental approach is favoured, whereby the KM activities are gradually planted in the core business processes to institute knowledge culture throughout the organisation.

4.8 Knowledge structure and content

It is important for a successful KM project to have a standard and flexible knowledge structure and to continually update the knowledge content. These two factors will be discussed in the following sections.

4.8.1 Appropriate knowledge map or structure

Many researchers have identified knowledge maps (also called ontologies, taxonomies or structures) as one of the critical factor for successful KM implementation (Davenport et al., 1998; Liebowitz, 1999; Choi, 2000; Soliman and Spooner, 2000; Chua and Lam, 2005; Chong, 2006). Knowledge maps are actually classification that identify where knowledge resides and which knowledge needs to be shared with whom, how and why within and outside the organisation’s boundaries (Gupta et al., 2000). These maps need to cover all three areas of the intellectual capital (namely human, structural and customer capital) for both tacit and explicit knowledge (Soliman and Spooner, 2000). They provide the structure, terminology, and relationships in which to build the knowledge repositories (O'Leary, 1998). Organisations need to have these knowledge maps or ontologies defined to ensure standardization and integrity of the development of the repositories as well as to facilitate maintenance and controlled growth of these repositories (Liebowitz, 1999). Moreover, with more complex cross-functional knowledge repositories, it becomes critical to consolidate access to all sources and provide a clear map of the different ways to obtain codified knowledge (Trussler, 1998).
Knowledge is fuzzy and closely linked to the people who hold it, and its categories and meanings change frequently (Davenport et al., 1998). Thus, knowledge resists engineering. It is difficult to create a set of rules that covers even narrow knowledge domains, and then even more difficult to update and modify the structure (Davenport et al., 1998). However, if a knowledge repository has no structure, then it will be too difficult to extract knowledge from it. Organisations building a knowledge base or expert network must create some categories and key terms. Even if knowledge can be accumulated successfully, it could end up buried in mysterious places and difficult to find without a lot of bureaucracy and expert searching skills. This implies that significant effort needs to be spent on knowledge taxonomy and access channels, ensuring that people can find the right experts or materials in a hurry and receive guidance at the right level of detail (Trussler, 1998).

According to (Liebowitz, 1999), methods for building knowledge repositories using the knowledge maps can take several forms. These forms are combinations of active/passive knowledge collection versus active/passive knowledge analysis and dissemination. For example, passive collection and passive analysis/dissemination is in the form of using a knowledge repository as an archive which is consulted when needed - i.e. the workers enter their lessons learned and no analysis or dissemination of these lessons learned is actively done. Another approach is active collection but passive analysis/dissemination where the organisation is actively trying to create knowledge repository. Passive collection and active analysis/dissemination is called the knowledge publisher approach whereby the entering of lessons learned is left to the individual workers but there is a group which analyzes these lessons and sends them to appropriate individuals (who could benefit from these lessons) in the organisation. The last approach, called the knowledge pump, is active collection and active analysis/dissemination. The Center for US Army Lessons Learned applies this technique where web-based electronic observation forms are used and entered, and the Center analyzes the lesson learned and then sends it to appropriate individuals.

An important factor is the continual development of the knowledge map or structure. It is often useful to employ a thesaurus to connect the terms by which users search for knowledge to those used in categorizing it. At Teltech, for example, an extensive thesaurus of technical

If a knowledge repository has no structure, then it will be too difficult to extract knowledge from it.
terms allows browsing and searching of the expert network through terms that make sense to users (Davenport et al., 1998). Teltech employees capture the terms that users employ in searches, and add them to the thesaurus daily. Therefore, the structure of the knowledge is always changing with current usage. Any knowledge manager should be prepared to redefine the structure used in the knowledge base frequently.

Since organisations are striving to improve their bottom line, many of them have realized the importance of customers and suppliers are their sources of product and service innovation. Many organisations have in fact brought suppliers and customers into the organisation fold to share ideas for their product development and refinement decisions and to come up with new, innovative products and services. Organisations are striving to form strategic partnerships with customers so that the relationship becomes a long-term proposition (Bukowitz and Williams, 2000). Similarly, many suppliers have teamed up with the organisations to design products and services that meet customers’ expectations. In many occasions, many organisations have integrated backward to perform the functions of their suppliers through acquisitions. Knowing the importance of customers and suppliers, there must be a well-established knowledge structure, which includes knowledge about internal and external customers, suppliers as well as organisational work groups in order to implement KM successfully (Choi, 2000).

**4.8.2 Current and relevant content**

Organisational knowledge is continually created and then stored individually, in groups, on an organisational level and through inter-organisation with suppliers and customers. However, stored knowledge or the knowledge content has to be reliable, useful, accessible, in understandable format, up-to-date, relevant and timely (Trussler, 1998; Choi, 2000; Chua and Lam, 2005; Chong, 2006). Otherwise, knowledge content will not be applicable to problem solving and making appropriate decisions, which in turn render the KM project to be a failure.
4.9 Technical infrastructure

Another central aspect for KM project is the development of an appropriate technical infrastructure. A technical infrastructure is required to support the knowledge processes. In modern life, technological tools are becoming more and more available and important to capture, distribute and find knowledge. Particularly in organisations in which people have to communicate between different locations or at different times, technology becomes an important enabler. It requires that organisations think about their technical infrastructure, so that people can be connected to knowledge and other people as carriers of knowledge. The technology needs to be functional, easy to use and as much as possible standardised, so that networking can really take place.

4.9.1 Building effective ICT infrastructure

It is indisputable that one of the key enablers for implementing effective and efficient KM project is information and communication technologies ICTs (Bhatt, 2001; Moffett et al., 2003; Hung et al., 2005; Xu and Quaddus, 2005; Chong, 2006). Its capability has evolved from merely being a static archive of information to being a connector of a human to information and of one human to another. ICTs can enable rapid search, access and retrieval of information, and can support collaboration and communication between organisation’s employees (Wong, 2005). Moreover, it can provide an edge in harvesting knowledge (Bhatt, 2001) and provide the infrastructure needed to support network structures and organisational learning (Stonehouse and Pemberton, 1999). Furthermore, it makes it easier, faster and cheaper to identify and link development team members in order to share information and create knowledge to fulfil customers’ needs, wants and expectations (Cormican and O’Sullivan, 2003). As a matter of fact, Davenport et al. (1998) point out two most critical factors for the successful KM project, one is the establishment of a broad information systems infrastructure based on desktop computing and communications. The second is being the utilisation of the network technology infrastructure such as the Internet and Lotus Notes.

Two most critical factors for the successful KM project:
1. The establishment of a broad information systems infrastructure based on desktop computing and communications.
2. the utilisation of the network technology infrastructure such as the Internet and Lotus Notes.
systems for effective transfer of knowledge. Moreover, according to a survey by Covin and Stivers (1997), top executives of both Canadian Financial Post 300 firms and US Fortune 500 firms view information technology as one of the most critical success factors for KM success.

Despite initial fragmentation, technologies supporting KM are quickly evolving and converging, spurred by requirements of top global organisations, attention by consultants and integrators and efforts by pioneering vendors (Mantelman, 1999). Increasingly, organisations are using ICTs as strategic enablers of formal KM initiatives. These KM Systems (KMS) incorporate various technologies and tools to facilitate the creation, storage, transfer, and sharing of knowledge both within and outside the organisation’s boundaries (Davenport et al., 1998; Ruggles, 1998; Hlupic et al., 2002; Alavi et al., 2006). In fact, many organisations are already performing KM under the name of CRM, with large customer and product or service databases centred on content management that includes sharing, distribution, and utilisation of knowledge (Walczak, 2005). Figure 2 shows a possible model of knowledge management system architecture, as presented in (Lawton, 2001).

It is noteworthy to recognise that ICT is only a tool and enabler not an ultimate solution (Quaddus and Xu, 2005). Although IT solutions have a key role of supporting KM practices, management understanding of their possibilities and limits is also required (Fehér, 2003). As mentioned by King (1999), successful deployment of KM requires an organisation to think in terms of applications and how people use applications; not systems and software. It is not the technology itself that induces knowledge sharing, but rather a separate motivation to share knowledge (Chong, 2006).

Technology alone will not lead to a KM culture (Davenport and Prusak, 1998). However, a well-designed, standardized, fully implemented technical infrastructure for KM can improve information processing capabilities, knowledge discovery, project collaboration and rapid decision making within organisations. This in turn encourages a cultural shift, as stated by Lank (1997): “The organisations that are best at knowledge sharing are not necessarily those with the best technology infrastructure. But they do have a culture of teamwork and trust. If you

A well-designed, standardized, fully implemented technical infrastructure for KM can improve information processing capabilities, knowledge discovery, project collaboration and rapid decision making within organisations.
have that culture and put in tools to help knowledge flow quickly around the organisation, you have a hugely powerful combination”. Empirical research indicates that many organisations are finding it hard to change their practices and structures when they want to incorporate IT into existing organisational structure, especially in motivating the employees to contribute and share knowledge (Chong et al., 2000)). Human’s motive and willingness to engage in KM activities are the underlying factors that dictate the actual IT usage (Yahya and Goh, 2002). In addition, IT is weak in information interpretation and high level communication (Bhatt, 2001). Information interpretation is the cornerstone for knowledge creation, while high level communication (i.e. face-to-face communication) is rich in transfer of knowledge and information between individuals.

Two important areas have accelerated the emergence of modern KMS: networking technologies and computer databases (Ives et al., 1998; Civi, 2000). Computer databases store enormous amounts of information and codified knowledge. While, networking technologies enable the movement of information, first within an office on a local area network (LAN),
then across the world on wide area networks (WAN) and the networks that linked LANs and WANs together, including the virtually ubiquitous Internet. The merge of these two electronic technologies has made it possible to codify, store and share certain kinds of knowledge easier and cheaper than ever before.

### 4.9.2 Integration with current information systems

As a first step in developing the appropriate technological infrastructure, Chua and Lam (2005) suggest that a technical individual should be appointed to the KM project team who is able to formulate a clear vision of how the technology will be used. A justification for the technology should be given to ensure that it is aligned to the goals of the KM project at large (Soliman and Spooner, 2000). As part of this, the total cost of ownership (TOC) should be calculated so that excessive technology spending can be curbed and the best-value solutions for the organisation can be determined (Bixler, 2002). Any technical solution must add value to the KM processes and achieve measurable improvements (Davenport et al., 1998). Prototypes and preliminary testing should be conducted early on in the project to identify potential usability, reliability and scalability problems (Lam and Chua, 2005). Such tests should be conducted before commitment to any particular choice of tool or vendor product is given. Moreover, it is necessary to review existing architecture, infrastructure and IT systems for KM applicability to avoid unnecessary costs (Tiwana, 2000; Bixler, 2002; Chong, 2006).

### 4.9.3 Effective use of software tools

There are many tools and technologies currently being used to manage knowledge. Some organisations are concerned mainly with storing explicit knowledge and others are attempting to capture tacit knowledge through the use of expert systems and artificial intelligence (Stonehouse and Pemberton, 1999). Knowledge-based systems (KBS) perform knowledge processing based on expert systems or deductive databases to help users find acceptable solutions to problems (Basu, 1998). This approach allows firms to capture knowledge by culling it from experts. Limitations to implementation include the need to overcome cultural barriers related to giving up information and relatively high expenses.
Most KMS have evolved from pre-existing applications for managing documents, databases, workgroups and customers. Most explicit knowledge lives in documents, Web or PC files, paper or scanned images. Smart systems do more than track or store information. They help organisations manage content in the context of what people know and need to know (Mantelman, 1999). Knowledge capture and refinement capabilities through electronic dialogue are potentially greatly increased, along with the enhancements in knowledge distribution. Other important developments included the creation of hyper links and the Web. Now, the technologies that underlie KMS usually consist of some sort of electronic network supporting groupware or Web technologies, or some combination thereof, along with electronic mail (Bollinger and Smith, 2001). Software tools are available which let people build communities and take part in virtual teams; brainstorm, develop, present and deliver knowledge; share documents or applications; discuss and manage projects; and coordinate activities (Mantelman, 1999).

It should be noted that there is no “one-size-fits-all” solution for KM although some software products are represented in that manner. KMS are very different for different organisations, depending on firm culture, experience and future vision (Chong, 2006). It is necessary to carefully craft the right mix of tools that suit an organisation’s needs.

There is evidence that use of such KMS tools leads to enhanced communications and increased levels of participation among staff members, efficiencies in problem solving and time-to-market, improved financial performance, better marketing practices, continuous improvement and growth through innovation and improved project team performance (Alavi and Leidner, 1999; Moffett et al., 2003). The media and channels of communication that assist in the creation, storage, sharing and transfer of knowledge are an integral part of building the intelligent organisation (Stonehouse and Pemberton, 1999). By providing the right information, to the right people at the right time, KM technologies and software applications enable organisations to design dynamic operational processes and make effective use of their human resources (Malhotra, 1997). However, the effective deployment of KM requires an investment in KMS and technologies, and an organisational commitment to continuous use (Shankar et al., 2003).
There is a broad collection of software tools and information technologies that supports KM which can be applied and integrated into an organisation's technological infrastructure. According to Tyndale (2002) they can be grouped into one or more of the following categories: intranet and Web portals, content management, search and information retrieval engines, business intelligence, relational and object databases, groupware and workflow systems, collaboration, data mining, electronic and publishing systems, customer relationship management (CRM), data warehousing, push technologies, agents, and knowledge creation applications. (Luan and Serban, 2002) add two more groups namely: knowledge base and e-learning tools.

Despres and Chauvel (1999) report that knowledge bases (repositories) and intranets are the most popular ways of implementing KMS. On the other hand, Ruggles (1998) states that creating an intranet, data warehousing and creating knowledge repositories, and implementing groupware to support the practices and information systems architecture currently employed by the organisation. Moreover, many organisations have established extranets with their customers, suppliers and partners, with whom they may exchange strategic knowledge and achieve mutually beneficial objectives (King, 1999; Cormican and O'Sullivan, 2003). Furthermore, KM practitioners consider developing a database of best practices and lessons learned as the starting point for KMS implementation (Bixler, 2002). A good example is being carried out by the Royal Mail, whereby best practices are documented to act as a base for internal transfer of knowledge (Zairi and Whymark, 2000). In addition, Leonard (1995) notes that knowledge mapping technologies allow an organisation to track its sources of internal and external knowledge so that individuals in need of a specific type of knowledge know where it resides.

Important factors that need to be considered in the development of a KM system include simplicity of technology (Chua and Lam, 2005), ease of use and friendly interface (Liebowitz, 1999), suitability to users' needs (King, 1999), reliability (no failure) (Bixler, 2002; Lam and Chua, 2005), relevancy of knowledge content (Bixler, 2002; Wong and Aspinwall, 2005), security (Bixler, 2002) and standardisation of a knowledge structure or ontology (Wong,
Important factors that need to be considered in the development of a KM system include simplicity of technology, ease of use and friendly interface, suitability to users’ needs, reliability, relevancy of knowledge content, security and standardisation of a knowledge structure or ontology.

2005). Moreover, accessibility and portability of KM systems is crucial to effective enterprise KM (Bixler, 2002). Getting not only the right knowledge to the right people is important, but also to the right place and at the right time. Furthermore, the technical infrastructure should support the required volume of users and allow expansion of the knowledge base (scalability), since high loads on the system may affect performance and system responsiveness. In addition, maintenance cost for these systems should be reasonable (Bixler, 2002).

Knowledge bases that require a great deal of upkeep may tend to fall into disuse and decay due to obsolete information (Chua and Lam, 2005). Also, information taken out of context can be misleading and misinterpreted (Shum, 1997). Sometimes, too much information is available, and people are unable to assimilate it due to sheer volume and lack of appropriate tools. This results in information overload, frustration and demoralisation. If workers do not see the benefits of the application, they will not use it (King, 1999; Bollinger and Smith, 2001).

5 Summary

The aim of this report is to give the reader a wide overview of the literature related to KM implementation. It covered in-depth the suggested CSFs found in the literature related to KM implementation.

The CSFs of KM implementation were classified into nine dimensions each with its own factors namely: top management competent, championship and evangelisation factors (such as KM champions and leaders, communication and KM strategy), culture factors (such as trust and openness), organisational infrastructure factors (such as establishing KM roles and teams), HRM (such as employee empowerment and reward systems), continuous improvement factors (such as KM performance measurement and benchmarking ), content and structure, and technical infrastructure.
These factors culminate in a holistic model for KM implementation that was proposed in this report. This model aims to cover the important features of KM synthesis and consequently can provide organisations with a guideline for implementation. Adhering to these factors in the proposed model will ensure a smooth implementation and allow the organisation to have a maximum benefits from KM project.
6 References


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