A Theoretical Framework for Knowledge Management Implementation

NAKKIRAN N SUNASSEE AND DAVID A SEWRY
Rhodes University

This paper outlines ongoing research in the area of knowledge management implementation strategies. An investigation of the literature reveals that when organisations initiate a knowledge management effort, most of them tend to over-emphasise the role of information technology at the expense of the human factor. A preliminary survey of local organisations using Duffy's Knowledge Management Benchmarking Questionnaire confirms these findings. This paper then proposes a framework that will address the shortcomings in current knowledge management implementation strategies. The framework consists of three main interlinked components: Knowledge Management of the Organisation, People, and Infrastructure and Processes. The framework focuses on the importance of aligning the knowledge management strategy of the organisation with the overall business strategy of the organisation. The culture and managing the culture change when implementing knowledge management are also dealt with. Furthermore, the framework recommends a holistic approach to managing knowledge.

Categories and Subject Descriptors: H3.5 [**Information Systems**]: Online Information Services – *Data Sharing*; K4.3 [**Computers and Society**]: Organisational Impacts - *Computer-supported collaborative work;* K6.1 [**Management of Computing and Information Systems**]: Project and People Management - *Strategic Information Systems Planning*

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1. INTRODUCTION

The world is experiencing an era which has been termed the "knowledge age" or the "knowledge economy". In this new context, knowledge is the primary commodity, and knowledge flows are regarded as the most important factors in the economy. Since rapid technological innovations are quickly bridging the gap between competing companies, there has been a trend in the industry to regard the collective knowledge of the employees as the key factor in producing innovative and competitive products. This is illustrated by M H Zack [1999a], who states that "business organisations are coming to view knowledge as their most valuable and strategic resource." Ikujiro Nonaka [1998] agrees, saying that "in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge." This change of focus forces organisations to re-think the way they manage their business since the focus is no longer on tangible assets but on people's abilities and experience.

The collective knowledge of employees has become such a critical resource to the organisation that managers need to know how to manage that "intellectual capital". J Liebowitz [2000] argues that "most managers feel that the critical asset that separates their organisation from their competitors is the knowledge assets or intellectual capital of their employees." Managing this intangible asset involves a change in mindset, since previously managers did not encourage dissemination and sharing of knowledge amongst employees. This management of knowledge within organisations has become more and more crucial because many activities of organisations and of the broader economic and social life today are knowledge-driven. In recent years, this managerial activity has been known as Knowledge Management (KM).

This paper represents an interim report on research currently being undertaken in the area of knowledge management with reference to the South African motor vehicle manufacturing industry. Firstly, the research aim and research problem are introduced. Secondly, the terms knowledge and knowledge management are discussed, followed by a summary of the findings of the literature survey. A theoretical framework based on the findings of the literature and the survey is then put forward. Finally, a brief outline of the future progress of the research is presented.

Author Addresses:
N. Sunassee, Department of Information Systems, Rhodes University, PO Box 94, Grahamstown, 6140, South Africa; N.Sunassee@ru.ac.za
D. Sewry, Department of Information Systems, Rhodes University, PO Box 94, Grahamstown, 6140, South Africa; D.Sewry@ru.ac.za

2. AIM OF THE RESEARCH

There is an indisputable need for knowledge management practices in the workplace to enable managers to promote the sharing of knowledge and allow the organisation to acquire and retain intellectual capital. The motor vehicle manufacturing industry, for example, is highly competitive and innovative, with ever-changing customer needs and technology. Motor vehicle manufacturing companies need the organisation to be rich with information and knowledge to make confident and timely decisions to succeed [Miller, 1999].

This is evident in the case of the Ford Motor Company, where knowledge used in the design stage of a typical car impacts up to 90% of that car's final cost, although the design itself only impacts 5% of the final cost of the car [Tiwana, 2000]. The importance of managing the knowledge in the organisation is again illustrated at Ford, when after the record-breaking bestseller sedan, the Taurus, was built, management wanted to know what made that particular car such a success. Unfortunately, there were no records anywhere in the organisation which documented the Taurus project, and this knowledge was lost forever, preventing Ford from replicating the success of the Taurus [Tiwana, 2000].

There is evidence that the formal procedures and strategies, technology and metrics that are in place in the motor vehicle manufacturing sector in South Africa are not very successful [Sunassee, 2001]. Hence, amongst other things, there is a need for implementation strategies for KM that ensures the success of the knowledge management initiative and of the business itself.

This research aims to develop a knowledge management implementation strategy for a motor vehicle manufacturing company to acquire, develop, enhance & retain knowledge in the organisation.

3. KNOWLEDGE AND KNOWLEDGE MANAGEMENT

Karl Wiig [1996] defines knowledge as "the insights, understandings, and practical know-how that we all possess -- is the fundamental resource that allows us to function intelligently." There are two types of knowledge: tacit knowledge and explicit knowledge, as supported by Duffy [1999], Nonaka [1998], Tiwana [2000], Zack [1999b]. Tacit knowledge is the form of knowledge that is subconsciously understood and applied, difficult to articulate, developed from direct experience and action and usually shared through highly interactive conversation, storytelling and shared experience. Explicit knowledge, on the other hand, is easy to articulate, capture and distribute in different formats, since it is formal and systematic.

For the purposes of this paper, the author regards knowledge as the human expertise stored in a person's mind, gained through experience, and interaction with the person's environment. Knowledge is also highly subjective, depending on a number of factors such as culture, beliefs, values, insights, intuitions and emotions of the individual. Furthermore, it is contended that as knowledge is shared and disseminated throughout the organisation, it increases in value, as argued by Davenport et al. [1998], Sveiby [2000a], Tiwana [2000], Zack [1999a], Zack [1999c].

N Duffy [1999] defines knowledge management as "the identification, growth and effective application of an organisation's critical knowledge." However, Hirotaka Takeuchi proposes a contradictory view on Knowledge Management which advocates less control over employees and involving everyone in the organisation to create and share knowledge, which in turn fuels the organisation's innovative strategy. This different philosophy is shared by Sveiby [2000b] who argues that knowledge is not something that can be "managed", and that the term to be "Knowledge Focused" is preferable. Sveiby [2000c] also states that knowledge focussed managers do not manage knowledge, since this is impossible, but the environment in which knowledge is created.

The author adopts the view of Duffy [1999] and, including some of Takeuchi's [1998] and Sveiby's [2000b] arguments, proposes that knowledge management is the process of identifying, growing and effectively applying an organisation's existing knowledge in order to achieve the organisation's goals, while creating an organisational culture that permits further knowledge creation.

4. KNOWLEDGE MANAGEMENT IMPLEMENTATION STRATEGIES

A business strategy can be defined as a high-level, flexible plan that oversees the birth and development of a business initiative. To ensure the success of the business objectives, any subsequent business development within the organisation must be aimed at furthering the goals of the organisation. A Knowledge Management implementation strategy must be a function of the business strategy, or else the KM initiative will fail to accomplish goals that are tangible to the organisation. 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 to the overall business strategy, and must produce a tangible result to the organisation as a whole. For example, Zack [1999a] states that a knowledge management strategy expresses the overall approach a company intends to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy.

Hubert Saint-Onge states that a knowledge management strategy provides the framework within which his organisation manages new initiatives aimed at leveraging the intangible assets of the organisation Chatzkel [2000]. Furthermore, the strategy outlines the processes, the tools and infrastructure required for knowledge to flow effectively

[Chatzkel, 2000]. The author regards this definition to be that of a Knowledge Management implementation strategy, in that it goes in more detail than a high-level plan.

5. FINDINGS OF THE LITERATURE SURVEY

In their framework for analysing knowledge management strategies, R Rubenstein-Montano, J Liebowitz, J Buchwalter and D McGaw [2000] argue that most approaches to knowledge management do not adequately satisfy the knowledge management needs of organisations, and that there is a lack of cohesiveness across the various approaches. In this respect, they [Rubenstein-Montano et al., 2000] recommend that all knowledge management approaches submit to the systems thinking method, which will provide the ability to view complex processes and hence respond to the needs of the organisation [Chatzkel, 2000].

Furthermore they [Rubenstein-Montano et al., 2000] classify knowledge management frameworks in three categories: descriptive, prescriptive, and hybrid. Prescriptive frameworks provide direction on the types of knowledge management procedures without providing specific details of how there procedures can or should be carried out. Descriptive approaches describe knowledge management, and identify attributes of knowledge management that can influence the success or failure of the initiative. Finally, hybrid approaches are a mixture of both the prescriptive and the descriptive approaches.

Rubenstein-Montano, *et al* [2000] also recommend that a knowledge management framework should adhere to the following:

- Be both prescriptive and descriptive
- Be consistent with systems thinking
- The organisational goals and strategies must be linked to knowledge management
- Planning should take place before any knowledge management activities
- The cultural aspects of the organisation must be acknowledged and the knowledge management practices must be compatible with that culture.
- Knowledge management must be directed by learning and feedback loops, both single and double.

The analysis of eleven current knowledge management frameworks reveals that six can be classified as descriptive ones [Mentzas et al., 1998], [Carlson, 1999], [Beijerse, 1999], [Skyrme, 1998], [Skyrme, 1999], [Weidner, 2000], [Bhatt, 2000]; four as prescriptive [Van Der Spek et al., 1994], [Wiig, 1999d], [Macintosh, 1999], [Liebowitz, 2000]; and one as a hybrid framework [U.S. Army, 1999].

Upon analysing these frameworks, three main characteristics were observed. Firstly, the analysis revealed that the prescriptive frameworks do not place any emphasis on the alignment of the knowledge management strategy with the organisational strategy [Van Der Spek et al., 1994], [Wiig, 1999d], [Macintosh, 1999], [Liebowitz, 2000], whereas all but one of the descriptive frameworks ones [Mentzas et al., 1998], [Carlson, 1999], [Beijerse, 1999], [Skyrme, 1998], [Skyrme, 1999], [Weidner, 2000], and the hybrid framework [U.S. Army, 1999] do. This is in line with what other authors agree upon: that a knowledge management strategy should be closely aligned with the overall business strategy, and provide the organisation with a competitive and innovative edge [Chatzkel, 2000], [Duffy, 1999], [Jooste, 1999], [King, 2001], [Seeley, 2000], [Tiwana, 2000], [Wiig, 1999b].

Secondly, most of the descriptive frameworks [Carlson, 1999], [Beijerse, 1999], [Skyrme, 1998], [Skyrme, 1999], [Weidner, 2000], [Bhatt, 2000] and the hybrid framework [U.S. Army, 1999] also emphasise the importance of people and their contribution towards the knowledge management effort, whereas only one of the prescriptive frameworks does [Van Der Spek et al., 1994]. This is similar to what the rest of the literature suggests [Andrews, 2000], [Holland, 1998], [Tiwana, 2000], [Van Der Westhuizen, 1999].

Thirdly, in six of the frameworks analysed, the focus on technology was distinctly disproportionate to the focus on the employees of the organisation [Van Der Spek et al., 1994], [Mentzas et al., 1998], [Macintosh, 1999], [Beijerse, 1999], [Weidner, 2000]. Only in three of the frameworks was the emphasis strong on both the technological and human factors [Carlson, 1999], [Skyrme, 1998], [Skyrme, 1999], [U.S. Army, 1999]. In the remaining frameworks, there was no mention at all of these factors [Wiig, 1999d], and weak emphasis on both [Liebowitz, 2000]. This is also reflected in the rest of the literature, which reveals that there seems to be an emphasis on acquiring and using technology rather than to manage people [Holland, 1998], [Malhotra, 2000], [Moore, 2000], [Tiwana, 2000], [Zack, 1999a].

The literature also reveals that most Western managers and organisations have tended to choose an IT-Centric-Top-Down approach, but Nonaka [1998], Sveiby [2000b] and Takeuchi [1998] argue that what succeeds is a people-centric approach, from the bottom-up, but properly encouraged and supervised from top management. Finally, some of the authors reviewed also argue that KM strategies are unique to the organisations which devise them [Tiwana, 2000], [Zack, 1999a].

These findings are confirmed by the responses obtained from the six leading motor-vehicle manufacturing companies in South Africa, in response to Duffy's Knowledge Benchmarking Questionnaire [Duffy, 1999], administered by the author [Sunassee, 2001].

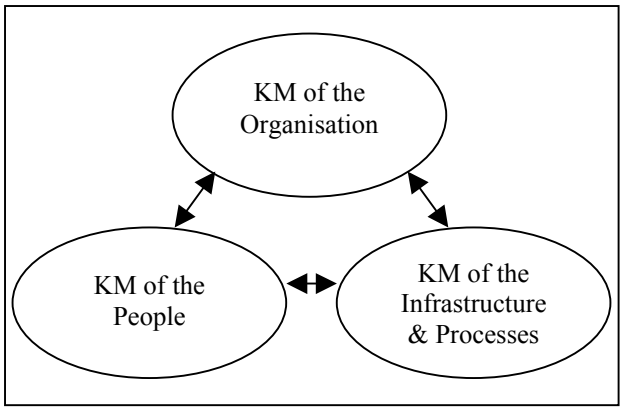

Figure 1

An analysis of the responses of the companies surveyed indicates that they attribute more importance to the Information Technology factor than to the human factor when it comes to Knowledge Management. There is also an indication that there is more consensus across the companies with respect to IT than with respect to how important people are to the organisation [Sunassee, 2001]. In this light, the literature recommends that knowledge management initiatives should focus more on people and not on technology if they are to succeed [Andrews, 2000], [Holland, 1998], [Nonaka, 1998], [Takeuchi, 1998], [Tiwana, 2000], [Wiig, 1999b]. The author subscribes to this point of view.

The survey also revealed that the industry regards Knowledge Management as being very important for their organisation. For example, the industry regards knowledge-based products or services as being key in the organisation. The companies surveyed also regard having a formal knowledge strategy and a formal knowledge plan to be very important. However, it is also clear that they are not achieving what they set out to do. For example, the responses indicate that the organisations are not doing very well with the implementation of their knowledge strategy. Furthermore, they indicate that their knowledge plan is also not achieving its intended goals. Finally, there is also an indication that the employees and more importantly, top management are not very committed to the knowledge management initiative [Sunassee, 2001].

6. PROPOSED FRAMEWORK

Based on the literature survey and the survey conducted in the motor vehicle industry, and on the recommendations of Rubenstein-Montano, *et al.*[2000], the author has constructed a framework which addresses the shortcomings of the current models. The proposed framework consists of three main interlinked components: Knowledge Management of the Organisation, Knowledge Management of the People, and Knowledge Management of the Infrastructure and Processes. The organisation needs to achieve a balance between these three subsystems in order to achieve a successful knowledge management effort.

The emphasis in this model is on the importance of aligning the knowledge management strategy of the organisation to the overall business strategy of the organisation. The culture and managing the culture change when implementing knowledge management are also of utmost importance. The author proposes a holistic approach to managing knowledge by including some external factors in the process. The concept of organisational learning is also catered for in this framework.

The focus should be on the importance of the employees of the organisation, and their contribution towards a successful knowledge management effort. There should also be a concerted effort to make people feel part of the change when implementing knowledge management. The organisation should also encourage individual learning, and innovative thinking with employees, and reward those that do produce such results.

Finally, the infrastructure and business processes of the organisation cannot be neglected when implementing knowledge management. The author highlights the importance of hardware and software that will facilitate employees to share and disseminate knowledge throughout the organisation. The business processes are also mentioned as they need to allow for formal as well as informal sharing and use of knowledge within the workplace. The framework is illustrated in Figure 1:

6.1 Knowledge Management of the Organisation

The Knowledge Management of the Organisation component deals with the overall activities that need to be performed in the organisation during the knowledge management effort. At this level, the organisation needs to carry out the following key high-level activities:

1. Perform a knowledge-based SWOT analysis.
2. Create a vision for the KM initiative & providing a Leader

3. Align the KM effort with the business strategy
4. Plan & Design the KM project (set goals & objectives)
5. Manage the organisational culture and manage change(s)
6. Manage with a holistic approach, including:
   - Stakeholders
   - Competitors
   - Business Environment
   - Overall Environment
7. Create & Manage organisational learning

6.1.1 Perform a knowledge-based SWOT analysis

The author recommends following Zack's [1999a] and Tiwana's [2000] recommendations that using the SWOT framework to identify the organisation's knowledge gap and help it define its knowledge strategy is the best way to achieve a clear strategy for the business.

It is important to identify the knowledge gaps in terms of the two forms of knowledge, tacit and explicit knowledge. The author argues that it is tacit knowledge that really gives an organisation its competitive edge. Hence, by filling these knowledge gaps, the organisation will be in a better position to compete in an innovative way.

It is also very important that the knowledge-based SWOT analysis is consistent with systems thinking. This means that the organisation should be considered to be a system, with sub-systems and interactions between these sub-systems. Therefore, any knowledge gap in the organisation should be analysed on the overall picture, and also on the sub-system and interaction level. This will ensure that the KM initiative is consistent with systems thinking.

6.1.2 Create a vision for the KM initiative & providing a Leader

It is argued that top management needs to create and share a vision for the knowledge management initiative. The vision is the long-term strategy that will drive the knowledge management initiative and provide the scope within which the knowledge management effort and the organisation will grow. The vision should also encompass the core beliefs and values of the organisation.

A very important aspect of the vision is a working definition of knowledge and knowledge management for the organisation. This will help employees better understand what they are being asked to contribute to the knowledge management effort, and help bring about knowledge sharing in the organisation.

The creation of the vision can be done in two ways. Top management can either appoint a chief knowledge officer (CKO), who will create the vision, or they can create a vision and entrust the CKO to carry it out. It is extremely important at this point that the employees of the organisation are allowed to share in the making of vision of the organisation. This will create a sense of belonging for the employees, and allow them to participate in the change process. It will also make them accept the change process more readily than if they were not allowed to participate in it. This process will ideally result in a vision statement where top management's aspirations as well as the workers' aspirations are met.

The leader of the knowledge management effort should ideally be the chief executive officer (CEO). This will send a clear message to the employees that the organisation is serious about KM, and will provide the commitment from top management for the knowledge management initiative. In particular, the knowledge leader should act as a role model for sharing and disseminating knowledge in the organisation and should be seen doing so.

The main responsibilities of the CKO as a leader should be to help integrate the three levels of knowledge management, namely the organisation, the people and the processes and infrastructure. The CKO should help bring down barriers to knowledge sharing and distributing, and the hierarchy that exists in the organisation.

6.1.3 Align the KM effort with the business strategy

It is crucial that the KM effort is not a project that is undertaken on its own without any link to the overall business strategy. The literature consistently emphasises the importance of the link between the business strategy and knowledge management, and the author agrees on this point.

The author refers to Tiwana [2000] to illustrate how the organisation can derive this linkage, as illustrated in Figure 2. :

By looking at the strategic gap, the organisation will discover the difference in what it wants to do and what it can do, and by looking at its knowledge gap, it will determine the difference between what it knows and what it needs to know in order to carry out its strategy. Explicating this link between what it must know and what it can do is extremely important, since it will determine how the organisation aligns the knowledge management strategy to the business strategy.

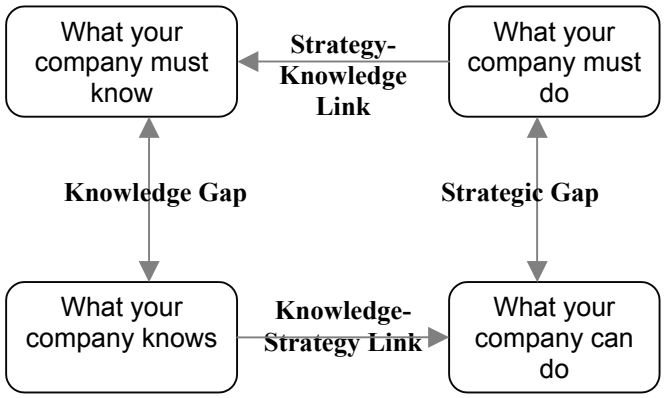

Figure 2

The most basic component of the knowledge strategy of any organisation is to determine the tacit and explicit knowledge gaps that will provide it with a competitive edge. Furthermore, as part of aligning knowledge management strategy to the business strategy, the organisation must also look at its tangible and knowledge resources and clearly define how these resources will be put to use in order to achieve the goals of the KM effort.

The KM strategy of the organisation should take into consideration its organisational culture. The literature contains numerous examples where knowledge management initiatives have failed in organisations because their approach was incompatible with their culture. Also, in keeping the knowledge management effort consistent with systems thinking, the organisation must extend the knowledge strategy to the sub-systems of the organisation.

6.1.4 Plan & Design the KM project

The knowledge effort of the organisation should start with a pilot project. Once the pilot project is complete, the CKO can review its effectiveness, and then decide how the knowledge initiative should be implemented in the rest of the organisation. The CKO must make sure that the pilot project(s) is started in an area(s) where there is already an inclination towards or an understanding of knowledge management. This will ensure that the people are enthusiastic about trying something new and achieving results in the project. By achieving visible results in the pilot project(s), the CKO will encourage other people in the organisation to learn how they can use KM to perform better and that sharing and distributing knowledge does benefit everyone. The pilot project itself can take three different approaches: organisational-wide, departmental- or unit-wide, or a mixture of both.

Once a method of implementation is chosen, the CKO needs to plan and design the roll out of the project. The author proposes that the initial pilot project should be implemented as any other project, with deadlines, budget considerations and reward incentives. This will ensure that the employees take this project seriously, and participate fully towards the goals of the project. It is very important that the CKO sets reasonable and attainable goals and objectives for the test project, otherwise the employees participating in the project will become disillusioned with knowledge management and the advertised benefits of sharing knowledge. The objectives and goals of the test project should be attainable in a period of six to twelve months, in order for people to be able to see the benefits of knowledge management, and become convinced of its usefulness.

The CKO should also involve employees on the planning and design of the pilot project. This will ensure that they will support the pilot project, and also help the CKO in setting reasonable objectives and benchmarks. The CKO should then initiate the project. After the test project has been completed, the CKO should then re-evaluate the effectiveness of the goals and objectives of the project, and if need be, modify the goals and objectives for the full implementation of KM in the organisation, after consultation with the employees who participated in the pilot project(s).

6.1.5 Manage the organisational culture and manage change

The CKO has the very important task of managing the change in organisational culture that implementing knowledge management demands. It should be taken into consideration that the change in culture will take a long time to happen. The literature abounds with case studies of organisations where knowledge management initiatives have failed because of improper management of culture. Therefore, the author recommends that the objective of the change is not to change the organisational culture drastically, but to modify the behaviour of people in a way that suits the demands of knowledge management in the context of the organisation, in the same way that the KM strategy needs to be compatible with the organisational culture. It should also be noted that the literature supports the view that there is no right way of doing knowledge management, and that whatever means that suit the organisation should be used.

The author argues that the most important factors in managing the change in culture are: a shared vision by employees and management, support and commitment from top management, trust between employees and management, communication and acceptable reward incentives. Hence, it is important that top management initiate the process, and provide support for the rest of the organisation.

The author recommends that one way to bring about a change in culture effectively is to educate people continually about knowledge management, and inform them of what is required of them. The employees should also be involved in determining what needs to change, and how to change it. This will ensure their support in the knowledge management initiative. The implementation of suitable reward schemes is also of utmost importance.

Finally, the CKO should put into place formal structures and processes that will deal with the various organisational changes that will take place during the implementation of the knowledge management initiative. It is important to remember that knowledge management is not a once-off project, but an incremental process, whereby change is constantly challenging the organisation and its people.

6.1.6 Manage with a holistic approach

The author argues that a knowledge management effort should not take place with the organisation focusing only on itself. Based on Skyrme's [1998] Knowledge Layers in his Knowledge Strategy, the author proposes four environmental factors which also need to be managed by the CKO and the organisation within its context of managing knowledge. These factors are :

8. Stakeholders
9. Competitors
10. Business Environment
11. Overall Environment

Firstly, the organisation must take into consideration its customers and their needs and knowledge needs. By acquiring knowledge about the customers and sharing knowledge with the customers, the organisation will be in a position to analyse trends with customers as well as with the market. This will provide the organisation with the opportunity to become proactive in meeting customer needs, generating new opportunities for business.

It is also important that the organisation carry out the same process with its suppliers. By creating a flow of knowledge between the organisation and its suppliers, the organisation should be in a position to forecast its supply needs in terms of the trends it has identified in the market. This will allow the business to take a proactive stance when it comes to securing its supplies.

Thirdly, the organisation needs to pay attention to its shareholders, and their views on the operations of the organisation. This will ensure that shareholders know what the organisation is doing, and will feel a sense of belonging with the organisation.

The author argues that the contribution of the employees in a knowledge management effort is invaluable to any organisation. In this respect, the organisation should create and improve the knowledge flows between its employees and management. This will provide the opportunities for employees to share their valuable knowledge with management, and participate fully in the knowledge management effort.

It is also important for the organisation to look at what its competitors are doing, and to collect and analyse knowledge about them.

The organisation does not operate in a vacuum. It is therefore very important that it performs an assessment of its business environment in terms of the knowledge that it needs in order to remain competitive and innovative.

The organisation should also not lose sight of the overall environment in which it operates. It is important that the organisation analyses knowledge about governmental regulations, global market trends, social and political trends, technological trends, and finally community demands.

6.1.7 Create & Manage organisational learning

The author proposes a 'knowledge life-cycle' in order to create and maintain individual and organisational learning in the organisation:

1. Create New Knowledge
   - 1.1 Identify new knowledge
   - 1.2 Identify old & existing knowledge
2. Identify Knowledge relevant to organisation
3. Verify selected Knowledge
4. Capture & Organise Knowledge
5. Disseminate & Use Knowledge
6. Combine new knowledge and re-evaluate assumptions to Create Knowledge

Firstly, knowledge needs to be created for the organisation, based on a selection of the internal and external knowledge needed by the organisation. Furthermore, the organisation also needs to identify old and existing knowledge as well as any new knowledge which it might need during the course of the knowledge management effort, and for the

business in general. It is important at this stage to identify which knowledge is explicit and which knowledge is tacit in nature.

The next step in the cycle is to identify which knowledge is relevant to the organisation in terms of its knowledge management strategy and its business strategy. It is also important that the knowledge which has been selected to be included in the repository is verified, in terms of its relevancy and importance to the organisation. The next step is to capture that knowledge, and organise it in relevant sections.

However, the author warns of classifying knowledge only according to traditional ways, such as content. Novins & Armstrong [1997] argue that knowledge could also be classified in terms of its users, applicability, transferability, richness, age and reliability.

The CKO should also encourage people to disseminate that knowledge, and to use it. The last step of the cycle is a double-loop learning feedback. This step involves re-evaluating assumptions held by the organisation and using these new assumptions with the knowledge created by the organisation to create new knowledge. The author argues that this process will generate innovative knowledge and allow the organisation to produce innovative products and business processes.

6.2 Knowledge Management of the People

At the Knowledge Management of the People level, the focus is on managing people, their behaviour, their expectations, and their potential to contribute to the success of the knowledge management effort. There should also be a concerted effort to encourage employees to share and use knowledge in the workplace, and to reward people who do so. The framework proposes the following activities to achieve this:

1. Manage people as individuals
2. Encourage Sharing and Use of Knowledge
3. Encourage Individual Learning and Innovative Thinking
4. Implement reward plans and incentives to promote above

6.2.1 Manage People as Individuals

It is important that management recognise that organisational learning can only take place through individual learning. Hence it is important that the employees in the organisation are treated as individuals and that management considers each person's opinion and input. This will ensure that employees feel that they are important and will reinforce the fact that they are more willing to accept change if they are part of that change. Furthermore, this might produce some innovative thinking from employees in terms of business processes and product development.

6.2.2 Encourage Sharing and Use of Knowledge

The CKO should be responsible for putting into place the appropriate structures and processes so that people are motivated to share and use knowledge in the workplace. The CKO will have to use his leadership skills to demonstrate convincingly that people who divulge what they know will not be retrenched, as traditional organisational values would predict.

The CKO needs to establish both 'pull' and 'push' factors to force employees to share knowledge. An example of a push factor would be to force employees to search through the knowledge repository before starting a project or a business venture.

McDermott & O'Dell [2001] propose three ways by which to make sharing knowledge an important factor in their business:

1. Make sharing knowledge a direct part of the business strategy
2. 'Piggyback' sharing knowledge onto other business initiatives
3. Share knowledge commonly as part of normal work

These practices have proved their worth in companies which have adopted them [McDermott et al., 2001], and the author recommends using these methods to encourage people to share and use knowledge in the workplace.

At this point, a very important distinction should be made between the two forms of knowledge, tacit and explicit knowledge. These two forms of knowledge need to be managed differently, since tacit knowledge is embedded inside the minds of people, and need to be shared with the rest of the organisation.

6.2.3 Encourage Individual Learning and Innovative Thinking

The CKO should encourage individual learning in the organisation. This can be done in a variety of ways, the easiest of which would be to demonstrate how sharing knowledge with other employees and learning from them can result in improved products and services and time and cost reduction. The CKO can also organise a number of formal activities aimed at creating the environment necessary to share and learn. The use of cross-functional knowledge teams is also recommended, since they create knowledge flows between different departments and help to transfer tacit knowledge throughout the organisation.

The CKO should also implement the notion of double-loop feedback in the form of challenging assumptions in conjunction with new knowledge. Furthermore, by allowing individuals and teams to learn and to contribute to the overall effectiveness of the organisation, the CKO will ensure that employees will be more willing to be a part of the change process of knowledge management.

6.2.4 Implement Reward Plans and Incentives

Another very important part of managing employees in a knowledge management paradigm is the reward plan and the incentives. Unlike traditional reward schemes, where the emphasis is on monetary value, the literature recommends a departure from this norm. The author recommends that the CKO implement a scheme where awards and monetary rewards are both awarded to employees who contribute. By recognising an individual's abilities and/or performance, or a team's performance and rewarding them with a coveted award, the CKO can encourage other employees and teams to try and match the same knowledge-based performance and abilities.

6.3 Knowledge Management of the Infrastructure and Processes

The third component consists of managing the infrastructure and the processes of the organisation which will support the overall knowledge management effort. The organisation should also re-evaluate its business processes in order to align them with the paradigm of knowledge sharing and people-oriented processes. There are two distinct parts to this process:

1. Managing the technology
2. Managing the processes.

6.3.1 Managing the Technology

The CKO has to plan what type of technology the knowledge management effort needs in order to be successful, and implement these technologies. The author recommends implementing IT infrastructures which will allow easy communication between employees, in other words collaborative technologies. It is also important that the IT infrastructure of the organisation be able to link easily with that of customers and suppliers, in order to allow a seamless flow of information between the business and its partners. This will allow the organisation to collect knowledge about its business partners and vice-versa.

The CKO should also choose the medium of the knowledge repository with care. If there is a need to build customised software to communicate to the knowledge repository, the CKO should ensure that the users are involved in the systems development process from the beginning. The author recommends using the organisation's intranet and web facilities to achieve this, since most novice computer users find the Web easy to use and manipulate.

Davenport et al. [1997] argue that the organisation needs to achieve a comfortable balance in its knowledge structure. The author concurs, and argues that on the one hand, the knowledge repository should have an easily understandable structure and categories so that users can find what they are looking for easily. However, the knowledge stored should not be over-categorised and over-structured, otherwise it will lose its essence.

Where the workers involved are not computer literate or simply not literate, the CKO should devise ways to ensure that their contributions are not overlooked simply because they cannot read, or use a computer. In a South African context, this is a reality that needs to be taken into consideration, especially when it comes to line workers. There are a variety of ways of bypassing this problem, one of which is to train a number of these line workers to be computer literate, and these empowered workers are then responsible to extract the tacit knowledge from their colleagues and document it on the knowledge repository. This will ensure that the tacit knowledge of production workers is not lost, and will further reinforce the feeling that management wants to involve everyone in the knowledge management initiative.

6.3.2 Managing the Processes

It is the CKO's responsibility to put processes in place in order to facilitate the creation of organisational learning. The business process should be re-evaluated and modified if need be so that the employees can create, identify, verify, capture, organise, disseminate and use knowledge easily throughout the organisation.

McDermott et al. [2001] argue that the organisation should make use of its existing informal networks and the author agrees. The CKO should use these informal networks to the best of their potential, perhaps by making them official, giving them more resources and rewarding them [McDermott et al., 2001]. However, sometimes the workplace processes will need to be modified to suit the knowledge paradigm.

It is important to remember that knowledge management is not a once-off project, but an incremental one, and that the business processes should be regularly re-evaluated to gauge whether they are creating an environment where knowledge can flow freely.

Another very important aspect of managing the knowledge management processes is the measurement of the impact of knowledge management on the business. The CKO is responsible for devising suitable metrics that measure how effective the knowledge management effort is to the organisation, and other impacts as well.

However, the author cautions against using only financial indicators as a measure of the success of knowledge management effort. For example, it would be impossible to assign financial value on the know-how and experience of the employees of an organisation. However, one cannot deny the value of such know-how and experience. Hence, knowledge management achievements cannot always be quantified in monetary terms, and the CKO should ensure that top management is made aware of this, and devise other metrics to represent progress accurately. The author recommends using the following success indicators [Davenport et al., 1997]:

- Growth in the resources linked to the project
- Growth in the volume of knowledge content and usage.
- Survival of project without support of only one or two individual
- Some evidence of financial return

7. FUTURE WORK

The author has proposed a framework aimed at correcting the current shortcomings of knowledge management in the industry. The effectiveness of this strategy needs to be tested empirically with the organisations surveyed previously. A survey will be carried out with various organisations, including those surveyed previously [Sunassee, 2001], and their responses will provide an indication of the applicability of the framework.

8. CONCLUSION

This paper presented a Knowledge Management framework based on the findings of a literature survey and a survey involving the major motor vehicle manufacturing companies in South Africa.

The framework addresses the lack of alignment of knowledge management with the overall business strategy, and focuses more on people than technology. The cultural aspects of the organisation are acknowledged and the framework recommends that the knowledge management practices of the organisation must be compatible with its culture.

The framework also adheres to the systems approach, and includes both prescriptive and descriptive characteristics, and a single and a double feedback loop.

The framework needs to be tested empirically to ascertain its validity and applicability.

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REFERENCES

ANDREWS, B. 2000. What Knowledge Management means for us as individuals. *Knowledge Management*, vol. 2, no. 2, 62-64.

BEIJERSE, R.P UIT. 1999. Questions in knowledge management: defining and conceptualising a phenomenon. *Journal of Knowledge Management,* vol. 3, no. 2, 94-109.

BHATT, G.D. 2000. Organizing knowledge in the knowledge development cycle. Journal of Knowledge Management, vol. 4, no. 1. [On-line]. Available: http://www.emerald-library.com/brev/23004ab1.htm

CARLSON, F.W. 1999. A Guide To Planning A Knowledge Management System. [On-line].
Available: http://faculty.ed.umuc.edu/~meinkej/inss690/carlson/Knowledge%20Management.html

CHATZKEL, J. 2000. A Conversation with Hubert Saint-Onge. Journal of Intellectual Capital, vol. 1, issue 1. [On-line].
Available: http://www.emerald-library.com

DAVENPORT, T., DE LONG, D.W., AND BEERS, M.C. 1997. Building Successful Knowledge Management Projects. [On-line].
Available: http://www.cbi.cgey.com/pub/docs/SuccessfulKMProj.PDF

DAVENPORT, T. AND PRUSAK, L. 1998. *Working Knowledge: How Organisations Manage What They Know*. Harvard Business School Press., Boston.

DUFFY, N. 1999. *Benchmarking Knowledge Strategy*. In *Leveraging Knowledge for Business Performance 1999: Knowledge In Action,* . DUFFY, A. JOOSTE, AND L. WHITTAKER Eds. WITS Business School, Johannesburg.

HOLLAND, D. 1998. The Top Ten Actions For Knowledge Management. *Knowledge Management Review*, issue 4,10-11.

JOOSTE, A. 1999. *Knowledge In Action: Making Sure That Your Knowledge Management Initiatives Don't Crash And Burn*. In *Leveraging Knowledge for Business Performance 1999: Knowledge In Action,* N. DUFFY, A. JOOSTE, AND L. WHITTAKER, Eds. WITS Business School, Johannesburg.

KING, W.R. 2001. Strategies for Creating A Learning Organisation. *Information Systems Management*, vol. 18, issue 1, 12-21.

LIEBOWITZ, J. 2000. *Building Organizational Intelligence: A Knowledge Management Primer*. CRC Press, Boca Raton.

MACINTOSH, A. 1999. *Knowledge Management*. [On-line].Available: http://www.aiai.ed.ac.uk/~alm/kamlnks.html

MALHOTRA, Y. 2000. Knowledge Management for E-Business. *Information Strategy: The Executive's Journal*, vol. 16, no. 4, 5-17.

MCDERMOTT, R. AND O'DELL, C. 2001. Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management*, vol. 5, no. 1, 76-85

MENTZAS, G. AND APOSTOLOU, D. 1998. Managing Corporate Knowledge: A Comparative Analysis of Experiences in Consulting Firms. *In Proceedings of the 2nd International Conference on Practical Aspects of Knowledge Management*, Basel, Switzerland, October 1998, U. REIMER, Ed. [On-line]. Available: http://SunSITE.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-13/

MILLER, R.J. 1999. *Knowledge Management Assessment*. . Available: http://www.arthurandersen.com

MOORE, K. 2000. The ancient art of knowledge management. *Knowledge Management Review*, issue 12, 12-13.

NONAKA, I. 1998. *The Knowledge-Creating Company*. In *Harvard Business Review on Knowledge Management*. Harvard Business School Publishing, Boston.

NOVINS, P. AND ARMSTRONG, R. 1997. *Choosing Your Spots For Knowledge Management*. Available: http://www.cbi.cgey.com/pub/docs/Choosing_Your_Spots.pdf

RUBENSTEIN-MONTANO, R., LIEBOWITZ, J., BUCHWALTER, J., AND MCGRAW, D. 2000. *A Systems Thinking Framework for Knowledge Management*. Available: http://userpages.umbc.edu/~buchwalt/papers/papers.html

SAGE, A.P. AND ROUSE, W.B. 1999. Information Systems Frontiers in Knowledge Management. *Information Systems Frontier*, vol. 1, no. 3, 205-219.

SEELEY, C. 2000. Crafting a Knowledge Management Strategy. *Knowledge Management Review*, Jan 2000, Issue 3, 20-24.

SKYRME, D.J. 1998. *Developing A Knowledge Strategy*. Available: http://www.skyrme.com/pubs/knwstrat.htm

SKYRME, D.J. 1999. *Knowledge Management: Making It Work*. Available: http://www.skyrme.com/pubs/lawlib99.htm

SUNASSEE, N.N. 2001. Knowledge Management for the South African Motor Vehicle Manufacturing Industry. In *Proceedings of the 2001 South African Institute of Computer Scientists and Information Technologists Annual Conference*, Pretoria, South Africa, September 2001, A. DE VILLIERS, M. CONRADIE, AND S. SINGH, Eds.

SVEIBY, K. 2000a. *A Knowledge-based Theory of the Firm to guide Strategy Formulation*. Available: http://www.sveiby.com.au/

SVEIBY, K. 2000b. *What is Knowledge Management?* Available: http://www.sveiby.com.au/

SVEIBY, K. 2000c. *Knowledge Management - The Viking way*. Available: http://www.sveiby.com.au/

TAKEUCHI, H. 1998. *Beyond Knowledge Management: Lessons from Japan*. Available: http://www.sveiby.com.au/LessonsJapan.htm

TIWANA, A. 2000. *The Knowledge Management Toolkit: Practical Techniques For Building A Knowledge Management System*. Prentice Hall, New Jersey.

U.S. ARMY. 1999. *Army Knowledge Online Strategic Plan*.Available: http://www.army.mil

VAN DER SPEK, R., VAN SCHENDELLAAN, A., AND DE HOOG, R. 1994. *Towards A Methodology For Knowledge Management*. Available: http://kmn.cibit.nl/index.html

VAN DER WESTHUIZEN, J. AND ANDREWS, B. 1999. To Share or not to Share? *Knowledge Management*, vol. 1, no. 3, 34-39.

WEIDNER, D. 2000. *Summary of KM Framework by Phase*. Available: http://www.km.org/gwa/papers/framework.html

WIIG, K.M. 1996. *On the Management of Knowledge*. Available: http://www.km-forum.org/what_is.htm

WIIG, K.M. 1999a. *The Intelligent Enterprise and Knowledge Management*. Available: http://www.krii.com/articles.htm

WIIG, K.M. 1999b. *Knowledge Management Must Address Business Direction*. In *Leveraging Knowledge for Business Performance 1999: Knowledge In Action,* N. DUFFY, A. JOOSTE, AND L. WHITTAKER, Eds. WITS Business School, Johannesburg.

WIIG, K.M. 1999d. *The Institutional Knowledge Evolution Cycle*. Available: http://www.krii.com/articles.htm

ZACK, M.H. 1999a. Developing a Knowledge strategy. *California Management Review*, vol. 41, no. 3, 125-146.

ZACK, M.H. 1999b. Managing Codified Knowledge. *Sloan Management Review*, vol. 40, no. 4, 45-59.

ZACK, M.H. 1999c. *2000 Handbook of Business Strategy*. Faulkner & Gray, New York.