

KNOWLEDGE MANAGEMENT PRINCIPLES

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ABSTRACT

Business drivers such as digitisation, globalisation, customer intimacy and the emergence of the Information Age initiate the need to manage the organisation's knowledge asset. Knowledge management aims at leveraging this explicit and tacit knowledge asset to the collective benefit of the organisation by developing an infrastructure to facilitate the knowledge process and by making information readily available. The implementation of such an initiative requires integration of the strategic, process, human resource, and technology architecture components as the company's competitive advantage depends on the quality of the organisation's knowledge asset and successful exploitation of it.

OPSOMMING

Veranderingsdrywers soos digitalisasie, die wêreldwye-mark-ontwikkeling, kliënteverhoudings en die ontstaan van die inligtingsera inisieer die behoefte om die organisasie se kennishulpbron te bestuur. Kennisbestuur het ten doel om die eksplisiete en nie-eksplisiete kennishulpbron tot die gesamentlike voordeel van die organisasie aan te wend deur 'n infrastruktuur daar te stel om die kennisproses te fasiliteer en inligting beskikbaar te stel. Die implementering van 'n kennisbestuursinisiatief vereis die integrasie van die strategiese, proses-, menslikehulpbron-, en tegnologieargitektuurkomponente, omrede die kompeterende voordeel van die organisasie afhanklik is van die kwaliteit van die organisasie se kennishulpbron en die organisasie se vermoë om dit te effektief te benut.

1. INTRODUCTION

‘The only sustainable source of advantage is the ability to learn faster than your competitors.’ [8]

Transformation from the Industrial to the Information Age implies a change in the rules of business. The traditional view that sustainable competitive advantage [14] depends on the five forces of customers, suppliers, buyers, new entrants, and competitors, is being influenced by three new forces - digitisation, deregulation, and globalisation [4]. This will change the leveragability of the traditional five forces by enabling new entrants in a new way. These forces serve as business drivers to adapt and utilise the knowledge assets embedded in the mobile workforce.

Survival in the Information Age depends on an organisation’s ability to capture data, filter useful information, transform it into usable knowledge, disseminate it via organisational learning, and diffuse it rapidly to where it is needed throughout the organisation [24]. Knowledge management entails the use and re-use of intellectual assets created and developed in the organisation to generate solutions for the client.

This article introduces Knowledge management as a discipline by considering the change drivers that initiated the need for this new business initiative and the characteristics of the knowledge asset. The rest of the discussion is focused on the definition of knowledge management and knowledge management principles.

2. DRIVERS OF KNOWLEDGE MANAGEMENT

“In this society, knowledge is the primary resource for individuals and the economy overall” [5]

As we leave the industrial era behind and move into the knowledge age, the sources of wealth and competitive advantage for organisations are changing. The primary capital assets needed to create wealth are no longer land, physical labour, machine tools and factories, but rather the “application of knowledge” [5]. Stewart is of the opinion that: “Knowledge has become the most important factor in economic life. It is the chief ingredient of what we buy and sell and the raw material with which we work. Intellectual capital has become the one indispensable asset of the corporation. In industry after industry, success comes to companies that have the best information and wield it most effectively” [19].

The resource-based economy (agriculture, production, and mining) is still subject to the principle of diminishing returns. Those parts of the economy that are knowledge-based, are subject to increasing returns. These include products such as computers, pharmaceuticals, software, telecommunication equipment, and fibre optics, which are complicated to design and to manufacture [7]. The development cost of knowledge-

intensive goods is heavily front-loaded as the cost of creating the first product is disproportionately higher than the last. Consequently, there is no definite correlation between the value of intellectual capital and the cost of acquiring it.

Changing forces that brought about the Knowledge Age have introduced a new environment with new business rules. The knowledge content of a product distinguishes it from other products and its brand name makes the sale. This marketplace is not restricted to time, information or geographical barriers but is rather guided by principles such as [4]:

- Moore's Law indicating that digital technology becomes increasingly cheaper, smaller, and faster with replacing atoms for bits.
- In the digital revolution the traditional barriers to entry such as infrastructure and fixed assets do not hold any more and turn out to be liabilities.
- Metcalfe's law stating that the value of an open system or a network becomes exponentially more valuable to its users as more people use it, once it reaches critical mass.
- The Law of Disruption explains that the exponential amount of changes in technology is responsible for major secondary effects on other unrelated systems.
- Transaction cost minimises because of the economies of cyberspace [17]. Consequently organisations that exist to optimise transaction cost with economies of scale will become ineffective. This brings about the law of diminishing firms where the reduction of the market's transaction cost implies the decrease in the organisation's size.
- The property of information is accepted as public goods and should be given away for free.

In this new environment the only competitive advantage depends on the quality of the organisation's knowledge assets and their successful exploitation of it [23]. The company can retain a balanced portfolio of intellectual capital to develop products based on the 'economics of ideas' [16] by managing the knowledge or the organisation's capacity to solve problems, to innovate, to remember without continually re-inventing the wheel, as well as to build on experience and skills. A number of drivers initiate the need to manage the knowledge of the organisation, including digitisation, globalisation, cost of reinventing ideas and the increasing importance of mass-customisation [13].

Digitisation

To eliminate the need for additional information capturing activities it becomes increasingly important to capture information at the source as part of the knowledge worker's daily activities. Once information is effectively indexed, transported, stored, and distributed, value-added information becomes accessible [10]. For this reason the participation in, and especially contribution to, Knowledge Management Systems (KMS) should become an ingrained aspect of the daily routine of every type of knowledge worker in the organisation.

Globalisation

An open system or network reaches critical mass if its users exponentially value the use of it. The network utility of such a system is described as the square of its number of users. The Internet's Communication Protocol, due to its openness, reached critical mass in 1993 and has become an open market for the sharing, using, and adding of information to the global information base [4]. For this reason it is essential that the organisation manage this new source of information to enhance its knowledge asset.

Costly Reinvention

Organisations can save on the 'reinventing the wheel' syndrome by retaining knowledge through recorded lessons learned and leveraging knowledge so that the whole company can do the job faster next time. By taking the knowledge from expert performers and applying it in similar situations, companies are able to develop this as a competence of the organisation.

Customer Intimacy

The primary *value discipline* of our age is the ability to quickly provide problem solutions to customers [18]. Through Internet technology mass customisation is becoming a reality. This means that the customer interacts with a personal interface according to his personal preferences that gives the company, in return, valuable marketing information on customer's behaviour.

3. THE KNOWLEDGE ASSET

'The knowledge and skills of employees is what really differentiates a firm from its competitors' [21].

Every employee builds a wealth of knowledge through learning and skills development. Thus, employees have valuable knowledge for the benefit of the company; yet most of this knowledge is not harnessed to the collective benefit of the organisation. The aim of knowledge management is to develop a knowledge base equal to all employees' knowledge, skills, behaviour, perceptions, values, principles, and education within the organisation's specific culture (leadership style, management style, communication and organisational behaviour), strategy, and structure.

Definition of Knowledge

It is essential to understand the difference between data, information, and knowledge before knowledge management can be defined. Knowledge is what is learned or

retained from data or information – that is where and how to find information as well as understanding and comprehending the information, developing beliefs, values, and ultimately establishing wisdom. Knowledge is the critical resource for the future of mankind and due to its leveragability, there is no clear relationship between the cost in creating knowledge and the number of users that could receive value from it. The characteristics of knowledge, unlike other resources, are that it is infinite, expandable and self-generating, it can also substitute land, labour, and capital, is transportable at dramatic speed, and increase with sharing [1].

In order for a thought to become knowledge it should be shared, distributed, and challenged. Knowledge does not belong to an individual but is the source in which everybody shares and to which everybody contributes. Knowledge becomes an asset when some useful order is created out of free-floating brainpower - that is, when it is given coherent form (a mailing list, a database, an agenda for a meeting, or a description of a process). When it is captured in a way that allows it to be described, shared, and exploited; when it can be deployed to do something that could not be done if it remained scattered around; and thus if knowledge is packaged appropriately, it becomes intellectual capital.

Definition of Intellectual Capital

‘Intellectual capital is the sum of everything everybody in a company knows that gives it a competitive advantage.’ [20]

The difference between the book value of a company, according to its balance sheet, and its selling price, usually comprises its intellectual assets, such as expected revenues from patents, customer relationships, brand names, and ability of management. Stock markets put premiums on knowledge asset value if its rates the organisation much higher than its book value. This shows the difference in the value of tangible, measurable hard assets and the intangible, people, brand name and management assets [19]. Intellectual capital combines human knowledge with structural capital (i.e. the tools which are used to package human capital and permit it to be used time and again in the creation of value) as well as customer capital (i.e. knowledge of the market and the organisation’s stakeholders). The development of customer, structural, and human capital is the company’s essential intellectual assets [6].

Internal Capital

A person's mental model is the representation of reality within a certain frame of reference while using mental processes to think and to solve problems. The combined result of the employees' mental models determines the thinking ability of the company and quality of decision making. The “intelligence” of companies depends on how good they use the mind power of their employees as their knowledge resource, through an up-to-date knowledge base, built by formal education and learning at work.

Structural Capital

'Even the smartest people in the world need a mechanism to assemble, package, promote, and distribute the fruits of their thinking.' [19]

Studies show that employees spend 35% of their time looking for information that others already have. The utilisation of the knowledge asset lies in the recycling of shared knowledge and experience. The structuring and packaging of competencies with technology, manuals, and process descriptions, ensures that knowledge remains in the organisation. The threat to organisations is that with a 10% annual turnover of employees, they will lose half of their experienced workers within five years. As a result, companies need to make newcomers learn what the organisation already knows so that they can start contributing to the organisation, as soon as possible.

Companies need the ability to collect and manage unstructured information, whether from the Internet or an intranet, whether it is documented or not, with some sort of repository facility to store it. They need to retain knowledge so that it becomes organisational property by creating structural capital. Intellectual property is the knowledge assets which can be legally protected, with the legal rights of ownership, in the form of patents, trade marks, trade secrets, copyrights, and products/services.

Customer Capital

Companies should invest in its employees and structures as well as in its customers. Companies which establish connectivity with their clients, benefit from their recommendations, which is one of the best sources of knowledge to help a company with the innovation of new products according to customers' latent needs. The reality is that the success of the customer feeds your own success and that long-term monetary value depends on customer loyalty and the value of the company's brand name.

4. DEFINITION OF KNOWLEDGE MANAGEMENT

'Knowledge management is simply delivering the right information, to the right person, at the right time and place, to make a business decision of value to the enterprise.' [11]

Knowledge management is a discipline that promotes an integrated approach to the identification, capturing, retrieval, sharing, and evaluation of the information assets of an enterprise. This includes databases, documents, policies and procedures as well as the uncaptured, tacit expertise and experience resident in individual workers. It allows the organisation to continually update and renew organisation-specific information, which is then made available to the appropriate individuals within the organisation. In turn, it enhances the knowledge and skills of employees, impacting on the performance of the organisation as a whole. Not only does this add to the efficiency and performance of the organisation, but also to the sense of worth and feelings of adequacy and contribution of the individual, resulting in job satisfaction and improved performance.

The objective of knowledge management is to integrate the collective knowledge of the employees' in such a way that the whole is greater than the sum of the parts. It develops the organisation's ability to learn, undergo a continual process of change, and by so doing, improve and enhance the performance of the organisation.

The purpose of knowledge management within an organisation is thus to create a knowledge base that contains up-to-date, organisation-specific information, which is accurate and secure. Furthermore, it should be supported by an infrastructure that is easily accessible, edited, updated and organised to simplify search and maintenance, making information readily available to all appropriate individuals in a cost effective way. Finally, it provides the opportunity to communicate through the sharing of information, ideas, and opinions.

5. KNOWLEDGE MANAGEMENT PRINCIPLES

A number of principles have been established regarding knowledge management, which include communities of interest, the knowledge market, knowledge management roles, and different ways to increase the company's knowledge stock.

Communities of Interest

'A group of professionals, informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge.' [12]

Communities of interest [19] (learning groups) emerge on their own both by social and professional forces. Group members use each other as soundboards, collaborate, give advice and explore new subject matter, in this way creating a breeding ground for new ideas, knowledge transfer, and innovation. These groups are voluntary, develop over time, are the result of a common interest or problem, involve learning, and maintain a unique culture. They are defined as virtual environments in which entities with convergent interest and needs congregate to collect, share, exchange, and disseminate information and knowledge. Such an environment could be a Web site, a selected set of Web sites, or the corporate Intranet.

Organisations need to create a vibrant learning community and socialise human capital in order to retain knowledge ownership, even if parts of the community should leave the company, thus fostering intellectual communities in areas contributing to the competitive advantage of the organisation. Management can foster the growth of such communities by recognising them and their importance, making resources available, creating a cross-organisational communication system, and frequently moving employees to enable new work-related relationships. These communities tend to be driven by their own little learning enterprise rather than the total organisation and cannot function within boundaries, as boundaries hamper the free flow of information.

Knowledge Market

Knowledge flows through the organisation, regulated by the same principles as market forces. Markets for knowledge exist within the organisation, because of a) the scarcity of the knowledge resource and b) any knowledge transfer transaction occurs because participants believe they will gain value from the interaction.

The roles in a knowledge market centre around buyers, sellers, and brokers [3]. A *buyer* is someone that needs insight, judgement, and understanding in order to solve a difficult problem. A knowledge *seller* has a reputation in the internal market as someone who has knowledge and is willing to share. Specific individuals in the organisation who are interested in the company as a whole, perform the role of the knowledge *broker* (gatekeeper) who is responsible for connecting sellers and buyers.

The pricing system operating in the knowledge market has a few intangible motivation factors. The “*reciprocity*” factor is a self-interest motive where the seller shares knowledge because he believes that he would be able to gain from the buyer in the future. The “*reputation*” factor motivates the seller because by selling he is perceived as knowledgeable and willing to share, which will enhance his position in the market for buying in the future. The last source of motivation is the “*good will*” factor where the seller finds personal pleasure in sharing his knowledge. All these motives depend on the level of trust sustained in the organisation, the level of participation of top management, and the amount of recognition the seller receives for sharing knowledge.

A number of indicators in the knowledge market refer the buyer to available sources of knowledge. These include education, position and informal networks. Both the formal structures of the individual’s education and position within the organisation and the informal networks (word of mouth) indicate useful and reliable knowledge resources. The informal structures are more dynamic and rely on gossip for a frequent update. On the opposite an ineffective knowledge market is caused by:

- a lack of sufficient indicators where knowledge resides in the organisation;
- a lack of knowledge diffusion through the organisation due to differences in purchase power;
- an ineffective distribution system where employees have no time to investigate the knowledge market;
- the price of getting the most effective knowledge being too expensive, due to the distance between seller and buyer and the transaction cost involved in getting the knowledge;
- a monopoly where only one expensive resource exists and a scarcity exists due to knowledge hoarding or downsizing;
- company principles which values original ideas in contrast with the re-use of ideas and where employees will refuse to buy.

However, effective markets can be created by:

- developing an effective IT infrastructure to establish a virtual knowledge market;
- by developing a reward and recognition system for using the infrastructure;
- by providing top management support.

This will enhance the morale of the company and individual participation as well as knowledge stock while it is actively validated.

Knowledge Roles & Skills

Management of knowledge assets requires new roles and responsibilities. Primarily Knowledge Management is *everybody's* responsibility and each individual is accountable for maintaining and sharing his knowledge. However, specific *knowledge workers* are assigned to extract knowledge from individuals, transferring it into a structural form, making it available for use, and maintaining it. Extracted knowledge is transformed into a structure to enable the users to get the knowledge themselves with sufficient navigational tools, training, and information on how to use it. The Chief Knowledge Officer (CKO) is a senior manager such as the Information Manager, Human Resource Manager, or an Intellectual Capital Manager that serves as a dedicated resource, responsible for the knowledge asset. The CKO is responsible for organisation learning by developing a sharing culture, facilitates the development of a technology infrastructure, manages the relationship with external information sources, oversees the measuring of knowledge assets, and develops the Knowledge Management strategies.

Developing the Knowledge Stock of the Company

There are a number of ways to increase the knowledge stock of the organisation and to utilise it.

θ Acquisition

The greatest feature of the knowledge asset is the difficulty of transferring it across organisational boundaries. It is dependent on time, investment, culture, political issues, and on a specific ecology for its existence. The organisation can hire employees and establish joint ventures to acquire knowledge, but the acquisition depends on the recipient's absorption ability. The reasons for transfer failure is due to the recipient's stubbornness, resistance to change, pride, lack of time, and lack of trust in the source of knowledge as well as to the medium that influences the speed of transfer and the quality or depth of knowledge.

θ Renting

Another way to generate more knowledge stock, is the renting of a knowledge source by outsourcing research and development activities, by contracting a

consultant, or by licensing specific knowledge sources. This is a temporary knowledge source that requires effective knowledge transfer to retain it.

θ **Dedicated sources**

A dedicated group of people with a specific knowledge responsibility, such as R&D and libraries, generates knowledge stock. Their challenge is to transfer or diffuse the tacit, internal, and know-how type of knowledge to the rest of the organisation, e.g. through mentoring, in order to retain and preserve individuals' knowledge.

θ **Fusion**

Combining different skills and ideas to generate creative chaos and innovative concepts can produce knowledge but require an overlap in the participants' knowledge bases.

θ **Knowledge Creation [13]**

Knowledge is created by any interaction between the tacit and explicit knowledge sources of the organization. The first dimension is knowledge from *socialization* that occurs when tacit knowledge is transformed to other tacit knowledge while people are in conversation. The result appears in the thoughts of those who participated in the process. The second dimension, *externalization*, is the transformation of tacit knowledge into an explicit form by codifying one's thoughts. The *internalization* dimension is the transformation of knowledge from an explicit into a tacit form, for example when one reads a book and absorbs it into one's own thoughts. The final dimension is the *combination* of different explicit knowledge sources such as the combining of different codified documents to generate a new document.

θ **Knowledge Networking**

The size of the organisation increases the probability that the required knowledge exists within the organisation but decreases the probability of finding it. This calls for strategies to initiate knowledge fairs where sellers and buyers can meet to discuss the knowledge available, with sufficient time and space to collaborate and generate knowledge. The channel for knowledge transfer depends on the type of knowledge. Tacit knowledge only transfers within a relationship and sufficient personal contact such as face-to-face meetings and informal conversation. This is true because through conversations the knowledge worker discovers what he knows, shares it, and processes new knowledge for the organisation [3].

θ **Codification**

Codified knowledge provides a portable, organised, explicit, and easy to manage entity. However, before codification, it is important to consider the sources of this knowledge, the appropriate form of codification, and the means

of distributing the knowledge entity. This is highly dependent on a need for codification versus a need for linking, because in some cases it is easier to link the enquirer with the source of knowledge (person), than to try and codify the tacit knowledge (for example, to transfer a builder's skill).

6. CONCLUSION

Knowledge Management requires the ability to manage the intangible and tangible information assets of the corporation. The challenge is that the wealth of the company's knowledge resides within the knowledge workers' tacit thoughts and experience. This type of knowledge resource is difficult to manage. The reason for this is that the quality of knowledge transfer is highly dependent on the level of face-to-face contact between employees, the sharing culture of the organisation, and the availability of effective technology architecture. The aim is to facilitate a human knowledge network supported by the necessary information technology by making people rely on the collective knowledge in the repository, interact with it and add to it. This requires that employees understand the underlying paradigm of sharing knowledge to the benefit of the organisation.

The aim of Knowledge Management is not to limit knowledge but rather to encourage diversity of opinions and to allow learning to take place - to create and maintain superior knowledge it is necessary to make it available at point-of-action, whilst enable a learning culture.

7. REFERENCES

- [1] Crawford, 1991.
- [2] Davenport T. H., De Long D. W., Beers M. C., "Successful Knowledge Management *Projects*", Sloan Management Review, Vol. 39, No. 2, 1998.
- [3] Davenport Thomas H., Prusak Laurence, "*Working Knowledge – How Organisations Manage What They Know*", Harvard Business School Press, Boston, Massachusetts, 1998.
- [4] Downes L., Mui C., "*Unleashing the Killer App Digital Strategies for Market Dominance*", Harvard Business School Press, Boston, Massachusetts, 1998.
- [5] Drucker P.F., "*The age of social transformation*", The Atlantic Monthly, p53-80, Nov 1994.
- [6] Edvinsson L., "*The identification of Intellectual Capital within the organisation: tapping its full potential*", Data Warehousing & Knowledge Management '98 Conference, Sandton, 1998.
- [7] Elliott R.K., June 1992.
- [8] Geus A.
- [9] Grayson C. Jackson, Chairman of American Productivity & Quality Centre
- [10] Lepeak S., 7 May 1997.

- [11] Libit J.
- [12] Manville P.B., July 1996.
- [13] Nonaka I., Takeuchi H. (Contributor), Takeuchi H., "The Knowledge-Creating Company : How Japanese Companies Create the Dynamics of Innovation", Oxford University Pr (Trade) , 1995.
- [14]Porter Michael E., "Competitive Advantage: Creating and Sustaining Superior Performance", June 1998.
- [15] Quinn J.B., Anderson P., Finkelstein S., "*Managing Professional Capital: Making the Most of the Best*", Harvard Business Review, p71-80, March-April 1994.
- [16] Romer Paul, 1992.
- [17] Ronald Coase.
- [18] Skyrme D., "*Knowledge Management: Oxymoron Or Dynamic Duo*", Managing Information, Vol. 4, No. 7, 1997.
- [19] Stewart T.A., "*Intellectual Capital*", Nicholas Brealey Publishing, London, 1997.
- [20] Stewart T.A., 1997.
- [21] Tobin Daniel R., "*The Knowledge-Enabled Organization : Moving from 'Training' to 'Learning' to Meet Business Goals*", AMACOM, 1997.
- [22] Ulrich Dave, "*Leading Lights: Author and Professor Dave Ulrich*", Knowledge Inc, Vol. 3, No 3, p 8, Stamford, CT, March 1998.
- [23] Wiig Karl M., "*Executive Perspectives on the Importance of Knowledge*", Chapter 2, p37-61, 1994.
- [24] Yockelson D., 7 May 1997.