# Knowledge Management Strategy for Virtual Organizations to Gain Competitive Advantage

Saron K. Yefta[1], Indra Gamayanto[2]
[1] Staf Pengajar Jurusan S1 Sistem Informasi
Fakultas Teknologi Informasi
Universitas Kristen Maranatha
Jl. Prof. Drg. Suria Sumantri No. 65, Bandung 40164
Email : saron.ky@eng.maranatha.edu
[2] Staf Pengajar Program Studi S1 Sistem Informasi
Institut Teknologi Harapan Bangsa
Jl. Dipati Ukur 80-84 Bandung 40132
Email : gama@ithb.ac.id

### Abstrak

E-business bukanlah isu yang baru. Keberadaannya telah mendorong organisasi tradisional berubah menjadi organisasi virtual. Walaupun demikian, menurut penulis, topik ini masih memiliki isu penting yang harus dieksplorasi karena cara pandang yang berbeda mengenai topik ini akan memberikan hasil yang berbeda pula. Hasil yang berbeda tersebut dapat diimplementasikan untuk berbagai situasi yang berbeda, sesuai hasil penilaian tim manajemen. Organisasi harus memikirkan pemahaman pembuatan dan utilitas knowledge serta mempertimbangkan kedua faktor yang tak dapat dipisahkan tersebut sebagai infrastruktur organisasi untuk memaksimalkan unjuk kerja organisasi. Knowledge management adalah sebuah cara untuk meningkatkan kapabilitas organisasi dalam mendayagunakan informasi untuk meningkatkan efisiensi dan produktivitas. Agar dapat memahami dan mengeksplorasi lebih jauh cara knowledge management membantu organisasi virtual, penulis mengumpulkan berbagai informasi dari perpustakaan, database online, buku-buku, dan halaman web. Selanjutnya, untuk dapat lebih menggambarkan keuntungan-keuntungan yang dapat dicapai, ancaman, dan tantangan yang dihadapi organisasi, penulis menggunakan sebuah studi kasus. Kasus tersebut akan digunakan sebagai pembanding dan pendukung teori, juga untuk menggambarkan situasi yang sesungguhnya dalam dunia nyata.

*Kata kunci:* Organisasi virtual, Infrastruktur organisasi, Efisiensi

## 1. Introduction

Internet has made products (goods and services) into larger virtual organizations to be marketed by sellers and buyers. The products can be easily traded worldwide with no boundary or limitation of geographical area. The trading process is what Power (2001, p. 189) calls as selling

mechanism. Buyers and sellers communicate via Internet allowing the products to be bought and sold over computer networks. The principle concept is that the products are purchased and paid for over the Internet and distributed by logistics carriers to the buyers' addresses. That online buying, selling, and paying is an integral part of e-business.

The evolution of Internet is growing rapidly because more people use Internet to seek information (see **Figure 1**). From Turner's (2000, p.8) point of view, the driving factors of the rise of the Internet are: reduced cost of the telephone calls; the spread of PC; the spread of open standard; and the development of online services. Because of the swift diffusion of the Internet technology, Internet has made a big change in the business environment globally creating a new market form to trade from traditional business into e-business trade or virtual organizations (see **Figure 2a** and **Figure 2b**). According to McKie (2001, p.69), Internet also plays a significant role as an intermediary for B2B (business to business) and B2C (business to consumer) in a way that Internet  disinter mediates traditional B2B and B2C relationships then the supply chains are reintermediated by promoting new types of virtual intermediaries that rely on it. Internet is connecting businesses to the customers, partners, suppliers, and also competitors.

**Internet growth worldwide (millions)**
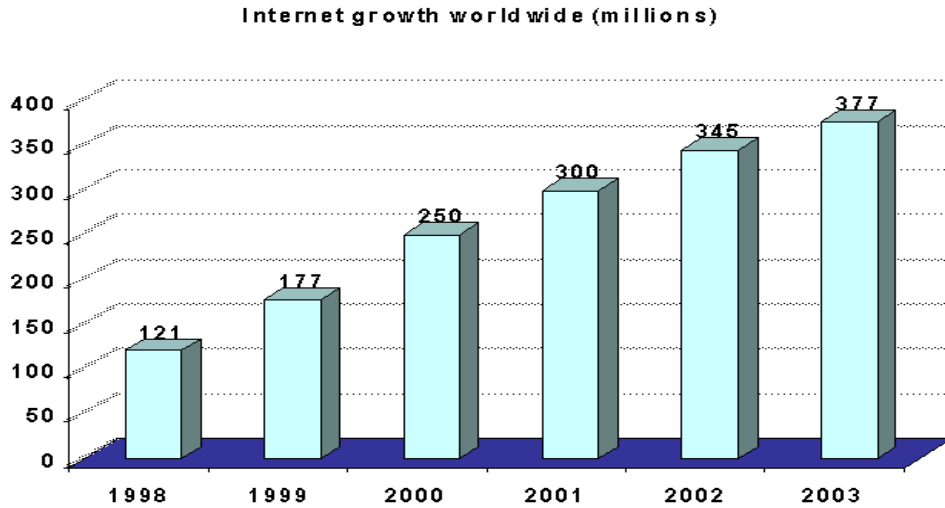


*Figure.1. Internet Growth Worldwide*
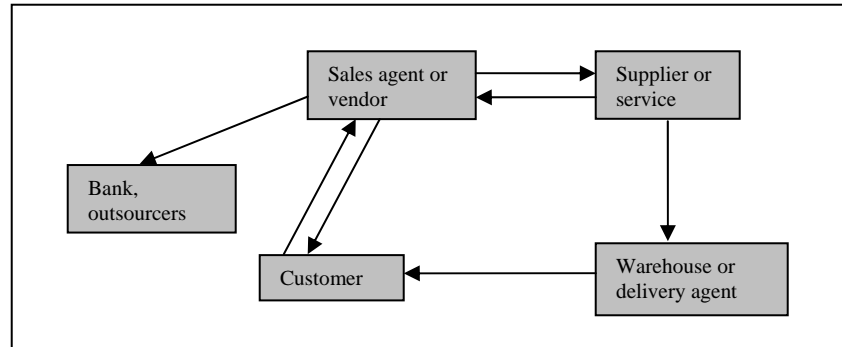*Source: http://www.commerce.net/research/stats*
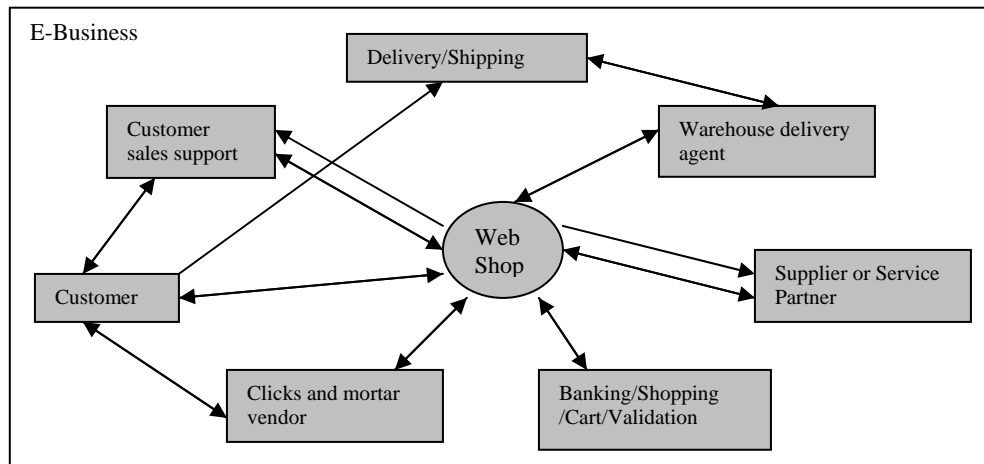
*Figure.2a Traditional Business*



*Figure. 2b. E-Business*
*Source: Farrell, et al., 2001, 'E-business@work', p. 3-4*

## 2. The Advantages of E-business

According to Amor (2000, p. 13), the strengths of e-business depend on the strengths on the Internet, which are the infrastructure can be expanded in the future, the availability of access for 24 hours everyday and low cost as well. However what Amor wants to show is that how Internet can change the topology of business. Amor (2000, p. 14) reckons that there are seven advantages that can be obtained by the e-business organizations (see **Figure** 3).

---

**Advantages of e-business**

1.  *Global accessibility and sales reach*. Businesses can expand their customer base globally and even their product line.
2.  *Closer relationships*. B2B sellers should be able to construct close relationship.
3.  *Free samplers*. Products can be sampled via the Web quickly, easily, and free of charge.
4.  *Reduced costs*. Businesses can minimize the costly production by dynamically adjusting prices.
5.  *Media breaks*. The Internet reduces the number of media breaks which are needed to transfer information.
6.  *Time to market*. Shorter time to market and faster response time to changing and competitive market demands.
7.  *Customer loyalty*. Improved customer loyalty and service through easier access to the newest information and a never closing site.

---

*Figure.3. Advantages of E-Business*
*Source: Amor, D., 2000, 'The E-business Revolution', p. 14*

### 3.   Knowledge Management Implementation

Organizations should be concerned in understanding of knowledge utilization and creation and consider the two inseparable factors as an organizational infrastructure to maximize the organizational performance. According to Dutrénit (2000, p. 35), the process of knowledge creation is:

> '*…the center of attention and issues about the management of knowledge are playing an increasingly important role in the explanation of the effectiveness of this process*'

Furthermore, the use of knowledge management facilitates the process of creation and enhancement of knowledge for the development of strategic technological capabilities.

According to the American Productivity and Quality Center (1996, available at: http://www.store.apqc.org/reports/Summary/know-mng.pdf), knowledge management is a set of strategy to acquire the right knowledge to the right people at the right time and help the individuals or groups to share and use the information into action in a way to enhance organizational achievement. Moreover, knowledge management is a complicated process that should be reinforced by a robust foundation of enablers – strategy and leadership, culture, measurement, and technology. Each enabler should be aligned to generate the knowledge process – procurement, presentation, transfer, utilization, and removal (see **Figure 4**). To obtain knowledge, organizations should be agile in balancing the knowledge management elements – people (culture), processes (content), and technology. Abell and Oxbrow (2001, p. 37) reckon that those elements have formed a knowledge management philosophy – to manage the knowledge balance which further determines an organization and its relationship in the market (see **Figure 5**).
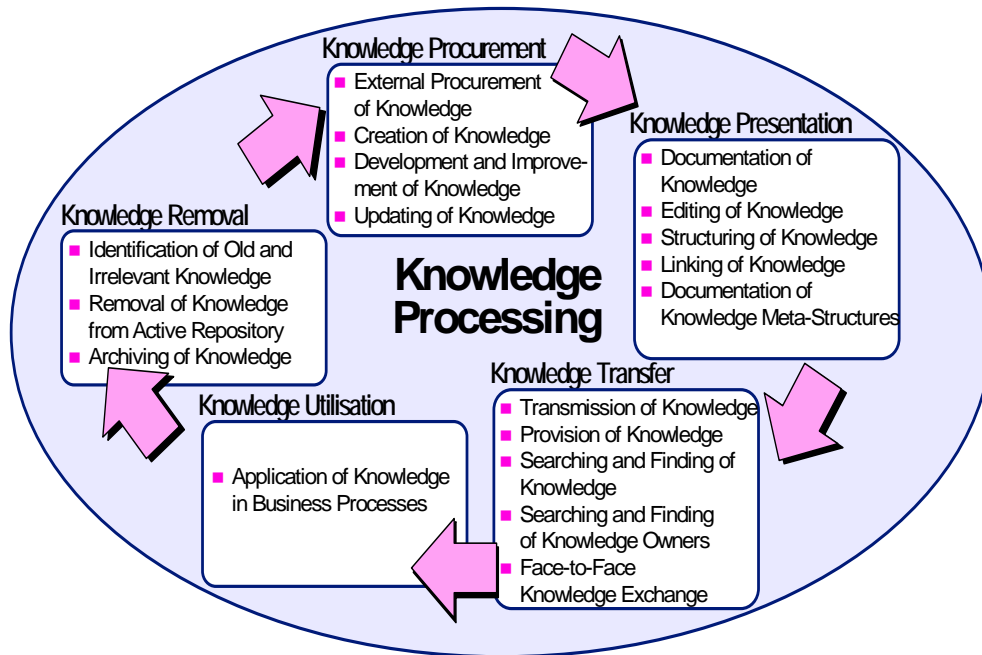
*Figure.4. Knowledge Processing*
*Source: Allweyer, T., 1997, A Framework for Re-designing and Managing*
*Knowledge Processes, p. 5*
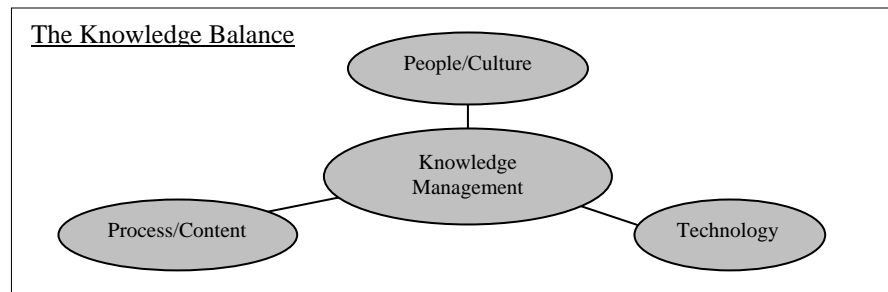


*Figure.5 The Knowledge Balance*

## 4. The Advantages of Knowledge Management

The role of knowledge management offers a number of benefits for organizations in developed or developing countries. Radding (1998, p. 61) identifies many substantial benefits that knowledge management offers, including: prevention of knowledge loss; strong decision-making; adaptability and flexibility; competitive advantage; asset development; product development; customer oriented and; leverages investments in human resource/capital (see **Figure 6**).
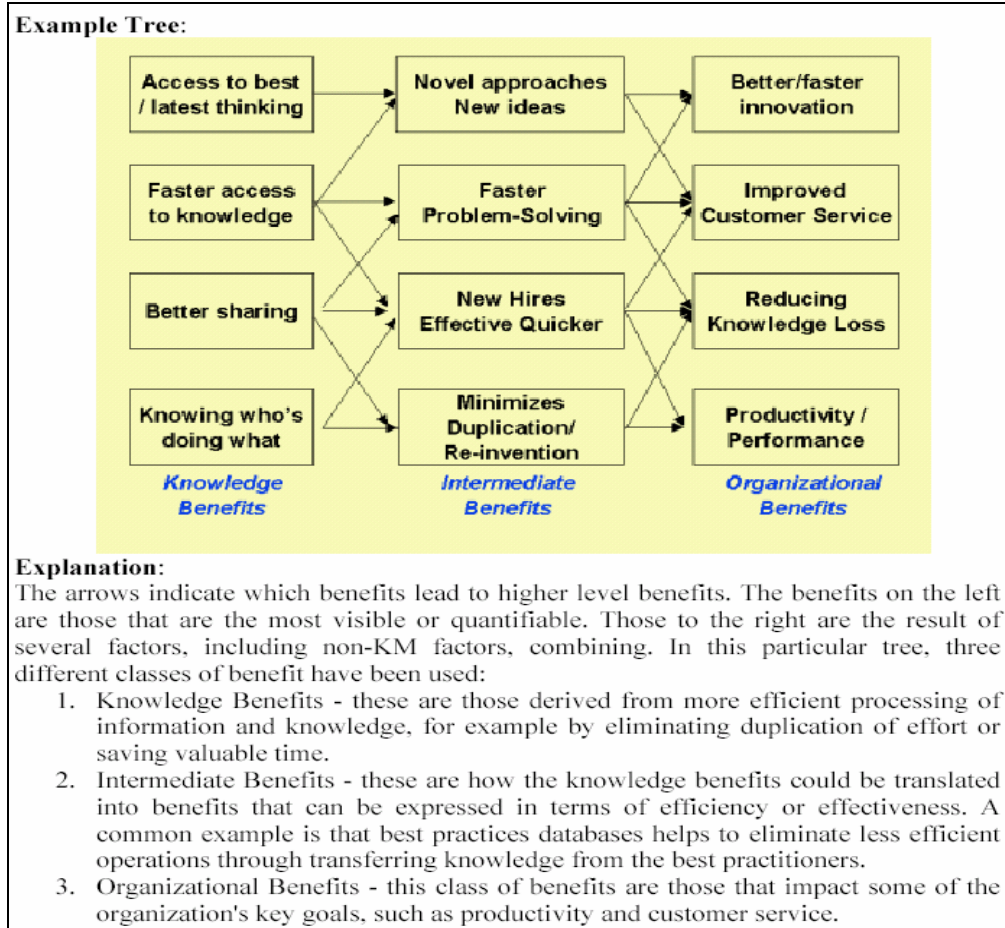
---

**Knowledge management advantages**
1. Prevention of knowledge loss – enables an organization to retain critical expertise and prevent critical knowledge loss resulting from retirement, downsizing, employee departures, etc.
2. Improved decision making – decisions are made faster with greater quality and also can be made at a lower level in the organization.
3. Adaptability and flexibility – staffs can work in cross-functional situations and the organization improves employee morale.
4. Competitive advantage – enables the organizations to fully understand its customers, prospects, market, and the competition, thereby enabling the identification of competitive gaps and opportunities.
5. Asset development – improves the organization's ability to capitalize on legal protection for intellectual property.
6. Product improvement – value of products is increased in direct proportion to the degree and quality of knowledge in the product.
7. Customer management – enables organizations to sharpen customer focus and service. Increased customer knowledge expedites response to customer queries, suggestions, & complaints. It also ensures the consistency and quality when servicing customers.
8. Leverages investments in human capital – organizations can better leverage their investment in hiring and training workers such as the ability to share lessons learned, document processes, the handling of exceptions, capture and transmit tacit knowledge, etc.

---

*Figure 6 Knowledge Management Advantages*
*Source: Radding, 1998, Knowledge Management, p. 60-61*

## 5. Knowledge Management Benefits Tree

According to Skyrme (2002, p.1), the use of the benefits tree is to show inter-correlations between different types of benefit. The use of the benefits tree is important for senior executives before they invest because the benefits tree will apparently describe an explanation of the bottom line benefits of knowledge management. Commonly, a knowledge initiative is a base plan where the cost is obvious, but the benefits are dispersed into the organization. A benefits tree connects the immediately obvious benefits, through a series of ways to those understood by senior executives (see **Figure 7**).

**Example Tree:**



**Explanation:**

The arrows indicate which benefits lead to higher level benefits. The benefits on the left are those that are the most visible or quantifiable. Those to the right are the result of several factors, including non-KM factors, combining. In this particular tree, three different classes of benefit have been used:

1. Knowledge Benefits - these are those derived from more efficient processing of information and knowledge, for example by eliminating duplication of effort or saving valuable time.
2. Intermediate Benefits - these are how the knowledge benefits could be translated into benefits that can be expressed in terms of efficiency or effectiveness. A common example is that best practices databases helps to eliminate less efficient operations through transferring knowledge from the best practitioners.
3. Organizational Benefits - this class of benefits are those that impact some of the organization's key goals, such as productivity and customer service.

*Figure.7 Benefits Tree*
*Source: Skyrme, 2002, KM Benefits Tree*

## 6. Information and Communications Technology (ICT)

The development of ICT has produced opportunities and challenges. According to Abell and Oxbrow (2001, p. 52):

> '…the use of ICT enables virtual working that is almost akin to sitting around the table together. But online working needs careful facilitating and leadership. It requires new skills and mindsets, and while it allows more inclusion for some it presents barriers for others. Paradoxically, collaborative software enables people in one room to work creatively together by challenge ideas, and vote for outcomes, anonymously, thus allowing the group to have a frank discussion without individuals feeling inhibited by their lack of confidence or status.'

Early applications of technology offered the prospect of increased production and less reliance on human. The integration of communications and information technology introduces opportunities to operate in new markets, change ways of working, deliver different products, and maybe to develop business relationships with a variety of suppliers. ICT enables flexibility, allowing information to be exchanged across geographical and time barriers. Virtual organizations, mobile work forces, and innovative partnerships have all been diffused by ICT. ICT also brings new problems, for example, technical directors and technical staff argue to utilize a compatible IT platforms and software applications to enhance faster and cheaper communication.

## 7.  Virtual Organizations

ICT has made a new form of business named virtual organizations. Skyrme (1999, p. 1) has defined the virtual organization as the organization diffused geographically and organizational work is distributed throughout electronic communications. Many smaller organizations or even start-up companies are now concerning about the advantages of becoming or maybe as a part of a virtual organization, which can give them the benefits of the different resources of a large organizations while focusing on the strength and agility of the small one. Furthermore, Skyrme also specifies the advantages that virtual organizations offer. The advantages of virtual organizations are: [1] provide access to a wide a range of specific resources, [2] should enable to present a united face to big corporate customers, [3] the organizations can keep concentrated to operate on the niche skills, and [4] easiness to reshape and change personnel based on the proposed task or project.

## 8.  People, Process, and Technology

The three inseparable elements of knowledge management – technology, people, and process – are playing an important role for the success of the virtual organizations. First, the knowledge in technology should be able to produce many benefits to users (easiness, practicality, functionality) and differentiate with other current products competitively. Second, the knowledge in people, people in an organization is considered as the most valuable asset because people act as the motivator to invent innovative ideas and generate the work process. Third, the knowledge in process can be illustrated as the structure – vertical or horizontal – of the organization, the way the employees work together in an complex situation, and if the organization has a flexible management then can be well adapted to the dynamic of changes, because no matter what changes will apply.

## 9.  The Success of Virtual Organizations

Today's business environment demands a new philosophy for accomplishing tasks.  The success of virtual organizations principally is in the hand of the staff (teams) that run the job. Managers should heavily motivate the teams to produce new ideas or process to fasten the work. As technology workers

continue to become un-tethered, often without warning to the enterprise and its IT infrastructure, it is increasingly the responsibility of the enterprise to provide the education and change management necessary for the employee's success in a virtual environment. IT executives should ensure that the appropriate education and competencies are developed among its core staff to leverage the full potential of a successful virtual team (Ader, M., 2003).

Successful virtual teams involve a strong combination of people, process, and technology. For people to work seamlessly across boundaries, distance, and time, collaboration tools and services to catalyze productivity must be readily available. IT executives should evaluate tools from emerging professional services automation (PSA) vendors, project management and collaboration players, as well as leading audio and video streaming technology that can support the activities of a virtual team (Haselkorn, M., 1998).

## 10. Challenge and Solution in Knowledge Management
Although knowledge Management can become a good strategy in many organizations to achieve competitive advantage in competing with others, it also presents significant challenges to the organizations especially to managers and IT professionals. The complexity in defining the most suitable knowledge management model, refining information, choosing the most appropriate technology are the examples of issues that face by organizations. However though the problems are a lot, it doesn't mean all the organizations face the same issues. The issue will depend on the organizations themselves, what is the core business and how the organization runs the activities (KMWorld, 2002).

## 11. Distributing Information
How to distribute and deliver the information is one of the issues which have impact organization greatly. Spreading the information among workers in organization, to other branches of organizations and collaborated organizations can determine the faith of organization itself. Speed of distribution and availability of information are the things that organizations try to sustain and achieve. Before considering a way of distributing the information, organizations have to understand clearly first, what kind of information those organizations have. According to Vice President of Hummingbird Ltd., Peter Auditore (KMWorld, 2002), there are three types of information in an organization, which are;
- *Explicit Knowledge*, knowledge that can be extracted from books, documents, emails and databases. This is the easiest way to get and gather knowledge in an organization.
- *Embedded Knowledge*, knowledge that found during running organization's task such as services and process. The knowledge can be achieved is a person carries certain tasks in organization.

- *Tacit Knowledge*, undocumented knowledge. This kind of knowledge is available inside the head of workers and can be spread among them via mouth to mouth.

After understanding what kind of knowledge an organization has, then managers and IT professional have to think the scope of information distribution. There are two scope of information distribution, which are *distribution of information among workers in an organization* and *distribution of information to the virtual organization worldwide* (Intranet Journal, 2003).

## 12. Distribution of Information among Workers in an Organization(focus on people)

Sharing information among workers in an organization isn't a new problem in knowledge management issue however it is still exist. One of the ways that used nowadays is *Intranet technology*. Research has already demonstrated that Intranet technology has showed significant increase in efficiency and productivity of an organization. And also there is significant correlation between intranet and job satisfaction (Intranet Journal, 2003).

Intranet technology can bring a lot of benefit in distributing knowledge management. Of course cost of the technology is one of the benefits however it's not the only advantage that organization seeks. Intranet can also benefit worker in many ways such as a tool of communication not only between workers and organization but also among the workers. Intranet technology allows workers to access knowledge from organization nevertheless, not only has that Intranet still had other advantages (see **Figure** 8) but  also help workers to communicate each other especially in distributing tacit knowledge which is very hard to be documented by organization (Intranet Journal, 2003).

<div style="border:1px solid;">

### Intranet Features/Advantages

- Focuses on user needs — not technology promises
- Directly supports the organization's goals and processes
- Enables collaboration and communities
- Inspires learning, innovation and new thinking through sharing best practices
- Promotes and delivers bottom-line results

</div>

*Figure. 8. Intranet Features/Advantages*
Source: Intranet Journal (2003), 'Knowledge Management and Intranets:
Putting People', available at:
http://www.intranetjournal.com/articles/200304/ij_04_23_03a.html

### 13. Distribution of Information to the Virtual Organization Worldwide (focus on technology)

The power of Internet and web technologies has become a new paradigm of information sharing. By using Internet, an organization can share the information to all corners of the world. It means that the act of sharing information to virtual organization emphasizes the use of technology. Unconsciously, organizations will focus more on technology than the information itself (Intranet Journal, 2003).

Enterprise information portal is the form of future knowledge management that wants to be achieved by many organizations. All the information and business intelligence around the world will be brought together and become a key role in empowering virtual enterprise. By providing an easy and personalized access, relevant information can be shared to all people who can enable people to make a faster and better decision. Not only has that, Enterprise information portal (EIP) can incorporated streaming audio and video to enhance the capability of e-learning and e-training elements thereby potentially reducing overall organization cost (KMWorld, 2002). There are several technologies that can be used to enhance the distribution of information around the world via Internet (see **Figure 9** for further details).

**B2E Enterprise Information Portal**
Provides a single point of access to all relevant information and applications, while also functioning as a gateway to communities of interest, best practice etc. EIPs can also function as a platform for knowledge networks.
**Federated Search**
The ability to search across all organizational structured (databases) and unstructured (documents, records, emails, video & audio files, etc) information sources.
**Taxonomy, Classification and Indexing of Information Sources**
Indexing of information resources and establishment and/or automation of an information taxonomy for industry-specific or organizationally specific information.
**Document/Information Management Systems**
Organization and archiving of documents, emails, files, illustrations, policies, procedures, records, audio files, video files etc.
**Collaborative eCommerce Application Environments and/or Workspaces**
Enable organizations to easily create virtual project team rooms, and/or communities of best practice by allowing team members to collaboratively develop and store documents, tasks and schedules in a secure virtual environment.
**Simultaneous Collaboration**
Allow workgroups and project team member to share information in real-time.
**Business Process Mgt. and Community of Interest Building**
Facilitates best practices and community of interest building by leveraging an EIP front end with threaded discussion groups and collaborative technologies through an EIP.
**Intelligent Agents—web crawlers,"knowbots"**
Enable relevant information derived from automated searching to be pushed to the desktop or added to a repository.
**Network News & Threaded Discussion Groups**
One of the first technologies of the web to be employed as a KM system for sharing information on projects and topics. Can also serve as a key technology for facilitating e-mentoring.
**Chat/Instant Messaging**
A technology that evolved from Internet Relay chat, enables real-time person-toperson interaction.
**Automated Community-building Software**
A new class of software that automatically builds communities of interest by profiling email and documents.
**Visualization Software for Information Systems**
A new class of software that provides more intuitive and easier interface for navigating information systems including web sites. This new way of viewing information can significantly enhance information discovery and access.
**Expert Systems**
Another new class of software that connects organizational experts with other members of the community by asking questions like who knows about this?

*Figure 9 Technologies that can be used to enhance the distribution of information around the world via Internet*
*Source: KMWorld (2002), 'Enabling Knowledge Management in Today's Knowledge Economy', January 2002, available at:*
*http://www.kmworld.com/publications/whitepapers/BCI/auditore.pdf*

## 14. Classifying and Indexing Explicit Information

As mentioned before, in an organization, there are three types of information; which are explicit knowledge, embedded knowledge and tacit knowledge. Though all the information can be identified at this time, it doesn't mean there will be no more information. Information in an organization will increase by the time goes. The bigger an organization the more information it needs and there is a habit for large organizations to document all the information for references and other needs.

The problem will occur when an organization got a lot of information. Before an organization can share the information, all the information has to be selected and classified to ease workers to find information. To select and classify useful information isn't an easy job to do. However there are several technologies can be used to help manage the information, which are (KMWorld, 2002);

- *Information Management System*, a system which facilitates the organization, indexing, classification of documents, content and digital assets such as audio and video files, illustrations, records etc.
- *Business Intelligence,* Formerly used as decision support by many organizations to manage data warehousing, financial information for routine data analysis, standard report writing and data mining. However, now, it is also used to classify and arrange information.

## 15. Over promising Myths about Knowledge Management
Knowledge management can help an organization to gain more benefit such as increase efficiency and productivity however it doesn't mean that knowledge management can do everything. There is a misunderstanding misguided by over promising of advantages of knowledge management.

According to Hildebrand (Knowledge Management Forum, 2002), there are three dominant myths in using knowledge management. There are:

- *Knowledge management technologies can deliver the right information to the right person at the right time*. In reality, technology is a tool to deliver the information however it cannot ensure that the right people will get that information. Though it's a fact that technology can increase the possibility that right people can receive right information however People tend to think that by adopting the most updated technology can ensure right people to receive the relevant information.
- *Knowledge management can store human intelligence and experience*. Technologies such as database can store information in form of bits and pixels but it cannot store the rich schemas that people possess for making sense of data bits. The data retrieved by different person can result different scenarios in handling an event.
- *Knowledge management can distribute human intelligence.* Again, organization tends to think by documenting all the information, it supposes to document the intelligence of a person. And by passing the information, it means that other people can definitely solve same problem. It's a wrong perception. Documented information only can be used as comparison before executing a plan.

Before embarking to use knowledge management, an organization has to check the purpose that wants to be achieved by using knowledge management and not to believe on the perception of what knowledge management offers (Knowledge Management Forum, 2002).

### 16. Case Study: Caterpillar Inc. Fends off Competition

Caterpillar Inc. (CAT) of Peoria, Illinois, is a world leader in manufacturing heavy machinery. In 1982, the company entered a difficult period. Komatsu of Japan, a major competitor, was offering bulldozers in the United States at prices 40 percent lower than CAT's. Caterpillar was forced to cut prices. A poor economy and a lengthy labor strike worsened the situation. By 1985, the accumulated losses amounted to $953 million. Caterpillar, which sells its products all over the world, responded to the downturn in all the usual ways: it closed plants, laid off workers, and slashes expense. But the usual did not work: market share declined and loses increased.

The manager of CAT decided that the have to implemented a state-of-the-art information technology. CAT would not be globally competitive without it. The first phase of the information technology project lasted eight years and cost $2 billion. What did it accomplish? Computer-integrated manufacturing (CIM), a dream at many companies, is a reality at CAT. Robots, computer-aided design, and computer-aided manufacturing are functioning throughout the various plants. These and other computerize systems resulted in in-process inventory reductions of 60 percent and savings of several million dollars. Nonessential labor was eliminated, production processes were simplified, costly plants and warehouses were closed, lead time to build a product was reduced from 45 days to 10, and on-time deliveries to customers increased by 70 percent. Modern management techniques, such as a computerized Materials Requirement Planning II, were installed, and computerized purchasing and logistics systems were put into operation. A sophisticated system for managing repairs and providing replacement parts to dealers and customers was installed. This system enabled dealers to provide parts to their clients quickly yet maintain low inventories.

Some other important IT applications at CAT are these:
- A global network with 7,000 terminals connects 50,000 employees and 180 dealers in 1,000 locations (Caterpillar uses both its fiber optic network and a leased satellite services). This network is used for an EDI, for the Internet, for other telecommunications applications, and intranet activities.
- An executive information system enables business units to analyze data, identify trends, and evaluate each dealer's performance.
- CAT's dealers and suppliers are on an EDI system.
- The telecommunication system includes a "CAT TV" link to dealers, as well as audio and video teleconferencing capabilities.

120

- Ninety-five percent of the company's employees can access data on the company's enterprisewide system (an intranet).
- A world-class repair and part inventory system was developed.

The IT project supported a massive reengineering of the company. By 1993, Caterpillar had become stronger than its competitors, controlling more than 30 percent of the U.S. construction equipment market. The firm was able to export more than half its sales to foreign buyers yet keep its manufacturing plants and the jobs in the United States. For its efforts, CAT was a winner of Information Week's 1991 "Excellence in IS" award. And what about CAT's chief rival: Komatsu of Japan? Komatsu shifted its construction-equipment strategy away from bulldozers in order to avoid head-to-head competition with CAT.

Source: Turban, E., McIean, E. and Wetherbe, J. 2001, *Information Technology for Management*, John Wiley & Sons, Inc., USA.

## 16.1. The Impact of Information and the New Economy

Caterpillar (CAT) is facing the competitor from the other part of the world because of the globalization. They competed in the same market that is become the global market. Komatsu of Japan is the main competitor who enters to US market to compete with CAT and offer the bulldozers with forty percent lower the price than CAT offered. CAT must cut down their products price to be able to compete with Komatsu but it is not a good strategy. They also facing a poor economy and at the same time, the labor strike make the situation even more worst. The Caterpillar lost amount of $953 million by 1985 and they have to lay off their employees and also cut down the expense as they next strategy. However, this strategy does not respond in positive to the company, market share still plunge while the losses are increasing. It can be seen that the CAT who normally in the leader position are facing the problem of new economy in their home country that is impossible in the past. Komatsu got the benefit of cheaper raw materials and low labor cost of manufacture is Asia become the main competitor when they enter to the global market and can offer the cheaper product to their customers. Caterpillar need to change their strategy to be able to compete with its competitor and solve all the problem that occur due to the globalization and the new economy that the other international or virtual firm become the major competitor in their own home country.

## 16.2. The Challenge

The challenge is, to implement the new information technology to enable knowledge management, company have to spend a huge amount of money for the technology that is very expensive especially when the company are facing crisis and they have to cut down the expense. The company cannot

be sure that when will the company can get the return from those investment and the situation will not even worsen. However, the manager of the Caterpillar decided the strategy to implement the information technology as the enabler of the information management to solve those problems. They also agree that CAT is impossible to compete with global competitor without using the information technology. The IT would be a great tool to gather the information that necessary to improve their products, services, enable knowledge sharing and a tool for making connections with its suppliers and customers and they can also gain the information about their competitor as well. So, they setup the information technology project with eight years period and it cost about $2 billion dollars.

## 16.3. The Solution

Caterpillar implemented the computer-integrated manufacturing (CIM) that is the concept of implementation of various integrated computer system in factory automation and it consists of three basic goals that are simplification, automation and, integration and coordination (Turban & Mclean & Wetherbe, 2001 pp.346-347). They also implement the robotics, and many kind of computer based applications. The result of this implementation has shown in decrease about 60 percent of the in-process inventory and it help caterpillar save several millions of dollar. The number of worker that not necessary was eliminated to reduce the expenditure as same as that the costly plants and warehouses were closed. The production processes were simplified so that the time in build up a product was decrease from about one and a half month from the previous to nearly just one week and in this way, it helps caterpillar deliver its product to the customer more rapidly. The on-time deliveries to customers improved about 70 percent. The Caterpillar also used new management techniques such as a Computerized Materials Requirement Planning II and computerized purchasing and logistics systems were put into operation. Caterpillar also setup the system to manage the repairs and provide the spare part for replacement to its dealers and customers. This system help support the dealer in providing parts to their customers more rapidly and also sustains low inventories.

Caterpillar also gain the benefit of the Internet by connected all of their branches together as a global network. They connected thousands of terminals and all of their employees and more than hundreds of their dealers from thousands of locations together. This network is used for an EDI (electronic data interchange), for the Internet, for other telecommunications applications and intranet activities. This is a great tool to enable knowledge sharing by connect one office to another in different places around the world to share the information together and the employees can also share the useful information and the experience to other colleagues. The manager from different part of the world can provide the useful information of the situation and the market change

environment to the head quarter to decide and adapt their strategy more rapidly and also more effectively to match with the situation and respond to the new environment quickly. In this way, CAT will be more flexible to adapt it selves to the external environment.

Caterpillar also used the executive information system that helps the manager to analyze the information and also evaluate the dealer's performance. The executive information system helps the manager to make more effective decision. It has greatly increased the availability and applicability of information and ought to provide a major contribution to the sense of greater confidence, certainty, and reduce risk in making the decision (Ritchie & Brindley, 2001). The executive information system can help manager of CAT analyze the information and find the relevant solution for the problem.

The Caterpillar is now using the EDI system with its suppliers and dealers. There are several of benefits that CAT can gain from this system. The EDI enable them to send and receive large amounts of routine transaction information rapidly around the world (Ward & Peppard, 2002 p.270). In this way, the EDI systems help CAT to trade with others dealer and customers around the world without boundaries, it is not time consuming and it is very few errors in the transformed data as a result of computer to computer data transfer. EDI can also helps CAT to access the dealers and customers database to see the needs of product and spare parts if there are low stock so that the Caterpillar can provide the product on time for the customers and dealers. In the same way, it can help create the sense of partnership relationship since it involves a commitment to a long-term investment and the refinement of the system over time. As a result, it will help make the barrier to other competitor to gain access to the distribution channel and prevent them from entering the market (Thompson 1998, p.78).

So, it can be seen that in this information age, the globalization makes change of locally traditionally business to become the e-business worldwide. An international firm can do the business across the boundaries. The Internet helps the firm to gain the information about the market of the other part of the world to invest. Komatsu of Japan sees this opportunity to launch their products in US market and they have the advantage of the cheaper product because of cheaper materials and lower labor cost than Caterpillar. The Caterpillar Inc. realizes the problem and they had implemented the information technology (IT) as an infrastructure to support the data gathering and also manage their information. Many infrastructures had been setup to make the benefit to the firm and to gain competitive advantage over its competitor. To acquire the technology, CAT are faced with the challenge that is to purchase the IT infrastructure, it is very costly especially when the firm are in suffering situation and they

not exactly know that when will they get the return and benefit from the investment. However, CAT manager understand the need for infrastructure that will enable the knowledge management that is very vitally to compete with global competitor.

Caterpillar had implemented the infrastructure such as CIM system and so forth. A global network has been created to transfer the important information between the company, dealers and customers all around the world. In this way, the network generated the share of important information such as the quantity of product in stock to help CAT deliver the product on time. Caterpillar can also know the need of spare parts and the lead time to produce the goods will be reduced. The network can be use as a tool to share the knowledge between colleague either in the same office or the other countries. It is allow the co-worker to communicate with each other for sharing the information to solve the problem, share experience, ask for an advice, share the information about the market environment so that the company can handle the change rapidly and so forth. Caterpillar can benefit from this knowledge sharing and it will provide the competitive advantage to the organization. Caterpillar also used the executive information system to analyze the information that has been collected to make the further decision to expand their operation or to solve the specific problem and also predict the future environment. This system can reduce the risk and reduce the uncertainty of the situation and it can also help CAT to gain the competitive advantage as well.

Another important system is EDI systems. Caterpillar can gain lots of benefits of manage their information by using this systems. They can send and received a huge amount of routine data especially the transaction to all over the world and it is very fast, less error and it can also help the company to access the database of its business partners to make an appropriate support to them. In this way, it can help create the commitment and the partnership to the caterpillar and prevent other competitor to gain access to the distribution channel. Thus, all of the benefit above can prove that the Caterpillar gain the competitive advantage over its competitor by using the information technology to enable the knowledge management to the firm and to be able to compete with the dynamic change of business environment in the new internet base economy of the world today.

## Conclusion

E-business is an interesting way for business to earn more profit and efficiency. Though there are a lot of benefit that can be gained from e-business, it's a wise decision to look at the negative sides such as threats, obstacles etc. In order to gain the benefits, companies or organizations that wish to implement Internet as part of their businesses activities have to look both the advantages and threats or obstacles that have to be faced.

Knowledge management is a method of the creation, capture, organization, access and use of organizations intellectual capital on consumers, markets, goods (product & services), and internal processes (Abell and Oxbrow, 2001, p. 33). It is a powerful way to help an organization or company to attain competitive advantages in competing with other companies. The implementation of knowledge management has successfully encouraged the continuance of many organizations to achieve goals. The characteristics of successful organizations that implement knowledge management are conservatism in financing, sensitivity to the environment, sense of cohesion and company identity among staffs and, tolerance of new ideas, circumstances, and changes.

Though knowledge management can bring a lot of benefit, at the same time, it also brings problems. The problems depend on the organizations themselves, what is the core business and how the organization runs the activities. Basically, the problems of using knowledge management that occur in an organization are distributing information; classify information and wrong perceptions of knowledge management.

**Bibliography**

Abell, A., & Oxbrow, N. (2001). *Competing with knowledge: The Information Professional in the Knowledge Management Age*. London, UK : Library Association Publishing.

Ader, M. (2003). *Technologies for Virtual Enterprises.* France : Workflow and Groupware Strategies. Retrieved from : http://www.e-workflow.org/downloads/gue-tec.pdf

Allweyer, T. (1997). *A Framework for Re-designing and Managing Knowledge Processes*. Saarbrücken, Germany : IDS Prof. Scheer GmbH. Retrieved from : http://www.itpapers.com

*Knowledge Management: Consortium Benchmarking Study Final Report 1996.* (1996). American Productivity and Quality Center (APQC). Retrieved from : http://www.store.apqc.org/reports/Summary/know-mng.pdf

Amor, D. (2000). *The E-business (R)evolution: living and working in interconnected world.* USA : Prentice-Hall.

Dutrénit, G. (2000). *Learning and Knowledge Management in the Firm*. Massachusetts, USA : Edward Elgar Publishing Limited.

Farrell, P., Bradbury, E., & Durovic, J. (2001). *E-business@work: an Australian interview.* NSW, Australia : Pearson Education Australia.
Haselkorn, M. (1998). *The Virtual Office: How it works (or doesn't)*. Todays Engineer. Retrieved from : http://www.welchco.com

*Internet growth worldwide*. (n.d.) Retrieved from : http://www.commerce.net/research/stats

Intranet Journal. (2003). *Knowledge Management and Intranets: Putting People.* Retrieved from : http://www.intranetjournal.com/articles/200304/ij_04_23_03a.html

KMWorld. (2002). *Enabling Knowledge Management in Today's Knowledge Economy*, *January 2002*. Retrieved from : http://www.kmworld.com/publications/whitepapers/BCI/auditore.pdf

Knowledge Management Forum. (2002). *What is Knowledge Management.* Retrieved from : http://www.km-forum.org/what_is.htm

McKie, S. (2001). *E-business best practices: Leveraging technology for business advantage.* USA : John Wiley & Sons.

Power, T., Weber, M., & Boswell, B. (2001). *E-business to the power of twelve: the principles of competition*. Great Britain : Pearson Education.

Radding, A. (1998). *Knowledge Management: Succeeding in the Information-based Global Economy.* South Carolina, USA : Computer Technology Research Corp.

Ritchie, B., & Brindley, C. (2001). *The information-risk conundrum*, Marketing Intelligence & Planning, Vol.19, Iss. 1, pp.29-37. Bradford. Retrieved from : http://80-global.umi.com.ezproxy.uow.edu.au

Skyrme, D J. (1999). *The Virtual Corporation.* David Skyrme Associates. Retrieved from : http://www.skyrme.com/insights/2virtorg.htm

Skyrme, D J. (2002). *KM Benefits Tree.* David Skyrme Associates. Retrieved from : http://www.skyrme.com/tools/bentree.htm

Thompson, A.A., & Strickland, A.J. (1998). *Industry and Competitive Analysis*, Strategic Management: concepts and cases, 10th Ed. The McGraw-Hill, Inc.

Turban, E., Mclean, E., & Wetherbe, J. (2001). *Information Technology for Management.* USA : John Wiley & Sons, Inc.

Turner, C. (2000). *The Information e-conomy: business strategies for competing in the global age.* London, UK : Kogan Page Limited.

Ward, J., & Peppard, J. (2002). *Strategic Planning for Information Systems.* 3rd Ed. England : John Wiley & Sons Ltd.