# Knowledge management enablers: a case study

Ying-Jung Yeh

*Department of Business Administration, National Taiwan University of Science and Technology, Taipei, Taiwan, Republic of China*

Sun-Quae Lai

*Department of Industrial Engineering and Management, National Taipei University of Technology, Taipei, Taiwan, Republic of China, and*

Chin-Tsang Ho

*Department of Accounting and Information Technology, National Chung Cheng University, Min-Hsuing Chia-Yi, Taiwan, Republic of China*

**Abstract**

**Purpose** – To analyze the crucial role that enablers play in carrying out knowledge management within the enterprise.

**Design/methodology/approach** – This research uses the method of a case study and has directed the survey on Advanced Semiconductor Engineering, Inc. (ASE) and VIA Technologies, Inc. (VIA). It is anticipated through the case study of these two companies that it will be possible to verify the finding of enablers concluded by other papers, thus showing the inter-relationship between theory and business.

**Findings** – It is found that among the enablers: on the part of strategy and leadership; obtaining top managements' support is most important; among organization culture enablers is the forming of an atmosphere and culture of sharing is most important but needs to be supplemented by informational technology; among people enablers, other than training courses and channels that provide learning, employee incentive program is one of the executing key factor; and among informational technology enablers, other than the digitization of documents, the function of speedy search of information for its re-use is becoming more and more important.

**Practical implications** – The result of this study not just validates theory with reality; it also provides a reference for the academia as well as the business field.

**Originality/value** – This paper has discovered that establishing a dedicated unit for implementing knowledge management is also one of the key enablers. Its role does not just stop at managing knowledge, but instead it plays the role of furthering knowledge management by taking on the duty of assisting and coordinating different departments in their communication.

**Keywords** Knowledge management, Knowledge management systems, Corporate strategy, Leadership, Organizational culture, Communication technologies

**Paper type** Case study

## 1. Introduction

The information technology boom has caused enterprises to realize the shift from the resource economy of controlling land, machines, factories, raw materials, and labor forces to the knowledge economy of creating business value through the utilization of intangible knowledge. This has caused "knowledge management" to be of crucial importance in the public sector as well as the private sector both for organizations as well as for individuals, and it has grabbed people's attention and generated significant

discussions. However, as enterprises start to manage their organizations' knowledge they need to be clear of the factors that will influence knowledge management, which are known as knowledge management enablers. Because enablers are the driving force in carrying out knowledge management, they do not just generate knowledge in the organization by stimulating the creation of knowledge, but they also motivate the group members to share their knowledge and experiences with one another, allowing organizational knowledge to grow concurrently and systematically (Ichijo *et al.*, 1998; Stonehouse and Pemberton, 1999).

Knowledge management enablers are the mechanism for the organization to develop its knowledge and also stimulate the creation of knowledge within the organization as well as the sharing and protection of it. They are also the necessary building blocks in the improvement of the effectiveness of activities for knowledge management (Ichijo *et al.*, 1998; Stonehouse and Pemberton, 1999). In related research, knowledge management enablers include the methods of knowledge management, organizational structure, corporate culture, information technology, people, and strategies, etc. (Bennett and Gabriel, 1999; Earl, 1997; Arthur Anderson Business Consulting, 1999; Arthur Anderson and APQC, 1996; Zack, 1999; Davenport, 1997; Long, 1997; Bose, 2004).

In the process of carrying out knowledge management, enterprises have to face the varying conditions of corporate culture, workflow processes, and the integration of group members' knowledge. They also need strong support from top management, because it is possible that during the process they will encounter resistance from employees. Enterprises also need to increase the usage of information technology in order to help the problem regarding the flow of information. Therefore, other than the collection of knowledge management theories, if through the study of actual experiences of various companies we can identify the key enablers, then we will be able to observe the various aspects of knowledge management as well as its overview. Thus, through the study of key enablers among the best practices in the knowledge intensive industry, this research not just tries to validate theory with reality, but it also hopes to provide a reference for academia as well as the business field. Although we might not be able to successfully duplicate previous experiences, through comparing and contrasting various enterprises' efforts on knowledge management we will be able to help enterprises understand the effect that different enablers have on the case companies.

## 2. Literature review and discussion
Knowledge management has a significant influence on the success or failure of business management, and hence bringing in knowledge management within a corporation has become one of the hottest topics for literature discussion. Besides, knowledge management is a key component in an organization's ability to realize the full potential of its intellectual assets in strategic and tactical decision making and in creating a competitive advantage (Hsieh *et al.*, 2002; Bose, 2004; Rowley, 2004). In order to ensure the success of bringing in knowledge management, it is crucial to be able to acquire the key enablers so as to make it possible to effectively utilize an organization's limited resources, reduce the use of manpower, material, and time, and still be able to achieve the expected results.

Ichijo *et al.* (1998) believe that in order for organizations to avoid arbitrary or un-systematic growth of knowledge they need to construct some enablers so that the organization's knowledge can grow concurrently and systematically. These enablers are those that form a system that can stimulate group members to advance in the growth of knowledge, to breakthrough the barriers that hinder the growth, and to encourage sharing among members regarding their knowledge and experiences. In addition, from the angle of the social environment, Gupta and Govindarajan (2000) believe there is an inter-relationship between the enablers and such a social system of the combination of various enablers should not be treated as by chance – instead it should be treated as a whole system.

Arthur Anderson Business Consulting (1999) point out that knowledge management has to start simultaneously with people and business. On the part of the people, leadership and corporate culture are the biggest enablers, because it is through them that job description, the necessary knowledge for the job, and the members' work atmosphere are clearly defined so that learning and change can continue to occur. On the part of the business, information technology and performance evaluation are the biggest enablers, because strong information technology helps communication in the business and information can be collected quickly, then acquired, and finally re-used.

Based on the previous findings, this research believes "knowledge management enabler" refers to the key factors that determine the effectiveness of executing knowledge management within the organization, and it is closely related to the current state of the utilization of information technology among the members, which are the driving force that solidifies knowledge management. However, knowledge management enabler is not a brand new discussion; it was mentioned in many published papers, such as "Critical success factors for implementing knowledge management" (Skyrme and Amidon, 1997; Davenport *et al.*, 1998; Liebowitz, 1999; Holsapple and Joshi, 2000; Hasanali, 2002; Chourides *et al.*, 2003; Bose, 2004;Hung *et al.*, 2005; Wong, 2005). They mainly focus on the proof of the effect of knowledge management enablers and at the same time they identify many different enablers like the method of knowledge management, organizational structure, corporate culture, etc.

After considering several knowledge management theories from various scholars and well-known enterprises, we have organized them in Table I and have listed them into four categories: strategy and leadership, corporate culture, people, and information technology.

### 2.1 Strategy and leadership
When one discusses knowledge management we need to have a strategy first and the members within the group need to be willing to plan and contribute to it (Pieris *et al.*, 2003). This is just like a good director needing to have a strong and clear vision and goal in order to create an actively participating atmosphere (Arthur Anderson and APQC, 1996). Zack (1999) believes that the most important background factor that guides knowledge management is the business strategy, he expresses the relationship between knowledge strategy and organization strategy in Figure 1.

Based on the above framework, Zack believes that we can discuss it from two sides: on the one side, the organization is the creator or user of the knowledge, and on the other side, the source of the knowledge can either be external or internal. Based on these two sides we can come up with two kinds of strategy: aggressive strategy and

| Published paper | Main content | Enablers |
|---|---|---|
| Arthur Anderson and APQC (1996) | Knowledge management includes its process and catalysts. Knowledge management process includes seven activities. Knowledge management catalysts include strategy and leadership, corporate culture, information technology, and its evaluation | Strategy and leadership Corporate culture Information technology Evaluation indicator Flow of knowledge management |
| Earl (1997) | There are at least four key factors in establish knowledge as strategic competence: knowledge system, network, knowledge worker, and learning organization | Information technology People Corporate culture |
| Arthur Anderson Business Consulting (1999) | Knowledge management uses technology to closely connect people and knowledge with information, so as to induce strategic thinking and improve the flow process within an organization with a sharing culture | Information technology People Corporate culture |
| Andrew *et al.* (2001) | When evaluating an organization's knowledge management ability we need to view it from the point of the organization's ability and it include two parts: fundamental building and flow management ability. Fundamental building contains three parts: information technology, organizational structure, and corporate culture. Flow management ability contains four parts: knowledge obtainment, knowledge transfer, knowledge application, and knowledge protection | Information technology Organizational structure Corporate culture Knowledge obtainments Knowledge transfer Knowledge application Knowledge protection |

**Table I.**
Summary of building knowledge management structure in the organization
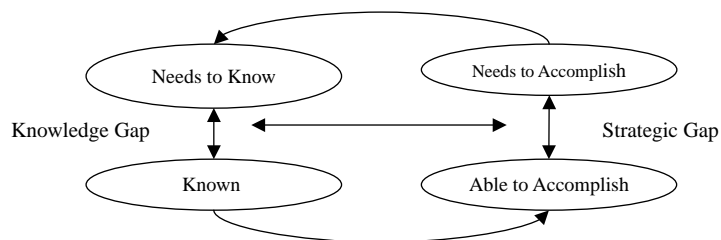


**Figure 1.**
Relationship between knowledge and organization strategies

**Source:** Zach (1999)

conservation strategy (shown in Figure 2). According to Zack's observations, companies that use an aggressive strategy do better in the long run, compared to those that use a conservative strategy. Therefore, companies that are behind in market share should use an aggressive strategy in order to create new organizational advantages.

After we understand the important relationship between knowledge management and strategy, leadership then comes into play as an important role. Some scholars consider the introduction of knowledge management program as a type of organizational change; therefore, the level of support by the top management will determine its success or failure (Liebowitz, 1999). Usually the commitment of the high level executives will determine the amount of resources allocated, and the amount of time that is allowed for the members to conduct the creation and sharing of knowledge for the knowledge management program (Von Krogh, 1998). Greengard (1998) believes that senior managers need to understand the value of knowledge management and are willing to support and play an aggressive role in decision making. At the same time, Davenport *et al.* (1998) based on 31 knowledge management projects also conclude that one of the key successful factors is the support of upper managers and it includes:

- conveying the information that knowledge management and organizational learning are the keys to the success of an organization;
- providing financial and other resources to build the fundamental building blocks of knowledge management; and
- clarify the kind of knowledge that is important to the organization.

Storey and Barnett (2000) added that support from top management should be ongoing and be delivered in a practical manner.

### 2.2 Corporate culture
Corporate culture is the combination of value, core belief, behavior model, and emblem. It represents the value system of the company and will become the employees' behavior norm. Every organization's culture is an independent entity different than any other organization.

Many research and published papers, even people in the field, all believe corporate culture is the key influence on knowledge management or the effectiveness of knowledge sharing (Chase, 1997; Demarest, 1997; Davenport *et al.*, 1998; Pan and Scarbrough, 1998;Holsapple and Joshi, 2000;Martensson, 2000; Gold *et al.*, 2001; Bose, 2004). Corporate culture not just defines the value of knowledge and explains the advantage that knowledge creates for the organization (Long, 1997) it also influences
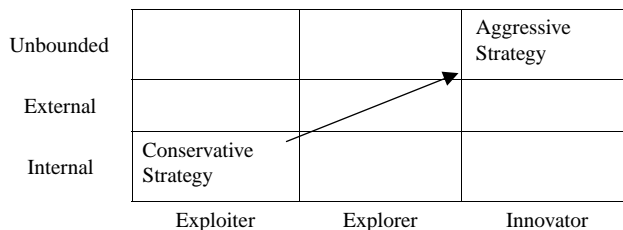
**Source:** Zach (1999)

**Figure 2.**
Categories of knowledge
management strategy of
an organization

the efforts that the employee is willing to share and put into the company. Therefore, being able to build a culture with easily accessible knowledge is necessary for management during the implementation process of knowledge management.

Alavi and Leidner(2001) in their survey of the application of knowledge management show that the majority of the success of knowledge management in their experiences of knowledge sharing is closely related to culture. Therefore, successful knowledge management depends on culture, management, and the cooperation of every level in the organization. Davenport *et al.* (1998) also point out the eight factors that contribute to the success of knowledge management projects with many that are related to corporate culture. In addition, Davenport and Prusak (1998) state that in order to successfully obtain and transfer knowledge other than the type of knowledge, the constituents of corporate culture also determine the extent of its success. Their research claims that when an enterprise simply has a complete system of knowledge management, but lacks a corporate culture that supports it, then the efficiency of knowledge management is limited. It is only when both are present that its effect will be maximized.

Ruppel and Harrington (2001) believe knowledge is a process instead of an asset, and hence in order to maximize its value an organization needs to create an environment that helps the flow of knowledge. After the empirical study this research also finds that for an organization to effectively use its own intranet it is necessary to provide a mutually trusting culture between all the employees and to maintain a trusting level. Some scholars believe that the standard of evaluating the success or failure of carrying out knowledge management is through the measure of whether or not the organization has established a culture of sharing (Skyrme and Amidon, 1997; Davenport *et al.*, 1998; Ruggles, 1998; Hauschild *et al.*, 2001).

*2.3 People*
People are the core of creating organization knowledge (Chase, 1997; Holsapple and Joshi, 2001; Ndlela and Toit, 2001), because it is people who create and share knowledge, and therefore, it is crucial to manage those who are willing to create and share their knowledge (O'Dell and Grayson, 1999). Since, knowledge is kept within the individual, the most important thing for knowledge management is the way to let the hidden knowledge within an individual be transferred to other members within the corporation in order for them to share, utilize, and then convert it into knowledge within the organization. Therefore, a key element for an enterprise to be successful in pushing knowledge management is the process to encourage people to communicate and share their knowledge with others (Nonaka and Takeuchi, 1995). Hence, organizations should view employees as their most important knowledge resource and must blend in the concept of knowledge management into their employee management policy, because it is crucial for an employee to be willing and enthusiastically motivated to participate and engage in the obtaining and sharing of knowledge (Szulanski, 1996).

Additionally, many scholars when focusing their researches on the key factors for the success of knowledge management have not just found the importance of organizational knowledge contribution and sharing, they have also discovered that incentive program plays a major role in the activity of knowledge management as well (Davenport *et al.*, 1998; Jarvenpaa *et al.*, 1998; Liebowitz, 1999; Massey *et al.*, 2002; Schultze and Leidner, 2002; Alavi and Leidner, 2001; Eisenhardt and Santos, 2002).

Such incentive program not just positively influences the amount of support that the members of the organization are willing to give for the activities of knowledge management; it also increases their willingness to participate in the creation and sharing of knowledge. Furthermore, Smith *et al.* (2001) in their study of the strategy that is needed for the implementation of knowledge management for the city of Saint Louis has discovered that the educational training of all the employees and the alignment of consensus is another one of the key factor for knowledge management.

*2.4 Information technology*
Information technology of knowledge management enabler mainly refers to the fundamental building block of information technology that supports and coordinates knowledge management; for example: database, knowledge platform, performance evaluation management system, and integrated performance support system, etc. (Beckman, 1999). Hence, information technology can enable rapid search, access and retrieval of information, and can support collaboration and communication between organizational members. In essence, it can certainly play a variety of roles to support an organization's KM processes (Alavi and Leidner, 2001; Lee and Hong, 2002;Wong, 2005).

Information technology and knowledge management are closely tied together, because both help the propagation of structured knowledge vertically as well as horizontally within the organization. They also make searching and using knowledge much easier. The goal of many enterprises is to use the advancement in information technology so as to conduct knowledge management (Skyrme and Amidon, 1997; McDermott, 1999; Alavi and Leidner, 2001).

Lin and Tseng (2005)propose enterprises should have a well-developed technology that is accessible and easy to leverage knowledge management. Davenport *et al.* (1998) believe that generally building knowledge management into the fundamental building of information technology in the organization can create a common controllable environment so that knowledge can be shared within the organization, helping ease its success. However, Zack (1999) believes that information technology plays four different roles in knowledge management:

(1) obtaining knowledge;
(2) define, store, categorize, index, and link knowledge-related digital items;
(3) seek and identify related content; and
(4) flexibly express the content based on the various utilization background.

In addition, Hendriks (1999) and Hedelin and Allwood (2002) have discovered that informational communication technology has a direct and indirect influence on the motivation of sharing knowledge, because it can execute four different functions to eliminate hindrances, provide channels to obtain information, correct flow processes, and identify the location of knowledge carrier and knowledge seeker. Smith *et al.* (2001), when studying the needed strategy for implementing knowledge management into the city of Saint Louis, discover that advanced information technology can allow the sharing and transferring of data on different platforms. Therefore, informational communication technology can be called as the hygiene factor, as without it, knowledge sharing can be obstructed.

Based on the previous studies we know during the process of knowledge management and through the use of multiple information technology that we can lower the cost of information usage, increase the speed of knowledge flow (Demarest, 1997; Davenport *et al.*, 1998), and also aid in the creation, integration, and transfer of knowledge (Alavi and Leidner, 1999). Therefore, in building the model of knowledge management, information technology appears to be one of the key factors of influence (Earl, 1997).

If strategy and people are the main enablers for executing knowledge management, then information technology is the fundamental tool for knowledge management, because it enables the transference of experience among employees much faster. An information system can provide instant, integrated, or even smarter interface platform to make knowledge management much easier to employ. Another fundamental tool for knowledge management is corporate culture, because only a culture of mutual trust and help helps the employees to depend and trust on the information provided by one another, thus raising the motivation for mutual sharing. Such a relationship is shown in Figure 3.

## 3. Case study

The implementation of knowledge management is a long-term strategy for a corporation, and with knowledge as an intangible asset, the usefulness of it usually cannot be seen in the short run. Therefore, this research uses the method of a case study and has directed our survey on Advanced Semiconductor Engineering, Inc. (ASE) and VIA Technologies, Inc. (VIA). The reason that we have chosen these two companies is that they both have already carried out a knowledge management strategy for a period of more than five years and its effect is apparent and recognized by the industry. This research anticipates through the case study of these two companies that we will be able to verify the finding of enablers concluded by other papers, thus showing the inter-relationship between theory and business. We also hope the result of this study can provide a reference for academia and the business field.

### 3.1 ASE

*3.1.1 Company summary*. ASE was established in 1984 with an investment capital of US$1.645 billion and currently owns four factories located in Kaohsiung (Taiwan), Chungli (Taiwan), Penang (Malaysia), and Paju (South Korea) with more than 30,000 employees worldwide. ASE is one of the world's leading providers of semiconductor manufacturing services, including IC packaging, IC testing, and IC materials. Its main business operations include various IC manufacturing, assembling, fabrication,
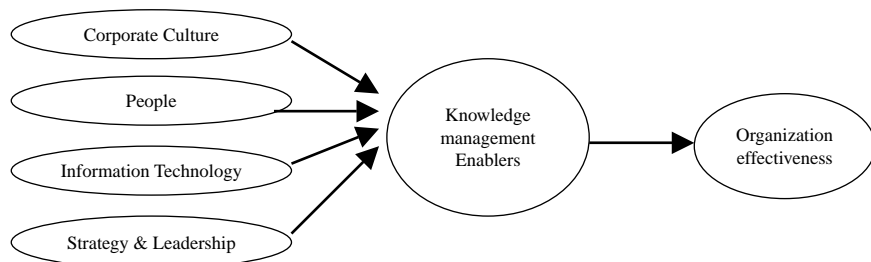
**Figure 3.**
Relationship between knowledge management enablers and organization effectiveness

testing, and sales covering computing, communications, and consumer electronics industries.

There are three parts to the business strategy of ASE. First, on the strategic planning side the guiding principles are continuous innovation, diversification, and flexibility to exceed customer expectations. Second, on the operating system side the primary goals are emphasizing execution, having effective quality assurance, controlling cost and discipline in order to achieve high quality growth, and at the same time building up the contents of the knowledge management system. Third, on the personnel and culture side the focus is on strengthening the training and evaluation system, elevating personnel quality and loyalty, raising the contribution of every personnel, and establishing a culture of enthusiasm and a keen sense of responsibility.

*3.1.2 Reason for the implementation of knowledge management.* The focus of ASE's operating strategy is customer satisfaction. In order to increase the quality of professional service, the engineering department effectively stores information for the usage by its employees. As for the knowledge management strategy, ASE emphasizes the "cultivation of environments." In addition to hosting information discussions at different levels, there are competitions for the best case studies and the selection of "model cases." A handbook on knowledge management is also published with promotions and reports on bulletin boards as well as meetings for the announcements of achievements in knowledge management. Finally, through information exchange seminars, internet case compilation, and academic lesson plans, the flow of knowledge is facilitated to "establish the local model."

ASE started implementing knowledge management in 1998 and formally established a knowledge management center in January 2001. The center is responsible for the planning and implementation of knowledge management for the ASE Group's engineering, R&D, and quality assurance departments. First, the center educates and promotes the implementation model of knowledge management to every department. Each department then, based on its own culture, adjusts the implementation and produces reports to be evaluated. Through this process it is confirmed that every department has actually carried out the knowledge management strategy.

*3.1.3 Knowledge management enablers.* 3.1.3.1 Strategy and leadership. ASE's first phase of implementing knowledge management is working to gain the support of the senior managers and to reach a common understanding of what knowledge management is. In this phase the company believes it is crucial to communicate continuously to the senior managers and directors about the importance of knowledge management and constantly infuse the employees about the concept and value of knowledge management. Therefore, the knowledge management center will periodically evaluate the strategy and the amount of work that is being put into the company's knowledge management both for the present and the future, and it will take specific steps accordingly.

3.1.3.2 Corporate culture. ASE requires every employee to produce one to two teaching materials within six month of employment according to the reference sample. All materials need to be approved by an expert and those who do not pass need to be corrected and re-submit their copy. The approved materials are placed and used in the knowledge management platform. This process not only increases the feeling of accomplishment as the employees share their knowledge, it also facilitates mutual

discussion and suggestions among the employees. Through this culture of sharing, it has increased the amount of knowledge transfer and also strengthened the quality of the knowledge structure resulting in effective sharing and flowing of information.

3.1.3.3 People. There are three main systems in ASE for the training of personnel. First, there is classroom education away from the workplace, called "OFF-JT." It focuses on various trainees (including mid-, high-, and entry-level personnel) and hosts a series of classes according to the management position, technical work, and administrative work. Second, there are the training activities by the department manager for their subordinates called "OJT." The third one includes self-learning activities by the employees themselves, called "SELF-DEVELOPMENT."

In the area of encouraging innovation among the employees, ASE mainly uses the method of expert evaluation. This means whenever there is a proposal by the employee, it is first placed in the knowledge management platform, then it is evaluated by the experts, and once passed it is promoted for execution among the employees. It will thereafter be published and the proposed employee will be cited and rewarded.

In the part of recruiting, ASE establishes medium- to long-term planning for human resources and evaluates the needs of manpower in the core departments with the goal of finding the right people. ASE also provides competitive salary policies to attract and keep suitable and outstanding talents.

For employee satisfaction, the management aims to provide a pleasant and open atmosphere for the employees. In addition to providing a complete training system, communication channel, promotion evaluation, reward and punishment program, and incentive program, in 2004 ASE established a physical check-up center to maintain the health of its employees.

3.1.3.4 Information technology. ASE's knowledge management platform emphasizes product engineering, manufacturing processing, research and development, and materials. Every department has its own platform and authorizes any ASE employee the right to log in and browse the information. However, ASE uses a system that is similar to the google search engine – "Best Known Method forum platform" – that connects every department's database and is only open to internal employees for the protection of company information.

3.1.3.5 ASE's specific knowledge management enabler. ASE set up the knowledge management center as a dedicated unit to promote knowledge management in order to show the support from top management concerning the company's policy and determination in executing knowledge management in the company. Such a center speeds up the spread of knowledge management within the company. Therefore, it also plays the role of an enabler.

*3.2 VIA*

*3.2.1 Company summary.* VIA was established in September 1992 with an investment capital of US$0.405 billion. It is the foremost fabless supplier of market-leading core logic chipsets, low power x86 processors, advanced connectivity, multimedia, networking, and storage silicon, and complete platform solutions that are driving system innovation in the PC and embedded markets. VIA, with its dynamic fabless business model, has combined its emphases in human resources and the development of technology has become the model to other enterprises in the semiconductor industry in this age of the knowledge economy. Headquartered in Hsin-Tien, Taiwan, with

offices in the US, Europe and China, VIA currently has a workforce of more than 2,000 employees with customers covering major PC OEM manufacturers, motherboard manufacturers, and system integrators throughout the world.

VIA positions itself by working closely with the mainstream of the personal computer industry, including software, complete system, system parts, and semiconductor manufacturers, to unite industry partners and to facilitate future personal computer platforms. Moreover, VIA in developing new highly efficient products hopes to bring together the best minds in the industry together with its dynamic fabless business model so as to continuously elevate its technology in the core logic, processor, and communication chipsets. At the same time, through mergers and strategic alliances VIA hopes to advance with the newest technology and to develop and hold the interface between the growing industry of computer, internet, and communications electronics. VIA dedicates itself to becoming the most influential company among the system platform solution providers in the world.

*3.2.2 Reason for the implementation of knowledge management.* VIA's knowledge management started with the common perception by the chairwoman, president, and the VP of R&D regarding the need to provide "anytime, document in hand" in order to meet the demands of the customers. For this to happen, VIA needed a document management center to provide the documents needed by the customers, which are headed up by the service department. Therefore, initially the concept of knowledge management was implemented in the service department. Since, most employees are knowledge workers, VIA did not formally announce the start of "knowledge management" but instead various appropriate ways of knowledge management are used to meet the different knowledge needs of the different departments; such as patent management, documentation, etc.

The implementation of VIA's knowledge management did not start with any strategy or goal in mind, because the management is concerned that employees might have negative feelings toward the company if they feel that the company is closely watching them. Therefore, VIA used a subtle way, by first making sure that all the employees feel that knowledge management can be helpful to them. It then proceeded with various steps of implementation and included the steps as part of daily management.

VIA's knowledge management implementation is mainly top down. First, it gains the recognition of the top level and then appoints the customer service department to carry it through. Although there is no special department setup for the implementation, the responsibility was given to the e-Business internet division and the knowledge management project was set up.

The biggest barrier during the implementation is the unwillingness of some of the department heads to systematically organize their knowledge. Since, this cannot be solved with technology, different kinds of work were needed. Examples include the promotion of knowledge management to the department heads and their workers, or requiring department heads to give their people pressure to implement knowledge management. Currently, this condition still exists within the company, however, once people discovered that knowledge management is helpful to the whole department, or after seeing other departments benefit from knowledge management, employees started to participate in its implementation.

*3.2.3 Knowledge management enablers.* 3.2.3.1 Strategy and leadership. The Chairwoman of VIA strongly supports knowledge management and often uses different occasions to emphasize its importance to first-level managers. She also encourages every department to fully push for its implementation. VIA believes that the first step of knowledge management implementation is to have all the top mangers to agree and recognize the importance of knowledge management and support it. Various methods can then be used to help the department heads reach an agreement on the strategy of knowledge management.

The company also requires every department to set a related key performance index, such as the number of customer complaints, the time frame of research and development, etc. Therefore, every department head can evaluate the effectiveness of knowledge management's implementation through the data provided by the information system regarding these indices.

3.2.3.2 Corporate culture. Since, knowledge management is broadly applicable, not all the employees can feel the same effect of knowledge management. For example, the management of information technology can be helpful to the legal department as well as to the R&D engineers, however, the angle will be very different and the functions to the employees are different as well. Eighty percent of VIA's employees are research personnel. Hence, when communicating knowledge management to the employees it is not effective to use the classroom style, but instead it has to be through various meetings to make the managers realize the help that knowledge management can provide for them so that they will be willing to participate.

VIA believes that corporate culture has to be flexible and easily adaptable so that employees can take on new projects in their own ways and each department manager plays the role of a supporter to help employees reach their goals. VIA fully utilize its corporate culture in facilitating knowledge management. First, it lets the department managers identify with the importance of knowledge management, and then allows each manager to implement it within his/her own department.

3.2.3.3 People. The training system in VIA is divided into three different categories. The first category is a general type of training, including managers, employees, or specific professional training like information techniques, patent sanctions, etc. It is provided by the human resources department. The second category is the company's professional field training, provided by the research and development department. The third category is the in-house training within each department. VIA has filmed the different types of training courses into a digital format and placed it in the information system in the company to make it available on-line to every employee at anytime.

VIA does not have clear incentive programs, however, every department has different indicators to evaluate the extent of knowledge management. For instance, department managers can know a team or an individual's problem solving ability through the report generated by the knowledge management system regarding the amount of time it takes for them to solve the problem. When combining this with a performance evaluation, it generates the driving force within the employees to do more than what their superior asks of them, thus achieving the goal of knowledge management.

3.2.3.4 Information technology. VIA understands that information technology plays an important role in knowledge management. Therefore, the e-Business internet division carries great responsibility in developing the knowledge management system.

The special assistant to VIA's Chairwoman and e-Business internet Division Manager
Mavis Liao expressed that:

> ... the e-Business division provides custom electronics system development and set-up
> according to the nature and type of work of the various departments and by focusing on the
> department's request of different system functions. The search engine in the system is very
> important, as it needs a good program to allow the user to find the needed information quickly
> and easily. In addition, the control of the information system rights is essential as well.

VIA has placed design research, production manufacturing, sales service, accounting,
and various activities related to knowledge and technical production in the knowledge
management platform, in order to provide the company's employees, customers, and
partners the ability to obtain the needed information in the network. Through the
knowledge management system, employees can find out the number of engineering
problems, the different kinds of solutions, and how many more questions that need to
be discussed and resolved. These are the visible benefits of utilizing information
technology.

3.2.3.5 VIA's specific knowledge management enabler. VIA believes that the
implementation of knowledge management varies according to the industry and the
corporate culture. Therefore, since most employees in VIA are knowledge workers and
are used to some type of work of knowledge management every day, it is not necessary to
convert knowledge management into a slogan before its implementation. Instead, VIA is
able to mingle the way of doing knowledge management into employees' daily work so
that the employees will develop the habit of knowledge management naturally.

The implementation of knowledge management in VIA is mainly by the acceptance
of the top management, and then the e-Business internet division carries through with
it. Although no special division or implementation committee is set up, the e-Business
internet division has established the knowledge management project to be led by the
department head, and it has become VIA's dedicated unit in its knowledge
management implementation.

## 4. Meaning in management
In ASE's and VIA's process of implementing knowledge management, among the
enabler of strategy and leadership it is clear that the most important thing is "gaining
the top manager's acceptance and support." This is also one of the necessary processes
before the execution of any strategy. This matches with Greengard (1998), Von Krogh
(1998), Davenport *et al.* (1998), Liebowitz (1999) and Storey and Barnett (2000) finding
that managers have to understand and see the value of knowledge management and be
willing to support it, and then they can play an active role during its implementation.
Other than this, the measurement of knowledge management performance indicator
has a major influence on this enabler as well. Since, knowledge management is not a
short-term strategy, but long term, once it has obtained the support and acceptance of
the top mangers, the strategy for knowledge management is maintained and the
concept of knowledge management can penetrate throughout the whole company.

For the corporate culture enabler, the "building of an environment of sharing among
employees" is most important. However, it needs to be supported by information
building, which is the support of the information technology enabler. This matches
with Ruppel and Harrington's (2001) finding on the extent of the application of
information being directly proportional to the extent of mutual trust in the corporate

culture. It points out that for an organization to maximize the utilization of its intra-net, it is necessary to build a culture of mutual trust and support among those who provide the information and those who use the information. It is especially necessary to increase the extent of mutual trust, including the management of the intra-net and the renewal of information so that employees can trust the information in the network.

ASE mandates every employee to generate one to two teaching materials every six months and to set up a system for the users of the materials to rate it. This is the method of quantity before quality. Learning about the building of the information system allows the materials to be digitized and communicable. With the set up of the Best-Known Method forum platform, ASE connects every department's database, making the search of information much easier. In addition to the emphasis on the digitalization of the teaching material and the importance of the search function, VIA also emphasizes the transparency of information within the company, which means that the employees can find all the problems that the company is facing when they enter the knowledge management system.

The people enabler shows that other than the training courses for the talents and the channel of learning that are important – which is identical to Davenport *et al.* (1998), Jarvenpaa *et al.* (1998), Liebowitz (1999), Alavi and Leidner (2001), Chang (2001), Eisenhardt and Santos (2002), Massey *et al.* (2002) and Schultze and Leidner' (2002) finding – the reward in management is essential as well. ASE initially uses the method of mutual evaluation, and then after one month it combines with the management system to become a part of the performance evaluation. On the other hand, VIA joins with the management system so as to process the form of employee performance evaluation.

Another common enabler is the "establishment of a dedicated unit" for implementing knowledge management. This is one of the enablers that is not extensively discussed or generalized in this paper. As for ASE's knowledge management center, it represents the support of top managers, and the dedication and strategy of implementing knowledge management. This center does not just manage knowledge; it mainly plays the role of a catalyst. As for VIA, although there is no dedicated department, there is a similar division that operates and establishes knowledge management projects, which is headed up by the division head. This also explains VIA's belief that knowledge management will happen naturally in the industry and it does not need to be converted into slogans for its implementation.

## 5. Conclusion and suggestion
Under the influence of the advancement of information technology with economic globalization, many enterprises have started to actively implement knowledge management with the goal of obtaining their future competitive edge – "knowledge." Since, people are the source of knowledge production, the application of knowledge management includes more than just the digitalization of documents, the setting up of the system, or the application of information technology. It is also a mixture of a combination of various factors resulting in the difficulty of implementing knowledge management. Therefore, if enterprises can be certain of the key enablers for implementing knowledge management, then they will be able to speed up the efficiency of knowledge management and make the process of implementation much easier.

This research first concludes that strategy and leadership, corporate culture, people, and information technology are four of the enablers in knowledge management, based

on past-published papers. Through the case study of ASE and VIA, we have found that for the strategy and leadership enabler the most important part is to obtain the support of the top managers. For the corporate culture enabler, the important part is the forming of a culture of sharing but needs to be supplemented by information technology. For the people enabler, other than the training courses, the channels of learning and the incentive program for the employees are also key factors. As for the information technology enabler, other than the digitalization of the documents, the speedy search of knowledge for its re-use is becoming more and more important. In practice we have discovered that the "establishment of a dedicated unit" is also a key enabler, and this enabler mainly plays the role of furthering knowledge management, taking communication, and coordinating as its duty.

This paper reaches the same conclusion as previous studies regarding the strategy and leadership, the corporate culture, the people, and the information technology enablers. This verifies the academic theories with real practice in the industry. In addition, this research has also discovered that establishing a dedicated unit for implementing knowledge management is also one of the key enablers. Its role does not just stop at managing knowledge, but instead it plays the role of furthering knowledge management by taking on the duty of assisting and coordinating different departments in their communication.

In the flow of knowledge management, this research approaches from the angle of enablers as being the factors that increase the efficiency of knowledge management has concluded that the key enablers, through the discussion of published papers, have combined with the case study to create the best practices. We have not just validated theory with business practice, but have also provided a reference for academia and business field, and we hope that enterprises will be able to understand the key enablers as they implement knowledge management.

**References**

Alavi, M. and Leidner, D.E. (1999), "Knowledge management system: issues, challenges, and benefits", *Communications of the AIS*, Vol. 1 No. 7, pp. 1-37.

Alavi, M. and Leidner, D.E. (2001), "Knowledge management and knowledge management systems: conceptual foundations and research issues", *MIS Quarterly*, Vol. 25 No. 1, pp. 107-36.

Arthur Anderson and The American Productivity and Quality Center (1996), *The Knowledge Management Assessment Tool: External Benchmarking Version*, Arthur Anderson/APQC, Chicago, IL.

Arthur Anderson Business Consulting (1999), *Zukai Knowledge Management*, TOKYO Keizai, Inc., Tokyo.

Beckman, T.J. (1999), "The current state of knowledge management", in Liebowitz, J. (Ed.), *Knowledge Management Handbook*, CRC Press, Boca Raton, FL, pp. 1.1-1.22.

Bennett, R. and Gabriel, H. (1999), "Organizational factors and knowledge management within large marketing departments: an empirical study", *Journal of Knowledge Management*, Vol. 3 No. 3, pp. 212-25.

Bose, R. (2004), "Knowledge management metrics", *Industrial Management & Data Systems*, Vol. 104 No. 6, pp. 457-68.

Chang, C.C. (2001), *The Study of Constructing a Model of Knowledge Innovation in Technological Industrial Organization*, National Taiwan Normal University Press, Taipei.

Chase, R. (1997), "The knowledge-based organization: an international survey", *Journal of Knowledge Management*, Vol. 1 No. 1, pp. 38-49.

Chourides, P., Longbottom, D. and Murphy, W. (2003), "Excellence in knowledge management: an empirical study to identify critical factors and performance measures", *Measuring Business Excellence*, Vol. 7 No. 2, pp. 29-45.

Davenport, T.H. (1997), "Ten principles of knowledge management and four case studies", *Knowledge and Process Management*, Vol. 4 No. 3, pp. 187-208.

Davenport, T.H. and Prusak, L. (1998), *Working Knowledge: How Organizations Manage what they Know*, Harvard Business School Press, Boston, MA.

Davenport, T.H., De Long, D.W. and Beers, M.C. (1998), "Successful knowledge management projects", *Sloan Management Review*, Vol. 39 No. 2, pp. 43-57.

Demarest, M. (1997), "Understanding knowledge management", *Long Range Planning*, Vol. 30 No. 3, pp. 374-84.

Earl, J. (1997), "Knowledge as strategy: reflections on Skandia International and Shorko Films", in Liebowitz, J. and Wilcox, L. (Eds), *Knowledge in Organizations*, Oxford/CRC Press, Boston/New York, NY.

Eisenhardt, K.M. and Santos, F.M. (2002), "Knowledge-based view: a new theory of strategy", *Handbook of Strategy and Management*, Sage, London.

Gold, H., Malhotra, A. and Segars, A. (2001), "Knowledge management: an organizational capabilities perspective", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 75-96.

Greengard, S. (1998), "How to make KM a reality", *Workforce*, Vol. 77 No. 10, pp. 90-2.

Gupta, A.K. and Govindarajan, V. (2000), "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21, pp. 473-96.

Hasanali, F. (2002), "Critical success factors of knowledge management", available at: www.kmadvantage.com/docs/km_articles/Critical_Success_ Factors _of_KM.pdf (accessed November 20, 2003).

Hauschild, S., Licht, T. and Stein, W. (2001), "Creating a knowledge culture", *The McKinsey Quarterly*, Vol. 1, pp. 74-81.

Hedelin, L. and Allwood, C.M. (2002), "IT and strategic decision making", *Industrial Management & Data Systems*, Vol. 102 No. 3, pp. 125-39.

Hendriks, P. (1999), "Why share knowledge? The influence of ICT on motivation for knowledge sharing", *Knowledge and Process Management*, Vol. 6 No. 2, pp. 91-100.

Holsapple, C.W. and Joshi, K.D. (2000), "An investigation of factors that influence the management of knowledge in organizations", *Journal of Strategic Information Systems*, Vol. 9 Nos 2/3, pp. 235-61.

Holsapple, C.W. and Joshi, K.D. (2001), "Organizational knowledge resources", *Decision Support Systems*, Vol. 31 No. 1, pp. 39-54.

Hsieh, C.T., Yang, H. and Lin, B. (2002), "Roles of knowledge management in online procurement systems", *Industrial Management & Data Systems*, Vol. 102 No. 7, pp. 365-70.

Hung, Y.C., Huang, S.M., Lin, Q.P. and Tsai, M.L. (2005), "Critical factors in adopting a knowledge management system for the pharmaceutical industry", *Industrial Management & Data Systems*, Vol. 105 No. 2, pp. 164-83.

Ichijo, K., Krough, G. and Nonaka, I. (1998), "Knowledge enablers", in Krogh, G. and Roos, J. (Eds), *Knowing in Firms*, Sage, London, pp. 173-203.

Jarvenpaa, S., Knoll, K. and Leidner, D.E. (1998), "Is anyone out there? Antecedents of trust in global virtual teams", *Journal of Management Information Systems*, Vol. 14 No. 4, pp. 29-64.

Lee, S.M. and Hong, S. (2002), "An enterprise-wide knowledge management system infrastructure", *Industrial Management & Data Systems*, Vol. 102 No. 1, pp. 17-25.

Liebowitz, J. (1999), "Key ingredients to the success of an organization's knowledge management strategy", *Knowledge and Process Management*, Vol. 6 No. 1, pp. 37-40.

Lin, C.H. and Tseng, S.M. (2005), "The implementation gaps for the knowledge management system", *Industrial Management & Data Systems*, Vol. 105 No. 2, pp. 208-22.

Long, D.D. (1997), "Building the knowledge-based organizations: how culture drives knowledge behaviors", working paper of the Center for Business Innovation, Ernst & Young LLP, Cambridge, MA.

McDermott, R. (1999), "Why information technology inspired but cannot deliver knowledge management", *California Management Review*, Vol. 41 No. 4, pp. 103-17.

Martensson, M. (2000), "A critical review of knowledge management as a management tool", *Journal of Knowledge Management*, Vol. 4 No. 3, pp. 204-16.

Massey, A.P., Montoya-Weiss, M.M. and O'Driscoll, T.M. (2002), "Knowledge management in pursuit of performance: insights from Nortel networks", *MIS Quarterly*, Vol. 26 No. 3, pp. 269-89.

Ndlela, L.T. and Toit, A.S.A. (2001), "Establishing a knowledge management program for competitive advantage in an enterprise", *International Journal of Information Management*, Vol. 21 No. 2, pp. 151-65.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company*, Oxford University Press, Inc., New York, NY.

O'Dell, C. and Grayson, J. (1999), "Knowledge transfer: discover your value proposition", *Strategy & Leadership*, Vol. 27 No. 2, pp. 10-15.

Pan, S.L. and Scarbrough, H. (1998), "A socio-technical view of knowledge-sharing at Buckman Laboratories", *Journal of Knowledge Management*, Vol. 2 No. 1, pp. 55-66.

Pieris, C., David, L. and William, M. (2003), "Excellence in knowledge management: an empirical study to identify critical factors and performance measures", *Measuring Business Excellence*, Vol. 7 No. 2, pp. 29-45.

Rowley, J. (2004), "Partnering paradigms? Knowledge management and relationship marketing", *Industrial Management & Data Systems*, Vol. 104 No. 2, pp. 149-57.

Ruggles, R. (1998), "The state of the notion: knowledge management in practice", *California Management Review*, Vol. 40 No. 3, pp. 80-90.

Ruppel, C.P. and Harrington, S.J. (2001), "Sharing knowledge through intranets: a study of organizational culture and intranet implementation", *IEEE Transactions on Professional Communication*, Vol. 44 No. 1, pp. 37-52.

Schultze, U. and Leidner, D.E. (2002), "Studying knowledge management in information systems research: discourses and theoretical assumptions", *MIS Quarterly*, Vol. 26 No. 3, pp. 213-42.

Skyrme, D. and Amidon, D. (1997), "The knowledge agenda", *Journal of Knowledge Management*, Vol. 1 No. 1, pp. 27-37.

Smith, L., Campbell, F., Sbramanian, A., Bird, D. and Nelson, A. (2001), "Strategic planning for municipal information systems: some lessons from a large U.S. city", *American Review of Public Administration*, Vol. 31 No. 2, pp. 139-57.

Stonehouse, G.H. and Pemberton, J.D. (1999), "Learning and knowledge management in the intelligent organization", *Participate & Empowerment: An International Journal*, Vol. 7 No. 5, pp. 131-44.

Storey, J. and Barnett, E. (2000), "Knowledge management initiatives: learning from failure", *Journal of Knowledge Management*, Vol. 4 No. 2, pp. 145-56.

Szulanski, G. (1996), "Exploring internal stickiness: impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol. 17, pp. 27-43.

Von Krogh, G. (1998), "Care in knowledge creation", *California Management Review*, Vol. 40 No. 3, pp. 133-53.

Wong, K.Y. (2005), "Critical success factors for implementing knowledge management in small and medium enterprises", *Industrial Management & Data Systems*, Vol. 104 No. 9, pp. 735-43.

Zack, M.H. (1999), "Enveloping a knowledge strategy", *California Management Review*, Vol. 41 No. 3, pp. 125-45.

**About the authors**

Ying-Jung Yeh is an Assistant Professor in the Department of Business Administration at the National Taiwan University of Science and Technology, Taiwan. She received her PhD from University of Wisconsin, Madison, USA. Her current research includes the social aspects of ERP implementation, the composition of cross-functional teams, and the work behaviors of employees with different work status. E-mail: yyeh@ba.ntust.edu.tw

Sun-Quae Lai, Dr of Business Administration at National Taipei University, Taiwan. Part-time Assistant Professor in the Department of Industrial Engineering and Management at the National Taipei University of Technology, Taiwan. Currently holding the position of General Director of Small and Medium Enterprise Administration at the Ministry of Economic Affairs, Taiwan. He dedicated efforts in continuously promoting e-Business among the small and medium enterprises (SMEs) in Taiwan, especially providing strategically planned web based e-learning channels. His main research areas include industry policy and business strategy. E-mail: sqlai@moeasmea.gov.tw

Chin-Tsang Ho is an assistant professor in the Department of Accounting and Information Technology at National Chung Cheng University. He received his PhD degree in the Department of Business Administration at the National Central University, Taiwan. His current research interests include performance management, knowledge management, particularly as applied to small and medium enterprises. Chin-Tsang Ho is the corresponding author and can be contacted at: miller@moeasmea.gov.tw