MANAGING KNOWLEDGE TO ENHANCE THE PERFORMANCE OF THE GRASSROOTS TECHNOLOGICAL INNOVATION FOR THAI SMES

**Somchai Numprasertchai, Faculty of Engineering, Kasetsart University,
snp@ku.ac.th**

**Haruthai Numprasertchai*, Faculty of Business Administration, Kasetsart University,
haruthai.p@ku.ac.th**

ABSTRACT

It is widely recognized that SMEs play significant role in driving the country's economy. Thai SMEs as well are heart of the Thailand's economy. Numbers of Thai technological SMEs applies knowledge management (KM) to enhance their innovation capability. This qualitative research, applying a case study method, aims to investigate the practices of knowledge management towards the grassroots innovation of Thai technological SMEs.

The research found that the successful Thai SMEs integrated both internal knowledge, namely technical knowledge, and the external knowledge related to the markets, and the needs of their target customers in inventing product or service innovation. Knowledge management facilitates the Thai entrepreneurs to create and select the right choice for innovation. Knowledge creation and integration help increasing the efficiency of the design and innovation management process. In addition, collaborations from their business alliances help promoting their innovations to the markets. Accordingly, knowledge management indeed supports the efficient innovation management process to Thai SMEs.

Keywords: Knowledge management, Grassroots innovation, Thai SMEs

---

* Corresponding author

INTRODUCTION

Future growth must increasingly come from innovation-induced productivity growth (OECD, 2010). This statement is also true for SMEs around the world. In Thailand, numbers of SMEs which are in the field of information technology has built a lot of technological innovations. Most of these innovations, however, are grassroots innovation, applying simple but locally practical technology. Their value is that they all well respond to the needs of the customers. On the other hand, with the uncomplicated technological development, their innovative products are easy to imitate by competitors of the same size. In the meantime, the large-scale business ignores such a grassroots innovation because it is incapable to efficiently serve a huge demand in the markets and it generates unattractive incomes.

In Thailand according to the official report for year 2011-2012 of the Office of Small and Medium Enterprise Promotion, there were 2,652,854 SMEs in 2011, contributing to the 10.9 million employments which accounts for 83.89% of the total employment. However, number of constraints exist for the SMEs, for example, the lack of experts, capital, machines, and especially knowledge to develop new products and sustain its standard quality. This causes SMEs to be incompetent with the large-scale industry in the field.

Innovation management process is defined as the ability of people to manage and control the factors that drive the innovation processes (Tuominen, Piippo, Ichimura, and Matsumoto, 1999). Basically, the innovation management process is a set of processes of enhancement for commercialization or utilizing of an innovative product, process or service.

In an economy increasingly based on knowledge and innovation, the development of fully functioning knowledge networks and markets can have a significant impact on the efficiency and effectiveness of innovation (OECD, 2010). A knowledge management system (KMS) is considered as an effective management tool that focuses on utilizing the knowledge for enhancing the organizational performance (Matensson, 2000). It plays a critical role in creating innovation and thus is important for the organization's survival and maintenance of competitive advantage (Numprasertchai and Igel, 2004, Numprasertchai, Kanjanasanpetch and Numprasertchai, 2009). The use of KM leading to innovation is found relative to increasing new products and service development within the organization (McAdam, 2000). Applying KMS in SMEs would help an entrepreneur to enhance his or her innovative capability under such constraints. As a matter of fact, KMS can reduce SMEs' weaknesses and could be done at low cost.

Accordingly, with a dominant role in a country's economy, the strengthening of the competitiveness of SMEs is crucial. SMEs need to improve its internal process of new product development (NPD) and make it aligned with the product innovation.

RESEARCH OBJECTIVES

This research aims to explore the current knowledge management practices of Thai SMEs especially the technological SMEs. The reason to focus on Thai technological SMEs is that this type of SMEs involves directly with the grassroots innovation and it is a major group of non-agricultural sector. It involves both manufacturing and service sector, each accounting for approximately 30% of the Thai GDP (Office of Small and Medium Enterprise Promotion,

2012). The obtained information is then integrated to develop a knowledge management model that can be applied for Thai technological SMEs in implementing their grassroots innovation.

RESEARCH METHODOLOGY

To investigate in-depth information about the knowledge management practices in the innovation management process of Thai SMEs, a qualitative research were conducted, using multiple case studies. The reason for this approach is that there is an unclear boundary between knowledge management practices and the innovation management process in Thai technological SMEs. Four cases of Thai technological SMEs were selected based on the two selection criteria as the following.

1) It must be Thai SMEs with grassroots technological innovation.
2) It must be a successful Thai SMEs in terms of financial performance and marketable products.

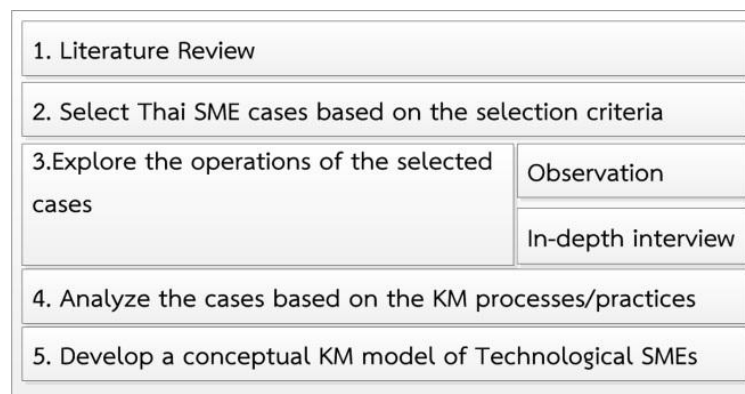The research followed the following steps shown in Figure 1.

Figure 1 Steps for the research

An in-depth interview was used as a tool for data collection. It was conducted with the selected SME management, staffs and business partners. Due to the requests of the informants to keep the name of the company anonymous, the cases under the study are named as SME_A, SME_B, SME_C, and SME_D respectively. In addition to the interview, observation by the researchers is also included to gather related information.

Results and Discussion

Based on the interviews and observations, the results are presented in 3 sections: overview of each SME, knowledge management concepts in innovation management process of each SME, and knowledge management model for grassroots innovation in Thai technological SMEs.

Overview of the SMEs as the Case Studies

Overview of SME_A: It has been operated since 1997. Its service mainly relies on information technology and internet network. At the beginning, there were only four staffs and some of them were undergrad engineering students. The main strategy that was adopted was creating new service innovation for its members as well as maintaining the customer relationship. At present, SME_A provides a knowledge portal service mainly through an e-service. Its members can create, share, and exchange knowledge whereas the non-members can only read and share their viewpoints but they are not allowed to create or add any issues to the system. With this service, SME_A connects more than 600,000 visitors per day. Based on the figures of the previous years from 2008-2010, SME_A made a profit as an average of USD 670,000 a year.

Overview of SME_B: The business focuses on wireless services and internet network. It started in 2001 by a duo who were friends and just graduated in the field of engineering. At the beginning, the business focused on developing an application on mobile phone. Later on, the business model was modified. Instead of selling the applications to end-users, it made contracts with mobile phone producers and distributors. This change has provided the SME_B not just an increase in revenue but also an access to new knowledge when working with large companies. In 2007 SME_B became a business alliance with one of the biggest phone service providers in Thailand. Since then, the business model of SME_B has been changed to be the sole application developer for its business alliance.

SME_B mainly emphasizes service innovation for mobile phone users. However, the technological change in social network like Facebook and Twitter has brought difficulty to some parts of its services.

In addition, to generate more source of revenue SME_B also provides a service of system development for companies. This type of job also helps increase skills of the staffs. Considering its financial performance in the previous years, SME_B made an average profit of USD 1,300,000 per year.

Overview of SME_C: The business focuses on software. It started in 2001 by only two persons as founders, developing a computer controlling software program for internet cafe. The developed software could enhance internet service efficiency as it could control more numbers of computers. SME_C adopts a strategy of keeping up good quality of developed systems and pricing on unit base. Along the last three years SME_C made an average profit per year of USD 2,700,000. Currently, SME_C has expanded its business to oversea markets in Singapore, Malaysia, Indonesia, and China. In addition, it extends its product line to mobile application as well as embedded electronic system development.

Overview of SME_D: The core service of this business is developing products of intelligent home electronic equipment. It emphasizes continuous R&D. All the products are high quality, user-friendly, and inexpensive when compared with the imported items. SME_D adopts a branding strategy. All the products are available only in large department stores and electronics specialty stores. The company also participates in business events such as product expo and publicizes in magazines. Along the last three years SME_D made a yearly profit as an average of USD 667,000.

Knowledge Management for Innovation Management Process of Thai SMEs

To explore the conducts of Thai SMEs related to grassroots technological innovation development, the four selected Thai SMEs were intensively investigated using the concept of the relationship between knowledge management and grassroots innovation management. The process is as shown in Figure 2.

Based on the four successful Thai SMEs case analysis following the concept shown in Figure 2, it was found that each SME shared some common concepts and conducts in managing knowledge for grassroots innovation management. Importantly, all of the four entrepreneurs are knowledgeable in a technical work aspect. They are determined and work hard. The common problem they all encountered at the beginning was related to management and marketing issues.
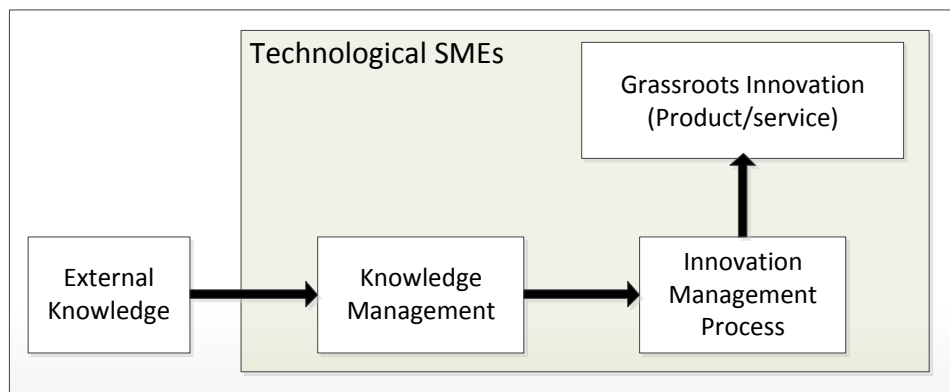

Figure 2 Concept of knowledge management for Thai SMEs' innovation management process

Knowledge Management Practices and Innovation Management Process

Innovation management process consists of 1) idea generation, 2) idea selection and evaluation for innovation, 3) design and innovation development, and 4) launching an innovation to markets. Accordingly, table 1 below summarizes the findings of knowledge management practices within the innovation management process from idea generation to launching an innovation to the market of the four successful Thai SMEs: SME_A, SME_B, SME_C, and SME_D. However, the innovation management process is not straightforward but evolves in numerous loops within the different process phases.

Table 1 Thai SMEs practices on innovation management process and KM practices

Innovation management process	Knowledge management practices (KM Practices)	SMEs			
		A	B	C	D
1. Idea generation	• An idea is initiated by the entrepreneurs/business owners	✓	✓	✓	✓
	• Integrate ideas with its business alliances		✓		
	• Learn from world-class organizations about their innovative products/services	✓	✓	✓	✓
	• An idea is created from customers' direct comments and comments on social network	✓	✓		✓
	• Create a fine work environment		✓		✓
2. Idea selection for innovation	• Decisions were made by the entrepreneurs/business owners based on their experiences	✓		✓	✓
	• Decisions were made together with its alliances based on the opportunity of success analysis		✓		
3. Design and innovation development	• Design and develop innovation based on their experiences and knowledge gained from extending their existing products	✓	✓	✓	✓
	• Design and develop innovation based on R&D team	✓	✓	✓	✓
	• Enhance competence of staff through coaching and on-the-job training	✓	✓	✓	✓
	• Store data and information regarding the process, problems, and approach to product development for each product category	✓	✓	✓	
4. Launching an innovation to markets	• Building trust to public by having the product tested by recognized institutions to obtain a quality certificate				✓
	• Launch the products directly to the market	✓		✓	✓
	• Launch the products to markets through their business alliances		✓	✓	✓

Idea Generation: For SMEs, idea generation for creating an innovation is usually viewed as to create something new to markets or to improve the quality of the existing products or services so that their customers' needs are satisfied. Indeed, it should be in good quality with

an affordable price. Most of the time, the idea is created by the entrepreneur. Accordingly, the entrepreneurs or SME owners should be creative, eager to learn, and observant by characteristic.

Based on the case of SME_A, its entrepreneur is keen to create service innovation to promote and attract more users to utilize the service of the knowledge center. Mostly the idea is created from 3 sources: the entrepreneurs, comments from web board, and adapting the service innovation of the world-class service providers to make it fit with the Thai context. *"I need to learn continuously the technology trends, how it is going to change. I need to know what the-number-one business leader in this field is doing, what my customers want, what I should do. Moreover, I have to encourage my team to do the same thing I do, learning new things so that they can help me think and create a new idea"*, said the owners of SME_A.

Regarding the conduct of SME_B, it integrates the creation of products and services for its own and for the business operations of its alliances. Based on this fact, the concept of new product/service development is taken from both SME_B entrepreneur through the brainstorming with his team and its alliances. Realizing that the technological changes usually affect its alliances, the SME_B entrepreneurs emphasizes the fast learning so that the business can provide a quick response to the needs of its alliances' customers. This finally becomes a business opportunity for SME_B.

For SME_C, it emphasizes development of product innovation for its targets which are large organizations with a mixed variety of business types. Accordingly, modifying product innovation to match with each of its customers is essential. The SME_C entrepreneur stated *"if we know the customers' problems and needs, we then know how to customize our products' features to satisfy those needs. However, we still need to continue thinking creatively what needs to be done further so that our product quality can be improved and respond well to the needs of other groups of customers too."*

Considering SME_D, as it focuses on developing products for intelligent home, the SME_D entrepreneur takes the space in the office as a place to display the products. Office is arranged as a resort-style office, creating a relaxed environment. He believes that such a physical setting like this helps promote creativity. He said *"Actually, the office space here used to be a restaurant. It was reorganized and re-arranged, adding a green area and now it becomes a fine green office with trees and a pool, creating a relaxed working environment which helps create many good ideas."* The new ideas for product innovation of SME_D come from many sources. One is from the existing products itself. Somehow, it could be by accident. Some are from customers' problems and needs. They want the product to be more user-friendly. No matter what, the entrepreneur needs to be observant and skillful in analyzing a business opportunity.

It is obviously seen that all four cases of Thai SMEs mentioned above share one thing in common: an idea to create an innovation that works for business is usually integrated from many sources especially the knowledge about the product or service, comments from customers and business alliances as well as competitors. The mix of information from variety of sources is also useful for the further step of product design.

Acquiring an information and knowledge related to a qualification of the products or services from the target groups such as customers, distributors, business alliances as well as large-scale competitors is necessary. It should be done continuously so that the product or service improvement can be efficiently managed. Information technology, i.e. web-board, Facebook Fanpage, etc. are useful tools to acquire such an information especially the one direct from customers. Nevertheless, the entrepreneurs need to further analyze and synthesize the data utilizing their own experiences to make decision how to create an innovation.

Idea Selection for Innovation: With a variety of ideas to develop an innovation as well as some existing constraints for SMEs, an entrepreneur has to employ a process of idea selection to assure the quality of the decision to further develop an innovation.

The main criteria the SME entrepreneurs use to make a decision on new product or service development include the followings.

1) A technical feasibility which is a self assessment on its own existing capability and knowledge as well as what needs to be acquired to develop an innovation.
2) Time
3) Cost of operations
4) Value of investment
5) Level of risk
6) Business opportunity to make benefits

In the past, an entrepreneur who was a business owner exclusively made an assessment and a decision on the concept for an innovation development based on his or her own experience. Anyhow, making a decision solely caused an entrepreneur a lot of problems as they made a wrong decision. To avoid problems, an entrepreneur shares ideas and comments among business partners and alliances. During the process of idea sharing, there might be an offer of a support on new product development. SME_B has its business alliances engage in the brainstorming and decision making process. It gains a support from its alliances in terms of information as well as resources to develop product and service innovation.

Based on the observations of the researcher, it was found that these four SMEs encouraged all of their staffs to comment on their new products or services even though some of the staffs did not engage at all to the product or service development process. This is a way to acquire a different point of view. However, the decision to continue the product development or to commercialize the product still depends mainly on the entrepreneurs or business owners except for the one with the business partners as alliances.

Design and innovation development: At this stage, most of SME entrepreneurs focus on self designing and developing as for the reason of business confidentiality. This is true for those four SMEs under this research. However, each of them has different approach of innovation design and development.

SME_A: The approach taken by SME_A is the participation of all staffs since the beginning of the project. This is due to the limited number of employees. The entrepreneur aims to have all staffs clearly understand everything in the organization. However, once the project is well formed, a designated staff will be in charge later on.

To solve some hard problems occurring during the design process, the SME_A entrepreneur coordinates with academic institutions to get an advice. He said *"If we encounter a problem with no solution, we lean on professors in universities and they all are willing to help. It does not matter if we are alumni or not. Advice is available in those academic institutions. SMEs should turn on to this source of information."*

SME_B: The approach taken by SME_B is a team approach. Each team is assigned a particular task. With this approach, each team member can learn the job in-depth and has a clear cut of his or her responsibility. However, later on each team member will be re-assigned the new task so that they can learn more about others and be able to substitute each other.

For the projects that work for its alliances, the staffs of the SME_B are assigned to work in cooperation with its alliances whilst the SME_B entrepreneur takes a role of coordinator and leader of design and development team.

SME_C: The entrepreneur of this SME takes a role of developer, responsible for the design and development of the core of the product. The design for the minor parts of the product is assigned to team members. Everyone works separately on a particular task and then all the outputs from each team member are integrated by the entrepreneur. This is to maintain its business confidentiality. The SME_C entrepreneur has to assure that there is no imitation of their software products.

SME_D: As the entrepreneur emphasizes a good quality and valuable price for customers, the product developers are assigned challenging tasks from the SME_D partner who is in charge of the marketing. However, the design and development of the innovation are being responsible by SME_D partner who takes charge of the development team leader.

The development team leader assign tasks and responsibility to each team member based on skills and expertise of each. The leader himself is mainly responsible for the design and technical aspect especially for the business confidential one. SME_D concentrates on the design that is hard to imitate by others especially by the Chinese. To do so, it employs a reverse engineering approach for the design and develops intelligent software to control the functions of the products.

Additionally, SME_D places an importance on supplying good quality parts with good price to the innovation development. The SME_D entrepreneur said "some parts of the product are applied from the parts available for other products in the market. These parts are in good quality and inexpensive. It is not necessary to make a custom-made order. This helps us reduce the developing cost.

For the process of design and development of innovation, it is important that employees must be competent. Their skills and expertise need to be developed or it is difficult to achieve the goal of innovation development. The learning styles and work patterns of each SME are different mainly due to the entrepreneurs, type of work and number of workload. However, these entrepreneurs employ some activities to develop its own staffs, which include "a senior-junior training system", on-the-job training and problems recording system.

All four SME entrepreneurs are confident in their staffs as they conduct a fine process of human resource selection. SME_C entrepreneur said *"the major concerns for SMEs are capital and operational capability. We do not welcome such problems so we recruit only a competent person who can work and stay with us. We promise him or her a career success. We provide him or her chances to be partnership with us. It is only if he or she wants it and is competent enough."*

Launching an Innovation to Markets: This is a highly important step and simultaneously a difficult one for SMEs. An innovative product/service becomes worthless if it is not accepted by customers or markets. According to the survey with those four SMEs, it is found that all of them used to encounter the marketing problem. However, at present all these SMEs have business alliances which support the product launching to markets. SME_B entrepreneur stated that *"we used to do it all by ourselves. It was so difficult that we almost failed. We were good at producing but not selling. We made a product that could not sell. We did not know what we made did not respond to the needs of the customers. We did not know where and how to sell. Once we have business alliances, it helps. Our partners know the markets, understand customers, and can access to marketing channels. At present, we are not afraid of making no sales anymore."* This is consistent with the statement by SME_C entrepreneur: *"We used to think that we well understood the oversea markets. But, the truth is not. Right now we have oversea alliances which help us a lot. For example, our Malaysian alliance could help us generate more profits, which is much higher than what we did by ourselves."*

Applying knowledge management in the innovation management process helps enhance efficiency especially in terms of product quality and satisfying market needs. Obviously seen from the four cases of successful Thai SMEs, they all conduct activities related to knowledge management in the innovation management process. Even though there is no precise announcement within their organization that they are promoting knowledge management, the impact of knowledge management practices on innovation management hinges on determined and continuous actions of the SME entrepreneurs.

Knowledge Management for Grassroots Innovation in SMEs

Knowledge management can be utilized as a tool to support the technological SMEs in the grassroots innovation management process with higher efficiency. Knowledge management model for innovation management can be summarized in Figure 3.

It is necessary for SMEs to be capable of creating knowledge from research and development and integrate the knowledge within the organization with external knowledge, i.e. market knowledge from alliances, customer knowledge, competition knowledge, etc., in order to create its own concept for innovation development. The findings are aligned with Zeng, Xie, and Tam (2010) concluding in their research that the vertical and horizontal cooperation with customers, suppliers, and other firms played a more distinct role in the innovation process of SMEs than horizontal cooperation with research institutions, universities or colleges, and government agencies. Storing knowledge to reduce time consumption and costs in extending innovation must be considered as well. Transferring and sharing knowledge among employees is another important matter which helps develop employees to be knowledgeable and competent in innovation development.
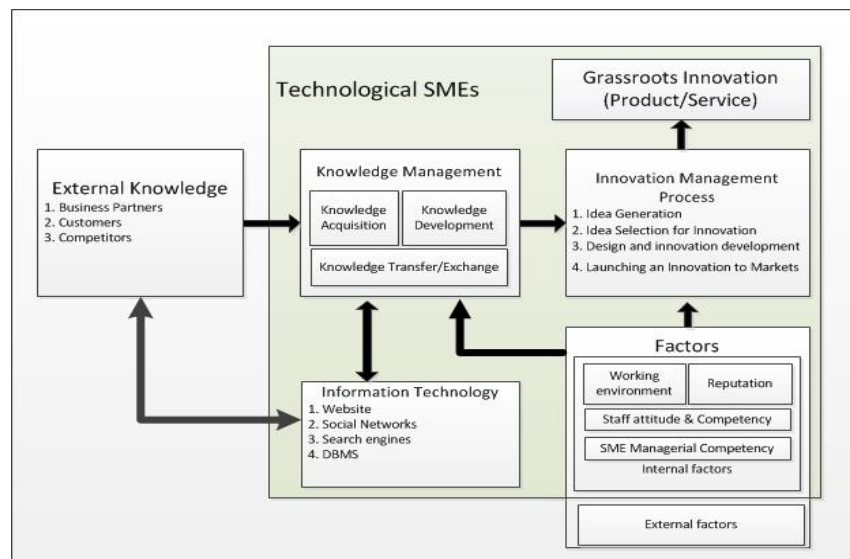
Figure 3   A Conceptual model of knowledge management for grassroots innovation in SMEs

As SME entrepreneurs or owners, they all are to be knowledgeable and have a vision in selecting the right concept for innovation development. Moreover, they should be able to plan and design the right innovation so that the products/service can respond well the market needs. Ability to efficiently manage organizational resources including human and physical resources is essential. Creating a good and casual working environment with the right attitude of employees helps elevate the efficiency of innovation development process.

In addition, it is an advantage for SME if the entrepreneurs are able to apply appropriate information technology to support knowledge management processes. For example, using information technology to acquire external knowledge, using database technology to store and retrieve knowledge for further innovation. Using website and Facebook to disseminate information and knowledge about product or service innovation to the target markets would also be recommended.

CONCLUSIONS

Nowadays knowledge management plays an important role in most organizations. It is one of the most important tools that can enhance competitive advantage. Comparing this tool to others, it costs less or even nothing as knowledge has already existed in an organization. Knowledge management becomes an efficient tool for organizations to successfully compete in the world of business.

Knowledge management supports an organization to achieve its goal. Well managing knowledge can create new knowledge essential for new product and service development as well as improve the innovation management process to be more efficient. As long as an organization gains efficiency and effectiveness, a chance of success is wide open.

Knowledge management can also be well applied for SMEs. Obviously seen from the cases presented above, it has proved that knowledge management is practiced by its nature, mostly

unofficially. The competence of SME staffs can be improved by implementing knowledge management more systematically, so does the innovation. It helps strengthen SMEs to be competitive and ready to play in the modern trading regions like ASEAN Economic Community (AEC) which are now approaching them.

ACKNOWLEDGEMENT

REFERENCES

1. Martensson, M. 2000. A critical review of knowledge management as a management tool. Journal of Knowledge Management, 4(3):204-216.
2. McAdam, R. 2000. Knowledge Management as a Catalyst for Innovation within Organizations: A Qualitative Study. Knowledge and Process Management, 7(4): 233-241.
3. Numprasertchai, S., P. Kanjanasanpetch, and H. Numprasertchai. 2009. Knowledge creation and innovation capability in the public university. International Journal of Innovation and Learning, 6(5): 568-580.
4. Numprasertchai, S. and B. Igel. 2004. Managing knowledge in new product and service development: A new management approach for innovative research projects. International Journal of Technology Management, 28(7/8): 667-684.
5. OECD. 2010. The OECD innovation strategy: Getting a head start on tomorrow. Organization for Economic Co-operation and Development, Paris.
6. Office of Small and Medium Enterprise Promotion. White Paper on Small and Medium Enterprises of Thailand in 2011 Trends of 2012. pp.34-37.
7. Tuominen, M., P. Piippo, T. Ichimura, and Y. Matsumoto. 1999. An analysis of innovation management systems' characteristics. International Journal of Production Economics, 60-61: 135-143.
8. Zeng, S.X., Xie, X.M., and Tam, C.M. 2010. Relationship between cooperation networks and innovation performance. Technovation, 30: 181-194.