Study on Construction of Knowledge Management System

Based on Enhancing Core Competence of Industrial Clusters

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Abstract

Under the background of the knowledge economy and globalization, knowledge becomes the firm's strategic resources, enhancing the core competence of industrial clusters requires knowledge management. In this paper, firstly, the connotation of the core competence of industrial clusters is analyzed. The mechanism of knowledge management affecting the core competence of industrial clusters is studied. Finally, the knowledge management system that helps to enhance the core competence of industrial clusters is constructed.

Keywords: Industrial clusters, Core competence, Knowledge Management System

1. Introduction

Era of knowledge economy, knowledge becomes an important enterprises' factor of production and an important source of competitive advantage. Therefore, the effective knowledge development, management and integration can improve the competitiveness of enterprises. At present, the industrial clusters have become an economic organization form, many countries and regions have implemented the industrial clusters strategy. How to enhance the core competitiveness of industrial clusters has become an important issue, thus, this article will be based on enhancing the core competitiveness of industrial clusters, according to the existing research results, further discuss the mechanism of knowledge management to enhance the core competence of industrial cluster and try to build industry clusters' knowledge management system.

2. Analysis on the Core Competence's Connotation of Industrial Clusters

Industrial clusters generally refer to the spatial concentration phenomenon that a number of related industries and institutions are concentrated in a particular region. The competitiveness of industrial clusters is the main source of competitive advantage in industry, which is the driving force of economic development. According to the "China City Competitiveness Report NO.1", industrial clusters can promote the economy development, such as expanding the industrial scale, promoting the derivation of new enterprises, building a competitive value chain, ensuring the continuous innovation of industry, overcoming the industry recession, etc. So that they can promote the industry competitiveness (Su xuechuan, 2004). Thus, to enhance the core competitiveness of industry clusters is very important for the economy development.

Porter's diamond model concerning industrial clusters states that the competitiveness of industrial clusters depends on six interrelated factors (Michael, 2004): factors of production, demand conditions, related industries and supporting industries, business strategy and structure and its competitors, opportunities, government effect. Enterprises in the industrial clusters are both in competition and cooperation with each other, forming a network-like organizational structure (Sun and Li, 2006). Research scholars believe that the core competitiveness of the enterprise should be attributed to the unique resources and its optimal allocation of resources and use. Then, as an economic body, the core competitiveness of industrial clusters is also the unique resources owned by it and its optimal configuration and use. Era of knowledge economy, knowledge is the company's core resource, knowledge and knowledge management is the source of the core competitiveness. Similarly, the industrial clusters' resources are undoubtedly a unique knowledge and

resources, especially tacit knowledge within the cluster and some explicit knowledge. Therefore, the key to enhance the core competitiveness of industry clusters is how to effectively manage, develop and integrate knowledge resources. An efficient knowledge management is not only able to cultivate the core competitiveness of industrial clusters, and enable it to continue to gain a competitive advantage.

3. The Mechanism on Knowledge Management to Enhance the Core Competitiveness of Industrial Clusters

Knowledge is the source of the core competitiveness of industrial clusters. The fundamental solution to enhance the core competitiveness is to implement knowledge management. The process of knowledge management includes knowledge acquisition, sharing, application and innovation. Knowledge management is of the four process-related activities for effective planning, organizing, leading and controlling, so that knowledge in the course of its flow is changed into productive forces and achieving innovation, so as to enhance the core competitiveness of the clusters.

3.1 Classification and Characteristics of Knowledge

Knowledge mainly includes two categories: explicit knowledge and tacit knowledge. According to the British philosopher Michael Polanyi, explicit knowledge mainly refers to the structure knowledge expressed by text, images and symbols, which can be taught verbally and learned by textbooks, reference materials, databases, etc. Tacit knowledge only exists in people's minds, which is difficult to express by words, symbols, images media. The management of explicit knowledge is relatively easy, you can use information systems, such as code and database to set knowledge base. The explicit knowledge is achieved through teaching, training. Its sharing depends on electronic information systems. The explicit knowledge is the basis for innovation. But the management of tacit knowledge is relatively more difficult. Tacit knowledge contains many knowledge cheats such as the work of know-how, experience, perspective and values, which implies more innovative ideas. They are the essence of the core competitiveness, which are imitative.

To enhance the core competitiveness of industry clusters lies in how to effectively manage the tacit knowledge. Therefore, the main features of tacit knowledge should be deeply understood, the management law of tacit knowledge should be grasped in order to enhance their management efficiency. The characteristics of tacit knowledge are: (1) The unspeakable nature: tacit knowledge can't clearly be expressed by language, text, graphics or symbols which is human non-verbal intellectual activity results. This is the most essential characteristic of tacit knowledge. (2)The individual nature: tacit knowledge exists in the human brain. Its main carrier is an individual. It can't be passed by the formal education. (3)The cultural nature: tacit knowledge has a stronger cultural identity compared with explicit knowledge, and is always associated with a certain cultural value systems. (4)The relative nature: the existing form of explicit knowledge and tacit knowledge is relative. Under certain conditions, tacit knowledge can be transformed into explicit knowledge.

Tacit knowledge is the power source of the core competitiveness. The important task of knowledge management is to promote tacit knowledge dominance in order to increase the sharing of tacit knowledge, realizing knowledge innovation.

3.2 The cultivation of core competitiveness during the knowledge management process

Knowledge management process includes the knowledge production process, sharing processes, applications and innovation process. Knowledge is in the ongoing transformation during the flows of knowledge. According to the studies of Nonaka and Takeuchi, the four kinds of mode of knowledge conversion are: socialization, externalization, internalization and combination. Socialization is the conversion of tacit knowledge into tacit knowledge, externalization is the process of tacit knowledge into explicit knowledge, combination is the conversion between explicit knowledge, internalization refers to the transformation from tacit knowledge to explicit knowledge. Transformation and innovation of knowledge among these four models is continuous. These four transformation models formed the SECI (Socialization Externalization Combination Internalization) process. It is shown in Figure 1. The constant flow of knowledge, alternating between tacit knowledge and explicit knowledge and the knowledge spiral make the value of knowledge generate value added, into productive forces.

3.2.1 The production process of knowledge is the basic source of formation and upgrading the core competitiveness of the cluster

The process is the collection of existing knowledge, coding, classification and storage process. Knowledge is achieved by the form of external repository, and is organized according to classification framework or standard. The powerful search tool, database management systems and document management systems are used during the knowledge production process. Among them, search tool is used to search and download other information resources in the Internet; knowledge base management system and document management system are used for classification, encoding and storage of the collected knowledge. The result of the production of knowledge is that knowledge with similar characteristics are together, so that knowledge can be effectively concentrated, forming an knowledge base of stimulating creative inspiration. Thus, this result is the base of upgrading the core competitiveness of industry cluster.

3.2.2 Knowledge-sharing process is the key to form and enhance the core competitiveness of industrial clusters

Knowledge-sharing process is the dissemination and sharing of knowledge. A strong and accurate knowledge search engine is built on the base of knowledge generated, which provides a variety of knowledge-sharing channels, such as seminars, study sessions, training, discussion groups, electronic conferencing, e-mail. Knowledge sharing can make knowledge seekers have a more convenient access to the necessary knowledge, greatly improved the efficiency of knowledge acquisition. Knowledge-sharing makes the static knowledge stored in the database of knowledge match dynamically with knowledge carriers, realizes knowledge innovation and use, as achieve the goal of value-added and enhance the core competitiveness of the cluster.

3.2.3 Knowledge application and innovation process is the decision part of forming and enhancing the core competitiveness

Application and innovation process of knowledge includes the management of knowledge innovation and application. It is the ultimate goal of knowledge management. Knowledge innovation is a complex business processes and organizational processes. Its fundamental purpose is to realize the value of knowledge and create new wealth for the organization and the community by seeking new inventions, acquiring new knowledge, exploring and mastering the new rules. Application and innovation of knowledge can bring enterprises technology advantages and market advantages. It directly affects the ultimate effect of the core competitiveness of industrial clusters.

The production, sharing, application and innovation process of knowledge management, are respectively the basic link, key link and decisive link of the core competitiveness of industrial clusters. They fully tell the inner mechanism of knowledge management affecting enhancing the core competitiveness of industrial clusters in. Figure 2 indicates the affecting process.

4. Constructing Knowledge Management System for the Purpose of Enhancing the Core Competitiveness of Industrial Clusters

Knowledge management system is to achieve the goal of knowledge management implemented by enterprises and industrial clusters by means of information technology. The knowledge management system includes both some hard environmental conditions such as the information technology equipments, and a series of soft environment conditions such as clusters culture, organizational system.

The construction of knowledge management system for each enterprise as well as industrial clusters has no specific and concrete model, but their core model framework is the same. Usually the beginning is from a client interface based on web-browser, the next layer is a variety of knowledge classification systems as well as the knowledge database. A more complete structure of knowledge management system is shown as in Figure3. Knowledge management system is divided into both internal and external Web-based level by knowledge maps, knowledge of precipitation and enterprise portal, that is network to connect all categories of personnel in various business and information technology to support system functions. The main framework of the system has two parts of the knowledge center and information center. The knowledge center is the core of knowledge management system, which consists of the knowledge base, knowledge-precipitation systems, knowledge maps and network system. The information center has two components of a database management system and database system.

4.1 The Outer of Knowledge Management System

4.1.1 Intranet

Intranet is the virtual network used to connect internal system, and is the network of personal connections that all enterprises and employees within the cluster deposit, share, use knowledge and mutually cooperate. Enterprises and their employee access to knowledge map to retrieve the knowledge they need through the Intranet; access to knowledge-precipitation system in order to keep the record of auditing, processing the accumulated knowledge during work; access to enterprise portals to acquire all enterprises' information and non-core knowledge. Intranet users largely are confined enterprises and their employees within a cluster.

4.1.2 Internet

Internet is the logic structure connecting the client with business through network. Customers and businesses within the cluster can use a variety of accessing via, such as Web pages, voice, network television, in order to manage and collect every kinds of knowledge. Finally, the provision and collection of knowledge is achieved. The cluster external users have the only right to access to enterprise portal.

4.1.3 Extranet

Extranet is the virtual network used to connect enterprises within the cluster with clusters of external organizations (such as business partners, and the seller). The organizations outside clusters can offer a great deal of potential and available intellectual resources for clusters. That will enable the enterprises in the cluster and other organizations to

effectively carry out the exchange of knowledge and sharing.

4.2 The Middle Layer of Knowledge Management System

The middle layer consists of knowledge maps, knowledge precipitation systems, and enterprise portal. It serves as a link between the outer and inner layer, which is user interface for employees to access the knowledge of the cluster.

4.2.1 Knowledge Maps

Knowledge Maps play an important role in the knowledge management systems, different from the general retrieval system, capable of more accurate positioning of knowledge. Knowledge Maps offer only a repository of knowledge and does not provide knowledge itself. Thus, it is called knowledge guide. The other end of the knowledge maps connects to the expert system, knowledge base or expert with a particular expertise such as engineers.

4.2.2 Knowledge Precipitation Systems

The main functions of knowledge precipitation systems are knowledge acquisition, collection, analysis. Sources of knowledge in precipitation systems: (1) staff personal potential; (2) organization meetings, e-community, etc.; (3) enterprise database; (4) market information and the related competitive intelligence acquired by partners and external customers. Knowledge that has been recognized can be directly deposited in repositories such as enterprise systems, conference documents. Other instructions or information to be audited must first be deposited in enterprise database, and then transformed into knowledge through the deposition system into knowledge base.

4.2.3 Enterprise Portal

Enterprise Portal is the enterprise site for release information. It connects with business and industry cluster database. Through enterprise portals, the enterprise within clusters and its employees communicate with each other to obtain all the information in the enterprise database. Enterprise Portal is an interactive system, through which external customers and partners of businesses within the cluster are available to some of the database information according to their permissions, at the same time, their own needs and supply information is conveyed to the enterprises within the clusters.

4.3 The Inner of Knowledge Management System

The inner layer of enterprise knowledge management system is the main tool that enterprises within the clusters use to implement knowledge management. It includes mainly expert systems, knowledge search, data mining system, knowledge base, database management systems and databases.

4.3.1 Expert Systems

Expert System is an intelligent programming system, which has the ability like expert level to solve problem in the relevant fields. It can use the accumulated experience and expertise over the years and simulate human experts' thing processes, to resolve difficult issues that only experts can solve.

4.3.2 Knowledge Search and Mining Method

Knowledge search methods mainly refer to agent-based knowledge search methods and search engine. The main methods of data mining are statistics, neural networks, rough sets and fuzzy clustering and so on. Possible changes of the system characteristics can be accurately predicted by using neural network technology; some imprecise or uncertain knowledge is classified by using rough set theory, whose algorithm is simple and easy to operate; the fuzzy clustering method is knowledge fuzzy reasoning, judging and handling to make it closer to reality.

4.3.3 Knowledge base

Knowledge base mainly includes three categories:

(1) External knowledge base: it is used to mainly store knowledge acquired from the enterprise network, most of which is data and factual content, involving more complex technology and management;

(2) Structured knowledge base: the development methodology of it is the same as the traditional database, using a structured way to store knowledge;

(3) Unstructured internal knowledge base: it is a less structured knowledge base. It's mainly used to realize the management of tacit knowledge, for the purpose of transferring tacit knowledge from employees' minds to the knowledge base, thereby accelerating the socialization of knowledge. The establishment of effective knowledge base will promote internal knowledge conveyance and use, and stimulate knowledge creation and innovation, and improve enterprise operational efficiency.

In addition, the database management system and database are to manage the enterprise information, namely the information management system. It is the base of enterprise knowledge management system.

References

Michael. E. Porter. (2004). On Competition, *HarvardBusinessReview*, United States, pp50-89, 2004.

Su, xuechuan. (2004). Agglomeration of Factors, Industial Cluster and Megalopolis In the Urbanization. *Journal of Central University of Finance & Economics*, Vol 1, pp49-51, 2004*(in chinese)*

Sun, yu and Li, jingcheng. (2006). Analysis on the core competence of industrial clusters. *Journal of Northwestern Polytechnical University (social sciences)*, Vol. 26 No. 3, pp14-18, 2006 *(in chinese).*
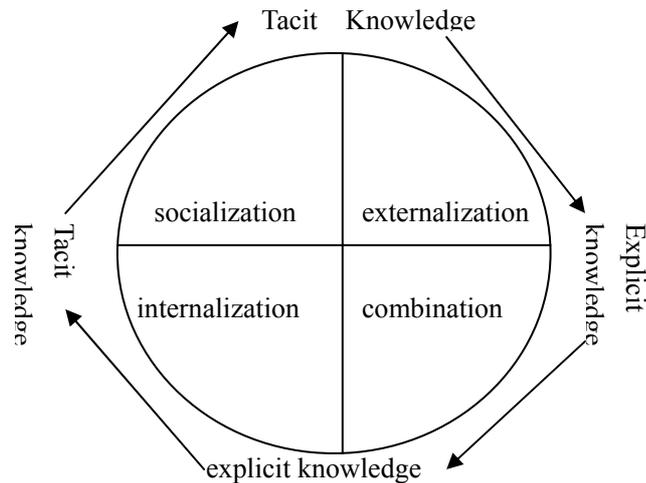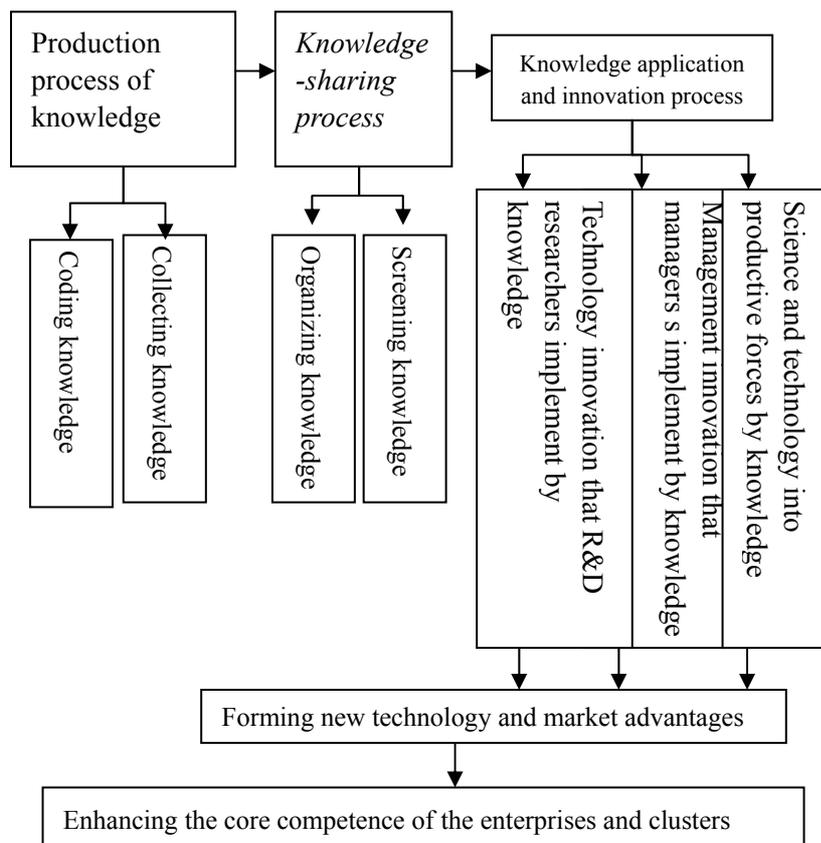
Figure 1. SECI Model

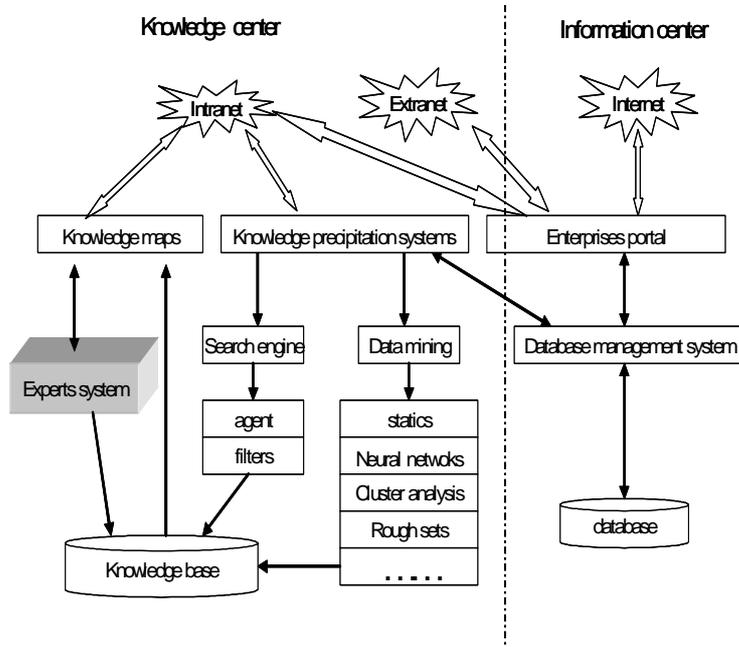Figure 2. The Mechanism of Knowledge Management Affecting Enterprises and Clusters

Figure 3. The Framework of Knowledge Management System