

# The Role of Knowledge Management in the High-Tech Virtual Enterprise

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**Abstract:** Knowledge management research is the key to success and failure of an enterprise, having important practical significance for it. By analyzing the role of knowledge management in the high-tech virtual enterprise, the virtual enterprise's knowledge management system model in this article provides a new approach to establish a knowledge utilization, knowledge spread and knowledge sharing environment among the high-tech virtual enterprises.

**Keywords:** Knowledge Management; High-tech virtual Enterprise; Agent technology system

## 1、 Introduction

Knowledge management research is the key to success and failure of an enterprise, having important practical significance for it. The High-tech Virtual Enterprise is a core concept which is put forward by the agile manufacturing basing on the enterprise organization form. It is a kind of dynamic network strategic alliance which is developed during the process of putting several independent enterprises with related resources together through internet technology as well as the process of timely designing, producing and selling the product or service. It can fast response to the dynamic changes of the market opportunities through the skill-sharing and cost-sharing. With the rapid development of the computer network and information technology more and more enterprises manage their companies in the way of high-tech virtual enterprise. The virtual enterprise has already developed rapidly in many industries such as manufacturing, logistics, clothing and so on and will become the inevitable trend of the enterprises' future development trend.

## 2、 The role of knowledge management in the high-tech virtual enterprise

As for the high-tech virtual enterprise, it is with high technical content while the relevant enterprise alliance mainly focus on the upstream technology innovation. Whether the technical cooperation or enterprise cooperation, the form of cooperation and product structure are condensing the alliance's knowledge superiority. The knowledge go thoughtout all along with the new changes in or after the process of cooperation entering the virtual combination with constant change and progress. Therefore knowledge management in the high-tech virtual en-

terprise takes a great important role, the main reasons are as follows:

### 2.1 The high-tech virtual enterprise's needs for development

First of all, the high-tech virtual enterprise's inherent characteristics ask for a unprecedented attention to the knowledge. The high-tech virtual enterprise will need to expand its knowledge and staffs' quality together with enterprise's experience so as to maintain the technology innovation's superiority. Second, the high-tech enterprise is the leading one with its development positioning having the advantages in the fields of region, industry and even the world. its business strategy and marketing strategy are the systematic and sustainable development strategies which need a strong knowledge platform to support. Thus the effective knowledge management can meet the high-tech virtual enterprise's technical requirements and make it strong.

### 2.2 The high-tech virtual enterprise's composition form is up to the knowledge management

The virtual enterprise is based on the network technology and knowledge economy, the information, technology and knowledge are the basic units of it. The virtual mode of production through information technology and knowledge node is the basic pattern of the virtual enterprise, thus making enterprise morphological form is based on the advanced science and technology innovation, powerful information network technology and extensive knowledge flow. This determines that the virtual enterprise members should have a strong knowledge management level as well as the effective knowledge sharing ability to increase the marginal efficiency of the

enterprise's knowledge value and to support the virtual enterprise's organization.

### **2.3 The demand from the high-tech virtual enterprise members to communicate and share knowledge.**

In any organization form, the individual member's communication is based on the knowledge, It is a cycle process like this communication-sharing-absorption-creation. The virtual enterprise's network knowledge and achievements are the products of the cooperation among different members. It is a kind of collective knowledge generating form the interactional activities which is mainly in the way of the knowledge integration, knowledge activation and so on among different enterprises.

### **2.4 The demand from the enterprise members' innovation and optimization**

The life of a hi-tech enterprise lies on its core competitiveness, while the key of the core competitiveness is about the competitive advantages what's more, the core technology affects the its competitiveness at the same time the knowledge is the support of the core technology. The high-tech virtual enterprise alliance has a higher knowledge structure system itself. Maintaining this system needs the union members' knowledge management and sharing besides the enterprise member's development also requests its constant innovation and optimization. Finally, the enterprise's own strong knowledge level is the promotion factor for its development.

## **3. To establish the knowledge management system based on the distributed computing in the high-tech virtual enterprise**

From the characteristics and functions we can see that the knowledge management in the high-tech virtual enterprise should be focused on analyzing the value of knowledge management even the knowledge integration and the knowledge innovation through the operation mode ,the structural characteristics and function from the enterprise itself to achieve the enterprise internal networked and finally it can adapt to the various market's changes .In recent years, many global projects having being researching the high-tech virtual enterprise in various aspects. the most representative ones are these, the NIIP in North America, the NIIP VEGA and PRONETII in Europe and so on. while the domestic high-tech virtual enterprises have appear in the manufacturing, clothing industry, electronic industry but still are at the at groping stage.

From the aspect of theory, just in terms of knowledge management, in recent years, many scholars do a lot of research in the aspects of he enterprise's knowledge man-

agement and related contents from the connotation,the model, the system, the technology and the application of knowledge management, etc, what's more ,they had made a lot of achievements. But due to the high-tech virtual nterprise has a much more obvious life cycle than that of additional.it put more stress on the dynamic phases: the creation phase,the operation phase, the adjustment phase and the integration phase, etc. Its members also have the characters of distribution, autonomy, coordination, therefore it is more difficult for the enterprise alliance to do knowledge management. This article will research the high-tech virtual enterprise's key technology in the process of knowledge management under the conditions of solving the dynamic distributed isomerism and combined with other related methods as well as based on the mobile Agent

### **3.1 The application of the Mobile Agent technology**

Along with the rapid development of network technology the distributed computing gradually become the key research area of the computer technology its main goal is to realize the resource's cross-platform transparent interoperable mechanism and coordinated calculation and to solve the problems of network information resource's explosive growth ,the mobile computing problems, the information services problems and other problems in the emerging network applications. Mobile Agent ( MA) is a new kind of distributed computing technology integrated with Agent technology. Its characters of intelligence, dynamic and mobility bring out the new ideas and excellent properties for the distributed computing technology.

From the early 1990s when the concept of Mobile Agent was put forward, Mobile Agent technology has been widely concerned by the industries. Although the time of the concept 's the formation and development was short, but it received great attention from many universities and research institutions. It has already developed from pure theory research stage into the stage of exploration and application and successively appeared some Mobile Agent system's developing platforms together with the execution environment. It is mainly divided into three categories: the based on traditional explanatory language, the based on a Java language and the based on CORBA platform, the representatives of the companies respectively are the General Magie's Tclescript, IBM's Aglets IKV++ and the Grass-hoPPer. At the same time, the mobile Agent have also made some achievements in the aspect of distributed information management and the sharing the application fields Although few scholars have conducted the research on the mobile Agent and its applications in the high-tech virtual enterprise. such as the based on mobile Agent technology and the mobile Agent's high-tech virtual enterprise coordination mechanism, the partner selection, the infor-

mation communication and the information services and so on. But these studies are also in the phase of model construction and algorithm design which lack specific implementation methods and core technology guidance, in addition, they also don't make the distinction according to different high-tech virtual enterprise's knowledge management processes.

### **3.2 To construct the high-tech virtual enterprise's distributed knowledge management system through the mobile Agent technology**

When the enterprise plans to construct the high-tech virtual enterprise's distributed knowledge management system through the mobile Agent technology it will make full consideration and make combination with its organizational characteristics and operating procedures and it will ensure the integrity of the knowledge management system's structure and function so as to build up a highly flexible, customizable knowledge management processes to meet different industries' characteristics and demands. At this moment, there still aren't related reports. about this field's research and achievements in home.

Because the high-tech virtual enterprise's knowledge management system based on mobile Agent technology involves many support technology and environment, such as the high-tech virtual enterprise's internal information system's infrastructure construction and the knowledge management's characteristics as well as the requirements in addition the mobile Agent 'core technology and difficulties etc. At present, these aspects' construction and research are still in the initial stage. Therefore the things that combine these two fully to achieve a better effect from the knowledge management will face a lot of new theory and practical problems. A lot of new theory, method and technology are waiting for further research but the research of this aspect is still rarely both at home and at abroad.

### **3.3 The superiority of using the mobile Agent technology**

Specifically speaking, the mobile Agent is an executable software which can be independent mobile in the heterogeneous network environment and they do not need the unified dispatching. The Agent created by the user may run in the network nodes concurrently and asynchronously, relying on the interaction among the static Agent, the local resources and their computing power to complete the task, and transmit the calculated results to the users. The mobile Agent technology can effectively reduce the network load in the process of distributed computing, improve communication's efficiency, support asynchronous independent interaction, can accommodate the dynamic network environment. It has the characters of security and tolerance. Therefore, the mobile Agent technology provides a new

method to design and build a distributed dynamic application which is fit for the large-scale network environment. The distributed information system based on the mobile Agent technology has the insurmountable superiorities in the aspects of establishing, communicating, founding and managing the information in the distributed environment.

### **3.4 The high-tech virtual enterprise's distributed knowledge management platform structure**

According to the characteristics of the high-tech virtual enterprise and the necessity as well as demand to do the the knowledge management for it, the enterprise moves the mobile Agent technology into the high-tech virtual enterprise's distributed knowledge management process and then regard this as the core to build the high-tech virtual enterprise's distributed knowledge management platform structure. what's more, it will combine the mobile Agent's characters: the mobility, the responsiveness, the autonomy, the environment adaptability and the target guidance etc with the high-tech virtual enterprise's distributed knowledge management process and tasks closely. At the same time, it will introduce the XML technology, workflow technology, the strategy as well as the algorithm for the partner selection to achieve the effective knowledge spreading and sharing among the high-tech virtual enterprise dynamic union's members so as to the high-tech virtual enterprise improves its operation efficiency and core competitiveness preferably under the condition of knowledge economy era through the advanced network environment

### **3.5 The current difficulties and breakthrough**

Because the high-tech virtual enterprise knowledge management system which is based on the mobile Agent technology system involves many supporting technology and environment such as the high-tech virtual enterprise's internal information system construction's foundation and its knowledge management's characteristics as well as the requirements, the mobile Agent's core technology and the difficulties etc. For the moment, these aspects of construction and research are still in the initial stage, thus fully integrate these two sides to achieve better effect which will face a lot of new theory and practical problems while at present the theory, method and technology are waiting for further research and breakthrough at home.

## **4. The conclusion**

At present, knowledge management are getting more and more extensive use, especially, it is more important for the high-tech virtual enterprise with high level knowledge. The virtual enterprise's knowledge management system model in this article provides a new approach to establish a knowledge utilization, knowledge spread and knowledge

sharing environment among the high-tech virtual enterprises.

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## References

- [1] Jean-Grégoire Bernard: A Typology of Knowledge Management System Use by Teams[C].Proceedings of the 39th Hawaii International Conference on System Sciences – 2006:1-10.
- [2] Wooldridge MJ: Agent-based software engineering. IEEE proceedings on Software engineering[C]. London, February, 1997, 144 (1) :26-37.
- [3] Bao Guo-xian, Ma Hui-xian: The Research for the Performance Evaluation of the Virtual Enterprise Knowledge Management [J]. Journal of Information, 2008, pp. 6: 32
- [4] Zhao Qiang, Xiao Ren-bin: Game Analysis and Mechanism Design on Information Sharing in Virtual Enterprise [J]. Computer Integrated Manufacturing Systems, 2007, pp. 8: 1566-1571.