

# A Study on Enterprises Cluster Oriented Collaborative Commerce System Construction

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**Abstract**— The application of collaborative commerce in enterprises cluster will further improve the competitive competences of the individual enterprises. This paper analyses the advantages that collaborative commerce brings after it has been applied in enterprises cluster. And then a framework used to describe the operation of collaborative commerce in enterprises cluster is put forward. Directed by this framework, an implementation solution is proposed to building the collaborative commerce system in enterprises cluster. The paper also fully describes the realizing technologies from three aspects that construct the intelligent search engine, create the application service environment that supports the enterprises interaction and build the collaborative commerce information portal.

**Keywords**— Enterprises Cluster; collaborative commerce; search engine

## I. INTRODUCTION

Enterprises Cluster as an important geopolitical phenomenon and industrial forms of organization in the development of the evolution of industry, its regional and national impact on the competitiveness has gradually been recognized by the people. That various enterprises combine together in cluster not only can take full advantage of the high efficiency and flexibility that industry specialization and the division of labor brought about, but also can have the scale advantages of large enterprises, speed up the flow of knowledge and technological innovation, forming competition and cooperation mechanism to promote regional economic development [1]. Enterprises Cluster relying on the advantages of geographical aggregation and industrial concentration occupies an important position in the regional economy. The members of the cluster enterprise achieve interactive link by industry value chain interaction or competition-cooperation interaction, and thus constitutes industrial ecology system of the internal Enterprises Cluster, but the exertion of the whole cluster's effects and the embodiment of competitive advantages are constrained and restricted by many aspects of hardware and software of enterprises cluster [2]. With the constant deepening of

enterprise information and the rapid development of Net-economy, how to use the advanced IT technology and the Internet to optimize transferring information and business cooperation mechanism, and enhance the overall competitiveness for laying the foundation for the industry upgrades and innovation and development will be the scientific development issues Enterprises Cluster face.

## II. THE BENEFITS BROUGHT BY COLLABORATIVE COMMERCE TO ENTERPRISES CLUSTERS

Under Internet and E-commerce environment, the traditional business modality of enterprise has changed radically. The future E-commerce trend focuses on collaborative commerce in the layer of enterprise applications [3]. In 1999, Gartner Group first proposed the concept of collaborative commerce that collaborative commerce is a business strategy which spurs partners having common commercial interest in a value chain; all the members of the value interests through their core competitive advantages create new combinations products or services to get profit.

IBM divides the Collaborative content under E-business environment into four areas, including the sharing of information and knowledge, business integration, the establishment of cooperative community, and business transactions. To the Enterprises Cluster, the collaborative commerce in Enterprises Cluster brings the following advantages:

### A. Collaborative buying and selling of Enterprises Cluster

Through collaborative buying, Cluster enterprises save transaction costs of the buyer and seller, at the same time, cluster enterprises as a whole will get more price space in the negotiations of buying. In sales, owing to the characteristics of geographical aggregation and industrial concentration, the cluster enterprises not only can collaborate extensively in the sales force, sales channels, and sales logistics, but also can carry out online collaborative B2B transactions through cluster network. Besides, sales knowledge, skills, experience, and so on also have the migration characteristics. At the same time, sales logistics of Enterprises Cluster also have the characteristics of warehouse collaboration, transportation cooperation, and distribution collaboration.

### B. Mass customization based on Enterprises Cluster

To manufacture customized products in the costs and speed of mass production has a very realistic conditions in the flexibility plus specialization enterprises cluster. The flexible

Manuscript received December 30, 2007. This research was financially supported in part by the National Natural Science Foundation of China under Grant 70572060 and Hunan Philosophy and Social Major Research Base Open Fund under grant 07 K001.

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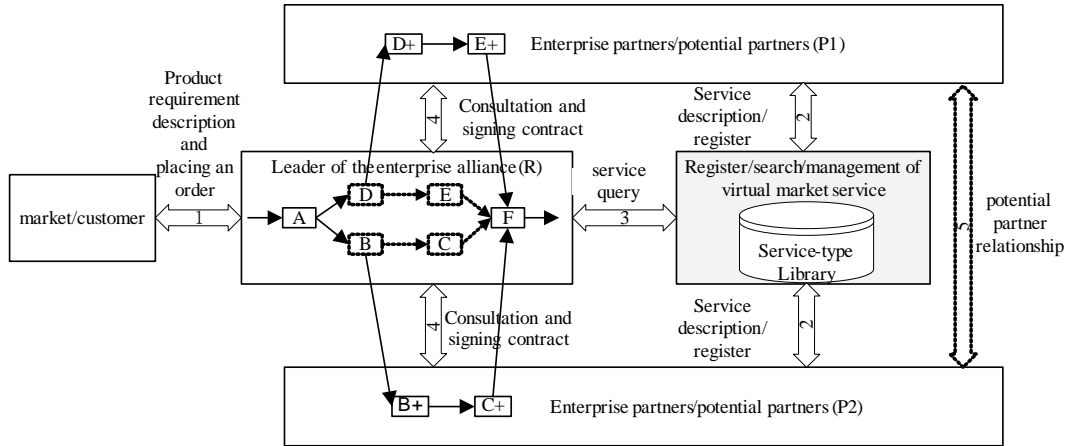


Fig. 1 The process framework of collaborative commerce in Enterprises Cluster

manufacturing capability of small and medium-sized enterprise in the cluster suits small batch customized products, and the density of enterprises in cluster enterprise has brought about the large-scale requirements of the total production. In the manufacturing platform of network, collaborative manufacturing operations of a number of companies within the cluster can meet the individual needs of diverse customers through online orders, production group technology, and flexible production technology of cluster enterprises. And it also can improve overall production efficiency, reduce stock and achieve scale production requirements rapidly and efficiently.

*C. The knowledge sharing oriented Enterprises Cluster network*

The learning and innovation of the cluster brought by technical knowledge spillover and information spillover of Enterprises Cluster is a major feature of the Enterprises Cluster. The cost advantages of human resource market and information search and the advantage of innovative learning of the internal cluster in the network environment reflect the sharing of information base and knowledge base in the cluster enterprise, and the collaboration between information flow and knowledge flow through collaborative business operations.

So, the application of collaborative commerce in Enterprises Cluster will reflect inherent competitive advantages under a larger scope and deeper level in the E-commerce environment and further improve the competitive competences of the individual enterprises.

III. THE PROCESS FRAMEWORK OF COLLABORATIVE COMMERCE IN ENTERPRISES CLUSTER

From the level of the collaborative Enterprises Cluster, the application of collaborative commerce includes two different levels. The first level is the collaboration between Enterprises Clusters. The level of cooperation is based on the sharing of

business behaviors and specific resources in Enterprises Clusters. The second level is based on the collaboration between the cluster enterprises and external organizations, institutions, and government departments. The sharing of resources derives from dynamic alliance between the enterprise and global enterprises and horizontal association between the enterprise and a variety of scientific research institutions, industry associations and other services and intermediaries. Therefore, the author proposes a framework used to describe the operation of collaborative commerce in Enterprises Cluster, as shown in Fig. 1.

There are four kinds of transaction objects (roles) in the framework used to describe the operation of collaborative commerce in Enterprises Cluster: (1) market / customer, which is a potential client or a new source of demand for new products; (2) leader of enterprises, the sponsor of dynamic alliance in the Enterprises Clusters, provides external services on behalf of the Union. It has its own production capacity and its own products. The leader analyzes its requirements beyond production capacity after receiving project, and then seeks the allies to virtual market. The leader is responsible for managing the operation of the entire enterprise Union and providing the final products and services; (3) enterprise allies / potential partners, are the manufacture enterprises with sophisticated equipment or those special units with special design capability before forming dynamic alliance. The establishment of the identity of its allies depends on the characteristics of the product and the business scope of the leader. The identities of its allies are cancelled at the end of the entire product life cycle. (4) Virtual Market, a third party service agency provides intermediary services for the dynamic establishment and operation of the Union. The potential partners register the services that they can provide to the virtual market and the leader inquires about services needed to virtual market. Virtual market manages these types of service information, and provides shared field ontology services and the service matching mechanism to enable enterprises to find a suitable

partner. Such institutions can be advocated and regulated by the corresponding government department, confirmed by the way of commission or tender and operated in the form of Enterprise Corporation. At present information portal under the guidance of industry associations generally will serve as such role. These portals only provide the scattered information collection of supply and demand sides, and can not fulfill the automatic registration, searching and using of the services. For this reason, the cost of matching the supply and demand sides is high and the efficiency of intermediary can not play fully. We propose the virtual market that it is an information platform to support the interaction, cooperation and coordination of information between the various autonomous entities under the distributed environment, and to offer the intermediary services for the dynamic construction and operation of enterprise union. The virtual market is indispensability for partner search, partner selection and association and the construction of service environment.

Customers log on leader's web site through the Internet to purchase its products and put forward the special requirements of the products. The leader analyzes the requirements beyond its own production capacity through orders, and then searches the enterprises which can provide such services to meet the requirements to virtual market, later chooses the ideal allies in many returning results in accordance with the strategy of selection. Finally, the leader signs an electronic contract after the success of consultations, forming dynamic alliance to achieve enterprise application integration in an open service environment.

#### IV. BUILDING COLLABORATIVE COMMERCE SYSTEM ORIENTED BUSINESS CLUSTERS

Whether realizing effectively collaborative commerce or not lies in the existence of such an information portal that offers public information platform through which enterprises in cluster can be connected and be chosen as partners by the Internet quickly, and carry through the integration of applications for adopting a common specification [4-5]. To construct collaborative commerce system oriented business clusters, the keys are:

##### *A. the creation of intelligent search engine system*

From product design and manufacture to delivery of the goods, cluster enterprises search and apply fleetly and pellucidly the information of various related resources, capacity, components, design, processing, manufacturing, management, marketing through Internet in order to ensure the completion of customer orders efficiently and rapidly. Although the Enterprises Cluster is concentrated geographically, its internal database has become an "isolated islands of information". So on the one hand, launched enterprises search quickly the resource information such as the technology sought and key components through Internet, as well as information of enterprises and their production capacity to seek allies; On the other hand, launched enterprise

searches for collaborative enterprises through the Internet according to its own production capacity and service capabilities. Therefore, collaborative commerce should first build an efficient intelligent search engine system.

The rapid development of Internet makes it possible for the exchange of enterprise information. Search engine as an important tool to obtain information in Internet draw attention in recent years. Not only the leaders of search giant Google, Yahoo, also domestic Baidu, Sohu and so on achieve certain success. Many of the industry believe that enterprises in China can make use of E-commerce to create its own value directly with the rapid growth of economy. While the key to entering E-commerce is search engine.

However, enterprise resource information based on Internet is enormous, and has grown geometrically every year. Traditional search engines based on the search method of hyperlink analysis and keywords matching logically, [6] often make the index-base huge, useful information only account for a small part, retrieval efficiency low, and resource-consuming great, in addition only apply to static information search.

In order to achieve high efficiency query and retrieval of the information among members of enterprises on the Internet, multi-agent technology will be introduced to the field of information search, and intelligent search engine system will be deployed on the virtual market servers. Normally, a search task can be defined as an acting set and a state set of environment. The search agent chooses the search acting as a link set when it search to the next step by linking, and an incentive and the new state are given for the search results. Thus the search efficiency can be improved by constructing Markov model based on decision-making process and adopting reinforcement learning algorithm. In addition, network information mining technology based on association rules makes it possible further to enhance the quality of information searched. Besides, the current difficulties the search engine faces mainly are the lack of the handling and understanding capacity for the knowledge and information retrieval based on mechanical keyword matching. Therefore, the key to the solutions of these problems is elevating information retrieval based on keywords level to the knowledge-based (concept) level. In recent years Semantic Web becomes hot spots the next generation of Internet will research, which provides a great driving force and application prospects for information retrieval, search engine, knowledge representation, resource discovery, intelligent Web and so on.

##### *B. Building interoperable application services environment of the enterprise*

Application integration can be defined as: the sharing of business processes and unlimited data between the arbitrary interconnection application and the data source. A great amount of autonomous and heterogeneous data sources and application software, a flood of multimedia data, a wide variety of application routine and services are distributed in

Enterprises Cluster. The degree of difficulty can be imagined to carry through commercial negotiations, signing of contracts, and pre and post-sale services on the basis of that. All the operational process of collaborative commerce is in a heterogeneous, distributed environment because of various scattered enterprises in the region, and the existence of their respective applications and workflow. How to ensure various enterprises to achieve seamless integration and interoperability is the base of developing collaborative commerce.

Web services technology based on service-oriented architecture (SOA) which offers open architecture for the Enterprises Clusters is a standardized software components of cross-enterprise border and self-described on the Internet [7]. However, the Web services technology is essentially distributed network software components, supporting only a simple request / response model of interactive services, Description Language WSDL and UDDI are lack of semantic description aiming at services, this machine will not be able to discover Web services automatically, so they could not complete coordination between the services [8]. As the intelligent agent technology with a high degree of intelligence, initiative, coordination and mobility, we need comprehensively study on the advantages of these two areas that services serve as the core, conjoining intelligent agent technology and Web services to forming a new semantics of the Service Agent (Service Agent). The initiative finding of the services and dynamic coordination between the more services can be realized by raising the initiative and intelligence of Web services technology. On this basis, the necessary technical basis is provided for the realization of collaborative commerce in Enterprises Cluster through the construction based on a multi-agent semantic service environment.

### *C. Construction of collaborative commerce portal in Enterprises Cluster*

The emergence of information portal undoubtedly speeds up the transforming process of the traditional E-commerce business to collaborative commerce. But the limitations of the information portal is to provide customers with an integrated interface far from enough, because the information portal simply provides a unified entrance to visit, which causing no toggling of various application interface which brings more convenient compared to the past. But if the background information is still some islands of information or less integrated application databases, even if users see an integrated front of the stage, they cannot make use of the user's data, information and knowledge fully. Therefore, the platform for integrated collaborative commerce is the direction of development in the future except for union set for the function of E-commerce systems and information portal system. At present, the various application systems such as ERP, CRM, SCM and information portals will become an even more complex component of inter-enterprise system. In

the traditional business model, the ERP is at the core position. In the near future, there will be more dynamic online markets, namely the virtual market; the enterprise can collaborate with the employees, shareholders, suppliers and distribution channels through a more enterprise structure, making cluster enterprises operating in an integrated collaborative commerce application platform.

## V. CONCLUSIONS

Collaborative commerce with Internet and other emerging technologies for the realization of means draw increasingly attention of the people, through the creation of a new organizations that are in favor of information sharing and knowledge innovation between the business units in clusters to create continued competitive advantages. Search engine as an important tool to obtain information draw much attention in recent years. Multi-Agent-Based Intelligent search engine to optimize network information retrieval will also play an important role for further developing business activities based on network in the cluster enterprises. In the process of collaborative commerce in cluster enterprises, a new implementation solution is proposed. That is, a virtual market as intermediary service information platform which provides the function of search engines , Web services management capabilities, sharing field Ontology, as well as service matching mechanism to support finding, cooperation and coordination of information between various autonomous entities in the distributed environment.

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