Integration of Knowledge Management and Collaborative Commerce for Product Development Based on ASP

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ABSTRACT

Considering the rapid progress of information technology (IT) and volatility of the marketing environment, the past concept that enterprises run the whole show, has become insufficient in an environment so volatile, challenging and competitive, demonstrating the need of up and downstream supply chain cooperation to survive. Following the maturity of internet related technology, a new industrial method – application service provider (ASP) came into being, providing enterprises with a new low cost solution, different from traditional methods such as buyouts and self-developed information systems. Therefore, this research uses ASP as its basis, and constructs a system prototype of the applied model of knowledge management and collaborative commerce (CC) integration.
Keywords: *Knowledge Management, Collaborative Commerce, Application Service Provider, ASP, Supply Chain Management*

INTRODUCTION

There is fierce competition in the global market, and enterprises are facing tremendous challenges. As the life cycle of products become shorter and shorter, enterprises must develop new products with the fastest ways possible to satisfy the needs of customers. Over relying on enterprises to run the whole show has become insufficient in the volatile market; the current competition mode has changed, from enterprise against enterprise in earlier periods to supply chain against supply chain, objectives have changed from gaining the most benefits for enterprises to gaining the most benefits for supply chains. Therefore, enterprises needed to cooperate more with its upstream and downstream companions, and thus, collaborative commerce came into being.

Being in a market environment with so much competition, enterprises need to put in even more resources and manpower to gain better profits, utilizing information technology to assist enterprises in elevating their operation efficiency became more and more popular. Yet, IT related talent is hard to come by, in addition, nurturing talent costs immense time and money, and this will be anything but cheap for enterprises, therefore, ASP provides an absolutely superior option.

ASP sprang up in North America in 1998, and was an extension of the traditional concept of information outsourcing (Harney, 2002). After internet related technology became mature, this became a new industrial method, which is providing enterprises with hardware or software lease and other related services through the internet. Its objective is to provide a low cost solution, help enterprises focus on their core business and increase their competitive advantage.

RESEARCH MOTIVATION

If enterprises lack an efficient way to integrate and apply their knowledge, there will be no way of accumulating knowledge, it won't be passed on, and then the enterprise's competitiveness will be affected. Therefore, in the area of knowledge management, effectively utilizing IT to aid enterprises in reaching their goals is an important competitive advantage.

The center of attention in enterprise management has shifted from interior integration to exterior integration because of the volatile market environment. Besides requiring interior knowledge management mechanisms, upstream and downstream manufacturers needing fast information flow, for rapid response to customer needs, has made the supply chain trend unavoidable. Provide customers with faster and better services and products through the close-knit relationship of enterprises, this sort of internet-based CC pursues to reduce the time a product is designed, made and distributed. Collaborative cooperation between enterprises in a supply chain, and its integration and application with interior knowledge management mechanisms, are the key to obtaining competitive advantage and economic benefits. Therefore, developing a method for integrating knowledge management and CC became the first motive for this research.

Applications often face problems such as maintenance, updating and correcting, this costs large amounts of money, time, manpower and resources. The way ASP operates is, provide enterprises with application lease and management and maintenance services through the internet, so that when they are leading-in applications, the above problems can be

solved. Therefore, utilizing the way ASP operates, to let enterprises accelerate the speed they lead-in the application structure of CC, became another motive for this research.

According to the above motives, the collaborative cooperation of enterprises in a supply chain, leads to gaining competitive advantage, also, the maturity of the internet and characteristics of ASP, can help enterprises even more in creating their core competitiveness. Therefore, how to utilize IT to integrate and apply knowledge management and CC, and also develop a system structure that provides integration of knowledge management and CC services, using ASP as its basis, became the objective of this research.

LITERATURE REVIEW

Application Service Provider

ASP is a new industry; it provides application software lease services through the internet or a dedicated line. Some scholars think of ASP as a single point in all communication, hardware and software contracts that provide the required consulting on distribution, operation and maintenance. According to the ASP Industry Consortium (2005), the definition for ASP is: ASP provides management and transfer functions to multiple individuals through information centers in a wide area networks (WAN). It can be told, that there isn't common definition for ASP yet, and although each definition has its differences, the main meaning of ASP is: ASP has its own mainframe that provides clients with application or system program lease and follow-up management and maintenance services through the internet, the services mentioned include temporarily managing system facilities, establishment of information centers, software maintenance and update, security certification and system integration (Factor, 2002; Harney, 2002; Smith and Kumar, 2004; Tao, 2001).

Chou (2004) summarizes the characteristics of ASP as follows:

1. Software services as the core business

Other than providing software for enterprise use, the main business of ASP is to provide the services needed to use the software, including software maintenance, support and management. Selling software or simply changing billing methods from buyout to leasing through the internet without providing services doesn't count as ASP. Therefore, the core business of ASP is not the product itself, but the information service that follows it.

2. Provides internet-based services

The spirit of ASP is to provide service through the internet, this internet often means WAN, as a precaution to ensure quality. From the software point of view, the software provided by ASP are mostly categorized as server end software, enterprises only require browser or thin-client techniques to access the software provided.

3. Flexible valuation methods

Different from the past method of software authorization buyout, ASP adopts the lease method (Pay for as much as you use) to provide two options: Period of usage (according to month, season and year) and Price valuation (according to the client's revenue, profit and number of users), this allows enterprises to choose a valuation method that is most suitable for their way of operation.

4. Standardized software products

Only by establishing a shared management mechanism, can economic scale be put into full play, and reduce the total cost for enterprises when using software provided by ASP. Therefore, standardization is an important consideration when ASP selects software products, and ASP specializes in making standardized products into divergent services and turns the center of attention from product function comparison to information service quality. After all, a mature standardized software product has little functional differences, the effectiveness and quality of usage is the key to creating benefits.

5. "One on many" operation model

Applying internet technology to manage clients through a fundamental centralized "one on many" structure is the goal of ASP. For small and medium sized enterprises that are unable of having a complete information department, ASP plays a critical role in establishing a shared information center, using internet technology and information sharing concepts to elevate their information application ability.

6. Service provision according to contract

The solutions provided by ASP requires the cooperation of collaborative manufacturers, to fulfill their commitments to clients, once a problem occurs in their service, ASP has the responsibility to solve it.

From the above ASP characteristics we can tell that, the core abilities of ASP are in the centralized "one on many" model, providing software management and maintenance lease services. Therefore, ASP should have abilities in infrastructure, applications, management and integration services (Chen, 2002):

1. Infrastructure

The infrastructure includes compatibility of operation platform, establishment of internet hardware and software, system integration and internet security management.

2. Applications

Possess vertical and horizontal integration abilities, at the same time provide high level application options, and meet the needs of enterprises for one-step shopping.

3. Management

Refined mechanisms for the secrecy and safety of enterprise data is required, this means to perform upgrade, 24 hour surveillance, internet and server management on the execution environment of applications.

4. Integrated services

Providing service on internet platform should reduce usage cost for clients. Therefore, besides providing the application itself, integration with software and hardware of client systems should also be considered.

Based on the service characteristics and required abilities of ASP listed above, usage of ASP has the advantages below:

1. No installation needed

ASP provides service through the internet, the required programs and databases are installed in the ASP host, users only need a computer capable of connecting to the internet and a browser. This sheds problems from installation steps and debugging.

2. System service won't break off

The service has the same advantages as the internet, which is accessible 24 hours a day 365 days a year, increasing usability and dependability.

3. Shares risk of utilizing new technologies

The rapid progress of IT has shortened the life cycle of applications. Application lease and management and maintenance services provided by ASP, can save online time of applications for enterprises, and share the risk of new technology usage, saving cost greatly.

4. Provides more flexible information management strategies

With the shortening of application life cycles, new software keeps showing up, and through lease services, the user will no longer be limited by development and maintenance cost of the software itself. The enterprise will be able to select the most suitable software combination according to its needs, this will help it focus in its core business and not IT issues.

5. Accelerates integration of enterprise applications

Integration of applications has always been a head aching problem for enterprises. From the IT point of view, integration of software is the biggest contribution to enterprises. This can be proved by the development trend of ERP software, which integrates applications that are scattered in different departments. Therefore, the largest advantage of ASP isn't providing lease of one software, but integrated software service with the support of large software developers.

Collaborative Commerce

The up rise of collaborative commerce

Internet technology has improved these few years; e-commerce has also become more mature. Chang (2003) mentioned, from 1995, enterprises have focused on elevating employee productivity and business process integration. From 1995 to 2000, enterprises gradually shifted their attention to e-commerce, making transactions between enterprises and enterprises or customers electronic to reduce cost. Arriving at the 21st century, the center of management has gradually changed from simple interior operation to integration of upstream and downstream manufacturers. Besides transactions through digital media, e-commerce also includes the true sources of power to modernized management, which covers the integration of an enterprise's front and end. For this reason, e-commerce not only emphasizes on electronic transactions, it also includes redefinition of past management methods, to pursue the maximization of customer value.

Following changes of the management environment, demand on quality grew even higher, not only did it have to meet different requirements, it had to be delivered even faster to the customer, being incapable of responding to market changes, would result in elimination. To deal with this problem, CC has become a solution established on the internet.

The up rise of CC demonstrates the need for cooperation of upstream and downstream manufacturers, to provide immediate and complete service, establish effective mechanisms for the planning, managing, distribution and control of resources and finally reach the objective of shortening product launch time. Managing the cooperation of upstream and downstream manufacturers is what we call supply chain management.

Supply chain management

Supply chain management can be defined as a network of tight-knitted providers, manufacturers, distributors, retailers and customers, with the final objective of having each link get what they need in the shortest amount of time, and reach collaboration and integration of the whole procedure.

Therefore, supply chain management is involved in many areas including purchasing, storing and delivering. Although supply chain management and cooperation of upstream and downstream manufacturers can reduce operation risk and reduce cost, it can't bring actual competitive advantages for enterprises. For this reason, some scholars began proposing the concept of collaboration, emphasizing that enterprises can cooperate in coordinated and synchronized ways through the internet. This will allow cooperation to become faster and more transparent, it will also connect enterprises scattered in different areas of activity, and make optimized arrangements.

Functions of collaborative commerce

Huang (2001) divided CC into four main functions including design collaboration, marketing/selling collaboration, purchasing collaboration and planning/forecast collaboration.

1. Design collaboration

This type of collaborative operation covers all discrete manufactured products, and configured to order products. These product types have longer life cycles, for instance, a turbine from a power factory; others are season recurring, such as clothes; and there are products with shorter life cycles, such as plastic bottles. These products have a common characteristic, they all start from the specification document, and these documents must be shared and modified by both cooperating parties. This type of collaboration can be the simple sending of samples, or it can be complicated, and require collaborative tools to trace and manage the working procedures.

2. Marketing/selling collaboration

This refers to the CC between distribution companions, and focuses on the sharing of information and orders/price/brand management procedures, also providing committable information. This type of CC includes establishing a virtual presentation room for a common brand, letting each link of the supply chain contributes to the customer's demand on product or service requirement.

3. Purchasing collaboration

This means to combine multiple buyers and reach larger amounts of purchase, with the objective of lower buying cost. Purchasing collaboration can be a public electronic trade market; it can also be the combination of enterprises with the same need for certain products or materials that purchase as one; comparatively, suppliers can combine strengths to provide products or services, making it convenient for buyers to purchase in large quantities instead of going to a number of suppliers.

4. Planning/forecasting collaboration

The source of power for this type of collaboration origins from The Voluntary Inter-industry Commerce Standards (VICS): Collaborative planning, forecasting and replenishment (CPFR). The CPFR method formulated nine steps to assist cooperation of planning, forecasting and replenishment between enterprises (especially between supplier and retailer). CPFR is a conciliatory plan of cooperating partners in the value chain, it is a business procedure that reduces differences between suppliers, and makes the supply chain more agreeable with demand orientation.

The definition for CC is a bit of an abstraction. According to Surgency (2001), the definition for CC is: Collaborative commerce is a cooperation oriented business method, its main application is between virtual enterprises. Mao (2003) mentioned that the definition for CC is: The collaborative cooperation of an enterprise itself, between enterprises and between enterprise and customer seeking to reach a common goal (such as product development, production, supply chain management, forecast, logistic and marketing), established on a foundation of trust, and actualized with the help of IT. Cooperation relationships include the integration of information flow between enterprises. The fundamental concept of this is to integrate all related departments and enterprises during a products life cycle, and have them share information, innovate products and manage development, with the objective of letting business partners and all operation partners that are in the enterprise's value chain integrate business procedures, share customer relationship and have inter-enterprise knowledge management, all based on a structure of collaborative cooperation. Consequently, usage of CC requires its integration with IT management mechanisms to create better benefits. Therefore, knowledge management provides a good IT management mechanism. Through the process of obtaining, creating, possessing, integrating and learning knowledge management, related information outside of the enterprise is shared and transferred, and takes a step further reaching innovation and application, making CC more efficient and systematic.

Knowledge Management

Regarding the definition of knowledge management, specialists and scholars each have their own opinion. Rosenberg (2001) divides knowledge management into three levels:

1. Document management
2. Information/knowledge creation, sharing and management
3. Enterprise intelligence

Utilizing IT to assist each level in reaching its objective of management and sharing innovation, helps knowledge overall in gaining the benefits it should provide.

Arthur Anderson's Business Consulting (2001) defines knowledge management as: Knowledge management is a systematic process of acquirement, creation, possession, integration and learning. It is performed through information usage, comprehension and experience enhancement, with the objective of elevating the quality and quantity of innovative organization knowledge, at the same time enhancing the viability and value of knowledge. Although the opinions on the definition and objective of knowledge management are widely divided (Alavi and Leidner, 2001; Awad and Ghaziri, 2004; Caro and Ali, 2004; Goh, 2004; Sher and Lee, 2004; Tiwana, 2001), its core meaning is: Utilizing IT to let information and knowledge assets of an organization, through processes such as retrieval, creation, sharing and innovation, help accumulate personal and organizational knowledge. Allowing individuals and organization to share and

use accurate knowledge more efficiently, then create even better knowledge.

In order to fit in with the above definition of knowledge management, utilization of IT is necessary, especially because of the progress IT is currently making. Even though technology can't do it all, it plays a part that can't be missing. Knowledge management technologies refer to computerized tools helpful to the execution of knowledge management. The services provided include e-mail, intranet, data mining and customer relationship management. For the convenience of analyzing, the services provided by knowledge management technologies have been divided into three categories; infrastructure services, core services and packaged services, establishing them on an inter-related foundation, with services provided such as e-mail, online conference, knowledge production, retrieval services and enterprise information portal (EIP). We know from the above that, although the role of IT is only to assist, it is a necessary tool nevertheless. Only by adequately making use of IT, will the objectives of knowledge management be realized. According to the above services of knowledge management technologies, it can be told that knowledge management is capable of being combined with other issues, to create an even more flawless knowledge management structure to increase the enterprise's competitive advantage.

When constructing a knowledge management system, the key factor to success is whether or not it can truly elevate efficiency for organization members, and reach the strategic objective pre-set by the organization. The key points to design are as below (Fong, 2004):

1. Accurately understanding knowledge management: Knowledge management is not only the usage of technology; it also involves organization strategy, procedures and personnel integration operations. The construction of a knowledge management system should be combined with an enterprise's organization objective.
2. Through the establishment of a system and application of technologies, create suitable groups/communities to gather members in an organization with the same interests, and promote a knowledge sharing and open learning atmosphere.
3. After completion of the system, training education and advertisement should be carried out. There should be dedicated personnel responsible for writing the manual, proceeding with training and providing consulting services.
4. After the knowledge management system has been constructed, maintenance and coordination are inevitable, and through interpersonal networks of groups and departments, proceed with the protection and filtering of data to ensure its value. User examination and performance evaluation should be used to analyze the actual benefits of the system. Rewards should be awarded to those who have made major contributions to database content.

SYSTEM STRUCTURE AND FUNCTIONS

This research uses the concept proposed by Marc J. Rosenberg and discussions on CC as reference, and constructs a theoretical structure of CC combined with knowledge management, using ASP as its basis. The framework of integrating knowledge management and collaborative commerce for product development based on ASP is shown in figure 1. The ASP-based knowledge management system is divided into three subsystems; document management, knowledge creation and sharing and enterprise intelligence as shown in figure 2. Departments from an enterprise and upstream and downstream manufacturers can use the functions of these three subsystems to create information and knowledge after communication and sharing, gain organization learning effects and reach the objective of collaborative cooperation. Illustration on the system structure and related system functions of the integration and application of knowledge management and CC is as below:

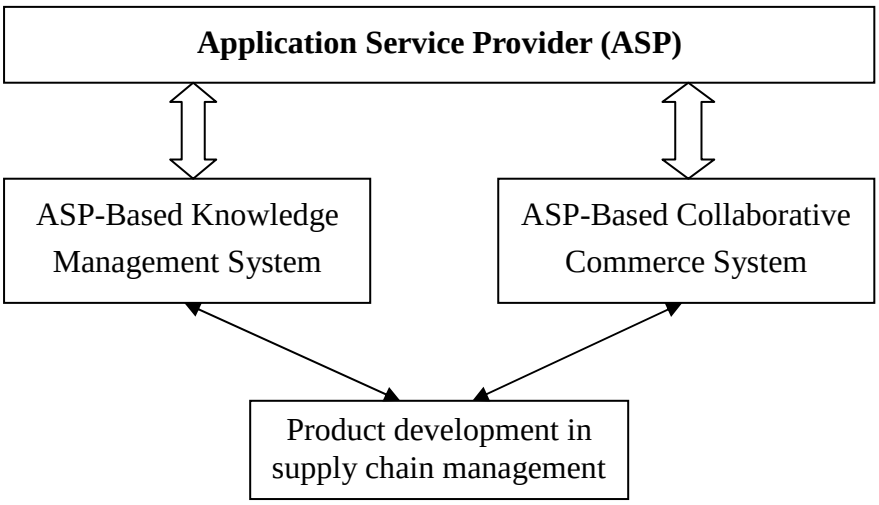

Figure 1. The framework of integrating knowledge management and collaborative commerce for product development based on ASP

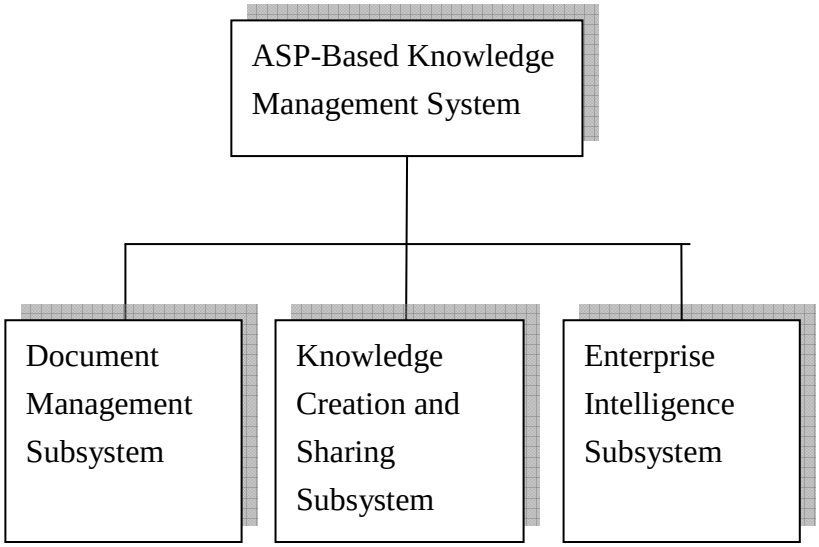

Figure 2. The system structure of ASP-based knowledge management system

Document management subsystem

Provides users with basic document information and management, it includes the two functions below:

1. Document storage: From massive numbers of documents, put useful documents into document storage according to different group types. The user can save documents into different groups/classifications, or add a new group, this allows users to search for documents by group first, and avoid long searching time periods that are a burden to the system. Creation of new groups makes the document database more complete for other users.
2. Document retrieval: After selecting a group/classification, use key words to search for the desired document, or add new data to this group for search of future users. When finding the desired document, press the view button and detailed information on the document will be shown, including description, file owner, date etc., it can even download the document onto the user's PC, making it more convenient to read.

Knowledge creation and sharing subsystem

1. Subject discussion forum and discussion area: Create new knowledge, by sharing knowledge with others or have others contribute knowledge, in a place for discussion, such as a discussion forum. When the user enters the subject discussion forum function, the first page will show subject names for different forums, selecting a topic will bring the user into that specific forum. If the user wishes to add a new topic of discussion, the new button will open a new forum. If a user wishes to give an opinion, he/she can respond to a certain topic of discussion. The discussion area has functions similar to the subject discussion forum, with the only difference in the area of free discussion and not limited to one specific subject, one can search for advice when encountering any type of problem.
2. Knowledge update and modification: Through the sharing of certain information/knowledge, such as law regulations or articles on issues, allow users to get the latest information faster than before. The main page will have a list of groups to select; the user can also add a new group to share different kinds of knowledge. Choosing a group will enter into that related subject. A view option is provided for the view of detailed contents of one specific knowledge topic, whenever there are modification to this entry, the update button will update it to its current data, and reach the goal of modification.

Enterprise intelligence subsystem

1. Expert network: When encountering a problem or is having doubt on a certain topic, and can't find the related information through document management functions, even the knowledge creation and sharing system doesn't seem to help, this is when to seek the enterprise intelligence subsystem. The function of the expert network is to solve problems whenever there is one, by seeking out the actual professionals or people with that specific specialty through e-mail, phone calls, etc.
2. Knowledge map: When a system has stored enormous amounts of documents and knowledge, it is often hard for people to find the information they want. The knowledge map functions in helping to find where the data is, in short time periods, and allows users to save time and solve their problem, it also allows them to have a better understanding of the whole system and become more efficient. The user will know the location of their desired knowledge or document by viewing the knowledge map. Sometimes the user is uncertain of the exact name or which

category the desired information belongs to, and is only search for documents related to a certain topic. At this time, by entering the key words and the complete name of related documents or knowledge will be found. This function can also show all topics related to the key words, and help the user understand the document or knowledge being searched for even more thoroughly, reaching better results from knowledge sharing.

CONCLUSIONS

Being in a challenging competitive environment, enterprises started valuing the application of IT to elevate competitiveness. The service characteristics of ASP, such as software accessibility and follow-up services provided through the internet, became another option for software usage, and could reduce time and manpower costs. Furthermore, if enterprises wanted to maintain their competitive advantage, the only way was through non-stop innovation and development, at the same time shortening time periods for new product development to gain the best results. Therefore, the integration and application of CC concept with knowledge management and a good IT management mechanism, can help enterprises to be more efficient when gathering information, connect core knowledge and abilities of business companions, assist product development design procedures, create an advantageous foundation for business management and provide better products or services. With this consideration, this research aims at the benefits and related functions of CC concepts and knowledge management, constructing a system with the integration and application of CC and knowledge management, and then explains the operation of this system through a system prototype, in hopes of proving the practicability of knowledge management and CC integration, which will help enterprises to focus on their core business and gain better competitiveness.

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