THE STRATEGIC RESEARCH ON INTEGRATING SERVICE MODEL FOR SMES CLOUD SUPPLY CHAIN IN TAIWAN

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ABSTRACT

The small and medium enterprises (SMEs) play important roles since the economic development increase in Taiwan. SMEs and Micro-business are one of the main important industries subsidized by the government actively in recent year. Most management software of cloud computing focus on internal management such as procurement, sales & stock system, CRM system and bill management system. The SMEs in Taiwan usually retain conservative attitude at the infancy stage of cloud computing technology. The proprietors have doubt to place financial data on the remote site and believe the clouding storage style is not fully mature nowadays. Our research will discuss the feasibility and market requirement on integrating service model for cloud supply chain. The preliminary conclusions are as follows:

1. The model for cloud supply chain should focus on the internal management and synchronous communication of external information to enhance the efficiency and competition ability of industries.
2. Cloud computing technology applies on supply chain system will lead the evolution of industries such as SMEs and Micro-business.
3. The charge way of integrating service model for cloud supply chain could be calculated by the amount of data records to reduce the loading cost of industry and raise the intension of implementation simultaneously
4. To establish the integrating service system for cloud supply chain on the clouding client, data and information of industries can be obtained all the time. The efficiency and quality of decision will be elevated and enhance competition of industries.
To build the integrating system for cloud supply chain via the connection and integration between cloud and client (desktop/notebook, smart phone) can transfer all kinds of information to the backend on time. The further processing and analyzing will be provided for users to combine the software and hardware at any time or any place. This information not only reduces the labor cost of traditional communication way but improves the efficiency and quality of management decision. It will enhance competition ability of the whole industry and construct the core competition step by step that cannot be replaced by competitors.

Keywords: Cloud Computing, Supply Chain, Integrating Service Model, Core Competition Advantage

1. INTRODUCTION

In the last few years, we have seen a dramatic growth in IT investments, and a new term has come on the surface which is cloud computing. The National Institute of Standards and Technology
defines the cloud computing as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” [10]. In fact, cloud computing has been considered as one of the promising solutions to our increasing demand for accessing and using resources provisioned over the Internet. It offers powerful processing and storage resources as on-demand services with reduce cost, and increase efficiency and performance. All of these features and more encourage enterprises, governments and even critical infrastructure providers to migrate to the cloud [14]. The cloud computing service model combines a general organizing principle for IT delivery, infrastructure components, an architectural approach and an economic model. The resource acquisition, usage and maintenance capabilities of cloud computing infrastructures enable customers to access and use Software as a Service (SaaS), Platform as a Service (PaaS) or Infrastructure as a Service (IaaS) offerings that lower their Total Cost of Ownership (TCO) if compared to traditional on and off premise data center models [2, 12].

Actually, the global development environment is favorable for cloud computing service. All modern countries applying actively the cloud computing industry will improve effectiveness in operation of government and industry. Taiwan also approves the development trend and prepares budget for this industry of cloud computing to help this industry and give suggestions. Figure 1 shows the requirement of the future and the present day on cloud computing for enterprises. According to the investigation result by the institute for information industry, the service of cloud computing adopted by enterprise can be categorized into three classes. The major proportion is IaaS (Infrastructure as a Service) that the percentage is up to 78.1%. This result shows that; the market requirement is mainly focus on IaaS. On the other hand, the industries that will bring the system into the companies in the future have significant growth on IaaS · PaaS (Platform as a Service) · SaaS (Software as a Service). The proportion is increasing from 21.9% to 74.2%.

Figure 1: The requirement of the future and the present day on cloud computing for enterprises [9]

2. LITERATURE REVIEW

「Cloud computing」 = 「Networking」 = 「Net computing」. Cloud computing is not a new technology or a kind of technology. It is an idea that by using the Internet, computers can cooperate together and provide service with no limit from distances. Practicing the idea will generate corresponding technologies [7]. Although the cloud computing is not a whole new technology, it rebuilds the information value chain and opens a new competition era of software and service. The best opportunity for Taiwan to develop cloud computing is innovation of software and application service. The hardware manufacturing capacity could be value-added and raise the gross profit of production value by lower construction cost and diversity application [1].

The cloud computing should offer an effective way to improve the calculate ability that the enterprise require without investing more new infrastructure, training new employees or purchasing newly software. Enterprise can save not only expenses of equipment of hardware and authorization of software via cloud computing from the viewpoint of users but human resource of IT department. The flexible operation environment without the limitation of place and time provides single enterprise, multi enterprise and the international operation better solution. Our research focuses on the requirement of medium and small wholesalers and retailers. They can not afford huge expenses for implementation of cloud supply chain that could also have data management and statistical analysis through common clouding platform with suppliers by the model of clouding service. The benefit of building cloud supply chain includes as follows:

1. Stable and preferential cost of network environment infrastructure.

The network infrastructure of the urban area is almost accomplished and that of remote districts are also finished by steps. The quality of bandwidth in
each place is stable and the cost gradually reasonable. The number of broadband network users is up to 5.24 million by September 2011. The whole number of commercial internet account is up to 26.16 million that grows 6 percent. The above data shows that network usage is more and more popular and thus the software of clouding management is highly potential in this mature environment.

2. The global financial crisis increase risk of enterprise operation.

The global financial crisis makes different walks of life depression. The survival key of enterprise is cost down without revenue. The expenses to purchase and maintain information management system are regarded as important but not urgent items. The occasion of lifting effectiveness always leaves aside by final decision of manager.

3. Forty percent of Taiwan benchmark enterprises still do not introduce the electronic system of clouding distribution to their companies.

According to the report of Taiwan commercial IT investment of benchmark enterprise in 2011, it discloses that there are 61.1% of enterprises bring in the electronic system of distribution and 38.9% on the opposite. The electronic system of distribution means that customers and suppliers both communicate by means of information system as the bridge of transaction and selling to achieve more benefit than traditional communication. The population of the above report is the companies with more than 100 million of yearly revenue. Forty percent of the benchmark enterprises still have not invested on electronic distribution, as well as smaller or micro enterprise [7].

4. The less manpower is used by enterprise, the more percentage cloud services are adopted.

According to the research report of “The application trend of cloud computing on Taiwan’s business”, company without IT employees has the highest adopting percentage on cloud services (49.5%) , the next is company with 1~2 IT employees (35.3%) . The adoption percentage of cloud services is getting lower accompanied with more IT employees. The company with lower IT employees will seek for professional cloud supplier and prefer IT outsourcing to cost down the IT expense [3].

The promote strategy is SMEs and micro business and thus to provide flexible cloud computing service and enhance the information application of them.

The requirement and opportunity of integrating service model for cloud supply chain.

Cloud computing is a way to increase the capacity or add capabilities dynamically without investing in new infrastructure, training new personnel, or licensing new software. It extends Information Technology’s (IT) existing capabilities. In the last few years, cloud computing has grown from being a promising business concept to one of the fast growing segments of the IT industry [13].

In general a supply chain performs two types of functions [6], namely:

i. a physical function comprises the production of the product out of raw material or intermediate parts or components, and the transportation of all components to the right place.

ii. a market mediation function ensures that the variety of products reaching the marketplace matches what customers want.

While for functional products the physical function dominates, the market mediation function is more important than the physical function for innovative products [11].

The cloud supply chain of cloud services needs to be identified and then managed and controlled from both a business and technical perspective. The cloud supply chain represents a network of interconnected businesses in the cloud computing area involved in the end-to-end provision of product and aggregated service packages required by end cloud service customers [8].

There’re several practical requirements for industries to apply the cloud computing technology to hand the daily business affairs such as following:

1. The SMEs locate far from the city have higher requirement for cloud computing integrating services.

The suburb areas are far away oppositely and the efficiency of service is not easy to maintain. The characteristic of clouding service and research will eliminate the distance effectively. The cloud system could be activated by online service; the training of cloud management also could be done online. This service is suitable for remote districts of SMEs that instant convenient and cheaper cloud service makes e-service without distance.

2. Flexible and extensible clouding software that relieve the cost loading of micro business.

General micro business would like to introduce the information management system for the huge time-consuming of manual operation on management that makes inefficiency on administration. To bring in the system not only bears the cost of software and maintain expense (the IT budge of half SMEs is only 100,000) but the sufficient professional employees should be taken into consideration (46% SMEs show that the main problem of electronic company is short of professionals). The above reasons always delay the schedule of information implementation. Therefore, this management software will be adopted if they provide flexible payment, implement conveniently
without management by particular persons and cheaper proposal without mainframe hardware [9].

3. The importance of electronic order management is getting higher.

According to the report of Taiwan commercial IT investment of benchmark enterprise on 2011, it appraises the importance of sales management rule, quality of transportation management, warehouse management and order management to analysis how importance for each distribution sales operation. The order management is the highest percentage among all items and 55% of enterprises are willing to utilize the common cloud distribution platform [5].

4. It is difficult to manage retailers and suppliers of SMEs.

The retailers and wholesalers who have lots of items and huge numbers cause the difficulty of management and communication. General SMEs can’t adopt complete ERP system by the limitation of scale that communicates with suppliers by the traditional way. It not only expend many human resource cost and much time on communication but cause faults easily [4].

The solution way of integrating service model for cloud supply chain and scenario description.

SMEs suffer great marketing competitive pressure in both domestic and abroad markets accompanied with the economic growth of Taiwan. For the domestic market, the foreign companies are entering the home market under the opening policy of government. Besides, the domestic companies have the tendency of the big one getting bigger. Owing to the domestic production costs (such as land, labor and environmental rules) are getting higher that SMEs of traditional industries are losing international competition.

The IT development for years generates huge impact on industry development, enterprise operation and personal life and works. IT creates new competition rules, new competition advantages and new career opportunities. Enterprises will face the same impacts regardless of big or small ones, therefore, the enterprise with quick and appropriate response will have the chance to survive and develop.

3. EMPIRICAL RESEARCH

The application targets of the integrating service model for cloud supply chain are medium and small wholesalers of many suppliers. They are limited by its labors and financial ability that can not recruit enough amount of manpower. The purchasing operation with these suppliers, nevertheless, should needs to expense a lot of labor power and time. This integrating service model could provide SMEs wholesalers and their suppliers with more convenient and cheaper cloud management software. Under this common structure, the companies could solve the complicate flow and form check operation easily. Figure 2 shows the purchasing operation flow of the general wholesalers. Before introducing the electronic procedures, the outside connection and communication of the enterprise still use the traditional way of e-mail or fax. This mode can not synchronize and need to be transformed or rebuilt. It also spends more time on the utilization of communicating tools. It will become heavy loadings for wholesalers or suppliers for wasting labor power in checking and calculating paper data. Human neglect or fault will occur when the big data appears.

![Figure 2: SMEs Wholesaler and retailer flow chart](image)

Solution proposal

The supply chain related systems on the market are involved with the outer companies that they should build complete system structure and hardware. It not only is expensive but can’t afford by the SMEs. The systems are also complicated that the SMEs can not operate and maintain for their few employees. The main supply chain e-systems focus on the large enterprises and the most information service companies also provide them with all new research results that SMEs have no chance to be considered.

This integrating service model for cloud supply chain is developed for the requirement of SMEs. It gives up the useless huge system functions and simplifies the requirements of SMEs. The mail appeal is the common platform for enterprises and their suppliers that the data can be connected with each other. The communication depends on the platform and there is no distance between them. The data can be collected and accessed in any time and place that the real time and corrected data will reduce the cost and time of communication, even raise the quality of managers’ decisions. The enterprises utilization will cause the related suppliers wish to adopt the same system that will have great contributions to strengthen the characteristics and competitions of enterprises.

The platform of the purchasing supply chain model shows as figure 3. The data of enterprises and...
suppliers is implemented in the clouding system and any devices that are able to connect to internet could query and update the date. The enterprises and suppliers use the same database to add, update and erase data on line immediately. According to the data synchronization, not only managing is conveniently and communicating rapidly, but the rate of accuracy will rise up. The clouding benefit will obtain from the utilization of the platform by enterprises and their suppliers.

In accordance with the management platform of purchasing supply chain, the benefits difference between before and after model of implementation are illustrated as follows

4. CONCLUSION

Each segment of analysis designing, coding and system testing could be integrated via MS.net to make the software development of integrating service model for cloud supply chain. It will be favorable for the management of codes and system documents that the system can follow every step to develop and test. The software development platform of purchasing supply chain is a visual and intuitional design of software that can design and develop by the way of “drag and drop”. It is easy and convenient as well as provides with the functions of exportation and importation.

This integrating service platform for cloud supply chain employs the technology of web services to connect each other with the data they need. “Web Services” is a kind of software element that provide services for other applications by web protocol and open standard of data format (such as HTTP, XML and SOAP). Web services take basis of web open standard that HTTP and XML are fundamental. Now the platform of purchasing supply chain employs the XML to connect and transform data stream and data processing by dB services and reporting services.

The account management, purchasing/ordering management and report processing are also operated independently, and then transfer the XML data by web services to process data rapidly. XML is also the most common way to make data transferring, along with the related technologies such as DHTML, ASP.NET, SQL and T-SQL to achieve the clouding operation for the purchasing management platform for cloud supply chain. The platform, therefore, can be used only by browsers of Internet Explorer, Firefox and Google Chrome.

For the development of internet, the business mode transfers from real world to the virtual one. The number of web stores is growing up and the integrated interchangeable technology of heterogeneous data by XMN (eXtensible Message Network) platform to integrated with ERP of enterprise that would assist to carry on web store and e-business. The web store will be faster and efficiency.

This research aims the feasibility and market requirement of SMEs wholesalers integrating service model for cloud supply chain. The primary results are as follows:
1. The integrating service model for cloud supply chain should focus on the communication and synchronization of internal management and external information to raise the efficiency and competition of companies.
2. The industrial development will be more efficient combining with supply chain and clouding application.
3. The charge fee of calculating is suggested by the amount of data records to reduce the cost of enterprise loadings and raise the intention of adopting.
4. The enterprises will raise the efficiency and quality of decision after implementing the integrated supply chain system via clouding design that could retrieve data at any time and place.

In table 1, we discuss the benefits for enterprises, suppliers and customers by applying purposed system. For enterprises, the integrating service platform for cloud supply chain can save labor and communication cost, improve decision and operating efficiency, etc. For suppliers, the benefits include saving labor cost, improving administrating efficiency, saving energy and reduce carbon emission, etc. Moreover, this proposed system has some benefits for customers who can place the orders, know the status of orders and query the situation of orders by any devices on internet anytime and anywhere, etc.
Table 1: The analysis table for implementing the platform before and after

<table>
<thead>
<tr>
<th>Target</th>
<th>Implement Enterprises</th>
<th>Suppliers</th>
<th>Customers</th>
</tr>
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<tbody>
<tr>
<td><strong>Work flow before applying purposed system</strong></td>
<td><strong>Purchasing processes:</strong> 1. Accumulate actual requirements manually. 2. Place orders by e-mail or fax. 3. Check the order quantities with suppliers manually.</td>
<td><strong>Ordering processes:</strong> 1. Wait for fax or e-mail orders from customers passively. 2. Reply the delivery date via fax or e-mail. 3. Request payment by fax/e-mail or sent transaction record by post.</td>
<td><strong>Inquiring Processes:</strong> 1. Wait for fax or e-mail orders from customers passively. 2. Reply the delivery date via fax or e-mail. 3. Calculate the shipping records manually and request the payment.</td>
</tr>
<tr>
<td><strong>Work flow after applying purposed system</strong></td>
<td><strong>Purchasing processes:</strong> 1. Establish purchasing order in ERP and upload to the cloud supply chain system. 2. Manage the check and transaction sheets provided by integrating service platform automatically. 3. Administrators can manage purchasing orders on integrating service platform anytime and anywhere.</td>
<td><strong>Ordering processes:</strong> 1. Login the cloud supply chain system and transfer the purchasing order to internal ERP system. 2. Check the delivery date in ERP system and reply the date to the cloud supply chain system. 3. Cloud supply chain system offers check and transaction sheets automatically. 4. Administrators can manage purchasing order placed by customers.</td>
<td><strong>Inquiring Processes:</strong> 1. Suppliers can connect the cloud supply chain system to download the inquiry and reply delivery date. 2. Suppliers could query the situation of orders, transaction details and download statistical tables by any devices on internet anytime and anywhere.</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>1. Save labor cost. 2. Save communication cost. 3. Improve decision and operating efficiency. 4. Know well the customers’ orders and purchasing situation of enterprise on time by any devices on internet. 5. Highly integrated of internal ERP system with consist data can improve the working efficiency dramatically. 6. Improve the e-ability of labor and the competition of industries.</td>
<td>1. Save labor cost. 2. Improve administrating efficiency. 3. Save energy and reduce carbon emission (reduce papers and communication cost). 4. Diminish operating data error manually. 5. Raise the opportunity and service quality of sales. 6. Improve the e-ability of sales and financial department and competition of industries.</td>
<td>1. Place the orders, know the status of orders and query the situation of orders by any devices on internet anytime and anywhere. 2. Improve administrating efficiency. 3. Save energy and reduce carbon emission (reduce papers and communication cost).</td>
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REFERENCES


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Jinn-Shing Cheng is an Associate Professor in the Department of Information management at National Kaohsiung First University of Science and Technology. He received his PhD and Master degree in electrical engineering from the National Sun Tat-Sen University. His main researches are computer internet、internet security enterprise information network.

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Chien-Chou Kung now he is supervised by Dr. Jinn-Shing Cheng to carry on his master degree.

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台灣中小企業雲端供應鏈整合服務模式之策略研究

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摘要

台灣自經濟起飛以來，中小企業所扮演的角色及非常重要，而其中又以中小企業或微小企業之批發零售業為近年來政府積極輔導的重點產業之一，有鑒於目前市場之雲端運算管理軟體，大部份著重以企業內部管理為主，如進銷存、CRM、票據管理等，再者，由於中小企業觀念較為保守，在雲端概念未完全成熟初期，對於企業內部的財務資料要放置於雲端，有諸多的疑慮及不安。本研究將探討雲端供應鏈整合服務模式的可行性及市場需求，初步得到以下結論：

1. 雲端供應鏈整合服務應著重企業內部管理與外部資訊的溝通及同步，提升產業效率及競爭力。
2. 系統業者若能以供應鏈角度切入雲端應用，應能有效帶動產業發展。
3. 供應鏈整合服務模式可採用以資料筆數計算之收費方式，降低企業成本負擔，提高使用意願。
4. 企業在雲端建置供應鏈整合系統，可隨時、隨地獲取資訊及資料，提升決策效率及品質，進而提升其產業競爭力。

企業建置雲端供應鏈整合系統，透過「雲」與「端」（桌上電腦/筆電、智慧手機等）的連結及整合應用，將各種資訊經由資通訊網路即時準確地傳遞至後端進行分析和處理，讓使用者透過軟、硬體結合的應用，在任何時間、任何地點獲得所需之資訊，不但能降低傳統以人工方式溝通產生的人事成本，可大幅提升管理者決策效率及品質，對整體產業競爭力提升有很大助益，並逐步建立讓對手無法取代的核心競爭力。

關鍵詞：雲端運算、供應鏈、整合服務模式、核心競爭力

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