Impact Of Cloud Computing On Supply Chain Management

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The information about a package is as important as the delivery of the package itself.

- Frederick W. Smith

Introduction

Extensive globalization of economies all over the world has significantly increased the degree of competition among businesses that has made supply chain management even more critical concern for any organization. In today's fast moving business environment, supply chain coupled with information technology is an inevitable option for the firms to provide goods and services to the customer in a better, faster and cheaper way. Fast changing customer requirements and inherent volatility in markets are forcing companies to adopt a more dynamic supply chain system. A traditional supply chain consists of raw material supplier, manufacturer, distributors and end product buyers. Last two decades have witnessed a significant change in architecture of supply chain where the manufacturing to delivery process shifted from manual to IT based solutions for example emergence of CRM tools has given power to companies to deal with their clients technologically.

Frequent disturbances in the financial markets and varying degree of factors in globally interconnected economies can significantly change the demand of customers which forces businesses to focus on strategies through which they can make their SCM much more flexible. Existing software systems for supply chain components were designed to automate the processes of single organization and were less powerful in handling globally dispersed clients. To deal with ever increasing information and to expand the supply chain beyond the boundaries of native country, cloud computing can be leveraged. This requires some components of supply chain technologies to shift on cloud. With the use of internet it would be

much more feasible to communicate with globally located service providers and this would result in more robust and resilient supply chain management.

Advantage of Cloud Computing

The fact which distinguishes cloud computing with personal computing is that the cloud technology provides a wide range of capabilities. The implementation of cloud based solutions depends on various factors such as the sector in which the business operates; the feasibility of porting existing components on cloud, size of the company, the location of clients etc. It could be leveraged the way procurement of services happen reducing the time of delivery and significantly cutting the fixed costs. So it is not appropriate to make one single explanation of cloud technology implementation. For example, startup firms may easily adopt the solutions based on clouds for all components of their supply chain but it is difficult for firms existing for a time to shift whole supply chain to cloud, instead it makes more sense for them to adopt the hybrid approach. To make it more elaborate, assume a business has both internal ERP and CRM solutions but security of data may be concern for them so it would be more suitable for them to keep ERP on in-house servers while moving CRM component to cloud.

The whole analysis of moving supply chain management tools on cloud zeros down the question to what are the reasons which force businesses to adopt the latest cloud based solutions. A portion of this qualitative analysis also consists the discussion on cost benefits which a business gets by using cloud computing-

1. Consumer demand for goods and services may change very fast sometimes touching spikes on the demand curve and sometimes taking shape of a valley which requires business to react dynamically and take necessary steps for order generation, client management, dealing with multiple raw material providers etc.
2. IT and media consumers are restricted on bandwidth and disk usage issues as usage of these services require demand of content from the users. A sudden hike of demand may force the company to deploy more and more servers which they will have to maintain for a long time and that would increase their operational and fixed costs to significant level. Instead the company may use the cloud technology for content delivery. This requires the company to choose from wide array of cloud service providers and pay for the usage. The charges charged by the cloud provider depend on the bandwidth or the disk or the number of users.
3. The main advantage of using the cloud computing for supply chain management is that the firms don’t need to invest in extra IT infrastructure as there are various supply chain applications available by existing cloud computing service providers. For example vendors like IBM, Logfire, Integration Point, Mercury Gate, Ariba etc are providing supply chain based software applications for cloud models.

4. The cloud computing infrastructure provides the scalability of services dynamically, which prove to be cost effective for the companies. For example data warehouse software, ERP application, CRM and data analysis applications can be easily moved to cloud systems like Amazon S3 services, and where it is easy to activate new processors instances as the demand comes from the customer. Sometimes this demand may go beyond the capacity of the internally hosted supply chain systems which would disrupt the services and this may result to the loss of credibility of the firm among the existing and future customers.
5. Since last 5-6 years there has been a great increase in social media platforms like twitter and Facebook which are heavily used by businesses to gain new customers. This new trend has resulted in new business models which are relying on cloud computing cutting their high IT infrastructure costs subsequently increasing the competition in the market for existing and new businesses. The increasing shift of supply chain systems on cloud has necessitated the companies to move from personal IT tools to cloud architecture.

   The potential customers also want services 24/7 without any delay. This requires companies to have robust supply chain which should not be affected by sudden events or natural calamities.

   For example recent super storm Sandy caused disruption of all services as all airports of New York were closed, seaports were closed causing all traffic to stop and more important roads and railways were also closed resulting the supply chains of various drug companies to get affected. In order to deal with such natural calamities, companies from various countries can collaborate using cloud infrastructure to meet the demands efficiently at such disastrous times.
6. Emerging technologies like grid computing and virtualization are constantly improving the cloud services in various ways such as providing robust software applications, flexible and scalable computer architecture and low latency-high bandwidth communication networks.
7. Centralized hosting of services on cloud would not force every time the customers to update or change their software client applications if they are sharing some communication platform with the companies. Applications on cloud can be easily updated at once without causing systems to go down which means clients can easily continue their communication without being affected.
8. Supply chain integrated on cloud computing helps us to achieve overall efficiency in terms of communication with raw material providers, inventory management, managing client relationship, gathering data on wholesalers and providing insights by conducting analysis on products. As the service and product providers may be dispersed at various locations, sometimes crossing economic boundaries; cloud computing based

applications developed explicitly for supply chain management may provide functionalities of auctions/bidding/reverse auctions.

9. The global business environments include inventories at many locations which are managed by different individuals sometimes by third parties too. This creates a situation, where lot of inventories will be in pipeline with varying number of distributors. The loss at any point may force the whole distribution system to get effected adversely but by using cloud computing based solutions these problems can be managed easily.

Facts and Figures

The worldwide public cloud services market where services are provided "as a service" via the web with users having little or no control over the technology infrastructure is to grow by 19.6 percent in 2012 to $109 billion, where as it was $91.4 billion in 2011, according to recent Gartner research. Gartner predicts that the total public cloud services market size will expand to $206.6 billion by 2016. According to Dwight Klappich, research vice president for Gartner, estimates that cloud-based adoption increased 40 percent this year, compared to 2011. Also he says that the adoption rates are highest in the areas of collaborative sourcing and procurement, demand planning, Global Trade Management (GTM), and Transportation Management Systems (TMS).

How Cloud Computing Impacts the Supply Chains?

Cloud computing can be efficiently used in activities and processes of supply chain which remain same across the organizations and different clients, meaning that it won't require much changes in the design of processes. Companies can retain their core competencies on their servers moving applications, which do not require customization, to the cloud. The main question is for what activities cloud computing can be utilized efficiently. The below description tries to answer this question-

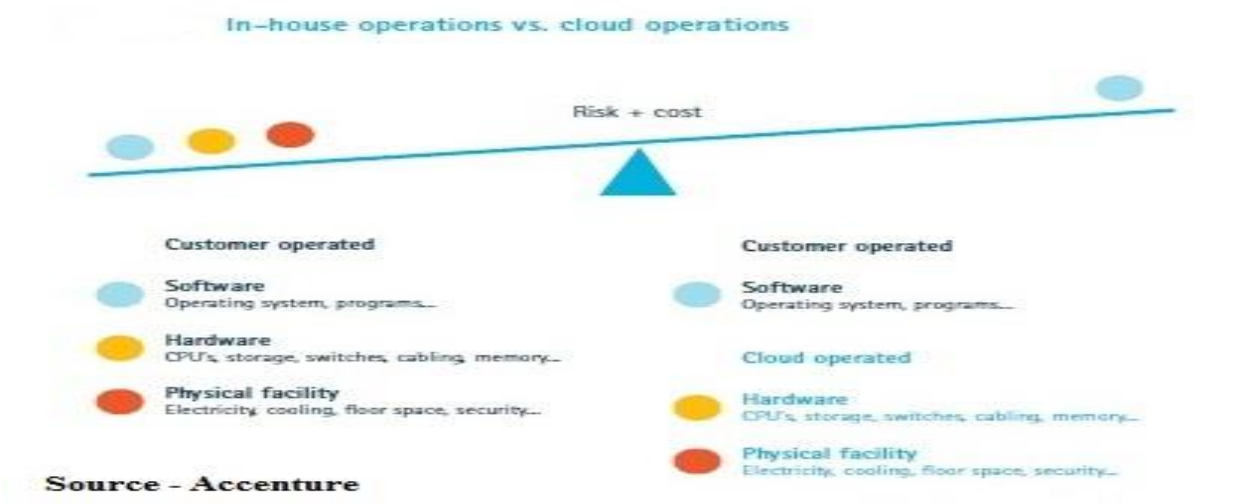
1. **Logistics management**- There are various open source solutions available which are compatible with cloud computing architecture. This includes transportation management, inventory management, transport route planning, order processing systems which can be purchased by businesses and they do not need to create them from scratch. The more research and developments in this field may provide functionalities like optimum network path, shortest routes for procurement of services.
2. **Database management**- Cloud computing offers reliable solutions for database management which eases the work of database administrators by making automated

backups, creating replicas. Cloud computing providers have also entered in the field of providing database-as-a-service.

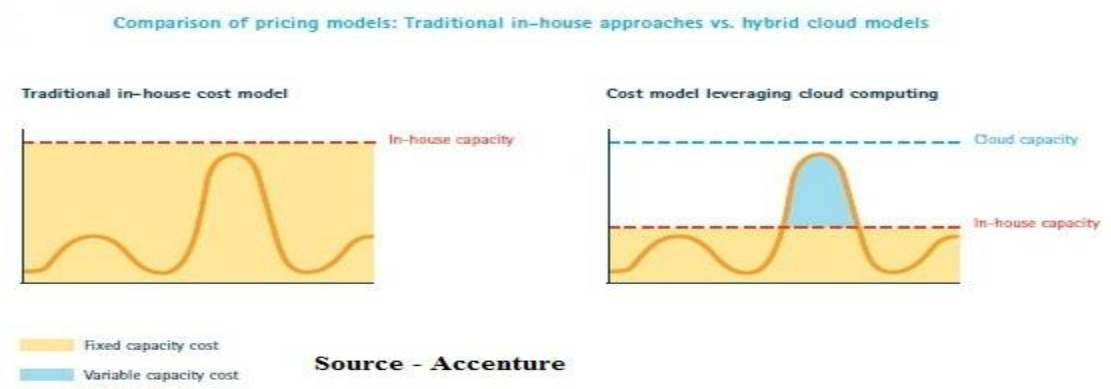
3. **Forecasting and planning demands-** Cloud computing offers various solutions to forecast the demand of users and they are highly capable of providing data analytics by executing advanced and sophisticated statistical functions. There are applications which are specifically designed for IT, retail, manufacturing etc. sectors; these applications include the capabilities of price strategy planning, promotion strategies and marketing analysis too.

Differences: "Traditional in-house SCM vs Cloud based SCM"

Risk and cost are important parameters in business perspective which needs to be controlled and maintain at a least level. If you adopt in-house operations to manage SCM activities, there are risk and cost associated with software, hardware, and physical facility. However if you go with cloud operations, you need to take only one component into consideration which is software. The hardware and physical facility will be maintained by cloud service provider virtually. See the Figure below.



Our responses must be dynamic in nature to cope up with the volatility that is ubiquitous in today's business environment. If we adopt a traditional in-house cost model, we need to increase IT infrastructure whenever there is a need for it. This increases fixed cost tremendously. However we can't reduce our IT infrastructure whenever there is a less demand. The below figure refers to the fact that we can take the help of cloud computing to respond to a sudden change that arises in the client requirements in a cost effective way.



Another way of looking at adoption of cloud computing is like pay-as-you-go. The operating expenditure depends on the number of requests you get from your customers or the capacity with which you use cloud services. The sporadic requirements can addressed in a viable and cost effective way with cloud computing. See the Figure below.

Conclusion

Cloud computing has the capacity to change the way we operate SCM activities. By harnessing cloud, we can reap operational benefits and potential savings excessively. Adoption rates for

this web-based, vendor-hosted distribution model are clearly on the upsurge. As more vendors are pressured to move into the cloud, it will become the principal operating environment for applications. Warehouse Management System (WMS), Global Trade Management (GTM), Transportation Management Systems (TMS), and demand planning are currently leading the cloud-based supply chain software space. Applications that help shippers in activities like plan, source, make, and deliver their goods are leading the pack right now. Altogether we can see a rosy picture for SCM coupled with cloud computing.