Chapter 29

Efficiency and Risk Management Models for Cloud–Based Solutions in Supply Chain Management

Dothang Truong
Embry-Riddle Aeronautical University, USA

ABSTRACT

Cloud computing has been proven to have numerous benefits for organizations, especially in supply chain management. More and more organizations have adopted cloud-based solutions to be their primary sourcing applications. Nevertheless, this technology is not without challenges, and in order to deploy and implement cloud-based solutions successfully with minimal risks organizations need to have practical guidance on this emerging technology. Despite the rapid growth of cloud computing in supply chain areas, the existing literature is still conceptual, inadequate, and mainly focused on the pre-adoption stage of this technology. This research examines the post-adoption stage of cloud-based supply chain solutions from the decision science perspective and intends to provide organizations with practical guidance on how to ensure the efficiency of a cloud-based supply chain system and control risks associated with cloud-based solutions.

1. INTRODUCTION

Cloud computing is changing the way industries and organizations do businesses. Industries are undergoing major transformations enabled by information technology (IT) and the Internet, and cloud computing is emerging as one of the major enablers for industries in transforming their business models. The National Institute of Standards and Technology (NIST) defines 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.'' (Mell and Grance, 2009).

Thus, cloud computing can provide on-demand computing services with high reliability, scalability and availability in a distributed environment (Xun, 2012). If used properly, cloud computing can become a valuable and inimitable resource that enables organizations to create and sustain their competitive advantages (Truong, 2010).

As cloud computing is expanding and being adopted in various business domains, it starts drawing the attention of supply chain practitioners. In a dynamic business environment, flexible IT-based solutions become an increasingly important part of the supply chain design. Supply chain management focuses on the inter-firm collaboration that requires massive levels of information sharing and process automation that can adjust to the changing demand. This is where cloud computing comes into the picture. Supply chain management can benefit greatly from using cloud computing. As a flexible IT-based solution, cloud computing promises to enable a wide and powerful range of capabilities in supply chain management including: reducing the startup costs, increasing the supply chain visibility, reducing the lead time, enhancing the inter-firm collaboration and supply chain integration, and reducing the response time to customers (Shacklett, 2010; Schramm et al, 2011; Marston et al., 2011). By adopting cloud-based solutions for supply chain management, organizations can improve their supply chain performance (Truong, 2010). Cloud-based solutions are particularly helpful in business-to-business integration, customer-supplier collaboration, and other areas that require the multi-organizational collaboration. Organizations that use cloud computing to facilitate collaboration are twice as likely as those that do not have formalized procedures in place to succeed in term of return on investment (Ostrow, 2011).

Cloud-based supply chain solutions have been growing dramatically. A research study conducted by Garner Inc. indicated that cloud adoption within the supply chain management sector had increased 40 percent in 2013 compared to 2011 (McCrea, 2013). More and more organizations choose the cloud to be their primary way of sourcing applications. However, cloud computing is still new to organizations, and how this technology can be used effectively to enhance the supply chain performance with minimal risks is still in question. Organizations may be interested in cloud-based solutions due to their potential benefits but they may not be fully aware of challenges and difficulties in using the technology. Integrating cloud-based supply chain solutions to in-house systems and applications can be challenging and requires strategic decisions. In some cases, it is very difficult for organizations to transfer their existing in-house systems and applications to cloud servers. System architectural compatibility and process alignment play a key role in the success of such integration (Truong, 2010). In addition, extra and unexpected expenses on employee training, new regulations setup, and process transition may incur. While cloud-based solutions help reduce startup costs, they usually increase recurring costs. These difficulties may affect the efficiency of organizations in a supply chain. Since a supply chain network consists of numerous organizations working inter-dependently (suppliers, manufacturers, distributors, retailers) the supply chain efficiency relies on the efficiency of each organization in the supply chain. All organizations have access to the same cloud servers and solutions but they may behave differently to the cloud environment. The inefficiency in operating cloud-based supply chain solutions of one organization will have a negative impact on the efficiency of the entire supply chain. Thus, it is important to identify inefficient organizations and form appropriate strategies to improve the supply chain efficiency.

Additionally, using cloud-based solutions could create some new risks to the supply chain. Putting an organization's systems, applications, and customer data on a remote server at a vendor location can be worrisome and raise questions about security and privacy issues (Truong, 2010; Durowoju et al., 2011). All organizations in a supply chain share important information about products, orders, inventory, shipment, payment, customer profile, etc. through cloud systems and applications, therefore, they

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