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Achieving Information Integration in Supply Chain Management Through E-Hubs: Concepts and Analysis

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ACHIEVING INFORMATION INTEGRATION IN SUPPLY CHAIN MANAGEMENT THROUGH E-HUBS: CONCEPTS AND ANALYSES

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ABSTRACT

While supply chain integration is achieved at three levels: information, resources and organization, the emphasis of the paper is placed on how information integration can be achieved through B2B e-hubs. After reviewing how e-hubs have evolved since its inception, we examine three groups of e-hubs classified by supply chain processes, namely procurement, transportation and customer relationship management, then a value-gap analysis is performed to identify the values added by the e-hubs and their potential gaps and limitations. Finally, we present a framework for integrating existing e-hubs in order to expand their functionality to provide a better solution to supply chain integration.

INTRODUCTION

The rise of the Internet has made it possible to virtually integrate various channel members and functions of a supply chain. All participants can transfer the information in real time with least transaction cost and global reach by using the Internet as the main medium. While the need of the supply chain integration has been recognized there was not a single supportive technology that could cope with the varying demands of the channels for smooth flows of information and physical goods. B2B e-hub is the concept to fulfill the need of end-to-end information flow.

B2B e-hubs are also known as exchanges and marketplaces, and the name signifies the potential that has been hidden underneath the concept. There are various e-hubs for different industries and various functions, providing unique and overlapping features. The industrial e-hubs basically facilitate buying and selling processes, whereas functional e-hubs provide exchange information on transportation, logistics or selling facilities.

SUPPLY CHAIN INTEGRATION: A FUNCTIONAL PERSPECTIVE

The term supply chain management (SCM) first emerged in the literature in 1982 and has gained prominence in the past ten years [5]. Although its widespread popularity leads to numerous kinds of definitions by different industries and academics, there seems to be a convergence towards the central theme of SCM. The theme suggests that SCM is an integrative philosophy of managing flows of material, information, and finance from the earliest supplier of raw materials to the ultimate customer.

The root of SCM is grounded in logistics management [5] [13]. As described by Metz [13], supply chain develops by progressively integrating a number of functions into the total process and that this steady advance is propelled and driven by the explosive development of information technology (IT). IT makes it possible to enable more information to travel more accurately and more frequently along the chains and to synchronize the activities of the chains. As a result, the trading partners can efficiently coordinate their business decisions and activities, thereby becoming integrated.

As discussed before, the core of SCM is integration. Lee [10] points out that supply chain integration constitutes the following three dimensions: information integration, coordination, and organizational linkage. It is easily seen that information sharing is the foundation of supply chain integration. The last two dimensions can be achieved through one or a combination of the following four ways: dyadic management, channel integrator, analytic optimization, and keiretsu/vertical integration [6]. In this paper, we focus on how information integration in supply chain management is enabled and powered by e-hubs

SUPPLY CHAIN MANAGEMENT AND E-HUBS: AN INTEGRATION MODEL

Most of the existing e-hubs are catering to the specific industry and also have overlapping features. In this part we will overview various exchanges that can be classified based on supply chain processes.

Procurement Hubs

Procurement hubs are initially emerged e-hubs. In their recent article, Kaplan and Sawhney [9] developed a framework for classifying these hubs. The authors argue that e-hubs are best explained according to what kind of market they serve as well as how they serve the market. There are essentially two general types of goods purchased by any company: operating inputs (MRO goods) and manufacturing inputs (i.e., the direct raw material). While MRO hubs provides systematic sourcing facility for MRO goods with the focus on long-term contracts, yield

management, which usually is operated in commodity market, provides spot purchasing facility. Both catalogue hubs and exchanges focus on manufacturing materials required for specific industry.

Transportation Hubs

In order for shippers to minimize shipping costs and carriers to maximize capacity utilization, a number of transportation exchanges have been formed over the last few years. According to the estimate of Kingsley Group Research [2], more than 100 transportation exchanges have been already formed. They are also growing and expanding rapidly

Current researches emphasize the possibility of consolidation among various logistics e-hubs. Bittner [2] and Foster [7] also points out that there will be convergence of service offerings by various transportation service providers. Currently *Transportation exchanges* like NTE, Frieghtquote and Rightfrieght provide load-matching services to shippers and carriers. Also there are *transportation management platforms* that are available from various companies like G-Log, Manugistics and i2 for individual companies to deal with customer order management and issues of logistics and financial related transactions. Companies like Nextlinx, Vastera, Clearcross and Xporta work as *International Trade Logistics Partner* to help companies grow and expand globally by simplifying and accelerating the importing, exporting and shipping of any product to any country. If the three types of e-hubs converge, then they can provide the ultimate solutions to satisfying the requirements of both carriers and shippers.

Customer Relationship Management Hubs

Customer Relationship Management (CRM) is thought to be a strategy and not a technology. It is a strategy of collecting data from all possible channels and using the analysis or business intelligence to access and shape this data into information that companies can use to create more profitable relationships with customers [3]. Total integration of companies' ERP systems including SCM and data gathering channels throughout all company departments must be in place to derive the promised business value of a CRM implementation.

In her research, Campbell [3] has stressed the need for attracting and retaining new and current business partners in an increasingly competitive B2B e-commerce. CRM offers personalization of relationships among business partners that can standardize buying patterns, save money and enable all partners to react quickly to dynamic business conditions. In a multi-stage supply chain, where a supplier for a particular industry can be a customer for another and chain partners have their own goals that may conflict with each other, complexities associated with the business model exist if B2B exchange is adopted. However, since a supply chain includes not only procurement side but also sales side, the distributor(s), retailer(s) and end users should be all considered customers. Therefore, it is generally agreed that

the chief concern of B2B companies in the near future should be to strengthen the quality of buyer-seller relationships, rather than reducing transaction costs [3]. If exchanges can reposition them as industry leaders and implement collaborative and personalized services according to customer's profile, they can become more attractive.

Value-Gap Analysis

In what follows, we first discuss the limitations of the procurement and transportation e-hubs that have longer history than the others, and then analyze the valuable impacts of e-hubs on four important supply chain functions and identify the gaps existing in current e-hubs.

Limitations of Procurement E-hubs

Procurement e-hubs are focused on a particular product or industry or material categorizations such as MRO goods. However, companies have varying needs of the products that go beyond industry, product or category restrictions set forth by individual exchanges. Apart from this, because of the myriad and overlapping choices available in the market, all suppliers do not register themselves with a particular exchange. Although there are a spectrum of private exchanges operating in the market that are being run by the industrial powerhouses that have large buying power, the participants in the private exchanges are usually reluctant to join the public exchanges. As a result, both buyers and sellers tend to register multiple exchanges to explore the best possible deal. If transacting parties solely rely on e-hubs for finding information, then they would have to surf through numerous exchanges before finalizing the deal. This makes the entire procurement process tedious, time-consuming and costly.

One of the immediate needs after finalizing the deal is to transport the material, including packaging, customs clearance, import/export handling, and actual delivery. While in the traditional marketplaces where there are members like traders to complete these jobs, there is no such provision available in procurement e-hubs. For example, in the absence of clear transportation information available to the supplier, the supplier may not be able to confirm the deal and to deliver the purchased items on time.

Limitation of Transportation E-hubs

Transportation e-hubs deal with two channel members of a supply chain: shipper and carrier. Among the existing different types of e-hubs, some of them focus on shipping mode selection such as air, road and rail, while others have regional focus. For example, some provide assistance for global transportation; some specialize in customs procedure, insurance and other matters. Needless to say, even the same shipper or carrier may have different needs in terms of product, region or mode of transportation. In this case both shippers and carriers need to search through multiple hubs to satisfy their requirements. Furthermore, the services provided by current transportation e-hubs are limited and are

not integrated with other functions of the supply chain, such as procurement and inventory management.

It is necessary to mention that in addition to purchasing and transportation, packaging and inventory management also most important functions of supply chain management. All these functions can be integrated with some of the latest SCM packages available in the market. At the same time if e-hubs attempt to provide holistic solutions to various requests of their clients, they need to also integrate these functions in their offer portfolio. Currently procurement hubs provide transaction capabilities with respect to buying and selling processes, but have limitations in other functions such as transportation, inventory management and packaging. Transportation hubs do not provide linkage between suppliers and shippers/carriers.

A value-gap analysis is performed to examine the impacts of e-hubs on four key supply chain functions: purchasing, transportation, inventory management, and packaging. By doing so, we can clearly identify the values added by the e-hubs and at the same time, we also explore the limitations.

E-Hub and SCM Integration Models

In summary, an e-hub is a Web-enabled platform for multiple trading parties to find, exchange, and prioritize information related to buying and selling. It automates all transactions that need to take place in the end-to-end customer fulfillment process, both inbound and outbound [11]. Unfortunately, the findings described in the preceding sections indicate that the connecting capability of current e-hubs is limited, and their functionality of existing e-hubs concentrates on either sell-side or buy-side trading partners, allowing only pair-wised collaboration and integration. A number of issues arise concerning the services provided by existing e-hubs. First, the information flow is transferable only between immediate trading partners, rather than among all trading partners. This information transmission bottleneck leaves the magnitude of the famous bullwhip effect open. Secondly, the main benefit of using the Internet and Web based applications in terms of time saving is not exploited, as both suppliers and manufacturers need to go through various e-hubs before finalizing the deal. Thirdly, due to information transmission bottleneck, participants still need to rely on additional channel of communication. Finally, because the information moves between only immediate trading partners, redundancy occurs in information transfer along the entire supply chain.

To cope with the problems associated with the current e-hubs, we attempt to propose that their capability to connect all trading partners can be extended when used in conjunction with some supporting technologies like CRM, ERP, and SCM. We think that these technologies with their existing features and functions can collectively provide the ultimate end-to-end integration. A framework is proposed here to briefly describe our idea. The concept of integration is achieved based upon the functionality of existing e-hubs, CRM, ERP, and SCM.

In summary, the efforts of the various channel members in reducing time and cost associated with installing or matching various software packages, searching time for functional requirements, redundancy in disseminating the information, and excess inventory can be reduced drastically. This integration, along with the opportunities of expanding the supply chain with the aid of the Internet, makes the model a better solution to supply chain management.

CONCLUDING REMARKS

The close collaboration of the trading partners of the supply chain with respect to their decisions and activities is the heart of this business philosophy. Achieving supply chain integration is divided into three phases: information integration, resources alignment/integration, and organizational linkages, where information integration is the foundation. Information integration requires that the information is visible, accessible, and shared in all stages of a customer transaction. In this paper, we focus on how information integration in supply chain management can be achieved through e-hubs. We have examined three groups of e-hubs in relation to supply chain processes: procurement, transportation and customer relationship management. It is identified that these e-hubs greatly facilitate the communication and collaboration among some of the key trading partners. The limitations of the services offered by these e-hubs are further examined through a value-gap analysis. As a result, a framework for integrating the existing e-hubs into ERP/SCM systems is suggested to provide a better solution to supply chain management.

[Note that all figures and tables are not included. The complete paper is available upon request.]