A case study of an inter-enterprise workflow-supported supply chain management system

Jianxun Liu[a,*], Shensheng Zhang[b], Jinming Hu[b]

[a]*Department of Computer Science and Engineering, Hunan University of Science and Technology, Hunan, PR China*
[b]*CIT Laboratory, Department of Computer Science and Engineering, Shanghai Jiao Tong University, PR China*

Abstract

Doing business over the Internet is cheap and convenient. This enlarges the view of enterprises and gives them an opportunity to select their partners. To support business-to-business operations, an information system (IS) with an embedded workflow management component is needed. The inherent characteristics of such a system makes it suitable to implement cross-organization management. Nowadays, however, these system additions are not common. When developing a supply chain management (SCM) system for a large motorcycle corporation in China, we had to construct an inter-enterprise architecture using the internet. The main part of this is a workflow-supported inner supply chain system and an integrated interface. In it, the business processes are defined and executed by the supply chain management system. The independent inner systems are connected by the integrated interface into a large, global, supply chain manage system to management business processes across the independent enterprises. This paper presents the system design and implementation and discusses our experiences and lessons learned.
© 2004 Elsevier B.V. All rights reserved.

Keywords: Workflow management; Supply chain; Electronic commerce; Interoperability; Agent

1. Introduction

Business organizations today face a complex and competitive environment. Because of this, e-commerce is becoming more dynamic. It is now termed open E-commerce [18]. In this, different enterprises put their services and resources together so that they appear to be a traditional enterprise to their customers but are better called virtual enterprises (VE) [4]. The relationship between members is thus different from that within a traditional enterprise, because the members are independent, constituent, and dynamic and the business process is scattered over multiple enterprises and subject to frequent change. However, the agility of a company's response to customer demand has been recognized as a critical success factor in meeting competition.

This implies that a cross-enterprise IS, is pressingly needed. It should aid in implementing interoperability among independent enterprises, smoothing the information flow between them, and deploying business processes over multiple enterprises. To satisfy and respond quickly to the requirements, many companies are now focusing on supply chain management (SCM) system in order to strengthen their ability to compete. This has therefore been recognized as an important area for IT innovation and investment [2].

*Corresponding author. Tel.: +86-732-8290466.
E-mail address: ljx70@263.net (J. Liu).

Workflow is the automation of a business process. It has now been adopted as a way to implement the cross organization management needed to carry out businesses. The internet's world-wide web has become the prime driver of contemporary electronic commerce (E-commerce). Phan [15] holds the view that the most successful new business models are probably those that can integrate IT to all activities of the enterprise-wide value chain.

2. Supply chain management system and WfMS

2.1. Supply chain management

The supply chain can be regarded as a business process to construct enterprise-wide methods. It is defined in many ways. The International Center for Competitive Excellence defined it to be [3] "the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders." With the implementation of supply chain management, the narrow focus of managers and the adversarial relationships between logistics providers, suppliers, and customers are replaced by strategic alliances and long-term cooperative relationships. Suppliers and customers are viewed as partners instead of adversaries with the objective of "maximizing competitiveness and profitability for the company as well as for the whole supply chain network including the end-customer" [14]. Levary [9] suggests that the benefits of a supply chain include:

(1) minimizing the bullwhip effect,
(2) maximizing the efficiency of activities,
(3) minimizing the inventories,
(4) minimizing cycle times,
(5) achieving an acceptable level of quality.

The major success factors for a supply chain are effective management of strategic alliances, extensive data management capabilities, and advanced inter-organizational IS to enable better information exchange; this provides more up-to-date information and allows for more accurate inventory responses to change in demand and appropriate inventory levels [24]. However, the participating enterprises usually are independent and distributed. The relationship between them has the following characteristics [7].

- *Goal-orientation:* If an enterprise A (manufacturer) needs enterprise B to do a task (take an order to supply material), A will set up an agreement between them for that task. After that, A will not interfere with B. This means that the relation between enterprises is more dynamic and changing.
- *Privacy:* An independent organization does not want to disclose details of its process models. Therefore, a service provider usually does not grant access to all internal information about the ongoing process. Equally, a service requester does not want to disclose its process models or organization database to its business partners.
- *Flexibility:* A provider wants to change internal procedures without asking permission of or informing the requester, unless the change affects the commitment with the requester. The same is true for the requester.
- *Independence:* Both parties want to stay independent of changes in the other, as long as the outcome is not affected.

Thus an open, standard and adaptable SCM system is needed to carry out business processes across enterprises and workflow and Internet technology are the obvious choices for its implementation.

2.2. Workflow management system (WfMS)

Conventionally, business processes were implemented by hard-coding business process related aspects, such as control and data flow, into the organization's software systems. This leads, however, to inflexible systems that were hard to modify and maintain. Workflow is a technology that addresses such problems by separating and abstracting business processes from the software systems [8]. It is the automation of a business process, during which documents, information, or tasks are passed from one participant to another for action, according to a set of procedural rules [20]. A WfMS is used to define, create, and manage the execution of workflows through the use of software running on one or more workflow engine. The engines can interpret the process definition, interact with workflow participants, and, where required, invoke the use of IT tools and applications.