

# Adoption of e-business functions and migration from EDI-based to XML-based e-business frameworks in supply chain integration

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Received 12 April 2006; accepted 2 November 2007

Available online 19 November 2007

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## Abstract

This paper explores how organizational and technological factors explain the adoption of e-business functions in 4570 European companies and the migration from EDI-based to XML-based e-business frameworks in 329 European companies. According to a linear regression model, a company with a wider scope, having more enterprise information systems or exchanging standardized data has more e-business functions in supply chain integration. A logistic regression model implies that a larger company or a company with higher skills or having more e-business functions is more likely to replace EDI-based with XML-based e-business frameworks in supply chain integration.

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*Keywords:* E-business; EDI; Information sharing; Supply chain; XML

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## 1. Introduction

Since the early 1980s *supply chain management* (SCM) has received the attention of practitioners and academics (Cooper et al., 1997). A *supply chain* is a bidirectional flow of information, products and money between the initial suppliers and final customers through different organizations. SCM is about planning, implementing and controlling this flow. Its goal can be to improve organizational competitiveness (Wacker, 2004). The supply chain, particularly SCM, contains different business functions, such as sales, purchases, demand forecasting and resource management. *Supply chain integration* is about information sharing within and between

companies (Nurmilaakso and Kotinurmi, 2004). *Information sharing* covers exchange of business documents in business processes. Supply chain integration is an important part of SCM. It aims to ease the flow between all organizations in the supply chain (Naylor et al., 1999). Companies are increasingly aware of the strategic importance of supply chain integration because it affects operational performance (Bagchi et al., 2005).

Information systems have a tremendous influence on achieving effective SCM (Gunasekaran and Ngai, 2004). Since the late 1960s companies have used information systems to exchange standardized data with their business partners (Hayes, 2002). When the data are processed and communicated electronically, printing and re-keying of the data can be reduced. Therefore, information sharing using

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information and communication technologies (ICT) can be faster and less error prone than information sharing by meetings, mails, phone calls, faxes or e-mails. ICTs can save both time and money (Malone et al., 1987). In *electronic commerce* (e-commerce), companies utilize ICTs in sales with their customers or in purchases with their suppliers (Laudon and Laudon, 2006). *Business-to-business* (B2B) e-commerce is a part of *electronic business* (e-business), in which companies use ICTs in all kinds of collaborations with their business partners (Laudon and Laudon, 2006). E-business includes not only sales and purchases but also e.g. demand forecasting and resource management. Supply chain integration and e-business are interrelated with each other in these collaborations. An *e-business function*, such as online sales, purchases, demand forecasting or resource management, is a business function in the supply chain in which a company shares information with its business partners through computer-mediated networks, such as the Internet or value-added networks (VAN). There is a large variety of initiatives ranging from simple supply chain integration between organizational units within the same company to complex supply chain integration between different companies in the supply chain network. In addition, companies have invested heavily in information systems, particularly in enterprise resource planning (ERP), SCM and customer relationship management (CRM) systems (Falk, 2005; Laudon and Laudon, 2006). Unfortunately, supply chain integration is not easy. Information systems are not interoperable due to differences between any two companies.

There would be fewer problems in supply chain integration if all companies used the same information systems, similar meanings for terms and similar modes of operations. Organizational units within a company may also face integration problems. Although many differences between business partners are inevitable, standards can bring order by reducing the complexity and uncertainty. Standardization of business documents, business processes and messaging leads to harmonization of meanings for terms, modes of operations and messaging interfaces. An *e-business framework* is a standard for information sharing within and between companies that enables the exchange of standardized data, e.g. in the Electronic Data Interchange (EDI) or Extensible Markup Language (XML) formats (Nurmilaakso and Kotinurmi, 2004). Companies can more easily use different information systems as

long as they use the same e-business frameworks in the same way. Nowadays, it is clear that EDI is no longer limited to the VANs but it can also be implemented over the Internet (Angeles, 2000).

This paper explores how organizational and technological factors explain the adoption of e-business functions, especially online sales, purchases, product design, demand forecasting and resource management, as well as the migration from EDI-based to XML-based e-business frameworks in supply chain integration. A linear regression analysis (Greene, 2003) is used to study the adoption and a logistic regression analysis (Menard, 2002) to study the migration. Instead of testing prior hypotheses, the paper is exploratory in order to obtain a clearer understanding on the e-business adoption and migration in supply chain integration. The independent and control variables are often entered into the linear combination when the adoption or migration is the dependent variable in a regression model (e.g. Hong and Zhu, 2006; Prosser and Nickl, 1997; Zhu et al., 2003). For these reasons, the regression models are simple in this paper. The paper proceeds by first introducing supply chain integration, e-business functions and e-business frameworks as well as reviewing the adoption and migration. Next, the paper presents the research approach. Then, the adoption and migration models are estimated and their findings are compared with the findings presented in the literature. Finally, the paper discusses the implications, limitations and further research and presents the conclusions.

## 2. Backgrounds

### 2.1. Supply chain integration

Before products can flow from the initial suppliers to the final customers and money from the final customers to the initial suppliers, the business partners have to share information. The business partners are not only different companies but they are often different organizational units within the same company. Fig. 1 presents how a bidirectional flow of information, products and money is related to the external and internal supply chain.

Perhaps the most important problem encountered in the supply chain occurs when information about the final customers' demand for any product becomes increasingly distorted as this information moves toward the initial suppliers in the supply

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