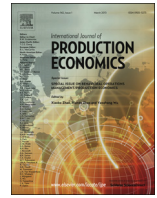




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# Supply chain practice and information quality: A supply chain strategy study



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## ABSTRACT

There is a wide acceptance of the strategic importance of integrating up-to-date information technology with effective supply chain practice. However, little is known about how the alignment between information technology and supply chain practice impacts business performance. This paper investigates two supply chain practices (i.e. sourcing practice and delivery practice) and information quality. Scales measuring sourcing practice, delivery practice, and information quality were developed. Four strategic clusters of companies, using alternative supply chain strategies, are identified. In three of the strategic clusters, the level of supply chain practice is consistent with the level of information quality. The fourth strategic cluster has a high level of information quality but a low level of effective supply chain practices. In this study, the fourth strategic cluster performed consistently worse than the other three strategic clusters. The performance measures consist of sales revenue and profitability. This study shows that firms need to align supply chain practice with the level of their information quality in order to achieve good overall business performance. Implications of our findings and future research opportunities are addressed.

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## 1. Introduction

Effective supply chain practices and integrated information technology (IT) are two approaches to improve business performance. It is important to integrate supply chain practices with information technology decisions in operations/supply chain management. As an example, Dell Computer positioned itself to take advantage of the Internet to build information partnerships, both with their suppliers and customers. Covisint was another good example of leveraging information technology in supply chain management. As an electronic marketplace for the auto industry, Covisint provided on-line purchasing services and promoted supply chain collaboration between major direct suppliers and automakers.

In this study, we consider two types of supply chain practices: sourcing practice and delivery practice. A company is considered to have effective supply chain practice if selected best practices are used. By using sourcing practices and delivery practices, both the incoming and outgoing portions of the supply chain are represented. As for information technology, this study measures information quality. *The question facing companies is how the alignment*

*between information quality and effective supply chain practice impacts firm performance.*

In the literature, few supply chain strategy studies have empirically analyzed the integration of information technology with supply chain practices in supply chain management (Fisher, 1997; Frohlich and Westbrook, 2001; Towill and Christopher, 2002; Harrison and New, 2002; Vickery et al., 2003; Millet et al., 2009; Li, 2012; Ulmer et al., 2013). Supply chain strategies are usually dichotomized into two groups: lean/efficient supply chain strategy versus agile/responsive supply chain strategy (Fisher, 1997; Towill and Christopher, 2002). However, recent business environment development requires firms to be not only “lean” but also “agile”. Firms are interested in knowing whether they can be responsive while still being efficient. The previous studies have never explored such a supply chain strategy that is both lean and agile. A recent study (Ward and Zhou, 2006) addressed the importance of balancing the Just-in-time production practices and information technology. However, no study has used supply chain practices and the information technology to characterize supply chain strategy. Therefore, the purpose of this study is to (1) cluster alternative supply chain strategies on the basis of supply chain practices and information quality, and (2) to identify which alternative supply chain strategies are consistent with good business performance.

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In this study, sourcing practice, delivery practice, and information quality are used to cluster a sample of 125 North America manufacturing firms into four strategic clusters. Each cluster represents a specific supply chain strategy. The business performance of the four strategic clusters is compared to identify the most desirable supply chain strategy.

In the next section, the literature on sourcing practice, delivery practice, information quality, and business performance will be reviewed. Based on the literature review, the research hypotheses are generated. The research methodology and scale development are presented in Section 3. Section 4 contains a discussion of the analysis results and provides the managerial implications of the findings. Section 5 concludes the study and suggests future research possibilities.

## 2. Literature review and research hypotheses

In this section, we review the literature in sourcing practice, delivery practice, information quality, and business performance. A summary of the literature is in Appendix A. Based on the literature review, the research hypotheses are developed. The survey questions are listed in Appendix B.

### 2.1. Sourcing practice

*Sourcing practice* connects manufacturers with suppliers and is critical for manufacturing firms, because manufacturing firms often spend a significant portion of its revenue on purchasing materials and services (Benton, 2006). The extant literature shows that sourcing practice has a significant impact on business performance (Benton, 2006; Watts et al., 1992; Narasimhan and Das, 2001).

In the sourcing literature, several sourcing practices have been identified as best practices. First, it is important to have a designated purchasing team (Ellram and Pearson, 1993; Trent and Monczka, 1994; Johnson et al., 2002). Such cross functional teams facilitate the timely completion of purchasing activities. The purchasing team organizes the necessary resources to achieve specific company objectives.

Second, establishing long-term supplier–buyer relationship and reducing the supplier base are good sourcing practices. The role of key suppliers in a supply chain should be assured through long term relationship (Benton, 2006; Li et al., 2005). Hahn et al. (1983) showed that companies' benefits gained by giving larger volume of business to fewer suppliers using long-term contracts outweigh the costs. By reducing the supplier base, economies of scale based on order quantity can be realized. Moreover, it is less costly to manage a smaller supplier base than a larger supplier base in terms of account management and other managements costs (Treleven, 1987). Therefore, reducing the supplier base is a good sourcing practice. Another benefit of long term supplier–buyer relationships is early supplier involvement in product development. According to Kamath and Liker (1994) and Womack et al. (1990), Toyota's first tier suppliers are involved in Toyota's new product development, which reduce the length of the product development cycle. Hartley et al. (1997) found a significant relationship between the supplier's involvement in product development and overall product development delays. They showed that in order to reduce product development delay, the suppliers should be involved early in the design process.

Third, Just-In-Time (JIT) delivery from suppliers is considered a good sourcing practice. The benefits of JIT delivery are widely documented (Dong et al., 2001; Benton, 2006). As an example, Dong et al. (2001) found that JIT purchasing directly reduced the buyer's logistic costs. Elements of JIT purchasing are found in

various studies (Hahn et al., 1983; Schonberger and Ansari, 1984). Typically, JIT purchasing reduces order size, reduces lead-time, and improves product quality.

Fourth, doing suppliers' performance evaluations and providing feedback is a good sourcing practice. Carr and Pearson (1999) tested the relationship among the supplier evaluation system, supplier–buyer relationship, and firm financial performance. According to the authors, supplier evaluation systems have a direct positive impact on buyer–supplier relationship, and an indirect impact on firm financial performance. More recently, Prahinski and Benton (2004) studied the role of communication in supply chain management. They found that executives at buying firms need to incorporate indirect influence strategy, formality and feedback into supplier development programs.

The literature review for sourcing has established the importance of following sourcing practices: (1) a designated purchasing team; (2) long-term supplier–buyer relationships and a reduced supplier base; (3) JIT delivery; and (4) suppliers' performance evaluation and feedback.

### 2.2. Delivery practice

The delivery process starts with order inquiry processing and finishes with customer invoicing. It includes processing inquiries, entering orders, consolidating orders, routing shipments, selecting carriers, transporting products, and so on.

The extant literature and anecdotal evidence show that a good delivery system has a significant positive impact on a firm's overall business performance. According to Johnson and Davis (1998), poor ordering processes cost Hewlett Packard a million dollars a day. Whereas, the cross docking technique used by Wal-Mart, using its warehouse as a switching station rather than a stocking place, reduced inventory carrying costs and the number of docking spaces (Stalk et al., 1992). Gurin (2000) described how Ford partnered with UPS to develop and implement an Internet-based delivery process, significantly improving Ford's delivery performance. Ahmad and Schroeder (2001) identified several factors that affect delivery performance. The factors include just-in-time management, quality management, production instability, and so on.

Best delivery practices include direct delivery, cross docking, JIT delivery, outsourcing of logistics services, and so on. Goldsby and Stank (2000) reviewed the world class logistics competencies and capabilities. One capability is sharing information with supply chain partners, which increases the real time visibility of order tracking. Agility is also an important competence of world class logistics. In this study, JIT delivery is used to measure the agility of a supply chain. Dell computer uses JIT delivery. The majority of Dell's suppliers are located within 15 min of a Dell assembly facility. Airborne Express or UPS serves as Dell's logistics department and has resulted in improved responsiveness and higher customer satisfaction. Other best delivery practices identified by the Supply Chain Operational Reference (SCOR) model (Supply Chain Council, 2010) include a single contact point for all order inquiries, order consolidation, and the use of automatic identification. The bar code technology significantly improves the relationship between suppliers and buyers and allows some emerging inventory management programs such as vendor managed inventory program.

### 2.3. Information quality

Information quality measures the degree to which the information exchanged between organizations meets the needs of the organizations (Petersen, 1999). A number of researchers have identified important characteristics of information quality. Tushman and

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