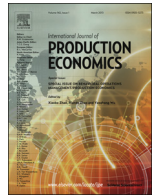




Contents lists available at ScienceDirect

Int. J. Production Economics

journal homepage: www.elsevier.com/locate/ijpe

The role of IT-enabled collaborative decision making in inter-organizational information integration to improve customer service performance

Christina W.Y. Wong^{a,*}, Kee-hung Lai^{b,1}, T.C.E. Cheng^{b,2}, Y.H. Venus Lun^{b,3}

^a Business Division, Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Hong Kong

^b Department of Logistics and Maritime Studies, Faculty of Business, The Hong Kong Polytechnic University, Hong Kong

ARTICLE INFO

Article history:

Received 7 August 2013

Accepted 21 February 2014

Keywords:

IT-enabled

Supply chain

Information integration

Service performance

ABSTRACT

While inter-organizational information integration is believed to benefit supply chain management (SCM), prior studies have shown mixed results. Based on Organizational Information Processing Theory, we question this belief and highlight the importance of information technology (IT)-enabled collaborative decision making to deliver performance benefits and the contingency of the integration–collaboration–performance link on IT infrastructure to establish electronic connections in a supply chain. Analyzing the survey data collected from a sample of 188 trading companies, we find a positive structural relationship between inter-organizational information integration and IT-enabled collaborative decision making, leading to customer service performance, when a high level of IT infrastructure development is present. Our post hoc analysis verifies these empirical findings. For practicality, we propose an empirical taxonomy of firms for managerial reference in developing IT infrastructure in support of linking inter-organizational information integration with IT-enabled collaborative decision making.

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1. Introduction

With an emphasis on coordination and collaboration, studies on supply chain management (SCM) have recognized the importance of inter-organizational information integration (Frohlich and Westbrook, 2001; Narasimhan and Kim, 2002; Shin et al., 2000). *Inter-organizational information integration* refers to the extent to which firms electronically link and deploy information technology (IT) for information sharing across partner firms (Rai et al., 2006). Information integration allows organizational activities to be coordinated as an integral whole (Frohlich and Westbrook, 2001), facilitating information, finance, and material flows across a supply chain (Dehning et al., 2007). Such integration for SCM is useful for reducing operations costs through elimination of waste, as well as improving communication and information sharing through removing uncertainty and equivocality in exchange (Stefansson, 2002; Wang and Wei, 2007; Wong et al., 2009). The premise of these benefits pertains

to better information sharing in a supply chain (Goodhue et al., 1992), improving supply chain partners' cooperative ties in business coordination (Malhotra et al., 2007), as well as customer service performance. From the supply chain perspective, *customer service performance* is concerned with the performance outcomes of firms in satisfying customer needs by being reliable, responsive, and flexible (Fawcett et al., 2011; Stewart, 1995). The establishment of information integration enables firms to coordinate with supply chain partners to better satisfy customer needs (Whipple et al., 2002).

However, recent studies have found that inter-organizational information integration is not related to effective coordination of activities across firms (Sanders, 2008), while other studies have emphasized collaborative decision making for reducing the bullwhip effect in supply chain operations (Fiala, 2005; Lee et al., 1997; Malhotra et al., 2007). The customer service operational consequences of collaborative decisions on performing supply chain activities should not be neglected (Swaminathan et al., 1998). Furthering the focus of collaborative decision making on group-based intelligence (Raghu et al., 2001), *IT-enabled collaborative decision making* requires application of IT to generate and disseminate information for decision making across firms (Nissen and Sengupta, 2006). This is helpful in reducing the adverse impact of the decisions made by one party on the operations of the other partners, compromising supply chain-wide performance (Fiala, 2005; van der Zee and van der Vorst, 2005). This is in line with

* Corresponding author. Tel.: +852 2766 6415; fax: +852 2773 1432.

E-mail addresses: christina.wy.wong@polyu.edu.hk (C.W.Y. Wong), mike.lai@polyu.edu.hk (K.-h. Lai), edwin.cheng@polyu.edu.hk (T.C.E. Cheng), venus.lun@polyu.edu.hk (Y.H.V. Lun).

¹ Tel.: +852 2766 7920; fax: +852 2330 2704.

² Tel.: +852 2766 5215; fax: +852 2330 2704.

³ Tel.: +852 2766 7407; fax: +852 2330 2704.

the service-dominant logic, one of the primary tenets of which is concerned with collaboration between supply chain partners (Lusch et al., 2008). For example, the production and shipment arrangements of a manufacturer can delay the new product launches of its downstream partners, incurring sales lost, and higher inventory and warehouse costs due to uncertain replenishments in the supply chain. Similarly, a lack of understanding of the quality requirements for product design and development in the supply chain can result in the making of unwanted products in the market. These inefficiencies suggest that collaborative decision making is essential for partners to benefit from information integration by resolving divergent goals in their supply chain operations.

There are studies on the performance impacts of inter-organizational information flows through the use of information systems, e.g., EDI, but the influence of the information backbone, i.e., IT infrastructure, on information integration and collaborative decision making has not received due research attention. *IT infrastructure* refers to the technical foundation for supporting the coordinating organizational functions and the adoption of enabling IT to perform present and future business operations (Pispa and Eriksson, 2003), reflecting the ability of firms to “connect” with their supply chain partners. A lack of IT infrastructure development can be detrimental to electronic linkages and collaborative decision making in supply chains, which rely on the use of standardized, timely, and accurate data for improving customer service performance (Byrd and Turner, 2001). This information backbone is therefore instrumental in integrating information and coordinating business activities in SCM.

Drawing on Organization Information Processing Theory (OIPT), this study has the following objectives: (1) investigating the mediating role of IT-enabled collaborative decision making in the relationship between inter-organizational information integration and customer service performance of firms and (2) examining the contingency of such relationships on IT infrastructure. This study makes two contributions. First, we advance knowledge on the role of IT-enabled collaborative decision making in enhancing the performance outcomes of inter-organizational information integration. Specifically, this study sheds light on the impact of inter-organizational information integration on IT-enabled collaborative decision making, and the business value of collaborative decision making in coordinating supply chain activities. Second, we identify the performance contingency of inter-organizational information integration and collaborative decision making on IT infrastructure for SCM. The results provide evidence on the impact of IT-enabled collaborative decision making on customer service performance of supply chains from the OIPT perspective.

2. Theoretical background and hypotheses

2.1. Organizational Information Processing Theory

OIPT suggests that organizational capability in processing information is helpful for alleviating operational uncertainties (Galbraith, 1973). These uncertainties may arise from various sources, such as changing customer demand, unstable supplies, unpredictable actions of competitors, and complexity of inter-organizational activities in a supply chain (Brush and Artz, 1999), highlighting the strategic importance of information processing for the involved partners. This notion of OIPT is in line with contingency theory, which posits that firm performance depends on the alignment between the structure of a firm and its environmental conditions (Sillince, 2005). While contingency theory suggests the need for alignment, OIPT extends contingency theory by providing a theoretical ground to explain why such alignment is valuable to improve firm performance. Specifically, OIPT stresses the importance of aligning information processing capabilities with information processing need to make performance

gains. If left unaddressed, the need for information processing would eventually reach a point that is difficult and costly for management (Premkumar, 2000). To reduce the operational uncertainties in SCM, it is beneficial for firms to enhance their information processing capability in the following ways: (i) sharing information with supply chain partners to improve coordination of inter-organizational activities, (ii) connecting with suppliers and customers through the development of appropriate IT infrastructure to support information sharing, (iii) collaborating with supply chain partners to reduce uncertainties in coordination, and (iv) providing a predictable business environment by repositioning the supply chain with stable supplies and customer demand, fewer number of competitors, and less complex inter-organizational processes, if such exist.

The first option has been identified in the literature as a feasible way to improve information sharing across firms (Goodhue et al., 1992). However, this approach has been criticized for merely increasing the richness of the information shared (Kaufmann and Carter, 2006), adding little value to supply chain operations if the shared information is not fully utilized for decision making. The second option of developing appropriate IT infrastructure has been found useful for improving the ability of firms in establishing electronic linkages with their partners (Zhu, 2004). IT infrastructure provides the required connectivity, capacity, and the extent of a standardized network and computer platforms in support of electronic integration and collaborative actions for SCM (Duncan, 1995). The third option is comparatively viable. Collaboration between partners and their collaborative decision making can be valuable for reducing uncertainties in SCM, where each decision maker is mindful of the operational needs of the other partners (Fiala, 2005). The fourth option is demanding because it requires considerable information processing efforts to identify such business environmental conditions, let alone the resources needed for sustainability after repositioning. In examining the relationships among inter-organizational information integration, IT-enabled collaborative decision making, and IT infrastructure, OIPT is useful for explaining the role that information processing capability plays in garnering performance gains (Wong, 2007).

2.2. Inter-organizational information integration and IT-enabled collaborative decision making

Inter-organizational information integration improves information visibility in a supply chain. It facilitates standardized information exchange and communication between partner firms with compatible information systems and databases (Koufteros et al., 2005; Wang et al., 2006). This boundary-spanning mechanism establishes a common platform to coordinate operations among partners in a supply chain (Galbraith, 1973). Information integration is essential for timely and accurate information sharing, allowing for informed decision making by partner firms to collectively plan and execute supply chain activities (Overby et al., 2006). The IT-enabled decisions for SCM include production planning, product design and development, distribution network design, and so forth (Premkumar, 2000), which are business activities in a supply chain that require inputs and developmental efforts from various partners. With joint organizational efforts, the chances of different partner firms making conflicting decisions are reduced, and hence the operations efficiency of the supply chain can be improved. Thus, we posit that:

Hypothesis 1. Inter-organizational integration is positively associated with IT-enabled collaborative decision making.

2.3. Customer service performance of inter-organizational information integration and IT-enabled collaborative decision making

By increasing information processing capabilities, the implementation of inter-organizational information integration and

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