Information & Management 52 (2015) 728–740

Contents lists available at ScienceDirect

Information & Management

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

The effect of IT and relationship commitment on supply chain coordination: A contingency and configuration approach

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ARTICLE INFO

Article history:
Received 15 July 2014
Received in revised form 25 April 2015
Accepted 4 June 2015
Available online 17 June 2015

Keywords:
Information technology
Relationship commitment
Supply chain coordination
Supply chain performance

ABSTRACT

This study investigates how information technology and relationship commitment, mediated by supply chain coordination, influence supply chain performance from a resource synergy perspective. The proposed model is tested using data collected from 617 manufacturing firms. Supply chain coordination with both suppliers and customers is found to enhance supply chain performance, and the effect of coordination with customers is higher. There is an interactive relationship between the supply chain coordination on the supplier and customer sides, indicating that synergizing supply chain coordination with suppliers and with customers improves supply chain performance. Furthermore, information technology and relationship commitment influence supply chain coordination.

1. Introduction

In today's hypercompetitive environment, successful supply chain coordination is critical for firms to improve their firm and supply chain performance [26,38,41]. Supply chain coordination refers to a firm's ability to coordinate transaction-related activities with its supply chain partners [93] and is one major dimension of supply chain integration [26,101]. Supply chain coordination is one of the key capabilities [73] that enable firms to leverage their resources to accomplish objectives that they are unable to achieve alone [44] and create a seamless, synchronized supply chain [34]. Many firms perceive supply chain coordination as integral to their strategy [52] and spend millions of dollars in creating and sustaining effective supply chain coordination [71]. Therefore, it is crucial to identify the key drivers of supply chain coordination and implement them efficiently.

Information technology (IT) has become a major driver of supply chain management as supply chain partners have become increasingly integrated via IT [28,91,101,102]. The traditional supply chain management approach relies primarily on the linkage between physical processes (e.g., inventory, warehousing, and shipment). However, a key feature of today's supply chain management is the change in focus from the linking of physical processes to the linking of information-based processes across supply chain operations [103]. IT can facilitate the coordination of inter-firm processes spanning the whole supply chain, including both upstream and downstream operations [21]. More evidence on the role of IT in improving supply chain coordination is provided in Appendix A. It is also evident in business practices; for example, many firms invest in digitalized inter-organizational systems (IOS), such as electronic data interchange, RosettaNet-based systems, and customer relationship management information systems, to help improve supply chain coordination.

Although IT can potentially boost supply chain management, many firms fail to realize this potential due to the lack of supply chain coordination through IT, or because their trading partners may not have the capability to align with them [6,72]. This poses a formidable challenge for firms to work out how IT can be leveraged to make supply chain coordination more successful [21,105]. However, most IT and supply chain coordination studies consider only two-level supply chains (a supply chain with two firms, such as a supplier–manufacturer supply chain or a manufacturer–retailer supply chain). For example, Rai et al. [72] found that IT infrastructure integration significantly improved supply chain process integration, which led to better firm performance. However, they studied integration only at a two-level supply chain and thus failed to investigate the difference between supplier-side and customer-side integration. Using a similar two-level logic, Dong et al. [21] examined the effect of digitally enabled supply chain management

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http://dx.doi.org/10.1016/j.im.2015.06.007
0378-7206/

– in terms of backend integration, managerial skills, and partner support – on supply chain process performance and competitive position. Therefore, to better understand supply chain performance improvement through the configuration of IT and coordination with both upstream and downstream partners, we extend these supply chain management studies from the two-level to a three-level supply chain setting (a supply chain with three firms, such as a supplier–manufacturer–distributor supply chain), with the aim of discovering how IT on the supplier and customer sides differentially affects supply chain coordination.

According to socio-technical system theory, both inter-organizational relationship resources and technical IT resources [67] play an important role in improving cooperation [58] and supply chain management [100]. For example, Zhao et al. [100] found that manufacturers' relationship commitment to their customers was positively related to the manufacturers' integration with those customers. Zhao et al. [101] also found that relationship commitment to suppliers and customers was related to supplier and customer integration, respectively. Patnayakuni et al. [63] found that both long-term relationship orientation and asset specificity were important in improving information flow integration for supply chain coordination through relational interaction routines. More evidence of the role of relational resources in improving supply chain coordination is provided in Appendix A. Aligning with the relationship perspective, this study further tests the effect of relational resources on supply chain coordination for the supplier and customer sides simultaneously. Extending this perspective to coordination within a three-level supply chain raises the important question of how the supplier-side coordination and the customer-side coordination should be configured, e.g., balanced or unbalanced, to achieve better performance. Previous studies have identified different sources of inter-firm synergy [86] and revealed an insignificant or negatively significant direct relationship between supplier-side coordination and performance [6]. Similarly, Flynn et al. [26] found that supplier and customer integration had a synergistic effect on operational performance, whereas the direct effect of supplier integration on operational performance was insignificant. Motivated by recent studies on resource synergy, we apply configuration theory as the theoretical lens through which to investigate how resources on the supplier and customer sides can be configured for overall supply chain performance improvement.

From the combined socio-technical system theory and configuration theory perspective, we address three major research questions: (1) How do IT for suppliers/customers and relationship commitment to suppliers/customers jointly influence supply chain coordination with suppliers/customers? (2) How does supply chain coordination with suppliers and customers jointly influence supply chain performance? (3) What are the patterns of supply chain coordination and their resource and performance characteristics? By examining the effects of IT and relationship resources on performance through supply chain coordination, this study contributes to the literature and provides knowledge that could improve the practices of supply chain management [101], IT [6,32] and relationship management [58] in several ways. First, we provide empirical evidence of the effects of IT for suppliers and customers and relationship commitment to suppliers and customers on supply chain coordination with suppliers and customers, respectively. The evidence reveals the relative importance of IT and relationship commitment in improving supply chain coordination, thus contributing to the IT, relationship management, and supply chain management literature. Second, we elucidate the relative roles of coordination with suppliers and customers in enhancing supply chain performance, thus contributing to the supply chain management literature. Third, we identify supply chain coordination patterns and link them with IT, relationship commitment, and supply chain performance, thus contributing to the IT, relationship management, and supply chain management literature. Finally, we provide managerial guidelines to help managers devote their IT and relationship commitment resources to supply chain coordination for the supplier and the customer sides simultaneously to improve performance.

2. Theoretical foundation and research hypotheses

The theoretical perspective we use to study IT and relationship commitment resources and coordination capability in supply chains combines socio-technical theory and configuration theory [22]. Theoretically, socio-technical system theory addresses how the use of two major resources affects firm performance and suggests that firms comprise both social subsystems, consisting of people, and technical subsystems, consisting of equipment and technologies [62]. Both resources should work together to achieve performance improvement. Configuration theory addresses the typological configuration of interrelated activities to form a firm's competitive advantages. As supply chain management focuses on the externally oriented capability in response to market demand, the coordination synergy of a supply chain is the link between upstream and downstream coordination capabilities in the supply chain context.

According to configuration theory, synergy is an important power for combining the resources and skills of individual organizations across organizational boundaries to enhance coordination [55]. The synergy that partners seek to achieve through coordination is more than a mere exchange of resources. Instead, synergy is the potential ability for two business units to enjoy super-additive value by integrating the individual organizations' resources so that the aggregate effect of sharing resources could be greater than the sum of the individual contributions [86]. For resource synergy to occur in supply chains requires IT outside-in resources that leverage partner linkage and market responsiveness by sharing inventory, demand, and shipment information [79], and supply chain coordination emphasizes partner linkages and market responsiveness across organizational boundaries [34,90].

2.1. Effects of supply chain coordination on supply chain performance

Supply chain coordination is similar to supply chain collaboration and supply chain cooperation, which are the key components of supply chain integration. According to [101], supply chain integration includes strategic alliance, information sharing, and working together. Working together involves the coordination of related activities. These three dimensions of supply chain integration are related but different. For example, whereas strategic alliance focuses on strategic-level activities, working together focuses on operational-level activities. Similarly, whereas information sharing emphasizes the technological aspects of operations, working together emphasizes the human aspects of operations. Thus, we need to investigate their effects in detail. Although strategic alliance and information sharing are popular topics in the strategic management and IT [39] and supply chain integration literature [26], coordination, particularly supply chain coordination, is less emphasized. In addition, coordination studies focus primarily on the individual effects of coordination on performance (e.g., [73]); few studies examine the joint effects of different coordination activities on performance. Therefore, this study focuses on different supply chain coordination activities.

Supply chain coordination primarily emphasizes the seamless process connection and synergy among supply chain partners such as suppliers and customers. Coordination with suppliers and customers is commonly referred to as external coordination [54], which is the degree to which a firm and its external partners structure inter-organizational practices and processes into a