

## Chapter 4.2

# Virtual Integration: Antecedents and Role in Governing Supply Chain Integration

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### ABSTRACT

The integration and coordination of strategic suppliers becomes increasingly important as the manufacturer relies on external transactions to build up collaborative advantages. By conceptualizing virtual integration as an efficient and effective vertical coordination mechanism, the study discussed in this chapter developed a model to examine the role virtual integration plays in improving manufacturing performance and the antecedent factors that can lead supply chain members to rely on virtual integration to govern supply chain integration. Based on the resource-based view and transaction costs theory, the suppliers' specific investments and environmental uncertainty are identified as criti-

cal antecedents to virtual integration. The results show that the suppliers' specific investments can significantly improve the manufacturers' achievement of manufacturing goals, thereby motivating the manufacturer to rely on virtual integration to better coordinate with the suppliers who made significant idiosyncratic investments for enhancing transaction value while controlling the potential hazards.

### INTRODUCTION

There has been a relative shift from capacity to specialized subcontracting by large original equipment manufacturing (OEM) makers when they were facing increasingly fragmented and

uncertain demand (Whitford & Zeitlin, 2004). With eroded operating margins and shortened product life cycles, modern manufacturers have increasingly leveraged outsourcing practices for the benefit of low-cost manufacturing, global logistics services, and accelerated product development. Moreover, other than fabrication services, suppliers have been more and more involved in the manufacturers' value chain activities to provide add-on values to buyers and to construct higher entry barriers against competing suppliers (Carter & Narasimhan, 1990). Although strategic sourcing has become an important instrument for realizing the ideal of "externalization of the core," careful management of such supply chain integration efforts are required to reap the expected profit (Narasimhan & Das, 1999; Nesheim, 2001).

The management of supply chain integration has been increasingly addressed in academic research as the practice of supply chain management continues to proliferate in industrial networks. Two themes predominantly examined by prior research were practices of supply chain integration and the impact of supply chain integration on performance improvement. For the former case, prior studies examined the scope, sophistication and focus of supply chain integration, which aimed at illuminating the essence of supply chain integration (Frohlich & Westbrook, 2001; Morash & Clinton, 1998; Narasimhan & Jayaram, 1998; Simatupang, Wright, & Sridharan, 2002). For the latter, supply chain integration was shown to be positively associated with manufacturing and operational performance improvements (Frohlich & Westbrook, 2001; Narasimhan & Jayaram, 1998). Although the fundamental importance of supply chain integration is widely accepted given the aforementioned studies, important questions remain open about how to manage supply chain integration. In particular, our knowledge is still weak concerning the kinds of mechanisms suppliers and customers use to govern supply chain integration under different transacting circumstances. Moreover, we know little about the

causal linkages between governance mechanisms choices and resulting performance implications in the context of supply chain integration. Such questions motivated this research to focus on exploring the use of information and communication technology (ICT)-enabled coordination as an alternative governance mechanism to managing supply chain integration.

As outsourcing practices gradually proliferate in modern business environments, ICT-enabled interorganizational integration has also been increasingly adopted to facilitate the implementation of such practices (Malone, Yates, & Benjamin, 1987). Since the inception of electronic data interchange (EDI), the use of ICT-enabled coordination has evolved from electronic monopoly to electronic partnership, allowing the customer-supplier relationship to develop toward a more cooperative mode (Clemens, Reddi, & Row, 1993; Hart & Saunders, 1998). Furthermore, ICT is utilized to support communication and operation of a supply chain as if the OEM makers and their suppliers functioned as an extended enterprise, advancing ICT-enabled coordination toward a "virtual integration" mechanism (Chandrashekar & Schary, 1999; Magretta, 1998). The success of Dell's direct model, in particular, demonstrates that virtual integration indeed is a viable means to facilitating integration of physically separated units and permitting coexistence of centralization and decentralization within an operating system (Stapleton, Gentles, Ross, & Shubert, 2001; van Hoek, 1998). Therefore, instead of common ownership, ICT has become more and more emphasized in implementing supply chain integration (Frohlich & Westbrook, 2001).

The research question of this study is to explore the role ICT-enabled coordination plays in managing supply chain integration. Drawing on both resource-based perspective (RBV) and transaction cost theory (TCT), ICT-enabled coordination is regarded as a governance mechanism to managing supply chain integration. The construct representing ICT-enabled coordination is

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