



The impact of operations and supply chain strategies on integration and performance[☆]

Yinan Qi^a, Baofeng Huo^b, Zhiqiang Wang^{c,*}, Hoi Yan Jeff Yeung^d

^a School of Business, University of International Business and Economics, Beijing, PR China

^b School of Management, Zhejiang University, China

^c School of Business Administration, South China University of Technology, Guangzhou, China

^d Department of Decision Sciences and Managerial Economics, Faculty of Business Administration, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

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ABSTRACT

This study aims to develop a comprehensive model that facilitates an understanding of relationships among operations strategies (OSs), supply chain strategies (SCSs), supply chain integration (SCI), and firm performance. It is a start to understand the role of operations strategies in supply chain design. We adopt structural equation modelling to test the relationships based on data collected from 604 Chinese manufacturers. The results show that a lean supply chain is appropriate for firms placing higher priorities on cost, quality and delivery strategies, while an agile supply chain is appropriate for firms competing on the flexibility strategy. Furthermore, both lean and agile SCSs require higher levels of SCI in terms of internal and external integration, but lean SCSs have a significantly higher impact on external integration than agile SCSs. The study refreshes the links between order winner/qualifier and supply chain strategies. Clear-cut differences exist concerning the role of operations strategy in supply chain management, indicating that appropriate supply chain design is very important for firms to achieve their operations objectives. This study contributes to a better understanding of the match between operations strategies and supply chain strategies, and offer a practical insights on investments in the development of supply chain integration.

1. Introduction

As an electronic firm with more than one million employees and 60 billion USD annual sales, Foxconn adopts a special operations and supply chain strategy and activity – lean strategy and supply chain integration (SCI). Foxconn reduces wasters and costs through several ways. Internally, they build the organization culture of “time is money”, teamwork and resource sharing, process improvement, and continuous quality control to enhance efficiency and reduce costs. Externally, they use just-in-time (JIT) and vendor-management-inventory (VMI) methods to integrate with suppliers to reduce purchasing costs. They also involve designers of Apple to help them to improve product quality, which leads to the wonderful product of iPhone.

Many studies have investigated operations strategies (OSs) since Skinner's (1969) seminal work. However, one of the major weaknesses in this field is that the OS theory fails to make contextual considerations in terms of supply chain, especially in a developing economy, in which technologies are relatively weak and levels of management are

low (Demeter and Boer, 2011). The changes to the business unit's strategy and environment must necessitate the change of its supply chain strategy, but there is no clear answer about how to change in the current literature (Perez-Franco et al., 2016). Thus, it is interesting and instructive to reconsider OSs from the perspective of supply chain management (SCM) in an emerging market like China. Furthermore, the decisions on production and supply chain network design become increasingly important for the firm to obtain competitive advantage (Macchion et al., 2015).

With the increasing importance of SCM, supply chain strategies (SCSs) should play important roles in defining firms' OSs. From a strategic SCM perspective, a supply chain's design should be aligned with a firm's missions and strategies (Qi et al., 2011) and the SCSs work as a logical bridge between firms' higher level strategy and its supply chain activities (Perez-Franco et al., 2016). Fisher (1997) argues that a firm's SCSs should match its product characteristics. The literature has generally testified to such a relationship (e.g., Qi et al., 2009). However, a firm's operational focus is to determine an order

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* Corresponding author.

E-mail addresses: yinanqi@gmail.com (Y. Qi), baofenghuo@gmail.com (B. Huo), bmzqwang@scut.edu.cn (Z. Wang), jeff@baf.msmail.cuhk.edu.hk (H.Y.J. Yeung).

winner (a criterion that differentiates a firm's products/services from those of others) or order qualifier (a screening criterion that allows a firm's products/services to be candidates for purchasing in the market) in terms of OS strengths (e.g., cost, quality, delivery and flexibility) but not SCS strengths. Product characteristics comprise the post-hoc description of a firm's products that have already appeared in the market, and order winners and qualifiers are the attributes a firm's products should have even prior to the product design stage. Therefore, order winners and qualifiers are factors that should be determined during the strategy development process. In fact, the determination of order winners and qualifiers is the key process of the development of a firm's OSs (Jacobs and Chase, 2011). In accordance, Jacobs and Chase (2011) argue that OSs and SCSs should be considered systematically to build effective supply chains for manufacturers with various order winners. In the SCS literature, most studies such as those by Naylor et al. (1999), Mason-Jones et al. (2000), Christopher (2000) and Towill and Christopher (2002) have conceptually argued over the relationships among order winners, order qualifiers and SCSs. Recently, Roh et al. (2014) investigated the relationship for responsive supply chain strategy and suggested more supply chain strategies. A large-scale and rigorous empirical study is imperative to explore such a relationship (Naim and Gosling, 2011).

In addition, SCI practices are important for the effectiveness of SCM. Much of the prior SCI literature has focused on validating the benefits of SCI practices (Huo et al., 2014a, 2014b). When a firm has a predetermined strategy, the kind of SCI that is appropriate for its corresponding SCS design is a significant issue. However, few studies have explored enablers of SCI (Wang et al., 2016), especially from the strategic perspectives, which are very important to understanding the role of SCI in a supply chain (Zhao et al., 2011).

While China has become a global manufacturing center and plays an important role in global supply chains, SCM in China attracts both practitioners and academia (Zhao et al., 2007). Most previous studies on operations and supply chain strategies have been conducted in the context of Western cultures (e.g. Droge et al., 2004; Germain and Iyer, 2006). There is a need for testing and validating theories of operations and supply chain strategies in different cultural settings. The collectivism culture in China provide a fertile ground for testing and validating these theories developed in Western cultures. Furthermore, firms in China have different histories and varying cultures and management philosophies in the collective culture, SCI is deemed more important in maintaining relationships, as compared to that in an individualistic culture. Therefore, we conduct this study using data collected from Chinese manufacturers.

This study builds and empirically tests a comprehensive model to describe how OSs influence SCSs and how SCSs influence SCI practices that lead to financial performance in the Chinese supply chain context. By extending firm-oriented OSs to supply-chain-oriented SCSs and linking with SCI practices, this study contributes to OSs, SCSs, and SCI literature and practices in several ways. First, this study reveals impacts of four types of OSs on two types of SCSs. Second, this study investigates effects of SCSs on SCI. Third, this study explores relationships between SCI and financial performance. Fourth, this study provides guidelines for managers to decide how to devote their efforts and resources regarding different types of OSs, SCSs, and SCI, as well as how to manage various types of SCI to achieve financial performance.

2. Theoretical foundations and conceptual model

2.1. Literature review

An OS comprises 'broad policies and plans for using the resources of a firm and should be integrated with corporate strategy' (Jacobs and Chase, 2011, p. 23). These policies and plans are commonly described according to the priorities of four competitive dimensions in Skinner's (1969) seminal work, including cost, quality, flexibility and delivery.

Previous literature pays much attention to understanding the compatibility of OS with environments, managerial choices and competitive strategies (e.g., Corbett, 2008; Paiva and Vieira, 2011). Although OS has been well understood from an organization-wide perspective, evolving practices and theories may require a new understanding of OS in the supply chain context. SCM requires supply chain-based strategies and practices beyond the firms' boundaries. Recent work focused on exploring the connections of OSs with knowledge management (Hussain et al., 2015), competitive strategies (Khalili Shavarini et al., 2013), competitive advantages (Liu and Liang, 2015), or sustainability practices (Longoni and Cagliano, 2015). However, very few OS studies are investigated from the SCM perspective. For example, Quesada et al. (2008) linked order winning strategies with supply chain integration. There is a call for further investigation of the role of OSs in forming SCSs and supply chain practices.

An SCS describes how a firm can gain competitive advantages through its supply chain capabilities, such as cost efficiency, response speed and flexibility (Qi et al., 2011). Prior literature has classified SCSs into two generic categories: lean and agile (Fisher, 1997; Yusuf et al., 2004). While a lean SCS efficiently streamlines the whole supply chain, an agile SCS focuses on the reconfiguration of a supply chain in response to uncertain and dynamic environments (Naylor et al., 1999). The use of new technologies, such as radio frequency identification (RFID), and new management techniques such as postponement, could mitigate internal OSs' conflicts in achieving SCSs (Kwok and Wu, 2009). Hiltefth (2009) also argued that a differentiated SCS required the combination of different supply, manufacturing, and distribution strategies based on the observations in two cases. A recent work by Morita et al. (2015) empirically tested the alignment of SCS and product characteristics and how this alignment should be conducted. As we know, the link between SCS and SCI has not been established and tested in the literature. Therefore, an integrated framework connecting OS, SCS, and SCI will benefit the OS literature from the SCM perspective.

2.2. The effect of OSs on SCSs

When developing an OS, firms should identify their customers' needs for different products and translate them into either order winners to differentiate themselves from competitors or order qualifiers to bring themselves to the market. Based on the order winner and qualifier classifications, firms are required to build operational infrastructures and capabilities accordingly, such as supply chain development and management infrastructures and capabilities. Thus, following an OS, the development of an appropriate SCS is necessary. Kim et al. (2014) suggested an integrated process of strategy formation, indicating the roles of OS in forming SCS.

Organizational capability theory provides an effective theory lens for relationships among OSs, SCSs, SCI and performance. Organizational capability can be defined as the "ability to perform repeatedly a productive task which relates either directly or indirectly to a firm's capacity for creating value through effecting the transformation of inputs into outputs" (Grant, 1996, p. 377). It is a firm's intended or realized competitive performance or operational strengths in operations management (Peng et al., 2008). Among various organizational capabilities, one major capability is dynamic capability that refers to the ability to integrate, build, structure, and reconfigure internal and external competencies to meet requirements of changing environments to generate multiple sustained competitive capabilities simultaneously in dynamic, unstable, or volatile environments (Peng et al., 2008; Teece et al., 1997). Both operations and supply chain strategies are dynamic capabilities because they can help firms to repeatedly conduct productive tasks which relate to the transformation of inputs into outputs.

From the perspective of organizational capability, when a firm has a high level of absorptive capability to understand OSs, the firm will be

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