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Supply chain integration and firm financial performance: A meta-analysis of positional advantage mediation and moderating factors

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ABSTRACT

Supply chain integration (SCI) is recognized as strategic process management that can be instrumental for creating positional advantages associated with improved firm performance. However, despite rigorous execution, recent meta-analyses derive different conclusions about the benefits of SCI. We propose that these inconsistencies may be associated with selection bias, failure to consider the mediating routes by which SCI affects financial performance, and lack of investigation of moderators. To address these issues, we apply positional advantage theory and the resource-based view, and focus on mitigating the potential selection bias by aggregating findings from 170 previous investigations in a comprehensive meta-analysis, to examine how discrete dimensions of SCI enhance firm financial performance through three types of intermediate firm performance. The moderating effects of time, relationship quality, and national culture are also assessed. The findings confirm that each dimension of SCI indeed improves financial performance. However, contrary to expectations, relational and strategic types of intermediate performance associated with superior customer value positional advantage have stronger mediating effects than operational performance associated with lower cost positional advantage. In addition, time, relationship quality, and collectivist national culture strengthen the associations between some dimensions of SCI and firm performance. Our study findings are reconciled with those from recent meta-analytic studies, and implications arising from our conclusions that may inform practice about how to effectively leverage SCI are presented.

1. Introduction

Firms' strategic efforts to create positional advantages in marketplaces and achieve better performance by improving the efficiency and effectiveness of supply chain activities and processes are heavily dependent on supply chain integration (SCI). SCI is a firm's strategic collaboration and coordination with its suppliers and customers and the management of internal and external organizational processes. The essence of SCI is that streamlining core business processes within and between firms yields advantages over competitors through cost reduction or superior customer value creation that are associated with superior firm performance (Leuschner, Rogers, & Charvet, 2013; Mackelprang, Robinson, Bernardes, & Webb, 2014). Research that examines performance benefits associated with SCI has proliferated in the past twenty years, and two recent meta-analyses conducted by Leuschner et al. (2013) and Mackelprang et al. (2014) present empirical generalizations on the SCI-firm performance relationship.

Despite their rigorous execution, the two meta-analytic consolidations of the extant research "derive different conclusions pertaining to the overall 'value proposition' of SCI" (Autry, Rose, & Bell, 2014, p. 275). Autry et al. (2014) contend that the inconsistent findings are largely due to the application of different definitions, operationalizations, and levels of analysis for SCI. However, in addition to differences in definitions and operationalizations of key constructs highlighted by Autry et al. (2014), other issues such as selection bias, failure to consider the mediating routes by which SCI affects firm financial performance, and lack of investigation of moderators may have constrained the researchers from coming to comprehensive and generalized conclusions about the benefits of SCI. To develop a more complete understanding of the SCI-firm performance linkage by taking into account these other issues, we apply the resource-based view (RBV) and positional advantage

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theory (PAT) to conduct a meta-analysis that aggregates 170 samples representing a total of 39,495 observations. Our study extends current knowledge about the benefits of SCI in three ways.

First, our comprehensive meta-analysis contributes to accomplishing empirical generalization while avoiding potential selection bias. Selection bias refers to "[t]he tendency of meta-analytic authors to select particular studies" (Eisend & Tarrahi, 2014, p. 317). Eisend and Tarrahi (2014) contend that biased estimates of relationships of interest caused by selection bias are critical threats to the rigor of meta-analytic studies. Selection bias can arise from the limitation of the literature search to a few electronic databases or particular journal outlets (e.g., leading journals) or the exclusion of unpublished work (i.e., publication bias) (Borenstein, Hedges, Higgins, & Rothstein, 2009; Eisend & Tarrahi, 2014). In the context under examination, Leuschner et al.'s (2013) restriction of the search process to one electronic database and exclusion of unpublished papers, Mackelprang et al.'s (2014) limitation of the search process to two databases, and the associated relatively small sample sizes in both studies (80 and 35 respectively) collectively increase the possibility that selection bias may have affected their study findings. To minimize the eventuality of generating conclusions that may be influenced by selection bias, the extensive dataset generated for our study comprises 170 independent samples from multiple databases and includes unpublished papers. Based on the application of a rigorous protocol for avoiding selection bias, our meta-analysis is expected to yield more generalizable and theoretically consistent conclusions.

Second, our application of RBV and PAT provides a more holistic assessment of how, and indeed whether SCI affects firm financial performance – the ultimate bottom-line concern for all firms. The proposed theoretical framework and associated study hypotheses investigate the direct effect of SCI on firm financial performance as well as the indirect mediating effects by which SCI enhances financial performance through improved intermediate types of performance associated with lower cost and superior customer value positional advantages. Failure to consider both direct and indirect effects may also result in potentially misleading conclusions. For example, Leuschner et al.'s (2013) finding that SCI is not positively related to financial performance is based purely on the direct association between the two variables. However, reporting this insignificant direct relationship may mislead mangers by generating perceptions that financial returns associated with SCI are not large enough to warrant implementation. Therefore, in order to provide a more complete understanding of SCI's contributions to firms' bottom lines, our framework captures the direct effect as well as the indirect mediating influences of three types of intermediate firm performance (i.e., operational, relational, and strategic performance) between SCI and firm financial performance.

Lastly, in response to Mackelprang et al.'s (2014, p. 92) call for research that identifies "potential unknown moderators" that may affect the SCI-performance linkage, we further explore the nuances of the relationship by examining the moderating effects of time, relationship quality, and national culture. Recent meta-analyses provide insights into how the effects of SCI on firm performance differ contingent on dimensions of SCI (e.g., internal, supplier, and customer integration) or types of firm performance (e.g., financial, market, operational, and relational performance). However, substantial or sample-specific moderators beyond operationalization-related moderators may provide additional explanations of why the SCI-firm performance association varies (Leuschner et al., 2013). We therefore seek to advance theory and practice by proposing and testing the moderating effects of time, relationship quality, and national culture on the SCI-firm performance linkage.

The remainder of the paper is organized as follows. Before presenting the study hypotheses, the dimensions of SCI, types of firm performance, and theoretical foundations for this study are briefly reviewed. Next, the meta-analytic method, results and implications of the study findings are discussed. Finally, a future research agenda is proposed to facilitate a better understanding of how firms can effectively leverage SCI to achieve performance objectives, and to identify additional moderating factors that may affect the SCI-firm performance relationship.

2. Background

SCI and firm performance are both recognized as complex, multi-faceted constructs. Flynn, Huo, and Zhao (2010, p. 58) therefore argue that "to fully understand SCI and its relationship to performance, there is a need to examine … how individual dimensions of SCI are related to different dimensions of performance." Given that inconsistent findings on the value of SCI come from differences in definitions and operationalization of key constructs (Autry et al., 2014), we first explicitly define each dimension of SCI and type of firm performance.

2.1. Dimensions of SCI

As pointed out by Autry et al. (2014), the literature on SCI has developed from divergent and often inconsistent perspectives. For example, Leuschner et al. (2013) focus on SCI characteristics and activities by classifying SCI as information integration that refers to the coordination of information and the availability of supporting information technology among firms in the supply chain (e.g., Hill & Scudder, 2002; Holweg, Disney, Holmström, & Småros, 2005), operational integration that focuses on the collaborative joint activities and work processes among firms (e.g., Ireland & Webb, 2007; Saeed, Malhotra, & Grover, 2005), and relational integration that emphasizes a strong connection between firms in the supply chain based on trust, commitment, and long-term orientation (e.g., Chen, Paulraj, & Lado, 2004; Johnson, 1999). In contrast, and consistent with the predominant stream of recent empirical research studies (e.g., Flynn et al., 2010; Zhao, Huo, Flynn, & Yeung, 2008; Zhao, Huo, Selen, & Yeung, 2011), Mackelprang et al. (2014) aggregate characteristics of SCI like information, technology, process, and relationship to classify SCI into the three dimensions of internal, supplier, and customer integration.

Internal integration refers to a firm's coordination and collaboration of its organizational information, processes, and behaviors within a firm. Supplier and customer integration are forms of external SCI and refer to a firm's coordination and collaboration of inter-organizational information, processes, and behaviors with its key supply chain members (customers and suppliers). Thus, consistent with conceptualizations of SCI that emphasize aggregate strategic integration rather than characteristics and activities, we define SCI as the collaborative and coordinated management of intra- and inter-organizational information, processes, and behaviors to create maximum value, which comprises three dimensions of internal, supplier, and customer integration (Mackelprang et al., 2014; Zhao et al., 2008, 2011).

2.2. Types of firm performance

SCI research categorizes firm performance into three types: operational, financial, and strategic performance (Fabbe-Costes & Jahre, 2008). Operational performance has long been recognized as a complex, multidimensional, hierarchical construct that involves the improvement of supply chain-related organizational measures including logistics cost reduction, on-time delivery, inventory turnover, and cycle time reduction. Financial performance