Linking capabilities to green operations strategies: The moderating role of corporate environmental proactivity

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\textbf{ABSTRACT}

The aim of this study is to investigate the specific role of supply chain capabilities (SCCs) in the implementation of green operations (GO) strategies. More importantly, it examines whether this relationship between SCCs and GO is contingent on corporate environmental proactivity (EP). Theoretical predictions of the conceptual model were tested using hierarchical regression analyses of data obtained from 225 senior logistics/supply chain managers in the global auto sector. To ensure the robustness of our findings, a post-hoc analysis using the partial least squares approach was conducted. Significant positive associations exist between specific SCCs and the adoption of GO strategies. EP positively moderates the external integration capability – green purchasing and the supplier appraisal capability – green manufacturing linkages. However, unexpectedly, EP negatively moderates the effect of internal integration capability on green purchasing. Equally surprising, consistent negative moderation effects are detected for supply chain flexibility on green design, green purchasing, and green manufacturing. This study contributes to the existing resource-based view literature by focusing on the capability – strategy linkage and its specific application to environmental management. The exploration of the moderating effects of EP confirms the important role of organizing context in the effective exploitation and deployment of resources and capabilities.

1. Introduction

The increasing need to address environmental issues surrounding business operations has gained enormous attention from both academicians and practitioners, leading to the development of various green operations (GO) strategies, such as green design, green purchasing, green supply chains, and green manufacturing (Nunes and Bennett, 2010; Wong et al., 2012; Gimenez et al., 2012; Gavronski et al., 2012; Beske et al., 2014; Longoni et al., 2014). This is evident in a growing number of leading multi-national companies investing in GO, including PUMA’s sustainable design and green packaging initiatives (PUMA, 2013), Unilever’s sustainable sourcing (Unilever, 2014), and Mazda’s green manufacturing programs (Mazda, 2014). These practical examples and the extant literature both support the assumption that GO can assist firms in gaining a first-mover advantage and achieving a long-term sustained competitive advantage (Zhu and Sarkis, 2004; Wong et al., 2012; Thoumy and Vachon, 2012; Figge and Hahn, 2012; Gimenez et al., 2012).

However, successfully adopting these green strategies is often a challenging task, particularly when firms are constrained by their limited resources and capabilities (Klassen and Whybark, 1999; Lee and Klassen, 2008; Wu and Pagell, 2011). To overcome the hurdles in green strategy implementation, organizations have started to develop complementary resources and capabilities with their network partners. For instance, to achieve sustainable innovation in its product development, Unilever collaborates with its partners to leverage the skills, capabilities, and network it lacks (Unilever, 2014). Similarly, by building strong relationships with suppliers, engaging strategic suppliers, and developing shared commitment and supplier capability, Ford is able to improve its capability to encourage and influence the sustainability goals and management processes of its suppliers, thereby helping to achieve its own sustainable objectives (Ford, 2014).

Drawing on the resource-based view (RBV) (Wernerfelt, 1984), prior research has argued that the choice of a corporate strategy should be supported by specific organizational capabilities to achieve intended performance (e.g., Gold et al., 2016; Morash, 2001; Beske et al., 2014). However, according to recent reviews of empirical research on the RBV of the firm, the associations between capability and strategy have largely been neglected, with the majority of studies focusing on linking resources/capabilities to competitive advantages and/or performance.

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Table 1

<table>
<thead>
<tr>
<th>Green strategies</th>
<th>Description</th>
<th>Exemplar practices</th>
<th>Exemplar Benefits</th>
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<tbody>
<tr>
<td>Green design (GD)</td>
<td>Green design or eco-design is defined as the systematic consideration of design performance with respect to environmental, health, safety, and sustainability objectives over the full product and process life cycle. (Glantschnig, 1994; Handfield et al., 2001)</td>
<td>• Design of products for reuse, recycle, recovery of material, component parts</td>
<td>• Product/service differentiation</td>
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<td></td>
<td></td>
<td>• Design of products for reduced consumption of material/energy (Zhu et al., 2004; Zhu et al., 2007)</td>
<td>• Premium price</td>
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<td>Green purchasing (GP)</td>
<td>Green purchasing/procurement refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment. It aims to facilitate recycling, reuse, and resource reduction. (Green et al., 1996; Min and Galle, 1997; Blome et al., 2014)</td>
<td>• Environmental audit for suppliers’ inner management</td>
<td>• Cost savings (e.g. lower waste management fees)</td>
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<td></td>
<td></td>
<td>• Supplier ISO4000 series certification</td>
<td>• Compliance with environmental regulations</td>
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<td>• Reduced risk of accidents, liabilities (Zhu et al., 2007; Blome et al., 2014)</td>
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<td>Green manufacturing (GM)</td>
<td>The notion of green manufacturing is to reduce the harmful environmental impacts of manufacturing, including minimization of environmental and health risks, reduction of energy consumption and emissions, improvement of materials utilization efficiency and enhancement of operational efficiency. (Zhang et al., 1997; Defi, 2011)</td>
<td>• Environmental compliance and auditing programs</td>
<td>• Efficient and enhanced internal processes</td>
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<tr>
<td></td>
<td></td>
<td>• Total quality environmental management</td>
<td>• Cost savings</td>
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<tr>
<td></td>
<td></td>
<td>• ISO14000 series certification</td>
<td>• Improved market opportunities</td>
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<td>• Pre-empting regulation</td>
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<td></td>
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<td>• Reduced risk of accidents, liabilities (Zhu and Sarkis, 2004; Zhu et al., 2008)</td>
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This study will address the following research questions: (a) Does the successful implementation of GO strategies require the support of specific logistics/supply chain management (SCM)-related capabilities? (b) Is this capability – GO strategy linkage contingent on certain organizing contexts? To answer these questions, the auto sector was selected for our study, as automakers have rather complex supply networks and are often at the forefront of environmental management (Zhu et al., 2007), which could offer interesting insights related to this study’s research objectives.

Owing to the level of complexity and worldwide expansion of its supply networks, the auto industry is often confronted with significant barriers and challenges to its environmental management (Thun and Müller, 2010; Xia et al., 2011). As Thun and Müller (2010) noted, these challenges may arise from a lack of eco-oriented partnerships with supply chain partners coupled with a lack of internal environmental commitment and cross-functional integration. The limited resources and capabilities of suppliers may also frequently hamper an effective response to the environmental pressures in the auto industry (Lee and Klassen, 2008; Oh and Rhee, 2010). Thus, based on practical examples and the RBV, we contend that the successful implementation of GO strategies requires auto firms to possess and deploy their specific supply chain capabilities (SCCs). SCCs are defined as the ability of a firm to identify, utilize, and assimilate both internal and external resources to facility the entire supply chain activities (Wu et al., 2006). SCCs are valuable, rare, imperfectly imitable, and non-substitutable (VRIN) (Barney, 1991), as they can deliver value to customers, are not equally distributed across competitors, and are sufficiently complex to avoid easy imitation (Olavarrrieta and Ellinger, 1997).

Furthermore, the environmental commitment of a firm is believed to have great influence on its strategic decisions for competitive outcomes (González-Benito and González-Benito, 2005). Environmentally proactive firms may be more willing to deploy their resources and capabilities to launch green initiatives. In line with Newbert’s (2007) organizing approach, we argue that corporate environmental proactivity (EP) is an important firm-level condition that may affect the effective exploitation of capabilities for successful GO strategy implementation.

Using data collected from the global auto sector, we empirically tested the interactions among SCCs, EP, and GO strategies. One significant contribution of this study is that it examines the capability – strategy link by explicating the effects of SCCs on the adoption of GO strategies in the auto sector. Most importantly, our introduction of EP as a crucial moderating construct in the linkage between SCCs and GO strategies distinguishes our contribution from previous research (e.g., Bowen et al., 2001).

This article includes six sections. After the introduction, Section 2 discusses the theoretical foundations and our conceptual framework. In Section 3, we introduce our research methodology for data collection and data analysis. Following Section 3, the survey results are presented in Section 4. In Section 5, we discuss the findings from our analysis results. Section 6 concludes our study with the implications of the research findings and several research limitations.

2. Theory and hypotheses

2.1. Green operations

GO addresses how to integrate environmental considerations into operations management by analyzing the specific strategies of organizations in, for example, product development, product lifecycle management, manufacturing, and supply chain management (Wong et al., 2012; Gimenez et al., 2012; Gavronski et al., 2012; Beske et al., 2014; Longoni et al., 2014). GO involves several environmental management strategies, including green design, green purchasing, green manufacturing, reuse, and recycling (Gmelin and Seuring, 2014; Sarkis and Dhavala, 2015; Nunes and Bennett, 2010; Wong et al., 2012). Incorporating these environmental strategies into daily business operations can bring many benefits not only to the focal firms, but also to the partners in the network (Handfield et al., 2005). For example, green design is a strategy in which a firm seeks to differentiate itself from its rivals by offering eco-friendly products and services.
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