Green supply chain practices as a consequence of the green bullwhip effect: understanding the relationship

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Sumary Abstract

This article aimed to understand and analyze how different institutional pressures created by different stakeholders tend to promote the green bullwhip effect and consequent adoption of green supply chain management practices across a supply chain. Based on case study methodology, the relationship between a focal company in the automotive battery supply chain in Brazil and its primary stakeholders was analysed.

Keywords: The Green bullwhip effect; Green supply chain management; Emerging economy.

Purpose

Green supply chain management (GSCM) has been greatly explored in the literature. Several studies use stakeholder theory or institutional theory to analyze GSCM (Sarkis, Zhu, and Lai 2011). For example, it is known that stakeholders exercise great environmental pressure and influence the adoption of GSCM practices (Björklund 2011; Mohanty and Prakash 2013; Chien and Shih 2007; Lee 2008) and that the most important stakeholders when it comes to adopting GSCM practices are customers (Mohanty and Prakash 2013; Chien and Shih 2007; Lee 2008). It is also known that specific institutional pressures can motivate companies to adopt specific GSCM practices (Hoejmose, Grosvold, and Millington 2014; Zhu, Sarkis, and Lai 2013; Prajogo, Tang, and Lai 2012). However, according to Zhu, Geng, and Sarkin (2016), it is still unclear how different institutional pressures are related to the adoption of various environmental management practices, which includes GSCM.

Therefore, it is important to understand the circumstances regarding environmental pressure from stakeholders in the focal company in order to understand GSCM (Betts, Wiengarten, and Tadisina 2015; Meixell and Luoma 2015) and its enlargement along a supply chain (Laari et al. 2015). This may drive the adoption of

GSCM practices; especially in tiers located downstream (Lee et al. 2014). In other words, it is important to understand the potential impacts of institutional pressure on the diffusion of adoption of GSCM practices in supply chains.

Moreover, this article contributes to the GSCM research field by:

- Uncovering evidence, within the same study, of how different stakeholders exert different types of institutional pressure that influences the adoption of GSCM practices. In general, articles have analyzed these two aspects separately, but more studies should focus on investigating whether companies make changes as a result of pressure (Meixell and Luoma 2015);
- Discussing the effects of the enlargement of environmental pressures along a supply chain in order to understand whether or not environmental pressures increase upstream supply chain (Lee et al. 2014). The traditional literature on the supply chain frequently discusses the bullwhip effect, which is related to inaccurate demand forecasts with consequences for increasing inventories upstream in the supply chain. The environmental management literature has identified a parallel between the idea of the amplification of demand from the traditional bullwhip effect and the increase of environmental pressures in the upstream supply chain. This article proposes to analyze this parallel further in order to shed light on the spread of GSCM practices across supply chains.

Therefore, the research question of this article is: how do different institutional pressures exerted by different stakeholders tend to promote the green bullwhip effect through the adoption of GSCM practices in the context of a supply chain located in Brazil?

This paper thus aims to understand and analyze how different institutional pressures created by different stakeholders tend to promote the green bullwhip effect and the consequent adoption of GSCM practices across a supply chain.

A case study methodology (Yin 2010) was used to analyze the relationship between a focal company in the automotive battery supply chain in Brazil, and its primary stakeholders. Few studies have examined stakeholders' pressure in sustainable supply chain management in South America (Meixell and Luoma 2015); and there is a need to understand the differences in dynamics of environmental issues in different countries (Laari et al. 2015; Lee et al. 2014). Consequently, Brazilians companies were selected for this study because Brazil is the leader in the production of motor vehicles (OICA 2015) and is also the leader in the production and use of lead (ILA, 2016) in South America. Additionally, this country has particular characteristics regarding the institutional environment of the automotive battery sector, which is relevant, according to Silvestre (2015), for analyzing the role of a focal company in terms of leading supply chains toward more sustainable business practices in developing and emerging economies.

Design/Methodology/Approach

This research was based on a case study method. A single case was used because it offers details regarding the phenomenon studied, i.e., the green bullwhip effect on the supply chain. A single case can also properly represent the influence of primary stakeholders on a focal company in which there is a particular institutional environment.

The case in this study concerned one of the principal automotive battery manufacturers in Brazil (based on Castro, Barros, and Veiga (2013)) and its principal primary stakeholders. The companies that were elected as primary stakeholders are the main customer, the more collaborative supplier, and the main government body of the chosen automotive battery producer, which will be called Alpha Company.

Primary data were collected through interviews and direct observations conducted at the studied organizations, and secondary data were obtained from the organization's documents (reports, manuals, procedures, website information, etc.). Thus, primary and secondary data were triangulated (Yin 2010).

The script for the interviews contained, in general, the questions below:

- What are the environmental pressures from the customer stakeholder?
- What are the environmental pressures on the stakeholder supplier?
- What are the environmental pressures from the government stakeholder?
- What answer does the company give to environmental pressures received from the government and customer stakeholders?
- Regarding the environmental pressures on the stakeholder supplier, does the company offer any kind of support or assistance to this stakeholder to transform environmental pressure into some kind of action?
- What GSCM practices are adopted by the company in response to environmental pressure from their stakeholders?
- Has the company adopted any GSCM practices that are not related to environmental pressures from stakeholders?
- Does the company encourage its suppliers to adopt some kind of GSCM practice?

The green bullwhip effect was identified by examining the evolution of the adoption of GSCM practices across the supply chain as a result of environmental pressures from stakeholders. The circumstances of this evolution have been taken into consideration for an understanding of the spread of GSCM.

The interviews were recorded, transcribed, and validated by the interviewees in way that imitated Tomasin et al.'s (2013) methodology. The text of the validated interviews was read and grouped into categories of analysis based on the constructs of the research: environmental pressures received/exerted from/on stakeholders, responses given to received environmental pressures, and GSCM practices adopted as a result of these pressures. Arguments from the text that could serve to fill each of the categories of analysis were highlighted and grouped together. The observations made were summarized in notes and these notes were read and grouped by categories of analysis. Likewise, the obtained documents were analyzed and the identified content was grouped into categories of analysis.

After this, narratives of the interviews were written and quotations were combined from key parts of the interviews. A table was elaborated for organizing the data. Additionally, the narratives were intertwined with theory to highlight the connection between empirical data and the previous theory in order to create new insights into the green bullwhip effect. These procedures were developed considering Eisenhardt and Graebner (2007).

Results

The eight groups of propositions (P1-P8), resulting from an analysis of empirical data from the perspective of stakeholders theory and institutional theory, were proposed for explain how different institutional pressures promote the green bullwhip effect and the consequent adoption of GSCM practices across the supply chain; and they are this study's biggest contributions to the literature.

Environmental pressures were found to propagate across a supply chain from tier to tier (P1). The end customer receives the environmental pressure and initiates its diffusion along the supply chain. The tiers use several mechanisms of pressure such as regulations, audits, demand for green products, clauses in contracts, and embargoes

(P3). In this context, sector characteristics may make certain stakeholders more prominent than others (P2). The adoption of GSCM practices may be influenced by primary stakeholders, the customer being the most influential (P6). The position in a supply chain also plays an important role in intensifying the green bullwhip effect, because the farther an organization is from the end customer, the more delayed the environmental pressures will be. This leads the organization to act intensely to respond to environmental pressures, adopting the most complex GSCM practices (P4). Cooperation between tiers is a means to mitigate the difficulties experienced by more distant tiers when it comes to responding to environmental pressure (P5). In a context in which companies are immersed in a mature institutional environment, normative pressures are more effective than coercive ones (P7), and these differences in institutional pressures shape the green bullwhip effect and its effectiveness in relation to the adoption of GSCM practices (P8).

Relevance/Contribution

This evidence helps to fill gaps in the literature, because few studies to date have tried to identify the circumstances that explain the levels of environmental pressure (Betts, Wiengarten, and Tadisina 2015), as this study does in propositions P1, P2, P4, and P6. These propositions also help to explain the magnitude of the expansion and transfer of environmental requirements across a supply chain, thereby filling a gap in the literature pointed out by Larri et al. (2015). This study also demonstrates that different pressures have different effects when companies have the objective of developing environmental sustainability with the supplier. It thereby fills a gap in the literature pointed out by Sancha, Longoni, and Giménez (2015), as highlighted by propositions P2 and P6.

Lee et al. (2014) suggest that further studies are needed to examine the environmental demands imposed on stakeholders located downstream. Our paper explores this issue by analyzing different tiers in the same supply chain, as highlighted by proposition P4. Furthermore, Lee et al. (2014) highlight the need to investigate how institutional differences cause differences in the green bullwhip effect. By examining the institutional environment of a particular sector, the article offers insights (such as those presented in propositions P7 and P8) into the behaviour of the green bullwhip effect in a chain that could present risks to the environment and to human health. Finally, it is noteworthy that in this study, environmental pressure does not tend to increase along the chain. Rather, the more distant the tier is from the end customer, the more it tends to adopt many more GSCM practices to respond to pressure, which corresponds with another point of view from the study by Lee et al. (2014).

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