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Reprint of "Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: Direct and indirect effects" ☆

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ABSTRACT

This study aims to test a new conceptual model based on the relationship between quality management (QM), environmental management maturity (EMM), adoption of external practices of green supply chain management (GSCM) (green purchasing and collaboration with customers) and green performance (GP) with data from 95 Brazilian firms with ISO 14001. To our knowledge, such links and relationships are not simultaneously identified and tested in the literature. The results indicate the validation of all of the research hypotheses. This paper highlights that an improvement in green performance will require attention to quality management, environmental management maturity, and green supply chain.

1. Introduction

In a recent survey, approximately 70% of business leaders said that sustainability has a permanent place in their management agendas, but the success of this process depends on collaborations established between supply chain firms (Kiron et al., 2012). In this context, the concept of green supply chain management (GSCM) has grown in importance because it contributes in the transition towards eco-efficiency (Govindan et al., 2014) and sustainability (Yusuf et al., 2013; Zhu et al., 2013b) and also to the future of operations management (Gunasekaran and Ngai, 2012; Diabat and Govindan, 2011).

As a consequence of the concept of extended producer responsibility (EPR) (Sheu and Talley, 2011), GSCM can be defined as the coordination of the supply chain in a form that integrates environmental concerns and considers inter-organizational

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activities (Green et al., 2012). GSCM manages the acquisition, production and distribution of materials to meet the requirements of stakeholders to improve profitability, competitiveness and the resilience of organization in the short and medium terms through improved green performance (Ahi and Searcy, 2013). GSCM practices that involve every tier in the greening of a supply chain are often called external GSCM practices (Zhu et al., 2007a).

The literature argues that in general, the adoption of GSCM practices tends to affect not only the company's green performance (Zhu et al., 2007b, 2013b) but also supply chain performance too (Azevedo et al., 2011). However, with regard to external GSCM practices, such findings may not appear conclusive because both supporting (Zhu et al., 2007a; Green et al., 2012) and contradictory results (Zailani et al., 2012) can be found. Another relevant finding, according to Zhu et al. (2012a), is that it is desirable for companies improve their EMM before they improve green management performance through external GSCM practices. Hence the maturity level of environmental management may have implications for the adoption of GSCM practices. Certainly, one way to improve the EMM in companies is through the early adoption of quality management (QM) principles (Pereira-Moliner et al., 2012; Llanch et al., 2013; Zhu et al., 2013a).

However, the literature lacks an adequate analysis of the relationship between QM, the environmental management maturity (EMM), external GSCM practices and the environmental performance of firms (GP).

Additionally, two relevant variables may influence this relationship: the national context and firm size. Seuring and Gold (2013) note that there are few studies on developing countries within the theme of sustainability in supply chains. Thus, analyzing Brazilian companies may be important, particularly because Brazil is part of the BRIC group (Brazil, Russia, India and China) and corresponds to approximately 30% of GDP in Latin America. In addition, Brazil is among the 10 largest world economies (Jabbour and Jabbour, 2014). The importance of firm size has also been highlighted by several authors as a variable that can influence the green performance of organizations (González-Benito and González-Benito, 2006).

From the above, the questions that we seek to answer in this study are as follows: Does quality management (QM) influence environmental management maturity (EMM)? Does EMM influence the adoption of external green supply chain management (GSCM) practices? Do external GSCM practices influence the green performance of these firms (GP)? Does EMM mediate the relationship between QM and GSCM? Does GSCM mediate the influences of EMM and GP? Are these relationships valid for the companies in Brazil with ISO 14001 certification?

Thus, the aim of this research is to answer the questions above. To this end, we present the results of a survey of 95 Brazilian companies with ISO 14001 certification and test these data using a conceptual model that incorporates 9 research hypotheses. The value of this analysis derives from the following: (a) the literature on organizational sustainability, as far as the authors of this article know, still presents no simultaneous testing of the identified relationships, (b) the reality of developing countries, with the exception of China, is still poorly analyzed. Thus, to our knowledge, these are the first research findings that combine the concepts of QM, EMM, GSCM and GP based on the Brazilian context.

This paper is structured as follows: Section 2 presents the literature review and the research hypotheses; Section 3 presents the research methodology; Section 4 presents the results; Section 5 presents the discussion and, finally, Section 6 presents the conclusions of this paper.

2. Theory and hypothesis development

2.1. Quality management (QM) and environmental management

In the 1980s, Western companies began to import a series of concepts, tools and Asian techniques to improve processes and, subsequently, competitiveness through QM (Lo et al., 2013). Just as QM had its greatest development in companies during the 1980s and 1990s, environmental management, a set of initiatives to mitigate the impact of organizations' operations on the environment (Bansal and Roth, 2000), intensified in the 1990s. According to Lubin and Esty (2010), the concept of environmental sustainability has changed the way in which companies conduct their business, and it appears to have followed a trajectory similar to that of QM.

Furthermore, the specialized literature (Narasimhan and Schoenherr, 2012; Pereira-Moliner et al., 2012) notes that there are numerous similarities between QM and environmental practices, such as zero defects, life cycle assessment, waste reduction, and the involvement and training of employees and senior management (Sroufe and Curkovic, 2008).

In this sense, some studies suggest that QM practices such as ISO 9001 and other certification programs and supplier total quality management (TQM) can facilitate or accelerate the implementation of environmental practices as well as increasing their effectiveness (Wiengarten and Pagell, 2012; Pereira-Moliner et al., 2012; Llanch et al., 2013). Indeed, Wiengarten and Pagell (2012) found empirical evidence that companies improve their performance in terms of cost, flexibility and delivery performance when environmental management practices exist due to high investments in QM practices.

Further, Pereira-Moliner et al. (2012) examined hotels in Spain, Llanch et al. (2013) investigated 374 restaurant managers, and Zhu et al. (2013a) studied manufacturing companies in China. All these studies observed that QM practices facilitate the development of environmental management practices, which in turn have a positive impact on quality management practices, producing knowledge that is acquired that then facilitates the adoption of environmental practices in a synergistic way. In other words, it is possible to favor the implementation of environmental practices by taking advantage of the resources and capabilities developed for QM.