



## Note from the field

## Green training and green supply chain management: evidence from Brazilian firms



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## ABSTRACT

The implementation of green supply chain management practices, such as green purchasing and cooperation with customers, presents several challenges, often due to a lack of green training. In order to analyze the relationship between green training and green supply chains, a survey of Brazilian firms with ISO 14001 certification was conducted. The main characteristics of green training in the sample were also explored. The results indicated that green training is positively correlated with the adoption of green supply chain practices in green purchasing and cooperation with customers, confirming the study's main hypothesis. The research results also indicated that green training tends to help firms improve their green supply chain management to cooperate with customers and implement green purchasing. This work extends the current literature by showing that employees' green training content and requirements for greening suppliers should be further aligned. This alignment should also involve cleaner production priorities built up through customer cooperation. As a consequence, firms will reach internal environmental targets and achieve external environmental improvements (such as through having greener suppliers). Finally, we also discovered the main characteristics of green training that can galvanize green supply chain management, including the following: green training topics that are appropriate and current for company activities, green training contents created through a systematic analysis of training gaps and needs; and employees who receive green training and have the opportunity to apply green knowledge in everyday activities.

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## 1. Introduction and research background

According to Gotschol et al. (2014), companies should give preference to GSCM (green purchasing and collaboration with customers), a more economically sustainable and environmentally friendly approach, when trying to become greener. In the context of more sustainable operations management (Walker et al., 2014; Piercy and Rich, 2015), GSCM extends the traditional concept of supply chain management (Tiwari et al., 2015; Wong et al., 2015; Govindan et al., 2014) by improving the environmental performance of products and services across their complete life cycles (Gunasekaran et al., 2015; Ahi and Searcy, 2015; Rostamzadeh et al.,

2015). In the context of searching for greater sustainability in supply chains (Brandenburg et al., 2014), the implementation of GSCM faces several barriers, such as the lack of financial resources to support remanufacturing (Zhu et al., 2014; Rauer and Kaufmann, 2014). Other potential barriers include the lack of trust among members in supply chains (Wood and Gray, 1991) and the lack of an appropriate commitment from top management (Luthra et al., 2015).

Although this topic has been discussed for the last decade (Srivastava, 2007), its implementation is still a challenge because of the aforementioned barriers—especially in emerging economies (Tiwari et al., 2015; Fahimnia et al., 2015; Gunasekaran et al., 2014; Muduli et al., 2013; Jabbour et al., 2013; Zhu et al., 2005), where research on the topic needs to advance for companies to make real contributions to environmental management (Pagell and Shevchenko, 2014; Tachizawa and Wong, 2015). This situation is no different in Brazil, which was until 2013 one of the world's fastest-growing economies (along with India, Russia, and China) and the most important economy of South America. According to a recent report, Brazil will keep its position as one of the world's top 10 economies through 2050 (PWC, 2015). It is necessary to know more about GSCM in South America, which is, according to Fahimnia et al. (2015), one of the world's least-studied areas regarding the current state of the art on GSCM, accounting for just 2.1% of the available literature on the subject.

Although recent studies have shown that there is a positive scenario in which to adopt GSCM in Brazil (Alves and Nascimento, 2014), the current adoption level of GSCM practices can be further improved (Kannan et al., 2014). Of the wide range of possible GSCM practices (Zhu et al., 2005), we highlight green purchasing (GP) in this research, as this is related to the inclusion of environmental criteria in supplier selection and purchasing and to collaboration with consumers (CC), which refers to customer engagement, green feedback and guidelines on the greening of firms (Zhu et al., 2008). GP and CC practices are used in an attempt to overcome the challenges of stakeholder inclusion in environmental actions (Abreu et al., 2015) by involving customers and suppliers in the decision-making processes related to green issues across the supply chain.

According to the resource-based view of sustainable supply chains (Touboulic and Walker, 2015), the alignment between human resource management and environmental management (including GSCM)—also known as green human resource management (GHRM) (Jackson et al., 2014)—can help firms to overcome barriers to adopting CC and GP. This is because GHRM, which is defined as the alignment between traditional human resources practices (such as training and performance appraisals) and environmental policies and objectives (Jackson et al., 2014; Renwick et al., 2013), can contribute to greater employee engagement in sustainability management (Renwick et al., 2013). This is particularly true in a context in which increasingly proactive environmental behaviors are necessary (Graves et al., 2013; Ehnert, 2009).

Among the GHRM practices that can contribute to GSCM, we highlighted green or environmental training (GT). GT can be defined as a process of on-the-job training and continued education intended to achieve corporate environmental management targets and purposes (Daily and Huang, 2001). According to Paillé et al. (2014) and Muduli et al. (2013), GT is a type of training related to relevant environmental topics; it enables all staff (top, senior, and middle managers and the workforce) to integrate the firm's performance with environmental issues. Recent research suggests that GT is positively related to the greening of companies around the world. For example, Sarkis et al. (2010) claimed that GT was relevant to the adoption of advanced environmental practices among companies in Spain.

Daily et al. (2012) stated that GT is relevant to green teams. Jabbour (2015) indicated that GT is positively related to the evolution of environmental management in firms. Other studies have reinforced the importance of GT for a green economy (Jackson et al., 2014; Renwick et al., 2013).

However, based on the available knowledge, the following gaps still remain in the current literature. First, works have suggested that organizational learning (van Hoof, 2014) and training are relevant to cleaner production programs (Stone, 2000). More specifically, Gosling et al. (2014) suggested that organizational learning is relevant to creating more sustainable supply chains. However, these works do not directly discuss the link between GT and GSCM. On the other hand, many works on green training are qualitative (Perron et al., 2006; Teixeira et al., 2012) or conceptual, such as literature reviews (Jabbour, 2013). More quantitative studies are still needed (Jabbour and Jabbour, 2016). As a consequence, this is a useful avenue for future research.

A research gap also exists regarding whether green training is positively related to green supply chain practices (such as green purchasing and cooperation with customers). Additionally, this study presented the main green training characteristics that support the above-mentioned GSCM practices.

Furthermore, considering that firm size (FS) plays a major role in the adoption of more sustainable management practices (Bai et al., 2015), this measure is expected to exert significant control over the adoption of GSCM. Assuming that green training is positively related to green supply chain management, we surveyed Brazilian companies that used the ISO 14001 certification for environmental management systems to test the validity of the proposed framework and research hypothesis. Additionally, we tested the role of firm size (FS). So far, we have found no similar works in the Scopus or ISI Web of Science databases dedicated to analyzing GT for GSCM (CC/GP) in this kind of sample.

## 2. Research method

This research was quantitative and based on an electronic survey. We proposed the research framework shown in Fig. 1. Survey studies are generally relational because they tend to be designed to empirically examine relationships among two or more constructs or variables (Rungtusanatham et al., 2003). Surveys are also relevant for describing important variables or characteristics of constructs (Rungtusanatham et al., 2003). The survey approach was selected in this work mainly because we tested the relationship between GT and GSCM to provide a description of GT's main characteristics. This quantitative approach was adequate for the research questions presented herein. As a consequence, we tested the following relationship ( $H_1$ ): *GT is positively related to the adoption of GSCM practices*. We also explored GT's main characteristics.

The survey questionnaire included the measurement of eight GSCM practices/items (five for GP and three for CC). The selected GSCM practices were validated by Zhu et al. (2008) in the Chinese context. As discussed by Zhu et al. (2008), the scale was inspired by assumptions from the ecological modernization theory applied to GSCM and were further discussed by Sarkis et al. (2011). In addition, the questionnaire measured 10 GT practices. The GT practices were based on the validated scale from Daily et al. (2012) and were inspired by works discussing GT, such as Teixeira et al. (2012) and the ISO 10015 (2001). Table 1 shows the references for all the selected items in the research questionnaire. As explained above, all the selected items were validated by the literature.

In addition, we measured the FS variable using four types of patterns in Brazil based on the number of employees: micro-sized firms (up to 19 employees), small firms (20–99 employees), medium-sized firms (100–499 employees), and large firms (500 or

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