



Shippers and freight operators perceptions of sustainable initiatives



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ARTICLE INFO

Article history:

Available online 13 July 2015

Keywords:

Sustainable transportation
Non-linear canonical correlation
Sustainable practices

ABSTRACT

The purpose of this paper is to document the extent to which Brazilian companies in retail channels have committed to adopting environmental sustainability measures, goals and strategies for waste disposal in the evaluation and planning of sustainable transportation. This paper also aims to examine the different viewpoints of sustainability issues and the preventive actions taken by companies in terms of controlling carbon dioxide emissions and proper disposal of tires, lubricant oils, accessories and spare parts. Finally, taking the perspective of these companies, this paper examines their difficulties in meeting environmental regulations. The research involved a survey completed by 185 representatives of different types of companies, including shippers (represented by manufacturers), LSPs (logistics service providers) and carriers. The non-linear canonical correlation was calculated to verify the opinions of these representatives from different companies regarding issues that impact on the environment, the preventive actions they adopt to reduce their environmental impact and their difficulties in meeting environmental regulations. The results show that shippers and LSPs have the same perceptions regarding these sustainability issues and preventive actions. In addition, the companies perceive high costs and the lack of training for their partners as the major challenges experienced in addressing these issues and undertaking preventive actions. Therefore they need to plan their transportation activities.

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1. Introduction

Sustainable business development has received much attention over the past decade due to the significant attention that governments and both for-profit and not-for-profit organizations have given to environmental, social and corporate responsibility (Gunasekaran & Spalanzani, 2012). The emergence of a changing economic order has also led companies around the world to think seriously about manufacturing and service sustainability (Ageron, Gunasekaran, & Spalanzani, 2012; Madu, Kuei, & Madu, 2002), focusing on pollution control and product life-cycle assessment (Gunasekaran and Spalanzani, 2012).

In terms of the sustainability agenda, due to the increase in pollution in the ecological environment and to global warming, an increasing number of countries and governments have enacted environmental regulations to curb environmental impacts, for example, the National Policy on Solid Waste (PNRS) in Brazil (Brazil, 2010). These regulations focus on reducing carbon dioxide

emissions and waste disposal (Ji, Gunasekaran, & Yang, 2014); these regulations also contribute to evaluation and program planning in sustainable transport by companies in retail channel. The problem of carbon dioxide emissions is not new, and effective strategies for reducing emissions are available for most emission sources. These include strategies for freight transportation, which is a primary source of air pollution in many cities, especially in developing countries whose transportation systems are predominantly based on road transport (Chow et al., 2004). Based on rankings by a group of transportation experts, Verma, Rahul, and Dixit (2014) recently revealed that carbon dioxide emission is the major indicator for assessing environment sustainability. Water reduction is also an environmental competitive priority for Brazilian companies (Jabbour, Da Silva, Paiva, & Santos, 2012).

However, most Brazilian companies engaged in retail transport operations have not measured their carbon dioxide emissions and do not recycle waste, and many have not adopted adequate waste-disposal strategies. Representatives of these companies are not fully aware of the environmental impact of disposing of spare vehicle parts. Vehicles require lubricant oil, tires, and spare parts for regular maintenance. In general, these Brazilian companies do not have much control over and do not attempt to directly

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influence consumer waste disposal habits. Therefore, it may be concluded that most of those companies have not applied a life-cycle assessment methodology to measure possible environmental impact reductions throughout the life cycle of their products or services.

The purpose of this paper is to document the extent to which Brazilian companies in the retail sector have committed to adopting environmental sustainability measures and goals as well as environmentally sound strategies for waste disposal. This paper also aims to examine the sustainability initiatives undertaken by companies for carbon dioxide emission control and proper disposal of tires, lubricant oil, accessories and spare parts. Finally, this paper seeks to examine the difficulties experienced by these companies in fulfilling environmental regulations. These objectives allow us to understand how companies have addressed aspects of planning and evaluation in sustainable transportation system.

The research reported on this paper follows [Lieb and Lieb \(2010\)](#), who have analyzed environmental sustainability goals and initiatives from the viewpoint of third-party logistics providers (3PLs). These authors have also examined the impact of these initiatives on 3PLs and their customers using two surveys, one in 2008 and the other in 2009, conducted with 39 and 35 CEOs (Chief Executive Officer), respectively, from the largest companies in the USA. In this paper some additional initiatives regarding transportation issues are considered. [Lieb and Lieb \(2010\)](#) indicate that many of the major global 3PLs have made important commitments to improving their environmental sustainability, especially those related to distribution and transportation activities ([Colicchia, Marchet, Melacini, & Perrotti, 2013](#)). In contrast, this research shows that these actions are still developing and that large companies find them restrictive ([Wolf & Seuring, 2010](#)). A survey conducted by [Martinsen and Björklund, 2012](#) with shippers and LSPs in the Swedish market revealed that LSPs and shippers have different perceptions of environmental issues and therefore have different points of reference, although LSPs appear to be more aware of environmental demands. The environmental initiatives (alternative fuel, emission data, energy data, transport planning, logistics system design, environmental evaluation system, etc) reflected in the shippers' responses resulted in lower mean values of importance than those of the LSPs. While some LSPs maintain a long-term perspective on green initiatives, this is not true for all companies, especially for smaller 3PLs, which tend to focus on short-term commitments ([Evangelista, Hüge-Brodin, Isaksson, & Sweeney, 2012](#)). Environmental issues are also a component of environmentally conscious manufacturing, which has shifted focus to environmentally friendly products ([Madu et al., 2002](#)).

However, the documentation of sustainability attitudes and initiatives from the viewpoint of companies is still poor, especially when considering the triad of shippers, LSPs and carriers, the main actors in the retail sector. This paper contributes to filling this gap. Moreover, as is known, the road-based transportation system produces many environmental issues that have been analyzed from a broad perspective. This paper addresses a number of specific environmental issues related to the end of the life cycle, a topic that has not been studied yet in the Brazilian transportation system.

Therefore, this paper makes a new contribution toward understanding the attitudes, perceptions and initiatives regarding sustainable transport from three types of companies: shippers, LSPs and carriers. This paper also represents the first large-scale effort to document the commitment of Brazilian companies in the retail channel to environmental sustainability measures and goals and can also provide insights for future studies. Non-linear canonical correlation (non-CCA) is utilized, which may inform policy makers to identify issues that are negatively perceived by different companies. Explaining and understanding individual

responses should lead to the development of policies and program planning that better reflect the complex and diverse needs of the sustainable transport industry. However, a limitation of this approach is that the adopted binary scale does not allow the evaluation of a wide range of company perceptions across all issues.

This paper is structured as follows. The first section provides theoretical background regarding sustainable practices and sustainability initiatives. This is followed by a description of the statistical methods being used, focusing on non-CCA. The empirical analysis of the data is followed by a discussion and a conclusion, including lessons learned, limitations and suggestions for further research.

2. Theoretical background

2.1. Investigating of outputs in the life-cycle analysis

[Gunasekaran and Spalanzani \(2012\)](#) emphasize that companies must strategically design their logistics operations, including transportation and third-party logistics activities ([Colicchia et al., 2013](#)), through GSCM (green supply chain management). The search for pollution control, energy efficiency and renewable energy ([Weisbrod, Lynch, & Meyer, 2009](#)) as well as wastewater emissions and solid waste disposal ([Wagner & Schaltegger, 2004](#)) leads many companies to develop innovations in their products and services ([Zhu & Sarkis, 2004](#)). Therefore, it is important to give environmental issues in operations the same importance as other aspects, such as cost and quality ([Jabbour et al., 2012](#)).

To address those issues, LCA (life-cycle assessment) and C2C (Cradle-to-Cradle) certification ([Braungart, McDonough, & Bollinger, 2007](#)) have been pursued to indicate possible environmental impact reductions by addressing the life-cycle of products or services. LCA is a recognized as a standardized method for evaluating the environmental impact of manufacturing processes from raw material acquisition to use, via production, and final disposal ([Finnveden, 1999](#)). LCA is based on evaluating the set of inputs and outputs. However, according to [Matos and Hall \(2007\)](#), the LCA method fails to recognize the conflicting interests among stakeholders taking part in the assessment, which are difficult or impossible to reconcile. C2C certification is also an important life-cycle approach; it has gained popularity with companies because it provides a way to distinguish more environmentally friendly products based on three qualitative principles: zero resource use, zero waste emissions, and zero toxicity ([Braungart et al., 2007](#)). According to [Llorach-Massa, Farreny, and Oliver-Solà \(2015\)](#), LCA is more relevant than C2C certification. LCA considers five life-cycle stages (material resources, transportation, production, use and end of life), whereas C2C neglects the production, transport and use stages, which are all associated with higher energy consumption. In addition, C2C considers the use of 100% renewable energy for product manufacturing and material recycling, which would have zero environmental impact. Another strategy is the eco-efficiency approach, which focuses on increased resource productivity, reduced toxicity, increased recyclability, extended product life-span and dematerialization ([Braungart et al., 2007](#)). These strategies reduce a company's carbon footprint and contribute to low-carbon cooperation between firms and an increase in the development of products while addressing their reuse, recycling and recovery of material and component parts.

Some end-of-life strategies for products are more commonly applied than others by companies and are described in the literature ([Saavedra, Barquet, Rozenfeld, Forcellini, & Ometto, 2013](#)). These strategies are included in LCA, such as *landfilling*, *compositing*, *reusing waste materials* and *recycling*, and represent the strategies generally adopted by carriers and LSPs. Other

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