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Adoption of Sustainable Supply Chain Practices and its Impact on Company Performance

Luisa Pinto¹

¹ Assistant Professor at Prince Sultan University, Aviation and Management Department, Riyadh, Saudi Arabia;
Polytechnic Institute of Viseu, School of Technology and Management of Lamego, E-mail: lpinto@psu.edu.sa

Abstract: To date, research on the performance of sustainable organisations has focused on green supply chain practices and corporate financial performance. This paper contributes to the field of sustainable supply chain practices by presenting an innovative approach that focuses on the simultaneous analysis of the three dimensions of sustainability (environmental, social and economic), and the relationship between economic, environmental and social performance indicators. Using a multiple case study, eight companies were investigated through twenty-two (22) semi-structured interviews to analyse which sustainable internal and external practices are being incorporated by industrial companies across the supply chain, the performance indicators used to evaluate their sustainable practices, and the impact of those practices on the economic, environmental and social performance. We found that the implementation of sustainable supply chain practices across the supply chain has positive impacts on the overall business performance. Practitioners can use this framework as a checklist to identify possible practices to achieve their sustainability goals. Furthermore, the results contribute to understanding the potential of sustainable practices on the company's performance.

Keywords: Sustainability; Supply chains; Performance; Case studies; Portugal

1. INTRODUCTION

There is an increasing recognition that organisations must address the issue of sustainability in their supply chain as an essential element of firm strategies (Seuring, 2013). Due in large part to pressures from various stakeholders, especially government regulators, community activists, non-governmental organisations (NGOs), and global competition, many companies have adopted a certain level of commitment to sustainability practices. In the supply chain (SC) context, it is necessary to implement management practices that not only promote the company and overall SC performance but also address social, economic and environmental concerns (Beske, 2012; Amin and Zhang, 2014; Alzaman, 2014). Sustainable supply chain

management (SSCM) is a critical and interdisciplinary field that derives from integrating the concept of sustainability with core business functions that fall within the domain of supply chain management, such as procurement, logistics and knowledge management (Morally & Searcy, 2013; Pagell & Wu, 2009).

The many studies to date that have been conducted on the relationship between environmental practices and economic performance (e.g., Azevedo *et al.*, 2011; Eltayeb *et al.*, 2011; Kleindorfer *et al.*, 2005; Svristava, 2007; Seuring & Muller, 2008; Seuring *et al.*, 2008) have largely overlooked the impact of environmental sustainability practices on economic performance (Longoni, Cagliano & Golini, 2014; Gimenez *et al.*, 2010; Pullman *et al.*, 2009). In recent years, there has been an increase of work on social practices in the supply chain, but few examine the social and environmental practices with economic, environmental and social performance (Carter & Easton, 2011; Walker & Jones, 2012; Walker and Laplume, 2014).

This paper aims to identify which industrial companies are incorporating internal and external sustainable practices across the supply chain, the performance indicators used to evaluate a company's sustainable practices, and the impacts of those practices on the economic, environmental and social performance. To this end, it uses a multiple case study comprising eight companies that are investigated through twenty-two (22) semi-structured interviews. The research framework has been defined based on a review of the literature and encompasses sustainable supply chain practices (environmental and social) and performance.

The main contribution of this paper is the distinction between environmental and social practices and the identification of indicators of economic, environmental and social performance and the relationship between the implementation of sustainable practices with environmental and social management in the supply chain and the economic, social and environmental performance

The structure of this article is organised in five sections. Section two details the research objectives and canvasses the related literature. Section three details the research framework followed by the research methodology in section four. The findings of the empirical data analysis are presented in section five. Section six concludes the paper with a summary of the findings and suggestions for future research.

2. LITERATURE REVIEW

The first element of the framework contains the environmental and social practices which are identified from the review of the literature. Sustainable practices are the social and environmental practices of the supply chain that intersect with the economic aspects. Environmental and social practices should be considered in the context of a company taking into consideration its strategy and economic and financial objectives (Carter and Rogers, 2008). According to Montabon *et al.* (2007), environmental practices are the set of techniques, politics and procedures implemented by companies that result in the reduction and elimination of waste, pollution, and hazardous materials thereby lessening its environmental impact. Those environmental practices include supply chain activities that comprise eco-design, reverse logistics, distribution, green purchasing, internal environmental management, environmental information systems, and green production requirements on suppliers' process management (Hervani *et al.*, 2005; Zhu *et al.*, 2008, 2010). Environmental practices also encompass inter-organisational activities through environmental collaboration between suppliers and customers (Vachon & Klassen, 2006).

Table 2 lists the environmental practices identified by different authors.

Table 2
Environmental practices

<i>Authors (year)</i>	<i>Environmental practices</i>
Lee (2011)	<ul style="list-style-type: none"> - Sustainable production - Continuous environmental and economic improvement - Measurement of the carbon footprint of operations (direct and indirect emissions)
Pusavec, Krajnik, & Kopac (2010)	<ul style="list-style-type: none"> - Spread the concept of carbon footprint for the supply chain - Reduction of energy consumption - Reduction of waste (generate less waste, increase the recycling and reuse of wastes) - Use resources efficiently - Use recyclable or reusable materials - Adopt methods of life cycle assessment
Santos & Vanalle (2010)	<ul style="list-style-type: none"> - Replacement of dangerous raw materials less aggressive to the environment and men - Development of new materials, eliminating the need for precious metals - Replacement of metal parts for recyclable plastics of low weight - Reduction of waste generation
Oiko <i>et al.</i> (2009)	<ul style="list-style-type: none"> - <i>Design for X (DFX): DFM – Design for Manufacturing; DfA – Design for Assembly; DFD – Design for Disassembly DFR – Design for Recycling; DFE – Design for Environmental; DFU - Design for Upgrading</i>
Zhu <i>et al.</i> (2008)	<ul style="list-style-type: none"> - Internal Environmental Management - Green Shopping - Collaborations with customers - Eco-design
Zhu <i>et al.</i> (2007)	<ul style="list-style-type: none"> - Product life cycle assessment - Implementation of OHSAS 18001 and ISO 14001 standards - Clean production - Eco-design - Green Purchasing - Decrease the consumption of natural resources by reusing water - Development of alternative raw materials, with the aim of reducing the impacts to the environment - Improvement of process efficiency - Reducing waste disposal - Develop programs for suppliers' environmental management - Continuous improvement of environmental practices
Srivastava (2007)	<ul style="list-style-type: none"> - Product life cycle assessment - Sustainable production

contd. table 2

<i>Authors (year)</i>	<i>Environmental practices</i>
Chien& Shih (2007)	<ul style="list-style-type: none"> - Environmentally friendly projects - Green purchasing - Checklist of hazardous substances for the environment - Selection of raw materials that do not contain prohibited substances - Evaluation table for environmental management of suppliers - Environmental audits - Green production - Eco-design
Koplin <i>et al.</i> (2007)	<ul style="list-style-type: none"> - Recovery and reuse of used products - Involvement of all departments on the purchasing process - Involvement of suppliers in the integration of sustainability issues in the purchasing policy - Requirement of ISO 9001 and ISO 14001 certifications to suppliers - Training of multidisciplinary teams to evaluate supplier information - Providing advice to suppliers with environmental and social problems - Share information with suppliers - Conducting suppliers environmental and social assessments - Inclusion of sustainability supplier requirements - Requirement that suppliers pass the requirements described in the supplier code of conduct to their suppliers - Training to disseminate sustainability concepts among members of the supply chain
Zhu & Sarkis (2006, 2004)	<ul style="list-style-type: none"> - Green purchasing - Environmental collaboration with customers - Eco-design - External environmental practices - Internal environmental management
Green <i>et al.</i> (2000) Sarkis (2003)	<ul style="list-style-type: none"> - Partnerships with suppliers through programs aimed to compliance with environmental legislation and practices; Reduction or elimination of hazardous/toxic materials in the products or manufacturing processes; Joint development of new materials, processes or other solutions to environmental issues
Bowen <i>et al.</i> (2001)	<ul style="list-style-type: none"> - Greening the supply process - Product-based green supply - Advanced green supply

The adoption of social practices in the supply chain is related to the social dimension of SSCM. It incorporates the organisation's internal and external social issues. Internal social practices are those related to the organisation's internal environment and are associated with human resources. It includes recognition, valorisation and promotion of the workforce capabilities with appropriate human resources politics, equity practices, development and wellbeing, creation and maintenance of a participatory and open environment

for employee development, fair remuneration, decent work conditions, and training and adaptation programs (Elkington, 2001).

External social practices include the relationship between surrounding communities and manufacturing facilities in order to ensure quality of life, a positive relationship with other stakeholders through democratic and ethical decisions, responsibility for the products and services offered, and considering the impacts on consumers and non-consumers affected by the negative externalities of other citizen's consumption (Pullman *et al.*, 2009). Given the complexity and the number of social practices, Table 3 lists social sustainability practices.

Table 3
Social practices

	<i>Practices</i>
Internal social practices	<ul style="list-style-type: none"> - Employment Practices: Disciplinary and safety practices, Fair employment contracts, Discrimination, Flexible working hours, Employment Opportunities Career Compensation and Progression, Investigation and development - Health and safety: Injuries at work; Health and safety practices
External social practices	<ul style="list-style-type: none"> - Influence of local communities: Health, education and housing; Service and mobility infrastructure; Support to educational institutions; Safety; Welfare and economic growth; Social cohesion and social pathologies; Grants and donations; Support community projects - Contracted stakeholders influence: Standardised contracts; Partnerships; Consumer/customer education - Other stakeholders influence: Influence of decision, Stakeholders empowerment; Collective hearing; Stakeholders Commitment

Sources: Searcy (2012), Ciliberti (2012), Gauthier (2005), Hutchins and Sutherland (2008), Labuschagne, Brent, & Claasen (2005), Tate, Ellram, & Kirchoff (2010)

Given the difficulty in measuring sustainability in social terms, with no consensus regarding social impacts and the form of measurement, there are a number of standards and codes of conduct that companies can consider. These contain recommendations on the implementation of environmental and social practices, related indicators and the different metrics to be used (e.g., GRI, Fair Labour Association Guides, Dow Jones Sustainability Indexes, Model SCOR). The GRI (Global Report Initiative) structure is broader and more inclusive. It provides a tool for companies to report the progression in implementing sustainable practices to their internal and external stakeholders.

3. SUSTAINABLE SUPPLY CHAIN PRACTICES - FRAMEWORK

Based on the aforementioned studies on environmental and social practices, sustainable supply chain practices have been classified into internal and external environmental and social practices (Cf. Figure 1):

Internal Practices:

- Internal environmental practices: internal environmental management, eco-design, green purchasing and green production.
- Internal social practices: top managers internal social commitment to manage social issues, labour practices and health and safety conditions.

External Practices:

- External environmental practices: environmental collaboration with customers and suppliers, green packaging and reverse logistics.
- External social practices: social collaboration with suppliers and customers and community collaboration.

Figure 1 synthesises the main components of the framework.

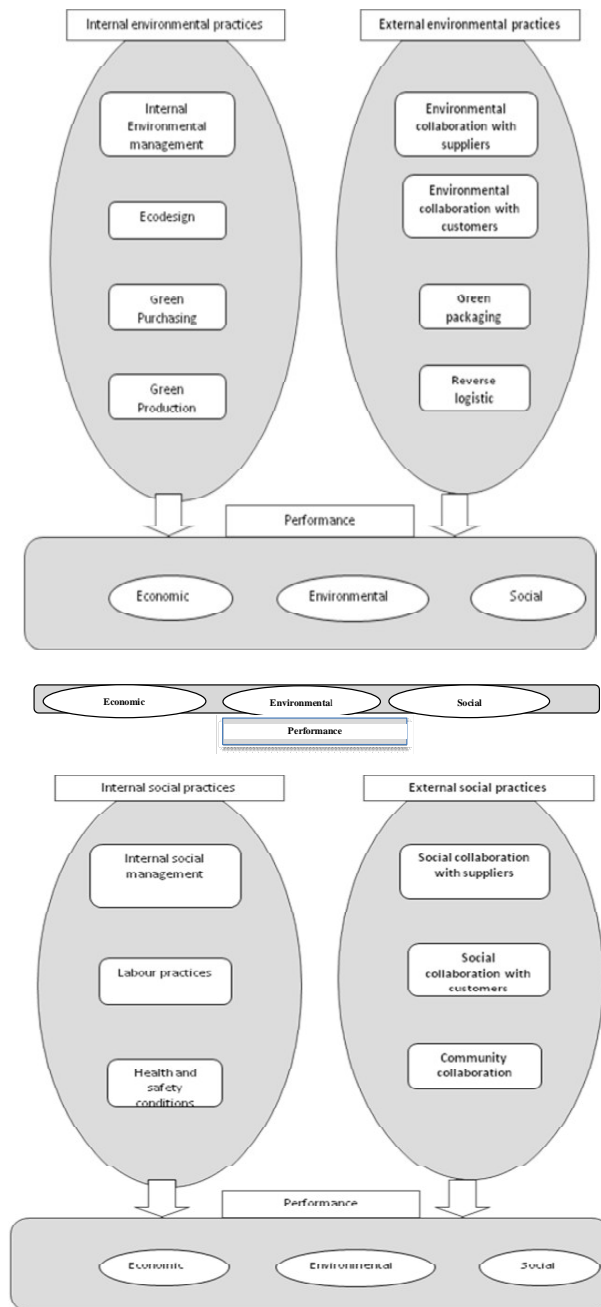


Figure 1: Research framework

The second element of the framework includes the performance indicators to measure the impacts of sustainable supply chain practices. We can only manage what we can measure, so measuring performance is critical to any organisation. Managing activities and operations is an important requirement to improve processes (Sink & Tuttle, 1989). Measuring the performance of sustainable practices involves quantifying the efficiency and effectiveness of all activities and processes aimed at obtaining a sustainable supply chain (Neely *et al.*, 2008). Measuring sustainable performance is much more complex than measuring traditional economic performance since it is necessary to include the social and environmental dimensions along with the economic dimension. This requires that the performance measurement consider not only the expectations of customers, but also the expectations of the stakeholders of other organisation and that the information among the members of the supply chain should be transparent (Amaeshi *et al.*, 2008; Epstein & Roy, 2003; Freeman, 1984, 2005). Supply chain managers, in order to ensure the sustainability of the company, will have to take into account economic, environmental and social objectives. Success can no longer be measured solely through economic performance, since there are other aspects that are essential to the long-term success of any organisation should be measured (Markley & Davis, 2007).

Based on GRI (Global Report Initiative), environmental and occupational health management systems performance indicators and others key performance indicators (KPIs) identified in the literature review, the performance indicators used in this study can be grouped into:

- Economic performance - measure the impacts of environmental and social practices: sales, earnings Before Interests, Taxes, Depreciation and Amortization (EBITDA);
- Environmental performance - measure the impacts of environmental and social practices adopted by the focal firm in relation to raw material used, energy, water, air emissions and wastes;
- Social performance - measure the impacts of environmental and social practices on focal firm, considering the number of injuries, working hours lost due to illness, accident frequency and gravity index, absenteeism rate, overall staff turnover rate and training.

On the basis of the research framework, the research aims at analysing the impacts of sustainable supply chain practices on economic, environmental and social performance. In line with this, the following research question has been formulated:

RQ1: How do environmental and social internal and external supply chain practices impact on the economic, environmental and social performance of the focal firm?

4. MATERIALS AND METHODS

This study adopted a qualitative approach, using a case study approach which was chosen as the most appropriate research method to describe and explore new phenomena applicable to sustainable practices in the private sector. Suggestions for the number of cases to use in multiple case study research vary, but Eisenhart (1989) suggests eight cases as the maximum that a person can mentally process. Yin (2009) and others are more circumspect in regards to hard numbers and instead suggest that data should be collected until theoretical saturation. In operations and supply chain management research, there are numerous examples of multiple case study research using from three to 11 cases (Pagell, 2009; Walker, 2012).

Our sample is composed of eight companies. Those companies were chosen considering their location and production plants in Portugal, and size as medium and large companies have more resources to implement environmental and social practices (González-Benito & González-Benito, 2006), the supply chain structure, the commitment to sustainability dimensions – economical, environmental and social, and having third party certification and/or recognition (e.g., OHSAS 18001, ISO 9001, ISO 14000, PEFC, GRI). The attitude of transparency that characterises their activities are described in their websites, social reports, and also through newspaper articles, articles in the business press and presentations at sustainability conferences.

Case studies have been developed by means of interviews conducted on the basis of a semi-structured protocol that was developed from the reviewed literature. The use of protocols is advocated to enhance the reliability of case studies (Eisenhart 1989; Yin, 2009). Twenty-two (22) semi-structured face-to-face interviews were conducted with at least one senior manager in each organisation. Each interview lasted about 60-90 minutes and was conducted on site. For six companies, the respondents were the General Manager, Purchasing and the Environmental, Health and Safety Manager, and in some cases, the Human Resource Manager. All interviews were taped, recorded and transcribed, and participants reviewed a draft case study report. To encourage openness of response from interviewees, the company names were made anonymous.

To enhance the validity and reliability of the study, triangulation with secondary data sources was conducted (Yin, 2009). Secondary data was collected from reports and websites, including annual reports, sustainable reports, environmental, safety and social policies, code of conducts, newspaper articles and confidential internal procedures provided by the sampled companies.

Table 1 shows the main features of the selected companies.

Table 1
Characteristics of the Sample

<i>Company</i>	<i>Industry</i>	<i>Annual Turnover</i>	<i>Number of employees</i>	<i>Number of interviews</i>	<i>Role of interviews</i>
C1	Glass	95 ME	350	3	General Manager Environmental, Health & Safety Coordinator Purchasing Manager
C2	Cork	318 ME	927	4	General Manager Environmental, Health & Safety Coordinator Purchasing Manager Human Resources Manager
C3	Automotive components	84.4 ME	348	4	General Manager Integrated Systems Manager Purchasing Manager Public Relations Manager
C4	Wood-based panels	1.321 ME	177	3	General Manager Environmental, Health & Safety Manager Purchasing Manager

contd. table 1

<i>Company</i>	<i>Industry</i>	<i>Annual Turnover</i>	<i>Number of employees</i>	<i>Number of interviews</i>	<i>Role of interviews</i>
C5	Office and commercial furniture	8.62ME	122	1	Quality, Environmental, Health & Safety Manager
C6	Automotive assemblage	216ME	190	3	General Manager Human Resources Manager Purchasing Manager
C7	Drink	498ME	1500	1	Environmental, Health & Safety Sustainable Manager
C8	Automotive textile	44 ME	182	3	General Manager Environmental, Health & Safety Manager Purchasing Manager

5. RESULTS AND DISCUSSION

In this section, the main results of the empirical analysis will be presented and discussed. After the identification of environmental and social practices used by the companies, we discuss the impacts of sustainable supply chain practices on economic, environmental and social performance of the focal firm.

Table 2 lists the indicators companies commonly used to measure sustainability performance. As we can see from the table, the typical economic indicators used to measure economic performance are sales and EBITDA (Earnings Before Taxes Depreciations and Amortizations). The assessment of environmental performance is determined by the ISO 14001 standard, which these companies have obtained. From the social point of view, social performance indicators include classic human resources and safety indicators. Although some of the companies do not have OSHAS 18001 certification, all measure health and safety indicators (Cf. Table 2). Customer satisfaction is also an indicator measured by all companies. The companies that collaborate with NGOs use the number of collaborative activities as a performance indicator.

Table 4
Key performance indicators

<i>Economic</i>	<i>Environmental</i>	<i>Social</i>
Sales; EBITDA	Energy; Water; Waste; Air emissions	Number of injuries; Number of working hours lost due to illness; Accident frequency index; Accident gravity index; Absenteeism rate; Overall staff turnover rate; Training hours per employee; Age profile; Break down by gender. Number of actions for community

The General Manager and Health & Safety Managers of the eight companies consider the impact of sustainable supply chain practices on economic, environmental and social performance of the focal firm as positive. In other words, the application of environmental practices (internal and external) has a positive impact on sales and EBITDA (economic performance). The General Manager from company C1 says:

“The relationship between environmental practices and economic performance increased, we had incredible energy savings, that was reflected in energy costs and EBITA, comparing with the last six years it was really exceptional. There are no tradeoffs, is always a win-win relationship”.

For the C3 General Manager: *“The relationship between the implementation of environmental practices and economic performance is direct and positive, not only in people’s satisfaction but terms of resource efficiency, minimisation of waste, more efficient use of energy, maintenance of the planet, job security and for sustainable company growth”.*

Regarding the relationship between the implementation of internal social practices and economic performance, despite the existence of tradeoffs applying social practices, namely the ones related to health and safety practices, for six of the companies, the effect on economic performance is positive. This is because increase employee motivation and satisfaction which affect quality, increase productivity and profitability. The Integrated Systems Manager and Public Relations Manager from company C3 share the same opinion. The former states: *“We believe that a satisfied employee produces much more, of course, it brings economic advantages, we are more efficient, workers are more motivated and satisfied with the company, with more knowledge about their work. The consequence is that we have less rejected products, so no doubt that we move towards efficiency”.* According to the Public Relations Manager: *“The implementation of external social practices has internal and external impacts. Internally it translates into the satisfaction and motivation of the people, and the pride of working in the Company, so people motivated increase productivity. Externally it is based on the recognition of the company by the community”.* For the Human Resources Managers of C8: *“Implementation of sustainable practices allows us, in the long-term, obtain economic benefits, being a differentiating factor contributing to the preservation of the image of our company”.*

With regard to the relationship between environmental practices and environmental performance, we find that for all of the companies, the implementation of environmental practices has a positive and immediate impact on reducing the costs of energy and water, and reduces waste and air emissions (environmental performance). The General Manager and the Environmental, Health & Safety Manager from company C4 state: *“The better environmental practices we have, the better the environmental indicators, the efficiency increases, the waste generation is lower and the energy consumption decreases”.*

The relationship between social practices and environmental performance for the companies is positive. However, some of the companies consider that this relationship is difficult to establish. For the General Director of C7: *“It is impossible to dissociate environmental practices from social performance, since by improving our environmental performance we indirectly improve social performance. Once people are more motivated, it is easier to get them to practice other types of actions and collaborate with other actions that are more ecologically sustainable”.* Moreover, the Environment and Safety Coordinator of C1 says: *“Many of the safety practices improve the environmental performance of the company, in particular with regard to prevention and emergency practices, chemicals products handling, housekeeping, shop floor organisation and cleaning”.*

The relationship between internal social practices and social performance is a win-win relationship for all companies. This was reflected in the improvement of social performance indicators such as employee motivation and satisfaction, absenteeism rate, turnover rate, and work accidents. The Director of Quality, Environment and Safety of C5 says: *“The relationship between the implementation of internal social practices and social indicators exists and is clear, the investments made in the machines, the awareness and training of employees is reflected in the number of the reduction of work accidents, number of working hours lost due to illness; absenteeism rate and staff turnover rate”.* For the Director of Quality, Environment and Safety of C6: *“The relationship is obvious, and it is*

easily checked on the results that we obtained in the different performance indicators used”.

Beyond the internal effects, external impacts are evident in corporate recognition by the community and customers through awards and establishing partnerships with NGOs and through the participation in different research projects with different stakeholders. For the Environmental, Health & Safety Coordinator of C2: *“Economic return exists, but it is very difficult to quantify, and it is not supposed to be, we are talking about intangible things. Those external practices are part of the company culture, are in company DNA, are part of our values, where people are the main resource”.*

6. CONCLUSION

This paper aims at studying sustainability indifferent industries by considering supply chain practices and performance. To achieve this objective, a literature review has been carried out to identify sustainable supply chain practices and performance indicators, and a framework was designed according to the reviewed literature. We conclude, based on the eight companies analysed, that the implementation of sustainable supply chain practices across the companies have positive impacts on economic, environmental and social performance. These results might help practitioners to understand what are the most sustainable supply chain practices used by companies and that using such practices they can improve economic, environmental and social performance.

Nevertheless, this research suffers from some limitations. Even though different industrial sector have been analysed, due to the limited number of companies involved, results may not be generalised to other contexts and broader samples. A wider sample of analysis is needed to support the results and to allow statistical validations.

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