

The impact of implementing green supply chain management practices on corporate performance

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Abstract

Purpose: The purpose of this research is to investigate the implementation of green supply chain management (GSCM) practices and its impact on corporate performance (CP). The research in particular examines the results of implementing a set of GSCM practices on different dimensions of the CP.

Design/methodology/approach: This study, being the first of its kind in the Middle East, developed a research model to test the relationship between four main GSCM practices namely, eco-design, green purchasing, environmental cooperation and reverse logistics, and four dimensions of CP: operational performance, environmental performance, economic performance and social performance, while controlling three main variables (firm size, firm age and environment management system certification). Statistical analyses were based on the data collected, through survey questionnaires. Reliability and validity of the research model were tested by the commonly accepted statistical tools. To test the hypotheses relating implementation of GSCM practice and CP, multiple regression analysis was used.

Findings: The finding of the study was that GSCM practices impact the CP dimensions differently. While none of the four GSCM practices were found to have any impact on the environmental performance, green purchasing and environmental cooperation were found to have a significant impact on the operational performance. The study found that only green purchasing plays a role in improving the economic performance, while only reverse logistics practices were found to impact the social performance of the firm positively.

Limitations/Research Implications: Research in the field of global supply chain management is still in its early stages. Further refinement of the survey may be needed to differentiate between different manufacturing industries. The generalizability of the results is also limited due to the data collected from a few manufacturing companies. This research provides important insights. The results of this research are generally consistent with the results of previous studies in other parts of the world. Companies in the manufacturing industry believe that global supply chain management practices help the company design and develop better products, which in turn increase the company's chances of selling its products in international markets, and at the same time, improve average profit and market share. Companies were also found to believe that implementing global supply

chain management practices helps improve the company's image, enhance employee job satisfaction, and improve employee health and safety.

Practical implications: Implementation of GSCM practices improves CP in different ways. Supply chain managers are required to decide on the CP dimension they want to improve and accordingly select the appropriate GSCM practices mix that leads to the desired level of improvement.

Originality/value: Although few earlier researches studied the impact of GSCM on CP, this study is different and makes a unique contribution by offering a holistic view of the impact of implementing four main GSCM practices on all dimensions of CP. The study offers some insights on the type of GSCM practices the firm needs to adopt to improve the targeted performance dimension.

Keywords *Manufacturing industry, Corporate performance, Green supply chain management, Quantitative research*

1. Introduction

The integration of environmental concerns and organizational performance started gaining attention over the recent decades. Climate change, the depletion of natural resources and environmental pollution are the main drivers behind the international efforts to greening the supply chains. Greening the supply chain has become an organizational mandate in some developed countries. However, when it comes to Middle Eastern countries, majority of them are still late adopters. The term green or carbon emission or carbon credits is not yet ubiquitous in organizational operations.

Although some early researchers focused on carbon emission models and pollution studies, “green” as a definition was not institutionalized until the past decade. Hervani et al. (2005) was probably the first academician who coined a clear definition for green supply chain stating; “Green supply chain is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation, marketing, and reverse logistics”. However, Sarkis’ (1998) definition was rather narrower in focus coining “a combination of the activities of an environmental company and reverse logistics, and emphasized the latter’s importance”. Later in 2010, Sundarakani et al. (2010) defined:

[...] green supply chain management can be defined as the integration of environmental thinking into supply chain management, including product design, supplier selection and material sourcing, manufacturing processes, product packaging, delivery of the product to the consumers, and end-of-life management of the product after its use.

However, in between, definitions were forwarded on other aspects like Beamon (1999) defined a green supply chain as:

[...] the extension of the traditional supply chain to include activities that aim at minimizing environmental impacts of a product throughout its entire cycle, such as green design, resource saving, harmful material reduction and product recycle and reuse.

Going beyond Beamon’s definition above, Kumar and Putnam (2008) claimed that the end-to-end supply chain process, which was called “cradle to grave” in the early eighties, is now called “cradle to cradle”, which means that the product has to be returned back to the origin (the manufacturer) to be reproduced or properly disposed; therefore, extending

the supply chain to include green activities is not sufficient anymore as claimed by Beamon earlier. Srivastava (2007), on the other hand, believes that green supply chain management (GSCM) practices need to be integrated across the whole supply chain including acquisition of raw material, product design, manufacturing processes, finished product delivery and finally the management of the disposal of the product after its useful life.

Recently, Agrawal et al. (2015) intended to present a comprehensive review of the published literature on reverse logistics issues being one of the most important GSCM practices, the authors found that there is no single study available on the drivers and barriers of reverse logistics adoption and implementation across sectors and demographics. To provide a forecasting method that is able to predict the rate of product returns and expected time of product returns claiming they are stochastic, random and uncertain, Agrawal et al. (2014) proposed a model for forecasting product returns using graphical evaluation and review technique which was validated by a case study within the electronics industry in India.

Motivating businesses to adopt GSCM practices starts by exploring the improvements these practices can bring about, not only on the economic side but also on other dimensions including the operational, social and environmental image of the organization. Hence, a holistic study is called for. Thus, this paper attempts to explore the impact of implementing a set of common green supply chain practices on different dimensions of corporate performance (CP).

The remainder of the paper is organized as follows: Section 2 reviews the existing literature in the field of green supply chain and CP. The research framework and hypotheses development are discussed in Section 3. Section 4 discusses the research methodology including the statistical analysis and hypotheses testing. Discussion of the analysis and findings are presented in Section 5, while the conclusion is presented in Section 6. The managerial implications are presented in Section 7, while the avenues for further researches and the research limitations are presented at Sections 8 and 9, respectively.

2. Literature review

The literature on GSCM and CP started to appear in the journals and social science books since early 1990s when a Harvard Business Scholar, Michael Porter, sparked a debate by claiming that corporate environmental improvements lead to financial improvements in the long term, and he also introduced the concept of “Innovation offsets” and that GSCM can be a vehicle for creating competitive advantages for a firm (Porter, 1991).

A recent study on the sustainable supply chain by Carter and Easton (2011), which intended to provide a systematic review of the evolution of supply chain management over a period of 20 years, found that environment aspects of supply chain have been the focus of researchers and academicians. The authors reviewed 80 articles and contrasted them in terms of: subject, inferential, moderation, methodology, analysis used, context and theory used. The authors found that a large focus on consumer product industry with 55 per cent of the articles heavily relied on descriptive statistics and 10 per cent included moderating variables, whereas less than 4 per cent used conceptual theory building and hence a clear lacuna in this area could be spotted.

The inconsistency in the existing literature stems from the mixed results reported on GSCM practices and its impact on CP outcomes. More specifically, while some studies found no relationship, other studies revealed either a positive or a negative relationship.

2.1 Green supply chain management and corporate performance: no relationship

An evidence of no relationship can be found in the recent work of Lee et al. (2012). The study aimed at exploring the direct and indirect paths of related factors between the implementation of GSCM practices and the firm’s performance. Using responses from a survey questionnaire to 223 small- and medium-sized enterprises (SMEs) in the electronic industry in Korea, the authors found that no direct relationship, but an indirect relationship exists between GSCM practices and organizational performance mediated by operational and relational efficiency. The strength of the study is supported by a good sample size (i.e. 223) and a 100 per cent response rate, but the measurement of the dependent variable, namely, “business performance”, might be inconclusive as it ignored the operational element, in particular, the

impact of the independent variables (GSCM practices) on the effectiveness and efficiency of the products and processes within the organization.

Similarly, the work of Benito and Benito (2005), reported same results. They intended to empirically analyze the relationship between environmental proactivity and business performance using quantitative data gathered through a survey questionnaire of 186 industrial companies in Spain. Using multiple regression analysis, the authors found no evidence on any relationship between environmental proactivity and financial performance. Using the same dependent variable used by Benito and Benito (2005), Watson et al. (2004), compared ten pairs of firms (environmental management system [EMS] adopters and non-EMS adopters) in different industries with an objective to propose and test a framework that quantifies EMS improvements to determine their impact on financial performance. The authors found no significant difference in the financial performance between EMS adopters and non-adopters.

2.2 Green supply chain management and corporate performance: negative relationship The second wave of literature documented negative relationships between implementation of GSCM practices and the different dimensions of CP. Examples of negative relationships include the work of Richey et al. (2005). The study used a survey questionnaire to collect data from 118 respondents to examine the effect of reverse logistics programs on reverse logistics performance in the automobile aftermarket industry in the USA. The findings revealed that internal innovation impacts performance negatively as it seems too costly. Another example of a negative relationship was reported by Montabon et al. (2007). The authors used content analysis of 45 corporate reports to empirically examine the relationship between a set of different environment management practices (EMPs) and firm performance. The study found a negative relationship between EMPs and the return on investment. The strengths of the study include: meeting most statistical assumptions for the canonical correlation analysis used and clearly justifying the use of content analysis to tackle the subject matter. Furthermore, Large and Thomsen (2011) reported a negative relationship between green cooperation with suppliers and purchasing performance. The authors obtained quantitative data from 109 purchasing and supply managers in Germany using survey questionnaire. The objective was to study the impact of different approaches (green assessment and green

collaboration) on environmental performance improvement and to investigate the impact of environmental performance improvements on the outcomes of purchasing department.

2.3 Green supply chain management and corporate performance: positive relationship Supporters of Porter's earlier claim on GSCM-CP positive relationship are many, and their research provides evidence from numerous industries to show that different GSCM practices lead to a variety of positive relationships on performance outcomes. The following section highlights the main studies.

A very recent study conducted by Diabat et al. (2013) to explore the relationship between green supply chain practice initiatives and performance outcomes using survey questionnaire to 50 participants from industry and academia, found that three main GSCM practices, namely, eco-design, co-operation with customers and reverse logistics, can impact the economic performance positively and can lead to better CP. Similarly, Green et al. (2012) used a larger sample size of 159 managers in the manufacturing industries in the USA to examine and assess the impact of implementing GSCM practices on the environmental, operational and organizational performance. Using structural equation modeling, the authors found positive relationships between different GSCM practices (including: internal environmental management, green purchasing, green information systems, cooperation with customers, investment recovery and eco-design and different dimensions of CP). Although a very low response rate of 8 per cent was reported, the study was the first to introduce staged GSCM implementation.

Adopting a similar research methodology used by Green et al. (2012); Zhu and Sarkis (2004) surveyed 186 manufacturing firms in China to examine the relationship between GSCM practice and environmental and economic performance. The authors found that enterprises with higher levels of GSCM adoption are having better environmental and positive economic performance.

In a same context, Liang and Chang (2008) surveyed 127 enterprises in China to investigate the potential influences of GSCM on the performances of SMEs. Using structural equation modeling, the authors found that performance of SMEs is positively associated with implementation of GSCM practices. Analogous results were also reported

by Zailani et al. (2012) who used a solid theoretical background that relied on strategic choice theory and institutional theory to develop their argument. The researchers adopted a survey tool to gather data from 132 ISO 14001 certified organizations in Malaysia and used structural equation modeling to examine the extent to which internal proactive environmental strategy and external institutional drivers motivate firms to adopt eco-designs that influence environmental performance. The findings squared with those of Zhu and Sarkis (2004) and Liang and Chang (2008). Furthermore they found that regulations and incentives positively impact environmental performance.

On the positive relationship between GSCM practices and environmental performance, a study by Kung et al. (2012) reported similar findings. The authors analyzed responses of a survey questionnaire to 118 respondents in the manufacturing industry in Taiwan to investigate the relationship between green management and environmental performance. Using hierarchical regression analysis, positive relationships were found between green manufacturing, green packaging, the adoption of ISO 14001 and the attainment of environmental labels from one side and environmental performance from the other side. Additionally, the work of Cordano et al. (2010) on the green practices in the winery industry in the USA reported similar results. Using a survey questionnaire to 369 managers within the industry, the authors intended to examine whether the development of rudimentary EMS, increases the success of implementing solid waste recycling and energy conservation practices. The multiple regression analysis used confirmed that firms with more developed EMP achieve greater success in implementing energy conservation and recycling activities and consequently better environmental performance.

In a similar manner, Gonzalez et al. (2008) analyzed the existence of differences in the implementation of environmental practices between companies that possess some form of certified EMS (ISO 14001 or EMS) and those that do not have any such system in Spain. The researcher used a survey questionnaire during one to one interviews with 157 executives in the automotive industry. Using logistic regression to test the relationship, the author found that there is a significant relationship between the possession of certified EMS, organization size and demand on suppliers to implement environmental practices (i.e. environmental performance) which in turn

indicate that implementation of GSCM represented by having EMS certification such as ISO 14001, directs the corporate environmental behavior toward the surrounding stakeholders including its suppliers. Although the study was limited to one industry within one country, it can be considered as one of the genuine works in the field as all statistical assumptions were met and the authors used valid and reliable measures to measure both variables, in particular, EMS as the independent variable and corporate practices as the dependent variable.

Based on the above, the scattered nature of observations and findings from studies on GSCM practices and their impact on CP could be evidenced. However, the dearth of a holistic conceptual model acts as a deterrent in giving potential researchers a proven research benchmark.

2.4 Review of independent variables selected for the proposed theoretical model Green supply chain practices are those initiatives that any organization adopts to comply with environmental legislations, reduce its operations' negative impact on the environment and improve its performance. This research will focus on those green supply chain initiatives that have been widely adopted and discussed in the existing literature which include: green purchasing, eco-design, environmental cooperation and reverse logistics. The above four practices will become the independent variables for the theoretical model to be investigated.

2.4.1 Green purchasing. Green purchasing can be defined as an environmental purchasing initiative that aims to ensure that purchased products and material meet with environmental objectives set by the purchasing firm such as reducing sources of waste, encouraging recycling, reuse and substitution of materials (Carter and Ellram, 1998; Min and Galle, 2001; Zsidisin and Siferd, 2001).

2.4.2 Eco-design. This research adopts the definition developed by Johansson (2002) for eco-design, which defines eco-design as the actions taken during product development stage targeted toward minimizing a product's environmental impact during its whole life cycle starting from acquiring raw material to manufacturing, use and finally to its final disposal without compromising other essential product criteria such as performance and cost.

2.4.3 Environmental cooperation. Adopting green supply chain practices requires internal and external cooperation among the different stakeholders,

for example, in the manufacturing industry, cooperation to achieve environmental objectives needs to exist between the organizations' different departments such as purchasing, marketing, production and human resources.

Environmental cooperation has been used as a GSCM initiative by several studies but in one of two forms, either in the upstream with the suppliers or in the downstream with the customers. In this research, cooperation with suppliers or customers will be referred to as environmental cooperation. Examples on existing studies that used environmental cooperation include the work of Lee et al. (2012), who examined its impact on different performance dimensions within electronic firms in Korea. In the same way, Perotti et al. (2012) used environmental cooperation along with other GSCM initiatives to examine how the adoption of GSC practices by third-party logistics (3PLs) in Italy can affect the company performance. Using collaboration with suppliers and collaboration with customers in addition to other GSCM initiatives, Diabat et al. (2013) aimed to examine their impact on different CP measures.

2.4.4 Reverse logistics. This research adopts the definition proposed by Carter and Ellram (1998) that defines reverse logistics as:

[...] the return or take back of products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reuse, remanufacture, repair, refurbishing or safe disposal of the products and materials.

Like other green supply chain initiatives, reverse logistics plays a key role in enhancing the organization's operational efficiency, improves its competitiveness and reduces system-wide costs.

Reverse logistics is one of the most commonly used GSCM practices in the existing literature. For example, Perotti et al. (2012) included reverse logistics along with other GSCM initiatives in their study of some logistics providers in Italy to assess the adoption level of such initiatives and their potential impact on different CP dimensions. Likewise, Diabat et al. (2013) used Fuzzy TOPSIS method to explore how reverse logistics along with other GSCM initiatives can lead to improved CP. In the same way, reverse logistics was among three GSCM practices that Eltayeb and Zailani (2009) intended to rank in terms of the adoption levels in Malaysia

2.5 Review of the dependent variables selected for the theoretical model

CP is the other side of the GSCM–Performance equation and was always considered as the dependent variable in most of the studies examined its relationship with GSCM. GSCM initiatives might lead to tangible benefits such as cost reduction (Orlitzky et al., 2003; Melnyk et al., 2003; Eltayeb et al., 2011), improved quality (Melnyk et al., 2003), wastes reduction (Azevedo et al., 2011), reduction of lead times (Melnyk et al., 2003), improved profitability (Darnall et al., 2008; Menguc and Ozanne, 2005), positive stock returns (Klassen and McLaughlin, 1996; Menguc and Ozanne, 2005) and energy conservation (Cordano et al., 2010). GSCM practices may also lead to intangible benefits including: enhanced competitiveness (Rao, 2002; Rao and Holt, 2005), increased shareholders value (Bose and Pal, 2011), increased customer satisfaction (Azevedo et al., 2011), improved job satisfaction (Jun et al., 2006), enhanced efficiency (Azevedo et al., 2011) and new market opportunities (Diabat et al., 2013; Walley and Whitehead, 1994).

Elkington (1994) introduced the concept of “triple bottom line”, claiming that sustainability is nothing but the intersection of economic, environmental and social performance; however, this research adds another dimension that is operational performance. Consequently, and based on the different effects GSCM practices can have on CP, it can be claimed that they fall under four different performance dimensions: environmental (such as waste reductions and resource savings), operational (such as enhanced efficiency and improved quality), economic (such as improved profitability and positive stock returns) and social (such as improved job satisfaction and enhanced health and safety). The section below elaborates more on each of these dimensions.

2.5.1 Environmental performance. This research adopts a modified version of the definition developed by Zhu et al. (2008), thus environmental performance refers to: the ability of the organization to reduce air emissions, effluent waste and solid wastes and the ability to decrease consumption of hazardous and toxic material and decreased frequency for environmental accidents.

2.5.2 Operational performance. This research uses a modified version of Melnyk et al.’s (2003) and Zhu et al.’s (2008) definition for operational performance; therefore, operational performance refers to the organization’s

capabilities to more efficiently produce and deliver products to customers with improved quality and reduced lead times which ultimately lead to improving its position in the marketplace and increasing its chances in selling its products into international markets.

2.5.3 Economic performance. This research adopts an extended version of Green and Inman (2005) and Zhu et al. (2007) definition for economic performance; hence, economic performance is defined as the financial and marketing performance improvements resulted from implementing GSCM practices that lead to enhancing the firm's position compared to the industry average. The financial improvement encompasses increased costs for material purchasing, decreased costs for energy consumption, decreased cost for wastes discharge and decreased costs for environmental accidents. The marketing-based improvements include: increased average return on sales, increased average profit and profit growth and increased average market share growth.

2.5.4 Social performance. The research adopts Wood's (1991) definition for social performance which is:

[...] a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs and observable outcomes as they relate to the firm's societal relationships.

2.6 Control variables To maximize robustness and reliability of the results, the model considers three control variables, namely, possession of EMS certification, firm size and firm age. These three variables were selected because earlier studies found a significant effect of these variables on the dependent variables used in this study.

3. Research framework and hypotheses

Based on the above literature review, it can be argued that there is a debate on whether implementing GSCM practices leads to improving or weakening CP and therefore, there is a lack of consensus on the GSCM impact on CP (Laosirihongthong et al., 2013). Zhu et al. (2012) argue that such conflicting results may create a barrier for organizations planning to adopt GSCM practices. Hence, this research aims to investigate the impact of GSCM practices implementation on CP from a 360-degree perspective.

3.1 Green supply chain management practices and environmental performance H1a. There is a positive relationship between implementation of eco-design practices and corporate environmental performance when external variables are controlled. H1b. There is a positive relationship between implementation of green purchasing practices and corporate environmental performance when external variables are controlled. H1c. There is a positive relationship between implementation of environmental cooperation practices and corporate environmental performance when external variables are controlled. H1d. There is a positive relationship between implementation of reverse logistics practices and the corporate environmental performance when external variables are controlled.

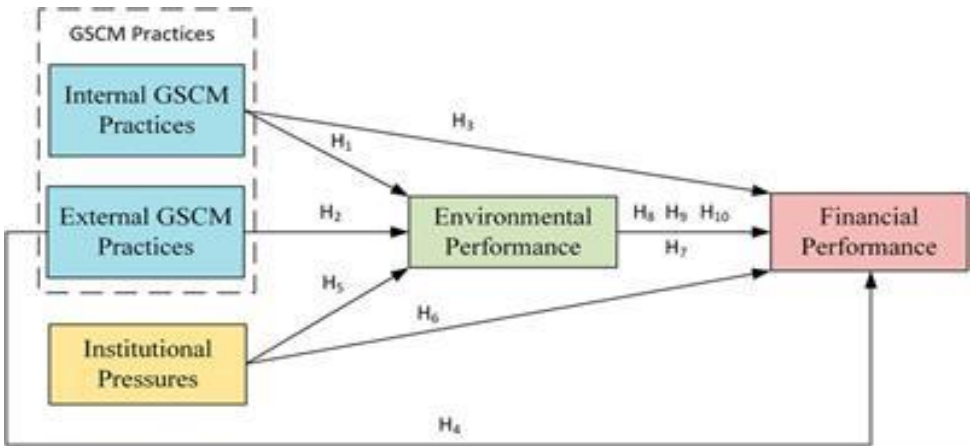


Fig. GSCM-IP-ENP-FNP model.

3.2 Green supply chain management practices and operational performance H2a. There is a positive relationship between implementation of eco– design practices and corporate operational performance when external variables are controlled. H2b. There is a positive relationship between implementation of green purchasing practices and corporate operational performance when external variables are controlled. H2c. There is a positive relationship between implementation of environmental cooperation practices and corporate operational performance when external variables are controlled.

H2d. There is a positive relationship between implementation of reverse logistics practices and corporate operational performance when external variables are controlled.

3.3 Green supply chain management practices and economic performance

H3a. There is a positive relationship between implementation of eco-design practices and corporate economic performance when external variables are controlled.

H3b. There is a positive relationship between implementation of green purchasing practices and corporate economic performance when external variables are controlled.

H3c. There is a positive relationship between implementation of environmental cooperation practices and corporate economic performance when external variables are controlled. H3d. There is a positive relationship between implementation of reverse logistics practices and corporate economic performance.

3.4 Green supply chain management practices and social performance

H4a. There is a positive relationship between implementation of eco-design practices and corporate social performance when external variables are controlled.

H4b. There is a positive relationship between implementation of green purchasing practices and corporate social performance when external variables are controlled.

H4c. There is a positive relationship between implementation of environmental cooperation practices and corporate social performance when external variables are controlled.

H4d. There is a positive relationship between implementation of reverse logistics practices and corporate social performance when external variables are controlled.

4- Hypotheses Research:

Based on these hypotheses assumed in the proposed research model, which were extracted based on the results of the research literature, and based on the research problem and its objectives, a set of hypotheses can be formulated that can be chosen to answer the research questions and achieve its objectives, as the research hypotheses can be divided into three groups of hypotheses, as follows:

The first group: The impact of green supply chain management practices on environmental performance:

The first hypothesis (a): It is expected that there is a statistically significant positive effect of internal environmental management on environmental performance.

The first hypothesis (b): It is expected that there is a statistically significant positive effect of green purchasing on environmental performance.

The first hypothesis (c): It is expected that there is a statistically significant positive effect of cooperation with customers on environmental performance.

The first hypothesis (d): It is expected that there is a statistically significant positive effect of environmentally friendly design on environmental performance.

The first hypothesis (e): It is expected that there is a statistically significant positive effect of investment recovery on environmental performance.

Group Two: The Impact of Green Supply Chain Management Practices on Operational Performance:

Hypothesis Two (A): It is expected that there is a statistically significant positive effect of internal environmental management on operational performance.

Hypothesis Two (B): It is expected that there is a statistically significant positive effect of customer cooperation on operational performance.

Hypothesis Two (C): It is expected that there is a statistically significant positive effect of environmentally friendly design on operational performance.

Hypothesis Two (D): It is expected that there is a statistically significant positive effect of investment recovery on operational performance.

Group Three: The Impact of Green Supply Chain Management Practices on Economic Performance:

Hypothesis Three (A): It is expected that there is a statistically significant positive effect of internal environmental management on economic performance.

Hypothesis Three (B): It is expected that there is a statistically significant positive effect of customer cooperation on economic performance.

Hypothesis Three (C): It is expected that there is a statistically significant positive effect of environmentally friendly design on economic performance.

Hypothesis Three (D): It is expected that there is a statistically significant positive effect of investment recovery on economic performance.

5. Research methodology

Given the deductive nature of the study that suggests a model with a causal relationship between green supply chain practices and CP requiring validation using empirical data, a quantitative approach is adopted using information gathered through a survey questionnaire to obtain categorical data needed for the statistical testing.

5.1 Measurement Measuring the operationalized constructs in this research was from different sources. For example, eco-design was measured using four items adopted from Zsidisin and Hendrick (1998) and Carter and Ellram (1998). Green purchasing was measured using five items adopted from Zsidisin and Hendrick (1998) and Walton et al. (1998). For environmental cooperation, the research used eight measures adopted from three different sources: Zsidisin and Hendrick (1998); Walton et al. (1998) and Vachon and Klassen (2006). Reverse logistics was measured using three items adopted from Rao (2007). The measurement of the independent variable dimensions was from different sources as explained hereafter. Environmental performance is measured using five items adopted from Zhu et al. (2007). Whereas, operational performance was measured using six items adopted from Melnyk et al. (2003). The economic performance was measured using four items adopted from Zhu et al. (2007) and three items adopted from Green and Inman (2005). Finally, the social performance variable was measured using five items: three items were adopted from Rao (2002), one item adopted from Homburg and Stock (2004) and Zhu et al. (2008) and the last item was adopted from Cordano et al. (2010). Table I summarizes the measurement items adopted for each construct and their sources

5.2 Population and sample selection The population for this study consists of all ISO 14001-certified and non-certified manufacturing firms in the UAE,

and the list was provided by Dun & Bradstreet Middle Est. It was decided to send the survey to firms with 50 employees and above to ensure that small firms classified under manufacturing such as tailor shops for example are excluded.

5.3 Details of the instrument and survey The survey questionnaire has three sections in addition to the introduction which is meant to brief the reader with the parts and the purpose of the survey. The first section of the survey aims to collect pertinent information on the characteristics of the respondents and their organizations including their titles, the organization scope of business, legal status, years of experience in the business, size and possession of EMS. The second section elaborates on GSCM initiatives adopted by the organization covering the four main GSCM practices introduced above. The third section solicits information on the impact of such GSCM initiatives on the corporate environmental, economic, operational and social performance. An online survey tool is used because it is more convenient and cost-effective and the responses can be easily exported to the data analysis application for statistical testing (i.e. SPSS).

5.4 Results In total, 143 responses were received with 14.7 per cent response rate; however, only 117 responses were found complete which could be used for the statistical testing.

Table (1): Measurement items

Variable	Measurement item	Source
Eco-design	Design of products for reduced consumption of material/energy Design of products for reuse, recycle, recovery of material, component parts Design of products to avoid or reduce use of hazardous products Design of processes for minimization of waste	Zsidisin and Hendrick (1998), Carter and Ellram (1998)
Green purchasing	Provide design specification to suppliers that include environmental requirements for purchased items Environmental audit for suppliers' internal management Second-tier supplier environmentally friendly practice evaluation Suppliers are selected using environmental	Zsidisin and Hendrick (1998), Walton <i>et al.</i> (1998)

Variable	Measurement item	Source
	<p>criteria</p> <p>Require suppliers to use environmental packaging (degradable and non-hazardous)</p>	
Environmental cooperation	<p>Cooperation with suppliers and customers for eco-design</p> <p>Cooperation with suppliers and customers for cleaner production</p> <p>Cooperation with suppliers and customers for green packaging</p> <p>Cooperation with supplies and customers for using less energy during product transportation</p>	Zsidisin and Hendrick (1998), Walton <i>et al.</i> (1998)
	<p>Packaging Cooperation with supplies and customers for using less energy during product transportation</p> <p>Developing a mutual understanding of responsibilities regarding environmental performance</p> <p>Working together to reduce environmental impact of our activities</p> <p>Conducting joint planning to anticipate and resolve environmental-related problems</p> <p>Making joint decisions with other supply chain members about ways to reduce overall environmental impact of our products</p>	Vachon and Klassen (2006)
Reverse logistics	<p>Use of remanufacturing</p> <p>Recovery of the company's end-of-life products</p> <p>Taking back packaging</p>	Rao (2007)
Environmental Performance	<p>Reduced air emission</p> <p>Reduced waste water</p> <p>Reduced solid wastes</p> <p>Decreased consumption for hazardous/harmful/toxic materials</p>	Zhu <i>et al.</i> (2007)

Variable	Measurement item	Source
	Decreased frequency for environmental accidents Improve a company’s environmental situation	
Economic performance	Decreased cost for materials purchasing Decreased cost for energy consumption Decreased fee for waste treatment and discharge Decreased fine for environmental accidents Average return on sales and investment over the past three years Average profit and profit growth over the past three years Average market share growth over the past three years	Green and Inman(2005)
Social Performance	Improved corporate image Social commitment Preserve environment Enhanced employee job satisfaction	Rao (2002)
Operational Performance	Enhanced health and safety of employees Operational performance Significantly reduced lead times Significantly improved product quality Significantly improved its position in the market place Helped the company design/develop better products Implementing green practices helps in reducing all types of wastes Improved its chances in successfully selling its products in international markets	Cordano <i>et al.</i> (2010) Melnyk <i>et al.</i> (2003)

5.5 Characteristics of the Respondent Firms Table II presents the characteristics of the respondents and their firms; approximately 82 percent of the respondents are in middle management positions, approximately 9

percent are in senior positions and the rest are at supervisory and non-managerial levels. Thus, it is clear that the information provided was from people who have knowledge and experience of GSCM practices within their organizations. The table shows that the organizations included in the survey fall into three main categories in terms of size: small (51-100 employees), medium (101-300 employees) and large (301-5,000 employees) with only two organizations having more than 5,000 employees. In terms of firm age, the table shows that approximately 75 percent of the organizations included in the survey have been in the field for more than 10 years and are therefore able to assess GSCM practices and their associated impact on performance over time. This represents a large representation of organizations that have engaged in GSCM practices and supports the validity and reliability of the results. The table also shows that 85% of the organizations surveyed are privately owned, 7.7% are multinational companies, the rest are government, semi-government and the company that is the subject of this research, Milano Co. This means that the private sector, which plays a major role in green supply chain practices, is well represented in this study. The EMS certification shows that approximately 48% of the companies surveyed are EMS certified, which in turn confirms that the GSCM information provided comes from companies that have implemented some type of GSCM practices and can therefore be considered reliable.

4.6 Validity and reliability

For content validity, the survey was shared with some industry experts to get their feedback and revise accordingly in case of any edits required. Moreover, a pre-test of the survey took place with a number of selected companies for the purpose of testing the understanding of the instrument and making any relevant changes thereof. To examine non-response bias, the survey was sent in two waves, and the test for the non-response bias was conducted using Armstrong and Overton's (1977) approach to ensure no difference exists between early and late responses. To measure the reliability of the measurements and to verify the internal consistency of the constructs, Cronbach's alpha was used as displayed in Table II. The results indicate that all the values are above 0.7 and this confirms that the constructs are acceptable (Cronbach, 1951).

Table (2): Cronbach’s variables

Variable	No. of items	Cronbach’s
Eco-design	4	0.826
Green purchasing	5	0.832
Environmental cooperation	8	0.888
Reverse logistics	3	0.710
Environmental performance	6	0.860
Operational performance	6	0.890
Economic performance	7	0.921
Social performance	5	0.891

5.6 Descriptive statistics for independent variables Table 3 shows the means of the four constructs of the fourth variable. In terms of practices, it is clear that, on average, the eco-design structure has the strongest practices (mean 3.76, SD 1.34), followed by reverse logistics (mean 2.81, SD 1.47), followed by environmental collaboration (mean 2.77, SD 1.31). The weakest practice was identified as green purchasing (mean 2.7, SD 1.38). The suggestion is therefore that manufacturers, including Milano, pay good attention to the eco-design of their products, reverse logistics and product recovery, driven primarily by close collaboration between supply chain members on environmental matters. In contrast, there is less attention to green purchasing, suggesting that auditing suppliers for environmental compliance and selecting them based on environmental criteria is not a high priority compared to other practices.

4.8 Descriptive statistics of dependent variables

Table 4 shows the averages of each of the numerical value components. Regarding the performance components, all four components showed relatively high levels of achievement except for economic performance, which was slightly weaker on average than the other three components (mean 2.65, SD 1.19). Social performance was found to be the strongest component (mean 3.79, SD 1.0), followed by environmental performance (mean 3.75, SD 1.04) and finally operational performance (mean 3.41, SD 1.08). The interpretation is that Milano is gaining a positive image of its products and organizations in the perception of its customers, employees and suppliers while at the same time reducing the negative impact of its

activities on the environment and improving the quality of its products and delivery time.

Table (3): descriptive statistics

Variable	No. of items	Minimum	Maximum	Mean	SD
Eco-design	4	1	5	3.76	1.34
Green purchasing	5	1	5	2.70	1.38
Environmental cooperation	8	1	5	2.77	1.31
Reverse logistics	3	1	5	2.81	1.47

5.7 Factor analysis

As per Hair *et al.* (2010), in addition to adequate sample size (observations must be equal or more than ten times the number of variables), three main items were checked and confirmed before proceeding with factor analysis: first, strong foundational rationale supporting the existence of a structure; second, an existence of sufficient correlation among the variables supported by Barlett's test of sphericity with a sigma value less than 0.05; and finally, measure of sampling adequacy with values for each variable exceeding 0.5 and if not to be deleted one at a time (p. 105). After carrying out the factor analysis, total variance explained was examined as well as factor loadings and commonalities which were all within the acceptable range as per Nunnally and Bernstein (1994). Table VI displays the output of the factor analysis conducted.

The indicators for the "eco-design" construct explain 66.29 per cent of the total variance in the data. The values for the other constructs are as follows: green purchasing (66.419 per cent); environmental cooperation (58.426 per cent); reverse logistics (63.187 per cent); environmental performance (63.332 per cent); economic performance (75.88 per cent); operational performance (64.702 per cent) and social performance (69.942 per cent). Factor loadings for all measurement items are above 0.7 as shown in the table.

Kaiser–Meyer–Olkin measure of sampling adequacy value for the eight constructs is greater than 0.50 as recommended by Kaiser (1974), and therefore factor analysis is appropriate for the data. Bartlett's test of sphericity tests the appropriateness for the factor analysis; the sigma values

for the eight constructs are all 0.0 and therefore less than α at 5 per cent which confirms that factor analysis is appropriate for the selected data.

5.8 Multiple regression analysis

Multiple regressions analysis was used to test the relationship between the independent variables and the dependent variables because it helps to analyze the relationship between a single dependent variable (each dimension of CP at a time) and several independent variables (GSCM practices).

The first set of hypotheses (*H1a-H1d*) examined the relationship between GSCM practices and environmental performance. None of the four GSCM practices were found to have any impact on the environmental performance. Table VII summarizes the results of the environmental performance hypotheses.

The second set of hypotheses (*H2a-H2d*) examined the relationship between GSCM practices and operational performance. Only green purchasing (0.219) and environmental cooperation (0.27) were found to have a significant impact on operational performance; therefore, *H3b* and *H3c* are supported but not *H3a* or *H3d*.

Table 7 summarizes the hypotheses results for operational performance.

The third set of hypotheses (*H3a-H3d*) examined the impact of GSCM practices on the economic performance. The results show that only green purchasing has a significant impact ($\alpha = 0.328$) on the economic performance; therefore, only *H3b* is supported. Table IX summarizes the results for the economic performance hypotheses.

The final set of hypotheses (*H4a-H4d*) examined the relationship between GSCM practices and the social performance. The results show that only reverse logistics practices have a significant impact ($\alpha = 0.208$) on the social performance, and thus only *H4d* is supported. Table X summarizes the social performance hypotheses results.

6. Discussion

The study found that EMS certification is associated with all dimensions of CP, and this association is a good indicator that Milano is on the right track because EMS implementation and certification form the basis of any green initiative to drive CP in the desired green direction. This finding was also

replicated by Melnyk et al. (2003). The authors found that there is a positive relationship between having a formally certified EMS and improved performance such as cost reduction

Table (4): Environmental performance hypotheses results

	Research hypothesis	β	Status
1a	ED > EP	0.139	Not supported
1b	GP > EP	0.038	Not supported
1c	EC > EP	0.175	Not supported
1d	RL > EP	0.031	Not supported

Table (5): Operational Performance hypotheses results

	Research hypothesis	β	Status
2a	ED > EP	-0.11	Not supported
2b	GP > EP	0.219**	Supported
2c	EC > EP	0.27**	Supported
2d	RL > EP	0.078	Not supported

Note: Significant at ** $\alpha = 0.10$

Table (6): Economic performance hypotheses results

	Research hypothesis	β	Status
3a	ED > EP	-0.156	Not supported
3b	GP > EP	0.328**	Supported
3c	EC > EP	0.211	Not Supported
3d	RL > EP	0.069	Not supported

Note: Significant at ** $\alpha = 0.10$

Table (7): Social performance hypotheses results

	Research hypothesis	β	Status
4a	ED > EP	0.012	Not supported
4b	GP > EP	-0.051	Not Supported
4c	EC > EP	0.011	Not Supported
4d	RL > EP	0.208**	supported

Note: Significant at ** $\alpha = 0.10$

(EcP), quality improvement (OP), waste reduction in the design and equipment selection process (EP) and delivery time reduction (OP). In addition, Gonzalez et al. (2008) found a significant relationship between having certified environmental management systems and the demand for suppliers to implement environmental practices. Milano is an ISO 14001 certified company, which in turn indicates that the company is beginning to realize the importance of environmental awareness.

With respect to company size, the study found that company size affects all dimensions of CP except operational performance. Small companies may find it difficult to allocate resources to green initiatives whose potential benefits may not be realized in the short term.

Company age, as a control variable, was found to have no effect on any corporate dimension. This finding reveals that newly established companies and those that have been in business for many years have the same opinion when it comes to green initiatives and their impact on CP. Although environmental performance showed high levels of achievement as shown in the descriptive statistics, ranking second only to social performance (mean 3.75, standard deviation 1.04), the study found that none of the independent variables had any effect on environmental performance. Green et al. (2012) found similar results. The author did not find any significant relationship between green purchasing and environmental performance. Furthermore, Simpson et al. (2007) reported that no significant relationship was found between environmental commitment and environmental performance. The explanation is that Milano Company implements GSCM practices without evaluating which practices produce the best results, for example, Lu (2014) claims that reverse logistics practices may achieve better performance outcomes than corporate eco-design practices downstream of the supply chain. It also varies from industry to industry, and green purchasing practices may produce better performance outcomes than corporate eco-design in the textile manufacturing industry.

The study found that green purchasing and environmental collaboration are positively associated with operational performance. These results are consistent with the findings recently reported by Diabat et al. (2013). The researcher found that environmental collaboration is one of the most important general supply chain management practices that can lead to better operational performance outcomes. These interesting findings in this study may be due to some recent regulations such as Estidama, Pearl Rating and

Green Building initiatives launched by Milano Company with the aim of motivating supply chain members to work more closely together to deliver more sustainable products and projects.

Green design and reverse logistics were found to have no effect on operational performance. Similar findings were found by Ritchie et al. (2005). The researchers found that implementing reverse logistics procedures did not improve the operational performance of the firms. Although both practices were the most widely adopted supply chain management practices in Milano, they failed to impact operational performance. It may be possible that the level of implementation was not sufficient to achieve better results (Zhu and Sarkis, 2006). Both practices require collaboration with other members of the chain to realize benefits; however, the study found no such collaboration as green collaboration ranked third in adoption by the firms surveyed.

In terms of economic performance, only green purchasing was found to have a significant impact on the economic performance of the four green SCM practices.

Surprisingly, both variables had the lowest levels of adoption and achievement. In other words, green purchasing is the lowest green SCM practice in terms of implementation, and economic performance is the lowest in terms of achievement. The only explanation is that the improvement in economic performance of Milano companies in the green context is mainly due to green purchasing practices. Thus, green purchasing practices are important for companies that have limited resources and want to achieve economic benefits in the short term. Green et al. (2012) reached similar results.

The researcher found that green purchasing is positively related to economic performance within the manufacturing industry in the United States.

The study did not find any significant impact of other green practices on the corporate economic performance. It is possible that other practices might be long-term-oriented and entail huge initial investments such as pollution prevention systems, R&D in eco-design products and so on, but green purchasing is less capital-intensive, as it is an externally oriented green supply chain initiative (Eltayeb *et al.*, 2011). Eltayeb *et al.* (2011) found that better economic performance is the main driver for Malaysian firms to adopt

green purchasing practices which might be the case of most of the firms, as reported by the study.

Only reverse logistics practices were found to have a significant impact on corporate social performance. Reverse logistics was found to be the second most widely implemented green supply chain practice in Milano after eco-design, while social performance was the highest. It is therefore not surprising that such a relationship exists.

7. Conclusion

The impact of implementing GSCM practices on CP has not received a great deal of interest within the UAE context, and therefore tackling this area was deemed necessary.

Earlier studies reported variegated results on the impact of implementation of GSCM practices on CP in different industries and using different measures and dimensions of CP.

This study shed light on GSCM practices currently adopted by business organizations in Milano Co. and their impact on CP in an attempt to motivate them to maintain an environmentally benign position while continuously endeavoring to improve the environmental, operational, economic and social aspects of CP.

The study found that operational performance positively improved when implementing green purchasing and environmental cooperation practices; therefore, organizations aiming to improve the quality of their products and shorten the lead times may need to involve upstream and downstream supply chain members and work collaboratively with them from design stages all the way through disposal.

Green purchasing has been found to be a good tool for economic vitality as it improves the firm's economic performance resulting from reduction in material and energy consumption, as well as improvements in market share, average sales return and average profit.

Firms interested in their corporate image and the social commitment shall devote more resources to implement reverse logistics practices which are found to impact social performance positively. Employee job satisfaction and health and safety measures are also improved once social performance is improved and thus firms need to actively involve and participate in reverse logistics campaigns.

In conclusion and to answer the research question, it can be claimed that overall, GSCM practices impact CP positively. However, if the firm is interested in certain dimensions of CP, for example, operational performance, then green purchasing and environmental cooperation are the most important green practices that influence such dimensions. On the other hand, if the firm is more interested in pecuniary outcomes, then only green purchasing can help improve the corporate economic performance. Lastly, societal-oriented firms that intend to develop social acumen to maintain the corporate image need to focus on reverse logistics practices.

8. Managerial implications

Supply chain managers need to carefully select the right mix of green supply chain practices to drive CP to the desired levels. Some practices may improve certain performance dimensions; therefore, it is crucial to decide which performance dimension brings the most value to the organization and consequently work with other chain members to implement the practices that improve it.

9. Further researches

Extending this study to other industrial sectors in Milano Co. may provide fruitful avenues to understand how the performance of these firms behaves toward GSCM practices implementation and how they comply with mounting environmental regulations in the construction, transportation or other environment-sensitive sectors.

It can be claimed that this study lays the foundations for future researches in other Gulf Cooperation Council (GCC) countries such as Saudi Arabia where the manufacturing industry is booming. Qatar, on the other hand, is witnessing unprecedented economic vitality in almost all sectors including oil and gas, construction and aviation, and therefore looking at its firms' position on the environmental radar and the different green practices implemented would be intriguing.

Further studies may investigate the impact of EMS certifications such as ISO 14001 on different CP dimensions within Milano Co. business organizations to assess whether such certifications play any role in improving their environmental acumen.

10. Limitations

Some limitations cannot be overcome in this study which are threefold; first, this study was limited to firms in manufacturing industry only, and this was due to the realization that manufacturing industry in any region accounts for a big portion of the environmental impacts and that manufacturing is greatly involved in the depletion of natural resources. Second, the study was limited to manufacturing industries in Milano Co. and that was due to the fact that the research purposefully intended to find out what GSCM practices Milano Co. businesses embark on and how they relate to the different magnitudes of CP and accordingly offer some insights based on the data gathered and the analysis thereafter. Countries for example may have similar socio-cultural situations to Milano co., but Milano Co. is marching ahead with different green initiatives such as “Istedama”, Green Buildings and Masdar which all make it different and entail studying it singly. Finally, the study did not differentiate between early and late adopters of green supply chain practices which was due to difficulties in capturing such information, which, if gathered, could have provided a deeper look into how the different corporate performance dimensions are impacted over time and how the green practices implementation outcomes are realized.

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