

The impact of firm size, firm age and environmental management certification on the relationship between green supply chain practices and corporate performance

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Abstract

Purpose – The purpose of this paper is to explore if control variables have any impact on corporate performance when implementing green supply chain management practices. The research in particular examines the impact of firm size, firm age and possession of environmental management system (EMS) certification as control variables on different dimensions of the corporate performance.

Design/methodology/approach – The research design consists of a comprehensive literature review, followed by an empirical questionnaire based survey with responses of 117 participant organizations proceeded by a comprehensive statistical analysis to validate the developed theoretical framework and contribute to both practical and methodological approach. This study investigates the impact of each of these three control variables on four dimensions of corporate performance using multiple regression analysis.

Findings – The research found that there is positive relationship between firm size and environmental performance, economic performance and social performance but not with operational performance. The study also found that a certified EMS within UAE firms is having a positive impact on all four performance dimensions while firm age does not have any relationship with any of the four performance outcomes.

Research limitations/implications – The research provides guidance for supply chain managers in the UAE and other similar emerging market in order to better understand the relationship between control variables, impact and performance, on corporate outcome. The paper also describes relevant strategies that should be taken into consideration by these managers in order to build their sustainable supply chain. The research contributes to social dimensions of supply chain sustainability on how resilient green strategies are important for supply chain stakeholders during uncertain conditions so that it can respond to uncertain changes in order to contribute to corporate social responsibility. Some of the limitations of this research include the geographic coverage of the study region and other methodological limitation.

Originality/value – This research is the first of its kind in the UAE region to assess the link between firm control variables and its impact on green supply chain management practices; which are less studied in the green supply chain literature. While there might be few other studies that addressed and uncovered the relationship between implementing green supply chain management practices and corporate performance, however, no study has attempted to find out if firm size, firm age and possession of EMS would have any impact on the green supply chain practices and corporate performance relationship. The research was conducted in an emerging economy to understand the relationship better. A series of recommendations are also provided for firms interested in improving their environmental performance while implementing green supply chain practices.

Keywords Green supply chain management, Quantitative research, Corporate performance, Control variables

Paper type Research paper



1. Introduction

The impact of green supply chain management practices implementation on corporate performance has received a great deal of research and investigation both from academic as well as business perspectives (Dubey, Gunasekaran and Papadopoulos, 2017; Dubey, Gunasekaran, Papadopoulos, Childe, Shibin and Wamba, 2017). Governments and environment conscious

organizations are pressurizing businesses to green their operations and promote organizational sustainability (Vijayvargy *et al.*, 2017). Managers are keen to implement green supply chain management practices because this leads to many benefits such as reducing operational costs (Orlitzky *et al.*, 2003), enhancing the corporate image (Porter, 1991), increasing customer satisfaction (Kleindorfer *et al.*, 2005), improving employee job satisfaction (Jun *et al.*, 2006) and creating more market opportunities (Diabat *et al.*, 2013).

Extant literature on GSCM covered different areas including; green operations, green design, green manufacturing, reverse logistics, GSCM practices and performance outcomes and, finally, green drivers and barriers, González-Benito and González-Benito (2005a, b), Cai *et al.* (2008) and Anthony (2019). The green supply chain management practices and their relationship with corporate performance were extensively researched and using different control variables, of which some are industry specific, such as industry type and institutional pressure, while others are firm specific, such as firm size and firm age; however, such studies in the Middle East and North African region are still nascent in the stage and therefore need to be examined.

1.1 Green supply chain

The journey of this research starts with defining the constructs of green supply chain and how they relate to sustainable supply chain. This section presents a number of definitions found within the literature. A useful definition of green supply chain is captured by Hervani *et al.* (2005, p. 334), who states that a “green supply chain is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation, marketing, and reverse logistics.” According to Sarkis (2003, p. 399), it is further defined as “a combination of the activities that encompasses product design, all stages of manufacturing and distribution and all aspects of reverse logistics, and emphasized the latter’s importance.” Sundarakani, Souza, Goh, Wagner and Manikandan (2010, p. 43) added another dimension asserting that “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 consumers, and end-of-life management of the product after its use.”

These definitions were built on from earlier work by Beamon (1999, p. 332), who 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.” Later, Kumar and Putnam (2008, p. 305) proposed 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 reused or properly disposed of.

Srivastava (2007), on the other hand, believed that green supply chain management 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. Based on the above definitions, it can be clearly observed that greening must span the entire supply chain throughout all stages and therefore it can be reasonably claimed that a green supply chain is a supply chain that produces a degradable product using minimum resources while generating minimal waste (Younis *et al.*, 2016).

While many literatures argue that implementing green supply chain management practices is nothing but a trade-off between economic, social and environmental performance (González-Benito and González-Benito, 2005a, b; Dubey, Gunasekaran and Papadopoulos, 2017; Dubey, Gunasekaran, Papadopoulos, Childe, Shihin and Wamba, 2017), others argue that there

is a negative association between these performance outcomes (Rao and Holt, 2005; Sundarakani, de Souza, Goh, van Over and Manikandan, 2010). In order to understand such debate in depth, the “control variable” concept is used to underline such a paradox. This study is the first to examine the relationship of control variables on sustainable corporate performance when implementing green supply chain management practices. Hence, using control variable as an indicator can help in understanding “when” and “how” the relationship might influence the performance outcome.

Therefore, the main objectives of this study is to investigate if there is any relationship between firm size, firm age and EMS certification and different performance dimensions including environmental performance, operational performance, economic performance and social performance all in the context of GSCM. Thus the research attempts to answer the following question: Do firm size, firm age and possession of environmental management certification matter in GSCM practices implementation and how it relates to corporate performance?

The study finds interesting how some private, semi-government and government organization in the UAE are pursuing green sustainable initiatives implementation, while other government and semi-government organizations are obliged by law to implement such sustainable practices. To this end, the motivation behind this research is that UAE is leading the region’s efforts in environmental sustainability by launching many initiatives and achieving different milestones. For example, US Green Building Council (USGBC, 2017) ranked UAE as the top country for LEED green building in Middle East and among the top ten internationally with 337 LEED certified projects in the UAE in December 2017. However, some businesses are still sceptical about the resources needed and the outcomes of implementing green supply chain management practices mainly due to their firm sizes, limited number of years in business (firm age) or being non-EMS-certified.

Thus, to carry out a thorough study in the domain of green supply chain management and corporate performance as well as the main control variables employed, a comprehensive literature review is presented based on control variables, grounded theories and dependent variables in Section 2. While Section 3 illustrates the research aim and questions, the theoretical model in terms of variable development, Hypotheses development are debated in Section 4. Section 5 describes the research methodology in detail with respect to sample size and data collection. Section 6 reports the data analysis and statistical results. Section 7 outlines the discussion of results pertaining to managerial and practical implications. Finally, Section 8 provides a summary of the paper and recommends on further studies and direction.

2. Literature review

2.1 Review on control variables

Researchers employed different control variables when testing green supply chain management practices impact on corporate performance, an example of these can be found in the work of King and Lenox (2001), who intended to find out whether it really matters to be green? These researchers have used control variables such as company size, capital intensity, the annual growth leverage, research development intensity and stringency.

Much ago, Russo and Fouts (1997), used other control variables including industry concentration, firm growth rate, firm size, advertising intensity, capital intensity and industry growth to examine if environmental performance impacts the economic performance of the firm and whether industry growth moderates the relationship.

Using firm size along with other control variables including plant equipment age, industry and advanced production and operations management, Benito and Benito (2005) empirically analyzed the relationship between environmental proactivity and business

performance to conclude that environmental practices related to transformation of logistics processes contribute to lean operational performance. Additionally, using firm size along with public visibility as control variables, Al-Tuwaijri *et al.* (2004) investigated the relations among economic performance, environmental performance and environmental disclosure. The author found that there is positive relation between economic performance and environmental performance and that environmental performance is positively related to environmental disclosure.

Within the same token, and using firm size and firm age as control variables, Lee (2008) examined the drivers for implementing green supply chain initiatives within small- and medium-sized suppliers who found a strong evidence that buyers play a key role in facilitating SME suppliers to get involved in green supply chain initiatives.

Moreover, to determine if the environmental management standard ISO 14001 helps organizations reduce the negative impact their business activities may have on the environment and, as a result, improves their business performance, Link and Naveh (2006) used firm size and time since 14001 was received in years as control variables in their study. The researchers found that ISO 14001 could lead to increased discretion when personal responsibility is allocated among firms.

Similarly, Russo (2009) used ISO 14001 along with firm size and firm age to examine three models used to evaluate the mediation relationships between the external and internal practices of GSCM with respect to environmental, economic and operational performance. Russo's findings echoed those of Link and Naveh (2006), confirming that early adopters of ISO 14001 have lower emissions compared with late adopters, and that the longer the facility operated under ISO 14001, the lower its emissions.

Earlier, Cordano *et al.* (2010) employed organizational size only as a control variable to examine whether the development of rudimentary EMSs increases the success of implementing solid waste recycling and energy. Eltayeb *et al.* (2011), on the other hand, used few more control variables in addition to the firm size which are industry type, firm ownership, number of suppliers and participation in green associations. The researchers' objective was to assess the actual environmental, economic and intangible outcomes resulting from the adoption of green supply chain initiatives.

Other control variables used were within green supply chain management and corporate performance domain these include institutional pressures by Zhu and Sarkis (2007); financial measures such as debt to equity ratio, assets turnover ratio, country and sub-sector by Wagner (2005); industry type, company status and job position by Ann *et al.* (2006); and, finally, investment, contracts and assessment by Simpson *et al.* (2007). Table I presents an extensive review of key contemporary to modern research in GSCM and respective control variables used.

The preceding literature as well as Table I clearly shows that three important control variables were mostly used in many of the studies conducted in the field of green supply chain management and corporate performance; these are firm size, firm age and environment management system certification; therefore, this research will investigate the impact of these three control variables on different corporate performance outcomes including environmental performance, operational performance, economic performance and social performance.

2.1.1 Review of green supply chain impact on corporate performance. The impact of implementing green supply chain management practices on corporate performance has been the focus of researchers, academics and practitioners. There are three schools of thought in this regard; first, those who believe that implementing green supply chain management practices can be a burden on the organization and entails huge upfront investments for which returns might not be realized in the short term (Zhu *et al.*, 2007; Rothenberg *et al.*, 2001). Members of this school include Friedman (1962) and Jaffe *et al.* (1995). Other researchers go

S.No.	Title	Author	Objective	Control variable	Findings
1	Green supply chain management: an investigation of pressures, practices, and performance within the Brazilian automotive supply chain	Vanalle <i>et al.</i> (2017)	The paper explores the GSCM pressures, practices, and performance in a Brazilian automotive supply chain	Institutional pressure	The research confirms that institutional pressures are influencing the studied companies to pursue GSCM practices
2	Green supply chain management practices and performance	Laosirihongthong <i>et al.</i> (2013)	To examine the deployment of proactive and reactive practices in the implementation of GSCM and analyze their impact on environmental, economic and intangible performances of the firm	Low cost strategy, quality and time-based strategy	Legislations and regulations are the key driver for environmental, economic and intangible performance and therefore reactive approach is more dominant than proactive one in Thai manufacturers
3	The examination on the drivers for green purchasing adoption among EMS 14001 certified companies in Malaysia	Eltayeb <i>et al.</i> (2010)	To examine the effect of four drivers, namely, regulation, customer pressure, social responsibility and expected business benefits, on green purchasing in the Malaysian manufacturing sector	Type of industry, number of employees, firm ownership, number of suppliers and participation in green association	Only firm type has a significant effect on the GP Among the 4 lvs, RG has the most significant effect on GP followed by CP and then EBB SR has no significant effect on the GP
4	A resource-based perspective on corporate environmental performance and profitability	Russo and Fouts (1997)	To examine if environmental performance impacts the economic performance of the firm and whether industry growth moderates the relationship	Industry concentration, firm growth rate, firm size, advertising intensity, capital intensity and industry growth	Environmental performance and economic performance are positively linked moderated by industry growth
5	Standardization and discretion: does the environmental standard ISO 14001 lead to performance benefits?	Link and Naveh (2006)	To determine if the environmental management standard ISO 14001 helps organizations reduce the negative impact their business activities may have on the	The number of employees and time since 14001 was received in years	There are significant differences among ISO certified organizations in the way they run their environmental operations ISO 14001 could lead to increased discretion when personal responsibility is allocated

(continued)

Table I.
List of key studies in GSCM with control variables

S.No.	Title	Author	Objective	Control variable	Findings
6	Does it really pay to be green	King and Lenox (2001)	environment and, as a result, improves their business performance To examine if environmental performance impacts the financial performance of the firm	Company size, capital intensity, the annual growth, leverage, R&D intensity and stringency	No positive relationship between environmental and business performance Environmental performance is associated with financial performance Firms with lower emissions in their industries have higher financial performance
7	Explaining the impact of ISO 14001 on emission performance: a dynamic capabilities perspective on process and learning	Russo (2009)	To examine three models used to evaluate the mediation relationships between the external and internal practices of GSCM with respect to environmental, economic and operational performance	Facility size, age of plant, total toxic releases per dollar of state GDP and presence of environment management system other than ISO 14001	Early adopters of ISO 14001 have lower emissions compared with late adopters The longer the facility operated under ISO 14001, the lower its emissions
8	How do small and medium enterprises go "green"? A study of environmental management programs in the US wine industry	Cordano <i>et al.</i> (2010)	To examine whether the development of rudimentary environmental management systems (EMS), increases the success of implementing solid waste recycling and energy conservation practices in winery operations in the USA	Organizational size	Firms with more developed EMP achieve greater success in implementing energy conservation and recycling activities Norms regarding environmental stewardship were strongly related to adoption of EMP components
9	The relations among environmental disclosure, environmental performance and economic performance: a simultaneous equations approach	Al-Tuwajri <i>et al.</i> (2004)	To investigate the relations among economic performance, environmental performance, and environmental disclosure	Public visibility and firm size	Stakeholders' involvement and support influence the type of program implemented by firms There is positive relation between economic performance and environmental performance Environmental performance is positively related to environmental disclosure Good environmental performers disclose more pollution-related environmental information than poor performers
10	The moderating effects of institutional pressures on emergent green supply chain practices and performance	Zhu and Sarkis (2007)	To examine the relationships between GSCM practice, environmental and economic performance, incorporating	Institutional pressures	Market and regulatory pressures will influence organizations to have better environmental performance mainly when they lead to adoption of eco-design and green purchasing practices

(continued)

S.No.	Title	Author	Objective	Control variable	Findings
11	How to reconcile environmental and economic performance to improve corporate sustainability: corporate environmental strategies in the European paper industry	Wagner (2005)	three moderating factors market, regulatory, and competitive institutional pressures To examine the relationship between environmental and economic performance and the influence of corporate strategies with regard to sustainability and the environment	Dept to equity ratio, assets turnover ratio, country, sub-sector and firm size	Manufacturers facing regulatory pressures tend to implement green purchasing and investment recovery practices; GP leads to improved environmental performance but IR leads to worse economic performance In environmentally intensive industries it is difficult to see positive relationship between environmental and economic performance unless there is a focus on integrated pollution prevention strategies Corporate strategy with regards to sustainability and environment have an important moderating effect on the relationship between environmental and economic performance Externally-oriented green supply chain initiatives such as green purchasing and reverse logistics have little effect on internal performance of the firm Strong relationship was found between eco-design and the four outcomes, i.e. environmental, economic, intangible and cost reductions and therefore eco-design is internally focused type of GSCM initiative
12	Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: investigating the outcomes	Eltayeb <i>et al.</i> (2011)	To assess the actual environmental, economic and intangible outcomes resulting from the adoption of green supply chain initiatives	Industry type, number of employees, firm ownership, number of suppliers and participation in green associations	The environmental practices related to transformation of logistics processes contribute to lean operational performance whereas product design practices enhance marketing performance *Transformation of internal production processes negatively affects mass operational performance No evidence was found to support that environmental proactivity improves the financial performance
13	Environmental proactivity and business performance: an empirical analysis	Benito and Benito (2005)	To empirically analyze the relationship between environmental proactivity and business performance	Company size, plant equipment age, industry and advanced production and operations management	

(continued)

Table I.

S.No.	Title	Author	Objective	Control variable	Findings
14	A study on the impact of environmental management system (EMS) certification towards firm's performance in Malaysia	Ann <i>et al.</i> (2006)	To investigate the impact of EMS certification on the performance of firms including economic and environmental aspects and perceived customer satisfaction	Industry type, company status and job position	ISO 14001 certification has a positive impact on a firm's performance, namely, on perceived economic performance, perceived environmental performance and perceived customer satisfaction Instituting an ISO 14001 EMS did not help management reduce lead times or costs or lead to quality improvements
15	Greening the automotive supply chain: a relationship perspective	Simpson <i>et al.</i> (2007)	To explore the moderating impact of relationship conditions existing between a customer and its suppliers on the effectiveness of the customer's environmental performance requirements	Investment, contracts and assessment	No significant relationship between the supplier's level of environmental commitment and the customer's environmental performance requirements Only investment found to moderate the relationship between the IV and the DV
16	Drivers for the participation of small and medium-sized suppliers in green supply chain initiatives	Lee (2008)	To examine the drivers for implementing green supply chain initiatives within small and medium-sized suppliers	Firm size and age	Strong evidence was found that buyers play a key role in facilitating SME suppliers to get involved in GSC initiatives The government's involvement was likely to be linked with a greater willingness of SME suppliers to take part in GSC initiatives The GSC participation of SME suppliers was directly related to their readiness including internal slack resources and organizational capabilities

beyond that and argue that implementing green supply chain management practices might in fact lead to negative economic performance; for example, Sarkis (2003) argues that implementing green supply chain management practices leads to an increase in operational costs, increased costs of procuring environmentally friendly items and materials and increased training costs.

Members of the second school, such as Fogler and Nutt (1975), Freedman and Jaggi (1982), Wiseman (1982) and Rockness *et al.* (1986), argue that there is no relationship between environmental and economic performance. However, other researchers from this school, such as Walley and Whitehead (1994), believe that implementing green supply chain management practices is nothing but a trade-off between economic and environmental performance.

Those of the third school of thought argue that there is a positive relationship between implementing green supply chain practices and corporate performance and that organizations may reap many benefits from such implementation such as reducing operational costs (Orlitzky *et al.*, 2003), enhancing the corporate image (Porter, 1991), increasing customer satisfaction (Kleindorfer *et al.*, 2005), improving employee job satisfaction (Jun *et al.*, 2006) and creating more market opportunities (Diabat *et al.*, 2013).

Evidently, Eltayeb *et al.*'s (2011) approach was adopted by Wagner (2005), who intended to examine the relationship between environmental and economic performance and the influence of corporate strategies with regards to sustainability and the environment. The authors adopted more reliable, objective measures to measure both constructs. Flipside, they used total emissions, water consumption and energy consumption to measure the environmental performance of the firm. On the economic side, return on employed capital, return on equity and return on sales were used to measure the economic performance. Using incomplete panel data on a set of 37 paper firms in Germany, Italy, the Netherlands and the UK, the authors regressed the variables using ordinary least square regression. The results revealed that in some sensitive industries such as the one targeted in this study, it is difficult to see a positive relationship between environmental and economic performance, unless a more proactive environmental strategy is implemented such as pollution prevention systems. This finding matches with results obtained by Zhu and Sarkis (2007) discussed above. Conversely, the authors found that end-of-pipe strategies lead to little positive or even negative performance.

The aim of this research is to explore the relationship of related factors between the implementation of green supply chain practices and corporate performance, and to identify the impact of these factors on corporate performance using control variable.

2.2 Review of grounded theories

Carter and Easton (2011), in their review of literature in a supply chain, found that 87 percent of the articles published during the period 1991–2000 did not use any sort of theoretical framework. However, during the following ten years of study, approximately 33 percent of the articles published within the area of green and sustainable supply chain included some theoretical foundation. While many theories were employed to help explain the impact of implementing green supply chain practices on corporate performance, three key theories have been found to be the main theoretical pillars within the extant green literature, namely, stakeholder theory (Freeman, 1984), institutional theory (DiMaggio and Powell, 1983) and resource-based theory (Wernerfelt, 1984). Each of these theories is discussed below.

2.2.1 Stakeholder theory. One of the early works in the field of corporate performance and possibly the most prominent and well-known theory of business management, was coined by Freeman (1984) as the stakeholder theory (p. 43), in which he claimed that

“Any organization performs to benefit and satisfy its stakeholders including: government, investors, political groups, customers, suppliers, communities, trade associations and employees.” Resultantly, businesses these days adopt GSCM practices to respond to various pressures from different stakeholder groups including employees, shareholders, environment conscious bodies and government organizations who also influence decision making in these organizations (Frooman and Murrell, 2005).

Lately, in his updated stakeholder theory, Freeman (2002) posited that organizations need to go beyond maximizing shareholders wealth to address the interest of its stakeholder groups and individuals who might affect or be affected by the organization’s purpose and existence. Those stakeholders are viewed as the potential beneficiaries or the bearers of any risk that the organization might undergo (Post *et al.*, 2002) and Dubey, Gunasekaran and Papadopoulos (2017) and Dubey, Gunasekaran, Papadopoulos, Childe, Shibin and Wamba (2017). In line with that, Freeman concluded that beneficiaries should be changed from stockholders to stakeholders and should be given effective decision making authority on a par with the firm’s executives (Stieb, 2009). Further, the author argued that “each of these stakeholder groups has the right not to be treated as a means to some end and therefore must participate in determining the future direction of the firm in which they have a stake” (Freeman, 2002, p. 39).

Ayuso *et al.* (2014) supported this view asserting that stakeholder theory is very much connected with corporate social responsibility and can help analyze the relationship between the organization and society and may provide direction to the firm’s managers. In summary, and as claimed by Key (1999), Freeman attempted to explain the relationship of the firm to its external environment and its behavior within this environment. The author documented the key players and relationships involved and sought to empower both groups and individuals involved.

2.2.2 Institutional theory. DiMaggio and Powell (1983), presented the institutional theory in the early 1980s, claiming that firms attempt to adapt to the surrounding environment by adhering to legitimacy rules and regulations from one side and through seeking social fitness from another side. These authors also claimed that a firm’s behavior may be driven by a strong social force motivating the organization to go in a certain direction. Such a force can be any form of social driver including; culture, law or regulations. However, Zhu and Sarkis (2007) found that the implementation of green supply chain management practices is not always motivated by efficiency but rather that businesses endeavor to achieve social legitimacy and business sustainability.

Government regulations can be one of the main institutional factors that drive businesses to implement green supply chain practices. That is why within some regions, such as Europe and the USA, where environmental rules are strict, businesses adopt GSCM practices more frequently than businesses in other regions where they still lack stringent environmental legislation. Such adaptation might be costly, especially if firms opt for cutting edge technologies to minimize environmental impacts (Groenewegen and Vergragt, 1991).

Researchers have used the institutional theory in different research areas such as total quality management, quality cycles and business continuity planning (Lin and Sheu, 2012). Lin and Sheu (2012) claimed that institutional drivers can be internal to help improve operational performance such as exploiting ISO 9000, or external such as pressures to implement TQM in order to seek legitimacy. The institutional theory can help explain whether such endeavor for social fitness is externally or internally driven and, consequently, will lead to performance improvement or not.

2.2.3 Resource-based theory. The third theory presents the resource-based view of the firm and links the firm’s success with the better utilization of its internal assets. This includes both tangible, such as financial reserves, and physical assets, and intangible assets such as reputation, employee skills and knowledge and corporate culture. Wernerfelt (1984) challenged the earlier belief that the firm’s success is only determined by its external

environment and argued that the competitive advantage of any firm is embedded within its inimitable assets. The firm needs to properly and effectively manage its capabilities to upscale its performance and outperform its competitors. From a tangible assets perspective, Russo and Fouts (1997) claimed that a firm can outperform its competitor's environmental performance if the deployment of new physical assets enhances internal processes in the use of resources and waste reduction.

However, the link between the firm's external environment and its internal assets remained unclear until Barney's (1986) early work which was later supported by Conner's (1991) study which made it clear that a firm's resources cannot be evaluated in isolation. Rather, their importance is determined in the interaction with market conditions and the most valuable resources are those that enable the firm to exploit market opportunities and avoid market and competitor threats. Later, Hunt and Davis (2012) claimed that resources can be tangible and intangible entities available to the firm to enable the production of a value-adding product for the targeted market. He also identified seven key types of resources: physical, legal, human, financial, relational, informational and organizational.

While the above studies highlight several approaches that can influence firms to green the supply chain, the pressure exerted on businesses to clean their operations and reduce their carbon footprints may lead them to react differently (Eltayeb *et al.*, 2010). For example, some may adopt compliance-based strategies such as pollution abatement and short-term "end-of-pipe" approaches, while others may react proactively and reengineer their operations to reduce material consumption and prevent pollution (Hart, 1995). It is only with the latter strategy that firms are likely to achieve a competitive advantage and reap benefits from the implementation of GSCM practices (Laosirihongthong *et al.*, 2013). More recently, Anthony (2019) examined the factors that influence environmental performance in organizations based on belief-action-outcome framework using the resource-based view theory and shown some significant relationship between information technology as resources and environmental performance.

Nevertheless, the theoretical lenses reviewed above, namely, stakeholder theory, institutional theory and resource-based theory, provide the theoretical basis for this research. Based on the above extant literature review relating to the application of different GSCM practices to different dimensions of corporate performance, the theoretical model and research objective are presented next.

3. Research objective

Based on the literature review, the main objectives of this study are:

- (1) to investigate if there is any relationship between firm size, firm age and EMS certification and different performance dimensions including environmental performance, operational performance, economic performance and social performance, all in the context of GSCM; and
- (2) to provide some recommendations for businesses and highlight potential future avenues for GSCM-CP domain.

This study attempts to answer the following questions:

- RQ1.* Does firm size matter in GSCM practices implementation and how it relates to corporate performance?
- RQ2.* Does firm age matter in GSCM practices implementation and how it relates to corporate performance?
- RQ3.* Does possession of environmental management certification matter in GSCM practices implementation and how it relates to corporate performance?

4. Theoretical model and hypotheses development

The theoretical model guiding this research is presented in Figure 1.

The three independent variables used in this model are: firm size, which is measured by the total number of employee the firm has; firm age, which refers to the number of years the firm has been in business; and, finally, the firm possession of environment management system certification such as ISO 14001.

4.1 Environmental performance

This research will adopt the definition employed by Younis *et al.* (2016), where they claimed that environmental performance refers to the ability of the organization to reduce air emissions, effluent waste and solid wastes as well as the ability to decrease consumption of hazardous and toxic material and decreased frequency of environmental accidents.

4.2 Operational performance

The definition adopted for operational performance is a modified one used earlier by Melnyk *et al.* (2003) and Zhu *et al.* (2008). Consequently, operational performance is the improvements in the quality of the products the company produces while reducing the lead times, which leads to improving the company's position in the market place and enhances its chances in selling products in international markets (Younis *et al.*, 2016).

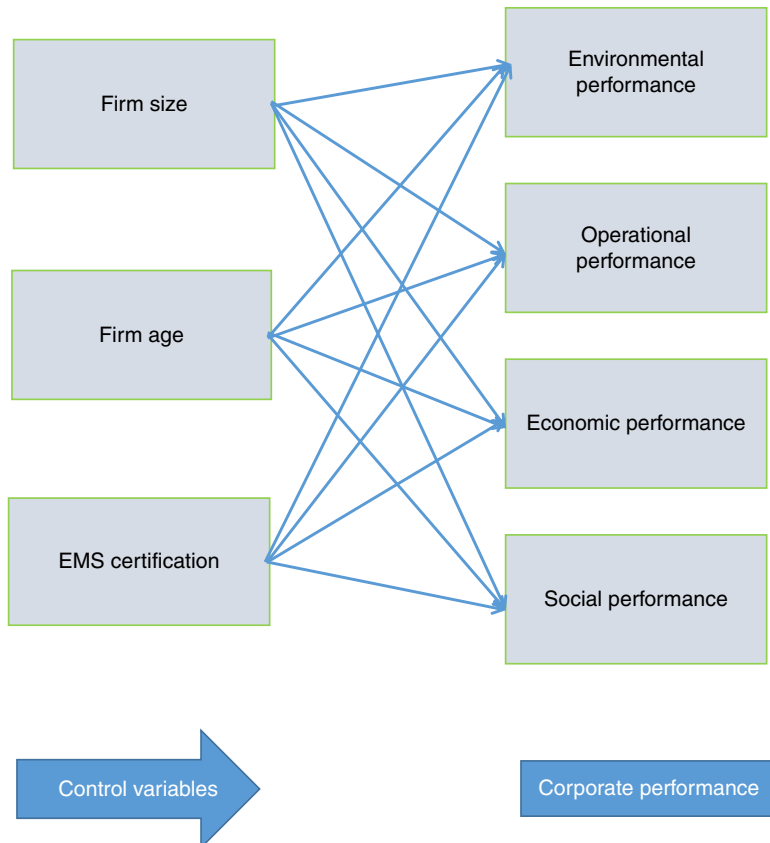


Figure 1.
Theoretical model

4.3 Economic performance

The economic performance definition employed for this research is adopted from Younis *et al.* (2016), where they defined economic performance 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 authors defined financial improvements as decreased cost of raw material purchased and energy consumed, decreased waste discharge costs and decreased costs of environmental accidents. The marketing-based improvements encompass an increased average return on sales and an increased average market share (Dubey, Gunasekaran and Papadopoulos, 2017).

4.4 Social performance

Wood (1991) defined social performance as “[...] 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” (p. 293).

While many literatures argue that implementing green supply chain management practices is nothing but a trade-off between economic, social and environmental performance in organizational performance, others argue that there is a negative association between these performance outcomes (Zhu and Sarkis, 2007; Dubey, Gunasekaran and Papadopoulos, 2017; Dubey, Gunasekaran, Papadopoulos, Childe, Shibin and Wamba, 2017). In order to understand such debate in depth, the “control variable” concept is used to examine such a paradox.

4.5 Firm size and performance outcome

Larger firms are in a better position to allocate sufficient resources and implement green supply chain management practices and therefore gain more performance improvements than small firms. Vijayvargy *et al.* (2017) studied the role of firm size for emerging economies toward green supply chain management practices and found that the adoption of green supply chain management practices within the Indian context leads to equal improvement outcomes for both large-size and medium-size organizations. Similarly, Min and Galle (2001) reported that large firms with bigger purchasing volumes are more heavily involved in green supply chain management practices than small firms.

Based on the above, this research proposes the following hypotheses:

- H1a. There is a positive relationship between firm size and environmental performance improvement as a result of green supply chain management practices implementation.
- H1b. There is a positive relationship between firm size and operational performance improvement as a result of green supply chain management practices implementation.
- H1c. There is a positive relationship between firm size and economic performance improvement as a result of green supply chain management practices implementation.
- H1d. There is a positive relationship between firm size and social performance improvement as a result of green supply chain management practices implementation.

4.6 Firm age and performance outcome

Firms with more years in business gain competitive advantage over young firms in terms of experience in green supply chain management and performance improvements. For example, Russo (2009) examined three models used to evaluate the mediation relationships between the external and internal practices of GSCM with respect to environmental, economic, and operational performance. The author found that early adopters of green supply chain management practices are having better performance outcomes than late

adopters, and that the longer the facility operates under environment management systems, the better performance improvements it achieves.

In view of the above, this study proposes the following hypotheses:

- H2a.* There is a positive relationship between firm age and environmental performance improvement as a result of green supply chain management practices implementation.
- H2b.* There is a positive relationship between firm age and operational performance improvement as a result of green supply chain management practices implementation.
- H2c.* There is a positive relationship between firm age and economic performance improvement as a result of green supply chain management practices implementation.
- H2d.* There is a positive relationship between firm age and social performance improvement as a result of green supply chain management practices implementation.

4.7 EMS certification and performance outcome

Firms that adopt EMS such as ISO 14001 are in a better position to achieve higher performance improvements compared to non-EMS-certified firms. Certification to EMS enhances corporate image (Ann *et al.*, 2006), improves environmental performance (Gonzalez *et al.*, 2008) and enhances long-term financial performance (Watson *et al.*, 2004).

Consequently, this research proposes the following hypotheses:

- H3a.* There is a positive relationship between firm possession of EMS certification and environmental performance improvement as a result of green supply chain management practices implementation.
- H3b.* There is a positive relationship between firm possession of EMS certification and operational performance improvement as a result of green supply chain management practices implementation.
- H3c.* There is a positive relationship between firm possession of EMS certification and economic performance improvement as a result of green supply chain management practices implementation.
- H3d.* There is a positive relationship between firm possession of EMS certification and social performance improvement as a result of green supply chain management practices implementation.

Figure 2 exhibits the model with the proposed hypotheses.

5. Research methodology

This study used a survey instrument to collect the primary data of managerial level respondents among the UAE organizations. The questionnaire consisted of three main parts in the survey in addition to the introduction section, which briefed the reader on the purpose of the survey. The first section of the survey aimed to collect pertinent information on the characteristics of the respondents and their organizations including their titles, the organizations scope of business, legal status, their number of years in business, size and possession of EMS.

The second section elaborated on the GSCM initiatives adopted by the organization covering the four main GSCM practices introduced, including eco-design, green purchasing, environmental cooperation and reverse logistics. The third section solicited information on the impact of such GSCM initiatives on corporate environmental, economic, operational and social performance. A five-point Likert scale was adopted since it has a middle neutral point which is 3, and this, in turn, gives the respondent an opportunity to select an answer at

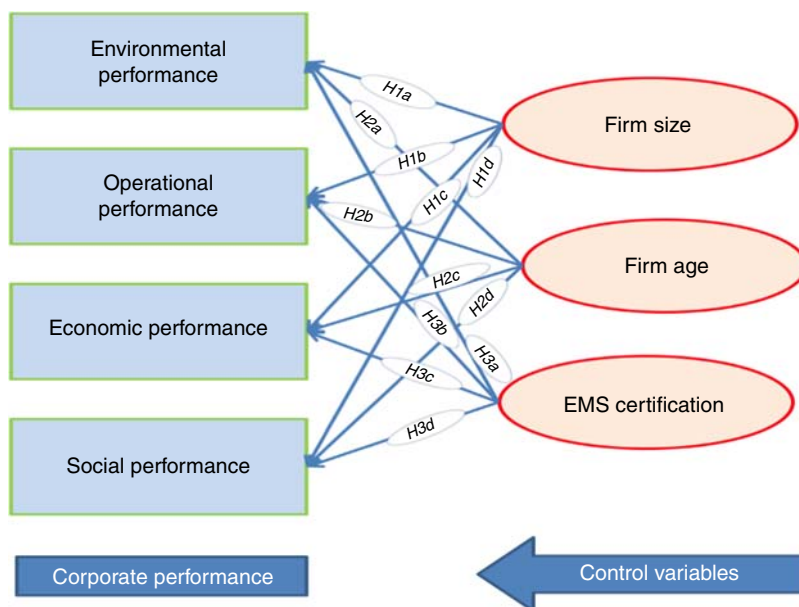


Figure 2. Research model with hypotheses

either side of the midpoint. Taking a statistical point of view, the answers of the respondents should show a normal distribution around a good portion of answers in the middle and a five-point scale with 3 in the middle offers this distribution. The survey consists of measurement items that are presented in Table II.

Variable	Measurement item	Source
Environmental performance	Reduced air emission, solid wastes and waste water Decreased consumption of hazardous/harmful/toxic materials and decreased frequency for environmental accidents Improve a company's environmental situation	Zhu <i>et al.</i> (2007)
Economic performance	Decreased cost for materials purchasing and energy consumption Decreased fee for waste treatment and discharge as well as 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 and social commitment Enhanced employee job satisfaction	Rao (2002) Homburg and Stock (2004), Zhu <i>et al.</i> (2008)
Operational Performance	Enhanced health and safety of employees Significantly reduced lead times and improved product quality Significantly improved its position in the market place and increased chances in successfully selling its products in international markets Helped the company design/develop better products Implementing green practices helps in reducing all types of wastes	Cordano <i>et al.</i> (2010) Melnik <i>et al.</i> (2003)

Table II. Survey questionnaire variables and their measurement items

In addition, the questionnaire adopted the criteria mentioned as follows for Section 2 of the survey which solicits information on the GSCM practices implemented by the firms surveyed:

- (1) not considering;
- (2) planning to consider;
- (3) considering it currently;
- (4) initiating implementation; and
- (5) currently implementing.

Whereas Section 3 designed to measure the impact of GSCM practices implementation on corporate performance, the research adopted the criteria mentioned as follows:

- (1) not at all;
- (2) a little bit;
- (3) to some degree;
- (4) relatively significant; and
- (5) highly significant.

The questionnaire items measured the impact of implementing four main green supply chain management practices, namely, eco-design, green purchasing, environmental corporation and reverse logistics on four dimensions of corporate performance: environmental performance, operational performance, economic performance and social performance. The study population was all manufacturing firms in UAE with more than 50 employees each. The participating list of firms was provided by Dun & Bradstreet Middle East in which 1,840 business organizations were identified to target the survey. The survey was sent through an online survey tool (survey monkey) to the environmental management representative (EMR) within each firm. An online survey tool is employed because it is more convenient, cost effective and the responses can be easily exported to the data analysis application for statistical testing. The survey questionnaire was pretested, validated and sent into two waves to measure the non-response bias. As per the response, in total, 971 firms were willing to participate and, accordingly, they were invited to the online survey. In total, 117 useable responses were received, which were then exported to SPSS Version 23 for statistical testing by using multiple regression analysis. The next section presents some demographic statistics related to these three control variables: firm size, firm age and EMS certification.

6. Results and analysis

This section elaborates the firm size, firm age of organizations participated in the study and whether they are EMS-certified or not. The responses were categorized as responding to the first call or to the follow up call. Of the responses received, around 33 were categorized as early responses (28 percent) and 84 responses were categorized as late responses (72 percent). A comparison of the means of demographic and independent variables for the two groups was conducted using one-way ANOVA (Rogelberg and Stanton, 2007). Results indicated that there is no statistically significant difference existing between the early and late wave groups, and therefore non-response bias was addressed.

Table III shows that the *t*-statistic value of all dependent variable and their significant is highlighted, which, in turn, means to predict the dependent variable.

Model	Unstandardized coefficients		Standardized coefficients		t	Sig.	Collinearity statistics	
	B	SE	β				Tolerance	VIF
<i>Control variable impact on environmental performance</i>								
1 (Constant)	-0.606	0.339			-1.787	0.077		
FirmSize	0.196	0.079	0.231		2.483	0.014	0.870	1.149
FirmAge	-0.026	0.102	-0.023		-0.259	0.796	0.915	1.093
EMSC	0.528	0.179	0.265		2.953	0.004	0.937	1.067
<i>Control variable impact on operational performance</i>								
1 (Constant)	-0.553	0.351			-1.577	0.118		
FirmSize	0.129	0.082	0.152		1.581	0.117	0.870	1.149
FirmAge	0.017	0.106	0.015		0.164	0.870	0.915	1.093
EMSC	0.435	0.185	0.218		2.352	0.020	0.937	1.067
<i>Control variable impact on economic performance</i>								
1 (Constant)	-0.409	0.347			-1.180	0.241		
FirmSize	0.137	0.081	0.162		1.696	0.093	0.870	1.149
FirmAge	-0.044	0.105	-0.039		-0.419	0.676	0.915	1.093
EMSC	0.513	0.183	0.257		2.805	0.006	0.937	1.067
<i>Control variable impact on social performance</i>								
1 (Constant)	-0.555	0.333			-1.665	0.099		
FirmSize	0.221	0.078	0.260		2.841	0.005	0.870	1.149
FirmAge	-0.066	0.100	-0.058		-0.656	0.513	0.915	1.093
EMSC	0.574	0.176	0.288		3.266	0.001	0.937	1.067

Table III.
Control variable impact on environmental, operational, economic and social performances

Note: *,**Significant at $\alpha = 0.05$ and 0.10 , respectively

6.1 Firms' size

Figure 3 shows that organizations participated 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.

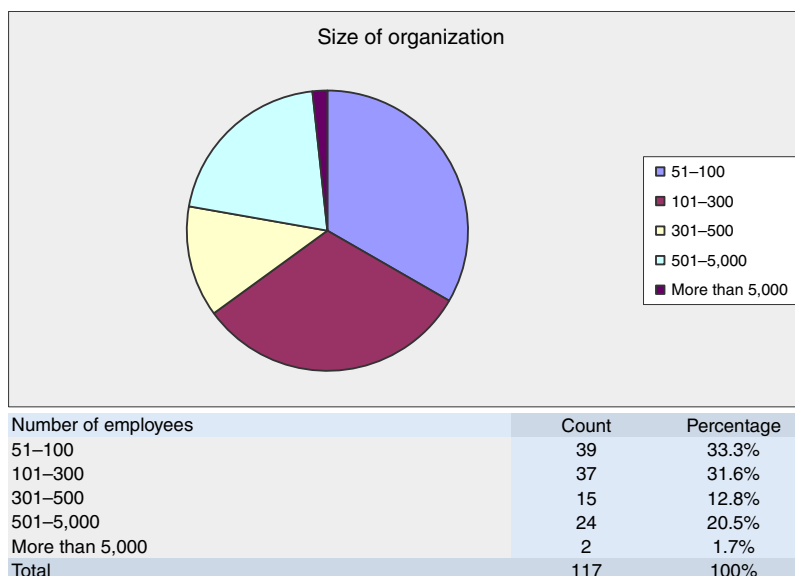


Figure 3.
Size of organizations

6.2 Firms' age

Figure 4 shows that almost 50 percent of the organizations participated in the survey have been in businesses for more than 21 years in the UAE, while 29 percent have been in the business for more than 11 years and less than 20 years. However, only 25 percent of the firms have been found in businesses with less than ten years.

6.3 EMS certification

Figure 5 shows that almost 48 percent of the firms surveyed are EMS certified. Examining those firms closely, the research reveals that they are private MNCs (87 percent) in terms of their legal status, government firms and semi-government firms (7 percent) and other branch of multinational firms (5 percent). Research outcome also reveals that both Dubai and Abu Dhabi share a major proportion of the firms, followed by Sharjah and RAK Emirates in the UAE.

6.4 Hypotheses testing

Multiple regression analysis were used to test the relationship between the three control variables entered in block 1, the four green supply chain management practices entered in block 2 and the four performance outcomes as dependent variables. The standardized β coefficient for each of the three control variables is shown in Table IV.

6.4.1 Firm size and corporate performance. The statistical testing shows a positive relationship between firm size and three performance outcomes including environmental performance, economic performance and social performance. However, no positive relationship was found between firm size and operational performance. Table V summarizes the results of the research hypotheses in regards to firm size.

6.4.2 Firm age and corporate performance. The statistical testing shows no relationship between firm age and any performance dimension. Table VI below summarizes the results of the research hypotheses with regards to the firm age.

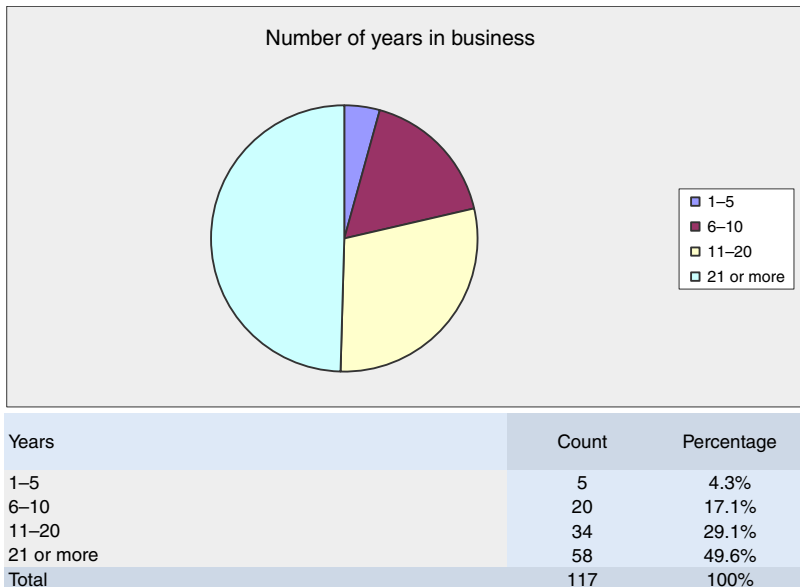


Figure 4.
Firm age

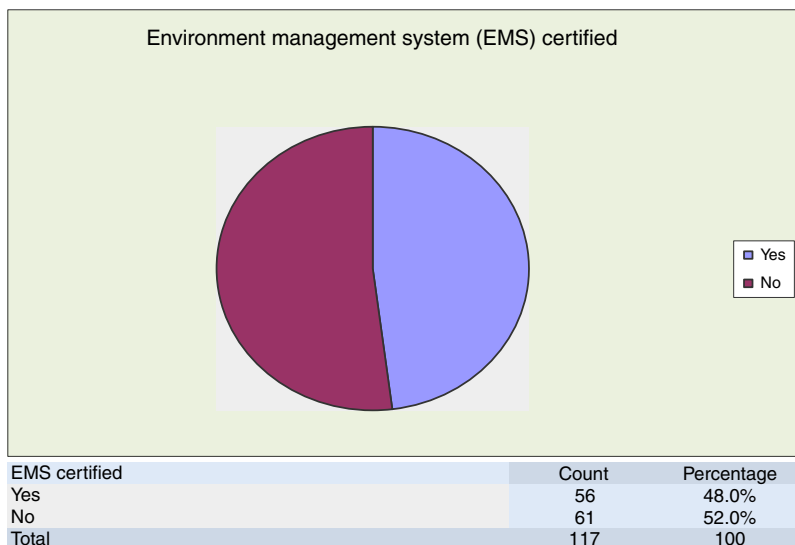


Figure 5.
EMS certification

Performance	Control variable (standardized coefficients β)		
	Firm size	Firm age	EMS certification
Environmental performance	0.231*	-0.023	0.265*
Operational performance	0.092	0.074	0.087*
Economic performance	0.162**	-0.039	0.257*
Social performance	0.26*	-0.058	0.29*

Note: *,**Significant at $\alpha = 0.05$ and 0.10 , respectively

Table IV.
Control variables coefficients

Research hypothesis	β	Result
<i>H1a</i> Firm size > environmental performance	0.231*	Supported
<i>H1b</i> Firm size > operational performance	0.092	Not supported
<i>H1c</i> Firm size > economic performance	0.162**	Supported
<i>H1d</i> Firm size > social performance	0.26**	Supported

Note: *,**Significant at $\alpha = 0.05$ and 0.10 , respectively

Table V.
Firm size hypotheses results

Research hypothesis	β	Result
<i>H2a</i> Firm age > environmental performance	-0.023	Not supported
<i>H2b</i> Firm age > operational performance	0.074	Not supported
<i>H2c</i> Firm age > economic performance	-0.039	Not supported
<i>H2d</i> Firm age > social performance	-0.058	Not supported

Table VI.
Firm age hypotheses results

6.4.3 *EMS and corporate performance.* The statistical testing shows that EMS certification initiatives are positively related to all performance dimensions, including environmental, economic, operational and social performance. Table VII summarizes the results of the research hypotheses with regards to the EMS construct.

6.5 *Model testing*

The significance value for each of the four dependent variables is less than 0.05 and therefore three predicting variables have significantly contributed to predicting the dependent variables. Table VIII presents the model summary in terms of various dimensions and level of significance.

7. **Discussions**

The research examined if there is any relationship between three main control variables, namely, firm size, firm age and possession of EMS certification, on the various corporate performance dimensions. These three important variables have been used by many early researchers inconclusively and the results were conflicting. The corporate performance dimensions included in this study are environmental performance, operational performance, economic performance and social performance.

The study was based on firms in the manufacturing sector within UAE. This sector was specifically selected because the manufacturing industry in any region accounts for a large proportion of the environmental impact, and manufacturing is also responsible for the depletion of natural resources in any country or region and, consequently, it is assumed what applies on one region might also be applicable on other regions.

Moreover, the study was focused on manufacturing industries in the UAE because the research purposefully intended to gain an understanding of green supply chain management practices among UAE businesses and sought to discover how these practices relate to different aspects of corporate performance. This was seen as significant in a rapidly growing economy and particular because the UAE is considered to be a role model for other Gulf Cooperation Council countries who seek to diversify their economies. The survey responses were exported to SPSS for further analysis and findings. Using factor analysis to summarize the data and multiple regression to test the relationship

Table VII.
EMS hypotheses
results

Research hypothesis		β	Result
<i>H3a</i>	EMS > environmental performance	0.265*	Supported
<i>H3b</i>	EMS > operational performance	0.087*	Supported
<i>H3c</i>	EMS > economic performance	0.257*	Supported
<i>H3d</i>	EMS > social performance	0.29*	Supported

Note: Significant at $\alpha = 0.05$

Table VIII.
Model summary

Performance dimension	R^2	Model summary	Sig
Environmental performance	0.150		0.000
Operational performance	0.089		0.014
Economic performance	0.109		0.005
Social performance	0.178		0.000

Notes: Predictors: firm size, firm age, EMSC; dependent variables: EP, OP, EcP and SP, one at a time

between the independent variables, which are firm size, firm age and EMS certification, and corporate performance dimensions as dependent variables, the study revealed interesting results discussed next.

There is a positive relationship between firm size and three performance dimensions including; environmental, economic and social performance. Large organizations are having enough financial and human resources to allocate for green supply chain management practices and can afford procuring and implementing environment systems such as pollution prevention systems as well as reverse logistics programs and this in turn positively improves their corporate performance outcomes. This was supported with Vijayvargy *et al.*'s (2017) claim that large organizations can act as a "diffusion mechanism" for collaboration initiation with other supply chain members for the adoption of GSCM practices. Large organizations such as Toyota and Sony corporations run joint programs with their suppliers to improve their carbon footprint.

The research did not find any relationship between firm size and operational performance and this, in turn, offers promising insights for firms that intend to implement green supply chain management practices regardless of their size. Businesses of different sizes that implement green supply chain management practices can have their products quality improved, lead time reduced and chances for selling their products in international markets enhanced, as theorized by Melynyk *et al.* (2003) and Zhu *et al.* (2008).

The study found that half of the companies surveyed are EMS certified. However, these companies are motivated by different institutional drivers in their attempt to satisfy certain stakeholders. Nevertheless, such certification is associated with all dimensions of corporate performance. This association provides a good indication that firms in the UAE are going in the right direction because EMS certification forms as a basis for any green initiative to drive corporate performance. The research found positive relationship between EMS certification and the four dimensions of corporate performance. These findings were also echoed by Melynyk *et al.* (2003), who found that there is a positive relationship between the presence of formal certified EMS and improved performance such as reduced costs (EcP), improved quality (OP), the reduction of waste in the design and equipment selection process (EP), and a reduction of lead times (OP). Additionally, Gonzalez *et al.* (2008) found that there is a significant relationship between the possession of certified EMS and demand on suppliers to implement environmental practices, which is in line with this findings.

Moreover, the research results were endorsed earlier by Darnall *et al.* (2008), who empirically evaluated the relationship between EMS and GSCM practices and found that organizations that firms adopting EMS are more frequently implementing the GSCM practices regardless of how long the EMS has been in place. The authors also found that EMS and GSCM complement each other and that EMS adopters have a stronger probability of improving the environment not just within their organizational boundaries but also throughout their network of suppliers and buyers.

Similarly, Russo (2009) reported that early adopters of EMSs such as ISO 14001 have lower emissions compared with late adopters, and that the longer the facility operated under ISO 14001, the lower its emissions.

Finally, the study's results of EMS certification's positive impact on economic, environmental and social performance were earlier evidenced by Ann *et al.* (2006), who found that ISO 14001 certification has a positive impact on firm's performance namely on perceived economic performance, perceived environmental performance and perceived customer satisfaction. As noted by Dun & Bradstreet (2014), more than 4,000 firms are ISO 14001 certified in the UAE and more are in the certification stage. This, in turn, indicates that UAE firms have begun to realize the importance of being green conscious.

8. Conclusion

One important findings of this research is that there is no relationship between firm age and any of the performance outcomes; this, in turn, indicates that old firms as well newly established organizations in the UAE can achieve performance improvements when implementing green supply chain management practices. Because sustainable supply chain practices in the UAE are still nascent in terms of the degree of maturity as opposed to other developed countries, there exists greater level of importance. This region is mixed with many different cultural, organizational and social aspects, and the outcome of this research warrants business organizations to look for such initiatives in order to retain their competitive advantage. An explanation of this can be that all firms in UAE are currently required to adhere to environmental regulations and need to satisfy different stakeholder needs including green requirements and therefore get equal performance results. Similar findings were recently coined by Badulescu *et al.* (2018), who concluded that there is no direct relationship between the age of the firm and its social performance measured by the number of social responsibility actions. Moreover, it was concluded that firm size is associated with all performance dimensions except operational performance, and this encourages businesses of different sizes to implement green supply chain management practices in order to improve their product quality and reduce lead time.

Finally, possession of EMS have shown a positive relationship with all performance dimensions when implementing green supply chain management practices, which, in turn, supports Vijayvargy's *et al.* (2017) earlier findings that GSCM adoption improves operational performance for large- and medium-size organizations.

8.1 Theoretical and practical implications

The research have contributed to the theoretical body of knowledge to key theories, such as stakeholder theory, institutional and resource-based theory, to frame the research and to help improve our understanding of the findings. Second, uncovering the impact of three main control variables, namely firm size, firm age and EMS on the relationship between green supply chain practices and corporate performance was unique in the MENA region and shall open new research avenues for researchers. Consequently, the study presents insights for researchers proposing to study the impact of these variables on green supply chain practices and corporate performance relationship to similar cultural and geographical regions. Thus, the study contributes to the sustainability theme of supply chain management as well to practice.

From a practice point of view, supply chain managers within large firms in the UAE are advised to implement green supply chain management practices if they intend to improve their organizations corporate performance either from environmental, economic, operational or social perspective. Second, EMSs certification such as ISO 14001 can be an important vehicle to accelerate corporate performance improvement, therefore, supply chain managers need to leverage such certification to achieve desired performance levels. Finally, business managers within young organizations can consider implementing green supply chain management practices in collaboration with other chain members being the driver for differentiation (Stevens and Johnson, 2016) and shall achieve promising performance results at early stage of their organizations life cycle.

8.2 Further studies

Extending this study to consider the impact of other control variables such as industry type, organization strategy, or firm legal status (i.e. government verses private) on corporate performance dimensions might provide fruitful avenues to understand if these firms behave differently toward green supply chain management practices implementation. This study has laid down the foundations for further studies in theme and contexts, and therefore

extending this study to cover other countries within the Middle East and African region may deem necessary to draw a holistic view on how environment-related regulations in these regions impact green supply chain management implementation.

8.3 Limitations

The limitations of this study are twofold; first, it only considered three control variables which are firm size, firm age and possession of EMS certification, while other variables such as industry type, sector and firm strategy could further be used to test the relationship between performance outcomes. Second, the study was only limited to a UAE context and this was due to the fact that the purpose of the study was motivate business in UAE ,in particular to go green and to consider implementing green supply chain management practices to shed the light on the importance of EMS certification in achieving the desired performance improvement levels.

Research on GSCM control variables is still at the nascent stage in the MENA region. Further studies and reviews might be needed in this area. For example, a general review on the industry type might open fruitful avenues for further development and exploration of how it impacts the relationship between green supply chain practices and corporate performance. The practical implications of this study is that it provides an abroad frame of reference and recommendation for researchers and business managers in the field of green supply chain and corporate performance especially when it comes to the nature of the relationship between GSCM control variables and the firm performance. Although few earlier studies have considered different control variables when testing the relationship between green supply chain management practices and corporate performance, no single study researched the impact of the control variables themselves on the corporate performance when green supply chain practices are implemented.

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