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Green supply chain management and export performance: The mediating role of environmental performance

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The mediating role of environmental performance

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Abstract

Purpose – The purpose of this paper is to examine the impact of green supply chain management (GSCM) on environmental performance (EP) and export performance in the context of a developing country, Jordan. In addition, the mediating effect of EP on the relationship between GSCM and export performance is investigated.

Design/methodology/approach – The study is based on survey data collected from 221 manufacturing companies in Jordan. The companies were selected from different industry types to ensure diversity. Validity and reliability analyses were performed using SPSS and Amos, and structural equation modeling was used to test the study hypotheses.

Findings – The results revealed that GSCM positively and significantly affects both EP and export performance. In addition, the results demonstrated that EP positively and significantly affects export performance. Further, it is also found that EP positively and significantly mediates the relationship between GSCM and export performance.

Originality/value – The current study is one of the first to investigate the impact of GSCM on export performance, especially in the context of a developing country. In addition, this study contributes to the existing literature by highlighting the mediating effect of EP on GSCM—export performance relationship. GSCM is an under-investigated area in Jordan. The results are expected to promote GSCM implementation among manufacturing companies in Jordan in order to achieve economic benefits by increasing their exports through improvements in EP.

Keywords Green manufacturing, Green operations, Environmental management, Performance

Paper type Research paper

1. Introduction

Rising environmental issues and resource depletion concerns have made regulators move to stricter regulations. Simultaneously, the public's environmental consciousness has increased. Given these changes, manufacturers have been compelled to start environmental initiatives to improve their environmental performance (EP). In addition, recent regulations, such as the restrictions on the use of hazardous substances, require firms to extend their environmental initiatives to their customers and suppliers. As a result, green supply chain management (GSCM), which integrates environmental issues into supply chain management (SCM), has been increasingly implemented by organizations (Zhu *et al.*, 2010).

The GSCM aims to reduce the environmental impact of products and services through their life cycle (Zhu *et al.*, 2005; Hendricks and Singhal, 2005; Navarro-García *et al.*, 2016). Adding the "green" element to SCM involves moving the impact of supply chain processes to eco-friendly processes. Therefore, the development of environmentally friendly processes, products and services requires joint efforts by all partners in the supply chain to avoid sub-optimization at the partner level (Green *et al.*, 2012). Organizations have begun to implement GSCM practices in response to customer demand for products and services that are environmentally sound and that are produced through environmentally sustainable processes and in response to environmental laws (Testa and Iraldo, 2010). There are different environmental SCM practices that are adopted by organizations to minimize environmental impacts (Hasan, 2013). Mirhedayatian *et al.* (2014) indicated that GSCM

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practices aim toward improving EP, given that GSCM practices make chances to decrease emissions and waste, therefore, the GSCM evaluation is important for any company's EP.

In line with international environmental regulations, the Jordanian government has adopted many environmental laws that support the notion of "greening." These include regulations for the protection of air quality, soil protection, protection against pollution of the environment in emergency situations, management of solid waste and others (Omar *et al.*, 2016). Jordan nationally determines to reduce its greenhouse gas emissions by 14 percent until 2030. However, Jordan, conditionally and subject to availability of international support and financial aid to means of implementation, obliged to reduce its GHGs emissions by additional, at least, 12.5 percent by 2030 (INDC, 2017). The Jordanian government obliges companies in both the service and manufacturing sectors to take these laws into account (Shehadeh *et al.*, 2016; MOENV, 2017). In addition, Jordan has committed to several agreements in the field of environmental protection, including United Nations Framework Convention on Climate Change, the Strategic Approach to International Chemicals Management, Minamata Convention on Mercury, Paris Agreement and others. This enables Jordanian companies enhancing their EP and meeting environmental standards that are imposed on their exports, especially, industrial exports that contribute to about 85 percent of the total exports of Jordan (JCI, 2018). In this context, Jordanian manufacturing companies lost many regional markets in the past several years due to the "Arab Spring" and, as a result, started focusing on exporting to East Asia, Europe and North America. Countries in these regions have strict environmental regulations and standards, such as US Energy Star program, ISO 14001, Green guard Certification Program, Clean Energy Standard, Carbon Trust Standard, EU Eco-label system and CE mark. Without meeting these standards, Jordanian companies will be unable to export their products to these markets. Balancing between economic performance and EP has become increasingly significant for organizations to meet competitive, regulatory and community pressures. Therefore, motivating firms to adopt GSCM practices starts through exploring the improvements these practices can bring about, not only for the environmental image but also on other firms' performance dimensions (Younis *et al.*, 2016).

The industrial sector in Jordan contributes directly to about 25 percent of GDP, and due to its links with various sectors such as transport, insurance, trade and others, it is concluded that this sector is playing a greater role to directly or indirectly contribute to about 40 percent of GDP (JCI, 2018). In addition, the Jordanian industrial sector is one of the largest sectors generating employment opportunities and accounts for about 60 percent of the total investments benefiting from the Investment law (JCI, 2018). Despite the various social and economic contributions provided by the industrial sector in Jordan, it still faces many problems and challenges internally as well as abroad, which hinder its performance and reduce its competitiveness including the Arab Spring movements that have emerged recently, rising costs of production and energy in all its forms, lack of liquidity and the difficulty of access to finance and the high rates imposed on the sector either as income or sales tax (JCI, 2018). The total exports of Jordanian companies decreased by 4.5 percent in 2017. Regarding trade with the main partners, there was an increase in the national exports to North America Free Trade Agreement by 9.4 percent and non-Arab Asian countries by 27.7 percent and the European Union countries by 13.9 percent, while there was a decrease in the exports value to the Greater Arab Trade Zone countries by 16.5 percent (DOS, 2018).

Although different studies investigated the effect of GSCM on different performance dimensions, including financial, social, business, economic and operational performances (e.g. Lee *et al.*, 2012; Green *et al.*, 2012; Mitra and Datta, 2014; Diab *et al.*, 2015; Abu Nimeh *et al.*, 2018), no previous studies have, to the best of our knowledge, investigated the impact of GSCM on export performance. In addition, no studies were found that attempted to investigate the mediating role of EP on the relationship between GSCM and export

performance. Moreover, there is a lack of studies regarding GSCM in the Arab world in general and in Jordan in particular. These facts have motivated our study that aims to shed further insights into the impact of GSCM on EP and export performance in the context of a developing country. Moreover, this study contributes to the existing body of knowledge by investigating the mediating effect of EP on the relationship between GSCM and export performance.

This paper is organized as follows: Section 2 presents a review of the related literature. Section 3 provides the theoretical background and hypotheses development. Then, the methodology is presented in Section 4. The results and hypotheses testing are provided in Section 5. Finally, discussion of results, implications, and conclusion are presented in Section 6.

2. Literature review

2.1 Green supply chain management

GSCM is considered a promising supply chain concept that takes into account environmental elements when managing the supply chain. In a broader sense, GSCM strives to achieve inclusive environmental improvements by adopting a life cycle approach from product design, material selection, manufacturing and end sales and recovery. GSCM has been defined as "integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to customers, and end-of-life management of the product after its useful life" (Srivastava, 2007).

The previous definition shows a number of environmental practices along the supply chain, ranging from eco-design, green purchasing, total quality environmental management, green packaging and transportation, to the product end-of-life practices defined by the "re's" of reduction, reuse, remanufacturing and recycling (Hervani *et al.*, 2005). Accordingly, GSCM practices are understood as a set of managerial activities that merge environmental issues into SCM to guarantee environmental compliance and promote environmental capability of the entire supply chain (Lee, 2015). Successful GSCM should be reflected in environmental, social and economic outputs so that to assure sustainable development and performance (Veleva and Ellenbecker, 2001).

GSCM practices have various classifications, possibly due to differences in industry type, company size and country. In this vein, barriers and drivers of GSCM may also differ between developed and developing countries, and this may affect the practices adopted by researchers from different countries. Shi *et al.* (2012) classified GSCM practices from a natural-resource-based view to intra-organizational environmental practices that are considered proactive, including environmental policies and implementation of environmental standards such as the ISO 14001 standard on environmental management systems (EMSs) and inter-organizational environmental practices, including green distribution, eco-design and green purchasing. Wu *et al.* (2011) considered GSCM to include the practices of cleaner production, patents, eco-design, green purchasing, internal service quality and green innovation. Laosirihongthong *et al.* (2013) categorized GSCM practices into proactive ones such as green purchasing, eco-design, and reverse logistics, and reactive practices (legislation and regulation). According to Ninlawan *et al.* (2010), GSCM practices include internal environmental management, green purchasing, eco-design, investment recovery and cooperation with customers. Meanwhile, Alshura and Awawdeh (2016) investigated these practices in terms of green supplier selection, green production, green design, green purchasing, green distribution and reverse logistics. Villanueva *et al.* (2013) classified green practices into green sourcing, green design, green distribution, green manufacturing and reverse logistics.

In the current study, four GSCM practices are adopted, eco-design, green purchasing, internal environmental management and cooperation with customers. These practices were chosen for the following reasons: first, they are considered key practices in GSCM that have

the "potential to reduce the direct and indirect environmental impacts" of an organization's supply chain processes (Darnall *et al.*, 2008). Second, they are the most widely cited practices in the existing literature (e.g. Green *et al.*, 2012; Zhu *et al.*, 2013; Diab *et al.*, 2015; Kirchoff *et al.*, 2016). Third, these practices cover internal and external environmental practices (Rha, 2010). And fourth, these practices can be implemented by manufacturers in both developed and developing counties. A brief discussion of each of these practices follows.

2.1.1 Eco-design (ECD). ECD refers to actions taken during the product development phase that are targeted at reducing the environmental effect of a product during its entire life cycle, starting from buying raw materials to manufacturing, to usage and ultimately to the product's final disposal (Younis *et al.*, 2016). Hu and Hsu (2010) mentioned that the United Nations Environmental Program suggested in 1997 that eco-design should consider environmental facets at every stage of the product development process to ensure the minimum environmental impact throughout its life cycle. Therefore, green design is a crucial aspect in a GSCM strategy for successful preliminary determination of a product's environmental impact at the product design stage (Shi *et al.*, 2012). Green *et al.* (2012) pointed out that the aim of eco-design is the reduction of a product's environmental impact without creating a negative trade-off with other design criteria, such as cost and functionality.

2.1.2 Green purchasing (GP). GP refers to eco-conscious practices that minimize sources of waste and boost recycling and renewal of purchased items and products without adversely affecting the performance requirements of such items (Younis *et al.*, 2016). Green purchasing takes into account environmental considerations in purchasing policies, programs and procedures (Balasubramanian and Shukla, 2017). Thus, green purchasing guarantees that purchased materials comply with eco-attribute standards, such as reusability, recyclability and harmless components (Hsu *et al.*, 2013). Green purchasing focuses specifically on dealing with suppliers (González-Benito *et al.*, 2016). This implies assessing the EP of suppliers based on environmental criteria that ensure environmental quality in their operational systems (Awad *et al.*, 2016) like cooperation with suppliers for environmental objectives and environmental audits for suppliers' internal management (Shi *et al.*, 2012). Incorporating the green concept into purchasing will enable firms to provide design specifications to suppliers that include environmental requirements for green purchased items (Hu and Hsu, 2010).

2.1.3 Cooperation with customers (CWC). CWC refers to an eco-collaboration with customers that comprises the exchange of technical information between a firm and its customers, and the readiness to gain knowledge about one another's operations and needs to plan and define environmental improvement aims (Abdallah and Matsui, 2008; Eltayeb *et al.*, 2011). Therefore, CWC requires working together with customers to design cleaner production operations that introduce environmentally sustainable products with green packaging (Diab *et al.*, 2015; Sharma *et al.*, 2017). This enables firms to decrease their environmental effect through a deep understanding of environmental-related issues and problems from a downstream perspective (Kirchoff *et al.*, 2016). The aim of CWC is to engage customers with greening processes through their feedback in order to integrate ecological aspects into designs, production processes and packaging (Green *et al.*, 2012).

2.1.4 Internal environmental management (IEM). IEM is "the practice of developing environmental sustainability as a strategic organizational imperative through commitment and support of the imperative from senior and mid-level managers" (Diab *et al.*, 2015). Green *et al.* (2012) indicated that once firms have adopted the commitment and support from top and mid-level management as a strategic imperative for environmental sustainability, the organization can proceed with the implementation of other GSCM practices. Researchers pointed to practices pertaining to IEM, such as environmental management certification, EMSs, cross-functional collaboration for environmental improvements and auditing systems (Green *et al.*, 2012; Zhu *et al.*, 2010; Yu *et al.*, 2014; Malviya and Kant, 2015).

2.2 Environmental performance (EP)

In the current era of environmental awareness, it is necessary for organizations to seek ways to reduce their environmental impacts through integrating the firm's EP with strategies, activities, quality, staff relationships and corporate image to face environmental regulations and issues (Kung *et al.*, 2012). EP is defined as "the outcome of a firm's strategic activities that manage (or not) its impact on the natural environment" (Walls *et al.*, 2012).

The 2018 Environmental Performance Index (EPI) scores 180 countries on 24 performance indicators across ten issue categories covering environmental health and ecosystem vitality (EPI, 2018). According to 2018 EPI Country Rank, Jordan ranks 62th (out of 180) and ranks sixth in the Middle East and North Africa region. With regard to issue Categories, Jordan ranks 26th in Environmental Health and ranks 132 in Ecosystem Vitality, specifically, ranks 107 in Climate and Energy and 20 in air pollution (EPI, 2018). Locally, in addition to the environmental protection laws imposed by the Ministry of Environment and the Ministry of Energy, there are awards that motivate environmental commitment like the King Abdullah II Award for Excellence. In 2014, the King Abdullah II Center for Excellence, in collaboration with the Ministry of Environment and USAID, launched the Environmental Sustainability Award to help public and private sector institutions promote economic, environmental and social sustainability.

Because no standard measures of EP exist, there are multitudes of EP indicators, and there is sometimes an intangible nature of environmental issues. These make the measurement of EP difficult and complex (Russo and Fouts, 1997; Banerjee, 2002). Despite having multiple performance measures in place, EP variations persist, whether within a firm, among firms in the same industry, or among firms in different industries (Bocken *et al.*, 2013). In the current study, some of the widely used EP indicators in the literature were adopted, including decreased solid and liquid wastes, reduced atmospheric emissions, limited consumption of resources and hazardous or toxic materials and a firm's environmental image (Hasan, 2013; Diab *et al.*, 2015; Scur and Barbosa, 2016).

2.3 Export performance (EXP)

Researchers have acknowledged the importance of exporting in the global economy as one of the core indicators of an organization's ability to successfully leverage its resources and capabilities internationally (Abdallah *et al.*, 2009; Beleska-Spasova, 2014; Boehe and Jiménez, 2016; Cadogan *et al.*, 2016; Azar and Ciabuschi, 2017). Export performance is defined as "the extent to which a firm's objectives, both economic and strategic, with respect to exporting a product into a foreign market are achieved through planning and execution of an export marketing strategy" (Cavusgil and Zou, 1994).

Export performance is deemed a vital and critical performance that can play a key role in promoting economy of Jordan. Jordan ranks 94th in the world in terms of the size of the export-dependent economy in the world and ranks 67th globally in terms of the complexity of the economy according to the index of economic complexity (JIC, 2018).

There are different measures of export performance (Brouthers *et al.*, 2009). According to Azar and Ciabuschi (2017), export performance can be measured using two dimensions, financial performance and strategic effectiveness. Export performance may encompass the decision to export, number of markets served, number of products sold and the value of exports (Kim and Hemmert, 2016; Spanos, 2016). Some studies have classified all of the above measures into two broad groups, economic/financial (e.g. profitability, sale) and non-economic/non-financial measures (Katsikeas *et al.*, 2000; Carneiro *et al.*, 2016). In this study, export sales, export market share growth, foreign markets served, profitability of exported products and export objectives were used as export performance indicators because these measures are widely used by researchers and cover the two main measurements of export performance, financial and non-financial measures.

3. Theoretical framework and hypotheses development

3.1 Research framework

The current research is based on the framework proposed in Figure 1. This framework depicts the effect of GSCM on EP and EXP. In addition, the effect of EP on EXP is considered. Moreover, the mediating effect of EP on the relationship between GSCM and EXP is proposed. In particular, the current study aims to answer the following questions:

(1) What is the effect of GSCM on EP in Jordanian manufacturing companies?

(2) What is the effect of GSCM on export performance in Jordanian manufacturing companies?

(3) What is the effect of EP on export performance in Jordanian manufacturing companies?

(4) What is the mediating effect of EP on the relationship between GSCM and export performance?

3.2 GSCM and export performance

No previous studies have directly investigated the impact of GSCM on export performance. However, some studies pointed to this effect indirectly and showed a highly positively correlated effect (e.g. Zhu and Sarkis, 2004; Lai *et al.*, 2011; Al-Zu'bi *et al.*, 2015). Singh *et al.* (2016) asserted that the adoption of GSCM ensures competitiveness in the global market. Using a sample of Japanese export-oriented firms, Nishitani (2011) found that adopting an EMS resulted in a boost in export performance. Eltayeb *et al.* (2011) examined a sample of ISO 14001 certified firms in Malaysia and found that adopting green purchasing actions enhances compliance with the eco-standards imposed by major export markets like the USA and the EU. Zhu *et al.* (2008) indicated that Chinese automotive manufacturing companies have focused their efforts on making cooperative strategic environmental agreements with their downstream customers due to motivational forces such as sales to foreign customers.

The above arguments assert that adopting GSCM will facilitate exporting products to many developed and developing countries that have strict laws regarding imported products with regard to environmental issues. Given the above arguments, the following hypothesis is proposed:

H1. GSCM has a direct positive impact on export performance.

3.3 GSCM and EP

There is considerable evidence in the literature that GSCM practices in various industries positively improve EP (e.g. Zhu *et al.*, 2010; Shi *et al.*, 2012; Diab *et al.*, 2015; Dubey *et al.*, 2017; Kumar *et al.*, 2017). GSCM implies designing products for reuse, recycling of products and reduced energy/material consumption that results in better use of materials and reduced waste in manufacturing of products which will consequently improve EP (Green *et al.*, 2012; Jabbour *et al.*, 2015). Subsequently, based on the eco-design, the next stage will be the purchase of materials that meet these eco-design requirements. This entails cooperation

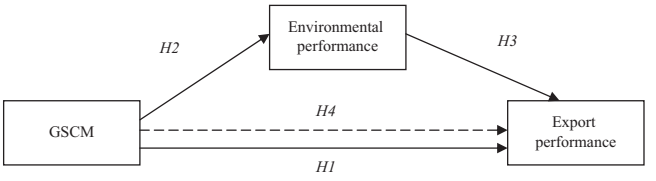


Figure 1.
The research model

with suppliers for environmental objectives to purchase environmentally friendly materials and components. In addition, GSCM is a strategic imperative based on customer requirements for eco-products that have been produced using processes that are designed and operated to enhance environmental sustainability (Green *et al.*, 2012). This collaboration should be supported by senior managers to boost cross-functional cooperation for environmental improvements, environmental compliance and auditing programs and creation of procedures and policies that depend on the EMS to adopt cleaner production actions (Zhu *et al.*, 2010; Kim and Min, 2011; Jabbour *et al.*, 2015). For instance, manufacturers can have discussions with their suppliers to choose materials and components that fit with the eco-design of products in the early research and development stage (Tseng and Chiu, 2013). Thus, suppliers can use more eco-friendly materials to meet the environmental concerns in order to incorporate the environmental requirements from manufacturers (Zhu and Sarkis, 2004). By doing so, firms will enhance their EP. Given the above arguments, the following hypothesis is proposed:

H2. GSCM positively affects EP.

3.4 EP and export performance

Generally, there is a lack of studies in the field of EP and firm performance that focus on developing countries. Companies that reduce the negative ecological effects of their products and processes and reusable post-consumer waste are poised to expand their markets (Demirci, 2014). Increasingly, Jordanian firms are looking beyond their traditional domestic markets and focusing on expanding export markets in order to enhance their competitiveness. Especially after entering the World Trade Organization, Jordanian companies need to improve EP. Indeed, Christmann and Taylor (2001) found that exporting is a major motivator inducing Chinese firms to improve their EP. Also, Chen *et al.* (2006) pointed out that improved international business performance will be a result of an improved EP within all phases of the manufacturing processes, through reduced energy and toxic material consumption, improved environmental image, improved waste treatment, and decreased emissions. These environmental improvements, in turn, lead to better marketing advantages, boost a firm's image and reputation and increase market share (Zhu *et al.*, 2013). However, Ural (2009) considered that exporting is part of a firm's marketing program. There might be associated costs like those for adoption of EMSs, costs of polluted air and increased running costs (Darnall and Edwards, 2006). This negative effect maybe in the short term, because in the long-term, the gains made, such as from energy savings, decreased waste and increased operational efficiency, can outweigh the costs and improve a firm's image, leading to gains in profits, which, in turn, enable firms to enhance their market performance and meet the environmental criteria (Shi *et al.*, 2012). Given the above arguments, the following hypothesis is proposed:

H3. EP has a positive impact on export performance.

3.5 The mediating role of EP on the GSCM–EXP relationship

Recycling, reuse and recovery activities that are employed at the eco-design stage can decrease emissions and toxic materials, reduce energy consumption and improve waste treatment along the product life cycle. Therefore, enhanced EP could be attained by eliminating waste and decreasing resource consumption (Zhu *et al.*, 2013). Adopting GSCM practices are likely to engage firms in assessing their EP and improving it, as such adoption of IEM procedures enables firms to minimize material consumption and decrease waste. Also, eco-cooperation with customers and suppliers contributes to enhancing EP through cooperation aimed at environmental targets and processes and meeting eco-design

considerations that can facilitate fitting customers' eco-requirements (Mollenkopf *et al.*, 2010). On the other hand, the "Arab Spring" has forced Jordanian firms in the industrial sector to look for new markets. These include other markets that enforce eco-restrictions on exported products. Therefore, an improved EP could be translated into a better brand image and boosted reputation and meeting of international eco-criteria, which could be considered an opportunity to expand exports to existing markets as well as entering new international markets that will enhance export performance. Given the above arguments, the following hypothesis is proposed:

H4. The impact of GSCM on export performance is positively mediated by EP.

4. Methodology

4.1 Sample

The population of this study consisted of all manufacturing companies in Jordan, the total number of which is 1,793 (JCI, 2014). The appropriate sample size for this population is 317 (Sekaran and Bougie, 2013). In order to achieve the targeted sample size, 350 questionnaires were distributed by the researchers in personal visits to the manufacturing companies in order to request their participation in the study. In Jordan, respondents tend to neglect questionnaires sent by mail or e-mail and researchers have to personally contact the targeted respondents. Some respondents filled out the questionnaires in the presence of one of the researchers and others requested the researchers return to collect the questionnaire in a few days. The unit of analysis was at the plant level. The convenience sampling method was used to select the study sample due to logistical difficulties associated with applying the random sampling method. However, the sample included different industry types to ensure sample diversity, including plastics and rubber, textile/garments, machinery, pharmaceutical, electrical and others. One manager from each manufacturing company was targeted to fill out the questionnaire. The targeted respondents were top-, middle- and lower-level management because they have the necessary knowledge regarding the survey questions. A cover letter was included with the questionnaire explaining the purpose of the research, providing instructions for completion and assuring that the received information would be used solely for purposes of scientific research. The total number of returned questionnaires was 236. This is due to the fact that many companies declined to participate either because they hesitated to provide data related to their environmental practices and performance or because of their internal policies. In total, 17 questionnaires were defined as unusable due to large amounts of missing data; therefore, the final number of usable questionnaires was 221 representing a response rate of 63.1 percent. This response rate is similar to other empirical studies conducted in Jordan using the same distribution methodology (e.g. Abdallah *et al.*, 2017; Ayoub *et al.*, 2017; Al-Sa'di *et al.*, 2017). The duration of data collection lasted for two months during July and August 2017. Table I reports the profiles of the respondents and surveyed companies.

4.2 Questionnaire and measures

To achieve the objectives of this research, a survey questionnaire was prepared. The questions for the survey were adapted from the existing literature. The questionnaire was initially prepared in English and was later translated into Arabic. The questionnaire was reviewed by five professors in operations and SCM to ensure that the measurement instrument was measuring what it was intended to measure. In addition, such a revision ensured the clarity and appropriateness of the survey items and the accuracy of the translation. Modifications were made as needed, and some items were revised, filtered, moved or deleted. Moreover, the questionnaire was pre-tested by five managers of manufacturing companies, and based on the received feedback, some modifications were made.

Category	Frequency	Percentage
Gender		
Male	178	80.5
Female	43	19.5
Total	221	100
Job position		
Top management level	47	21.3
Middle management level	158	71.5
Low management level	16	7.2
Total	221	100
ISO 14001		
Yes	101	45.7
No	120	54.3
Total	221	100
Industry type		
Chemical	41	18.6
Food	38	17.2
Electrical	25	11.3
Pharmaceutical	30	13.5
Plastic and rubber	27	12.2
Textile and garments	17	7.7
Metal	9	4.1
Machinery	4	1.8
Wooden	5	2.3
Mining and mineral	4	1.8
Paper and packaging	7	3.2
Other industry	14	6.3
Total	221	100
Number of employees		
Less than 50	64	29
50 less than150	57	25.8
150 less than 250	52	23.5
250 and above	48	21.7
Total	221	100.0

Table I. Profiles of respondents and surveyed companies

As for GSCM constructs, respondents were asked to indicate their agreement or disagreement with the statements provided using a five-point Likert scale where one indicated strong disagreement and five indicated strong agreement. For EP and export performance constructs, respondents were asked to evaluate their company's performance as compared to the performance of their competitors during the last three years, also using a five-point Likert scale. Table II presents the survey items along with the references of the constructs.

4.3 Validity and reliability

Validity evaluation of the measurement instrument was started with exploratory factor analysis (EFA). Principal component analysis and the promax rotation method were applied. The question items of the study constructs were entered simultaneously. The pattern matrix revealed six distinct factors as was initially expected. Some items were deleted either because they showed factor loading less than 0.40 or because they loaded onto more than one factor. All the retained question items loaded onto their respective factors with factor loadings greater than 0.40. Furthermore, eigenvalues for all the six factors were greater than one. Reliability of the six constructs was evaluated using Cronbach's α

Item number	Item descriptions (Reference)
Eco-design (Zhu et al., 2010)	
ED1*	Our firm emphasizes design of products for reduced consumption of material /energy
ED2*	Our firm emphasizes design of products that can be reused, recycled, and recovery of component parts
ED3	Our firm emphasizes design of products to reduce use of harmful/toxic material
ED4	Our firm emphasizes optimization of design process to reduce air emission and noise
ED5	Our firm emphasizes optimization of design process to reduce solid and liquid waste
Cooperation with customers (Zhu et al., 2010)	
CWC1	Our firm cooperates with customers to produce eco designs
CWC2	Our firm cooperates with customers to design cleaner production processes
CWC3	Our firm cooperates with customers for green packaging
CWC4*	Our firm has information sharing structure with customers
CWC 5*	Our firm cooperates with customers for using less energy during products transportation
Green purchasing (Zhu et al., 2013)	
GP1	Our firm cooperates with suppliers to meet environmental objectives
GP2	Our firm emphasizes purchasing eco-friendly materials
GP3*	Our firm evaluates suppliers based on specific environmental criteria
GP4	Our firm cooperates with suppliers who have environmental certifications such as ISO 14001
GP5	Our firm has partnerships with suppliers that aim to environmental solutions and/or development environmentally friendly products
Green purchasing (Zhu et al., 2013)	
IEM1	Senior managers in our firm are committed to green supply chain management
IEM2	Our firm emphasizes cross-functional cooperation for environmental improvements
IEM3	Our firm emphasizes environmental compliance and auditing programs
IEM4	Our firm has pollution prevention plans
IEM5*	Our firm has a system to track environmental laws and regulations
Environmental performance (Chien, 2014)	
EP1	Our firm has reduced consumption of hazardous/toxic material during the last three years compared to competitors
EP2	Our firm has reduced air emissions during the last three years compared to competitors
EP3	Our firm has reduced effluent wastes during the last three years compared to competitors
EP4	Our firm has sought to improve its environmental image /position during the last three years compared to competitors
EP5*	Our firm has reduced energy consumption during the last three years compared to competitors
EP6*	Our firm has reduced solid wastes during the last three years compared to competitors
Export performance (Carneiro et al., 2016)	
EXP1	Ratio of exported products has increased during last three years during the last three years compared to competitors
EXP2	Our export market share has increased during the last three years compared to competitors
EXP3	The number of countries that we export to has increased during last three years compared to competitors
EXP4	Our firm has achieved a high percentage of profits from exported products during the last three years compared to competitors
EXP5	Our firm has achieved its export objectives during the last three years compared to competitors

Note: *Deleted items

Table II.
Measurement items

coefficient which showed an acceptable level of reliability of the constructs, with $\alpha > 0.70$ indicating satisfactory internal consistency (Hair *et al.*, 2010).

Based on the results of EFA, confirmatory factor analysis (CFA) was performed using Amos 20. Some additional items were further deleted either because their loadings were less

than 0.50 or to improve model fit indices. The final model fit indices using first-order constructs fitted the data reasonably well $(X)^2 = 608.349$; df = 215; $X^2/\text{df} = 2.829$; CFI = 0.969; GFI = 0.912; IFI = 0.971; TLI = 0.947; RMSEA = 0.071; and RMR = 0.048). The normed χ^2 of 2.829 was below the maximum value of 3.0 (Bollen, 1989). The comparative fit index (CFI), goodness-of-fit index (GFI), incremental fit index (IFI), and Tucker–Lewis index (TLI) were greater than the suggested minimum value of 0.90 (Garver and Mentzer, 1999). The root mean square error of approximation (RMSEA) was 0.071 and the root mean square residual (RMR) was 0.048, indicating acceptable values (Garver and Mentzer, 1999). These indices implied a satisfactory level of unidimensionality and convergent validity. In addition, the standardized coefficients for all the question items were higher than twice their standard errors, providing additional support for convergent validity (Anderson and Gerbing, 1988). Moreover, all the factor loadings were higher than 0.50. Similarly, average variance extracted (AVE) values for all the measurement scales were higher than 0.50, providing further support for convergent validity (Fornell and Larcker, 1981). The composite reliability for all the scales was higher than 0.70, providing additional evidence of a satisfactory level of reliability (Garver and Mentzer, 1999; Fornell and Larcker, 1981).

The final model fit indices using the second-order construct of GSCM also fitted the data reasonably well $(X)^2 = 627.639$; df = 223; $X^2/\text{df} = 2.814$ CFI = 0.962; GFI = 0.904; IFI = 0.970; TLI = 0.943; RMSEA = 0.071 and RMR = 0.055). These indices indicated a sufficient level of unidimensionality and convergent validity. In addition, all the factor loadings were greater than 0.50. Likewise, AVE for GSCM constructs exceeded 0.50, providing additional evidence of convergent validity (Fornell and Larcker, 1981). The composite reliability for the second-order construct exceeded 0.70, indicating a satisfactory level of reliability (Garver and Mentzer, 1999; Fornell and Larcker, 1981).

Table III shows the standardized factor loadings of EFA and CFA, Cronbach's α values, and composite reliability for the final constructs.

Discriminant validity was evaluated by ensuring that the square root of each AVE value is greater than the absolute correlation value between that construct and other constructs. All the constructs met this criterion, providing sufficient support for discriminant validity (Fornell and Larcker, 1981), as shown in Table IV for the first-order constructs.

5. Results

Study hypotheses were tested using structural equation modeling (SEM) with Amos 20. SEM was selected because it allows simultaneous testing of direct and indirect effects. In addition, it provides more accurate results for testing the mediating effects. SEM is superior to the procedure recommended by Baron and Kenny (1986) which uses four separate regression models. Regression equations define each construct as either a cause or an effect, while constructs in a causal model can be causes and effects at the same time (MacKinnon and Fairchild, 2009; Kraemer, 2001); therefore regression analyses are imprecise in estimating the mediating effect. Furthermore, SEM allows applying the bootstrapping method which is suitable for small and large samples and does not require the indirect effects to be normally distributed (Hayes, 2013).

First, the total effect of GSCM on export performance was tested without including the mediating variable. The estimate of the standardized regression weight (β value) from GSCM to export performance was positive and significant ($\beta = 0.400$, $p < 0.001$). To test the direct and indirect effects, a bootstrapping re-sampling technique was used (Shrout and Bolger, 2002). This technique is preferred to the method suggested by Baron and Kenny (1986), which was widely criticized (MacKinnon, 2008). A total of 5,000 bootstrap samples were selected with 95 percent bias-corrected confidence intervals (Hayes, 2013). The α concerning the indirect effect is accepted or rejected based on the lower and upper bounds of confidence intervals.

Construct	Item number	Mean	SD	Loadings EFA	Loadings CFA	Cronbach's α	Composite reliability
Eco-design	ECD3	4.21	0.630	0.892	0.773	0.807	0.813
	ECD4			0.902	0.829		
	ECD5			0.699	0.701		
Green purchase	GP1	3.57	0.744	0.713	0.725	0.741	0.745
	GP2			0.716	0.600		
	GP4			0.860	0.599		
	GP5			0.410	0.673		
CWC	CWC1	3.66	0.844	0.865	0.838	0.858	0.860
	CWC2			0.842	0.847		
	CWC3			0.821	0.771		
IEM	IEM1	3.67	0.731	0.556	0.746	0.840	0.843
	IEM2			0.993	0.745		
	IEM3			0.810	0.794		
	IEM4			0.417	0.740		
EP	EP1	3.95	0.623	0.919	0.674	0.829	0.827
	EP2			0.776	0.734		
	EP3			0.704	0.717		
	EP4			0.698	0.820		
EXP	EXP1	3.34	1.033	0.955	0.953	0.961	0.961
	EXP2			0.966	0.971		
	EXP3			0.935	0.827		
	EXP4			0.938	0.916		
	EXP5			0.877	0.883		
GSCM[a]	ECD[b]	3.78	0.606	0.704	0.620	0.835	0.902
	GP[b]			0.869	0.970		
	CWC[b]			0.859	0.863		
	IEM[b]			0.833	0.859		

Notes: [a]Second-order construct; [b]second-order indicators

Table III. Reliability and validity of the constructs

Construct	AVE	1	2	3	4	5	6
1. ECD	0.592	*0.769*					
2. GP	0.514	0.586	*0.716*				
3. CWC	0.671	0.569	0.677	*0.819*			
4. IEM	0.572	0.517	0.687	0.713	*0.757*		
5. EP	0.545	0.386	0.563	0.492	0.650	*0.738*	
6. EXP	0.831	0.270	0.405	0.289	0.442	0.374	*0.911*

Note: Square root of AVE is on the diagonal

Table IV. Assessment of discriminant validity

If the number zero is contained between the two bounds, then the alternative hypothesis is rejected with 95 percent confidence that the indirect effect is zero. If the number zero is not contained between the lower and upper intervals, then the alternative hypothesis concerning the indirect effect is accepted. The results showed that the direct effect of GSCM on export performance with the presence of EP (the mediating variable) was reduced compared to the total effect, but still significant ($\beta = 0.318$, $p < 0.001$), implying that only partial mediation is possible. Based on this result, *H1* was supported. The bootstrapping results showed that the standardized indirect effect of GSCM on export performance through EP was 0.082 with confidence intervals between 0.013 and 0.157. These confidence values do not contain zero indicating that the indirect effect is significant; therefore, *H4* was supported.

The results of the mediation model showed that the effect of GSCM on EP is positive and significant ($\beta = 0.512$, $p < 0.001$); therefore, *H2* was supported. Additionally, the effect of EP on export performance is positive and significant ($\beta = 0.160$, $p < 0.05$); therefore, *H3* was also supported. Figures 2 and 3 illustrate direct and indirect models.

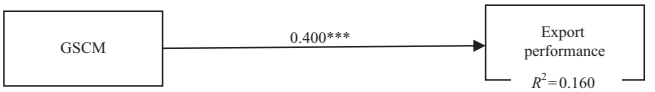
6. Discussion and conclusion

6.1 Discussion

The results revealed a direct positive effect of GSCM on export performance. This indicates that successful adoption and implementation of GSCM practices will enhance the ability of manufacturing companies to increase their exports. When Jordanian manufacturers adopt green practices, they meet the international eco-standards and specifications related to products, which contribute to higher export performance. This emphasizes that many international importers consider eco-product performance as an essential criterion when selecting potential exporters from developing countries. This is in line with the arguments of Singh *et al.* (2016), who asserted that the adoption of GSCM practices will enhance competitiveness in the global market.

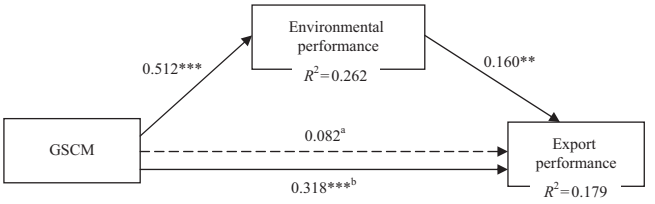
The results also showed that GSCM has a highly positive effect on EP. This result is consistent with the results of some previous studies (e.g. Zhu *et al.*, 2010; Kumar and Chandrakar, 2012; Diab *et al.*, 2015; Dubey *et al.*, 2017). This also indicates that when Jordanian manufacturers implement GSCM practices, the negative effects of their operations and production processes on the environment will be minimized, thus improving their EP. This result can be first attributed to the fact that most Jordanian industrial manufacturing companies are of a less polluting nature or within the permissible limits due to the uncomplicated nature of manufacturing operations (WB, 2017). Second, there are public shareholding companies in Jordan, including some banks that provide loans with low interest rates and financial privileges for Jordanian companies that adopt green practices and implement waste minimization projects. Third, it seems that there is a presence of environmental consciousness among manufacturing companies supporting legislation in Jordan.

The effect of EP on export performance is proved to be positive and significant, indicating that by improving their EP, Jordanian manufacturing companies can enhance their export performance. This result may imply that most Jordanian manufacturers export their products to countries that pay considerable attention to environmental issues. This is consistent with Mitra and Datta (2014), who found that many of the local Indian companies are suppliers to external companies requiring them to improve their EP in order to keep



Note: ***p<0.001

Figure 2. GSCM—export performance total effect model



Notes: [a]Indirect effect; [b]direct effect. **p<0.05; ***p<0.001

Figure 3. GSCM—EP—EXP model

their status as excellent suppliers in the long run. This result also implies that, by improving their EP, Jordanian manufacturing companies avoid the cost of poor EP in terms of sanctions, fines, and penalties; this, in turn, positively enhances their environmental image and reputation that is reflected in improved export performance.

The positive and significant mediating effect of EP implies that GSCM positively affects EP, which in turn improves export performance, indicating that EP is an effective tool for promoting the export performance of Jordanian manufacturing companies. This maybe the result of considering EP as an essential supplier selection criterion. Although the sample consisted of 120 non-ISO 14001 certified companies and 101 ISO 14001 certified companies, a great interest in improving the EP of Jordanian companies was noted during the data collection. Although the notion of GSCM in Jordan is still in its infancy, this reflects an environmental awareness among manufacturing companies. This is inconsistent with the arguments of Rao (2002), who indicated that the improvement of EP may not be translated into improved economic outcomes.

6.2 Implications for theory

This study presents a number of theoretical contributions. First, it contributes to the existing literature in investigating how GSCM impacts environmental and export performances. Moreover, this study contributes to the existing body of knowledge by investigating the effects of EP on export performance and the mediating effect of EP on the relationship between GSCM and export performance. This study contributes to the literature by being one of the first of its kind in a developing country like Jordan that attempts to build a thorough understanding of GSCM and its impact on a firm's performance.

6.3 Managerial implications

This study has clearly shown the impact of GSCM on environmental and export performance in the context of a developing country, Jordan. This study is expected to support managers' decisions in Jordanian companies to either adopt GSCM practices or adjust and enhance their existing practices. Although Jordanian manufacturing companies believe that GSCM helps generate new opportunities to strongly improve their international business performance through EP, they need to invest more in implementing GSCM practices to maintain their competitive position in a rapidly changing environment. Senior management in Jordanian manufacturing companies must seek to meet environmental standards (like ISO 14001, GREENGUARD, carbon trust standard, and others) to enhance their EP in support of their export performance. Although initiating GSCM and seeking international environmental certifications entails investments in the short term, and maybe in the medium term, the benefits obtained in the long run will recover and outweigh these investments in attaining sustainable business results in both the local and global markets. Also, based on the study results, managers in Jordan and other developing countries should realize that adopting such GSCM practices will not only respond to external pressures, but also strengthen their performance. Managers of manufacturing companies in other developing countries may benefit from the results of the current study. GSCM should be regarded as a strategic competitive tool that enhances the eligibility to export products to global markets through improved EP.

The social impact of the current study can be reflected in healthful products for consumers, safe internal environment for employees, reduced pollution and air emissions, decreased consumption of energy and resources, and increased sales and improved economic situation.

6.4 Conclusion and limitations

The study concludes that GSCM is an essential enabler of EP in Jordanian manufacturing companies. Additionally, the results demonstrate the important effect of GSCM on export performance. Moreover, this study contributes to the understanding of the importance of an

improved EP in helping Jordanian manufacturing companies enhance their export performance. Furthermore, the findings showed that EP mediates the GSCM—export performance relationship in a positive and significant way. This study provides a better understanding of the impact of GSCM on two critical performance dimensions, environmental and export performance, and provides new insights into the theoretical and practical implications of GSCM in the manufacturing sector.

Limitations of this study must be recognized. The main limitation of this study is applying the convenience sampling method. Although this method is widely applied in business studies, it may have resulted is some bias and affected the generalizability of the results. Second, the data were collected from a single respondent in each company. Although this method is also widely used in operations and SCM studies, future studies could collect data from multiple respondents in each company to improve the generalizability of the results. Third, the data were collected from different industry types in Jordan due to the small number of companies belonging to one industry type. Future research could focus on one industry type to provide more specific results and implications. Lastly, the current study used four GSCM practices. Future studies could extend to GSCM practices that were not considered in this research such as reverse logistics.

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