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RESEARCH ARTICLE

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Being good at being good—The mediating role of an environmental management system in value-creating green supply chain management practices

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Abstract

This study adopts a resource-based view to explain the complementary role of the corporate structure in the value creation of green supply chain management (GSCM) practices. Using 8-year panel data collected from 317 US international manufacturers, we analyze the influence of GSCM practices on corporate financial performance (CFP) and the mediating role of a certified environmental management system (EMS) in this relationship. We show that GSCM practices have a positive impact on accounting-based financial performance, meaning, return on assets (ROA) and return on equity (ROE). In contrast, firms that implement GSCM practices and a certified EMS simultaneously achieve a higher market valuation in terms of Tobin's Q in addition to a higher ROA and ROE in the following year. Our study demonstrates that, through their synergistic combination with a firm's complementary EMS, utilizing GSCM practices can result in intangible assets as sources of long-term financial benefits. Our results have several theoretical and managerial implications. They also address the limitations of the prior use of varying survey-based items for internal and external GSCM practices and add nuance to the existing GSCM practices in the literature.

KEYWORDS
corporate financial performance (CFP), environmental management system (EMS), green supply chain management (GSCM) practices, resource-based theory, value creation

1 | INTRODUCTION

According to the "WMO Statement on the State of the Global Climate in 2020" (World Meteorological Organization, 2020), the past 6 years (2015–2020) were the warmest on record. It is widely recognized that the accelerating pace of global warming is primarily caused by increased levels of greenhouse-gas emissions, to which firms are pivotal contributors. Increasing pressures from a broad range of stakeholders, including national and international governments, non-governmental organizations, media, lobbyists, suppliers, and customers, are pushing firms to embed sustainability into their business practices to tackle climate change. Using green supply chain management (GSCM) practices, which integrate environmental management with supply chain management, has become a core strategy for

Abbreviations: CFP, corporate financial performance; CSR, corporate social responsibility; EMS, environmental management system; GHRM, green human resource management; GSCM, green supply chain management; ROA, return on assets; ROE, return on equity; VIFs, variance inflation factors.

businesses worldwide (Seuring & Müller, 2008). Although greening one's supply chain is recognized as a major challenge due to its operational scale and complexity (Matos & Hall, 2007; United Nations [UN] Global Compact, 2015), this strategy has several benefits. One example is the competitive advantage of developing new business models for those whose actions on sustainability transcend basic compliance (Ernst & Young & UN Global Compact, 2016; Linton et al., 2007).

While GSCM is a relatively young research field (Beske et al., 2014), exploring the effect of GSCM practices on a firm's performance has gained momentum in recent years (e.g., Geng et al., 2017; Golicic & Smith, 2013). Some studies have found no relationship between GSCM practices and corporate financial performance (CFP) (e.g., Esfahbodi et al., 2016; Pinto, 2020), whereas others have reported either a negative relationship between them (e.g., Bowen et al., 2001; Montabon et al., 2007) or a positive one (e.g., Chan et al., 2012; Green et al., 2012; Zhu & Sarkis, 2004). To motivate organizations to engage in environmentally friendly practices, we must first identify the potential benefits for their performance (Younis et al., 2016). Hence, there is an academic and a practical need to further clarify and reach consensus on whether implementing GSCM practices has a desirable effect on CFP and, if so, under what conditions this effect can be maximized (Berchicci & King, 2007, p. 525).

Recent research argues that the inconsistencies in prior findings call for an examination of complementary assets in the relationship between environmental practices and economic performance (Christmann, 2000; Zhu et al., 2005). Implementing an environmental management system (EMS) is an investment in complementary assets that mediates the relationship between GSCM practices and CFP. An EMS can signify that a firm is certified at an accredited international standard such as ISO 14001 and incorporates environmental dimensions of corporate social responsibility (CSR), such as GSCM practices, into its corporate structure (Darnall et al., 2008; Epstein & Roy, 1998; Ronnenberg et al., 2011). The increasing popularity of EMS adoption is reflected in the 12% rise in the number of ISO 14001 certifications issued, reaching 348,218 worldwide in 2020 (International Organization for Standardization, 2021). Such a strategy can convert investments in GSCM practices from a cost or philanthropic motivation into a source of opportunity and competitive advantage (Porter & Kramer, 2006).

Our study combines the resource-based view with strategic supply chain management (Anand & Gray, 2017) to explain how strategic CSR, meaning, EMS-embedded GSCM practices, serves as a source of competitive advantage and, ultimately, improves the financial performance of firms with international supply chains. Specifically, we argue that a proactive environmental management strategy, such as a certified EMS, complements and reinforces the value-creating potential of firm-specific environmental resources and capabilities through their incorporation into the organization. Doing so strengthens the positive impact of GSCM practices on the firm's financial performance.

We test our hypotheses using objective, publicly available panel data collected over an 8-year period (2013–2020) from a large sample of 317 US companies that have globally located subsidiaries with international supply chains and are active in six categories of the manufacturing industry. We use accounting- and market-based financial performance metrics—return on assets (ROA), return on equity (ROE), and Tobin's Q, respectively—to test the relationship between GSCM practices and CFP, as well as the mediating role of EMS in this relationship. Our findings reveal that firms that simultaneously implement a certified EMS to train, monitor, coordinate, and evaluate GSCM practices will achieve improved CFP in terms of the next year's Tobin's Q, ROA, and ROE. In contrast, firms that utilize only GSCM practices without an EMS will see an increase in ROA and ROE but none in Tobin's Q in the next year.

Our study makes several contributions. First, we help clarify previous ambiguous findings about the relationship between GSCM practices and CFP by identifying the mediating mechanism of a certified EMS in this relationship, which elevates GSCM practices to a strategic, value-creating asset. While a few prior studies support the synergistic potential between EMS certification and GSCM practices (e.g., Albelda Pérez et al., 2007; Darnall et al., 2008; González et al., 2008; Melnyk et al., 2003), to the best of our knowledge, this study is the first to empirically investigate how having a certified EMS in place can influence the firm's potential to improve its financial performance by using GSCM practices. Second, building on the resource-based view in supply chain management (Hitt et al., 2016), our study adds to understanding the creation process of valuable environmental practices as interwoven novel resources and capabilities bundles (Dangelico & Pontrandolfo, 2015; Hart, 1995; Hart & Dowell, 2011; Kabongo & Boiral, 2017), which can be found in the firm's synergistic integration of those practices within its complementary corporate strategy and structure (Barney & Mackey, 2005; Hoejmose et al., 2012; Muduli et al., 2020; Teece, 1986).

Third, using an objective, large-scale panel database, we help generalize the results of quantitative studies on the relationship between GSCM practices and CFP (e.g., Golicic & Smith, 2013) by including several factors in our analysis: (1) various financial performance metrics such as ROA, ROE, and Tobin's Q; (2) the four most critical internal and external categories of GSCM practices; and (3) temporal and cross-industry considerations. Specifically, our findings support the resource-based view that a steady increase in GSCM practices improves efficiency in the food, textile, and apparel industries, evident in a better ROA and ROE. However, increasing Tobin's Q can be achieved only by combining GSCM practices with a complementary EMS. Doing so leads to a positive market valuation, evident in the increased participation of stakeholders, giving these firms a long-term competitive advantage. Overall, our study answers the persistent calls in the strategic management and supply chain research to demonstrate the value of integrating an environmental sustainability strategy with the firm's core business to achieve long-term financial advantages from GSCM practices (Gao & Bansal, 2013; Gond et al., 2012; Green et al., 2012; Porter & Kramer, 2006).

2 | GREEN SUPPLY CHAIN MANAGEMENT

Supply chain management is defined as "the systemic, strategic coordination of the traditional business functions and the tactics across those functions within a particular firm and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual firms and the supply chain as a whole" (Mentzer et al., 2001, p. 18). Supply chain management includes the coordination of marketing, manufacturing, information systems, purchasing, and logistic processes, together with aligning strategic requirements in terms of quality, efficiency, customer focus, and (most recently) environmental sustainability (Green et al., 2012).

GSCM is regarded as a fundamental subset of supply chain management. It includes green design, manufacturing, and operations, reverse logistics, and waste management (Srivastava, 2007). Broadly defined, GSCM is the strategic integration of environmental considerations into both forward and reverse logistics by implementing a set of environmental practices throughout the supply chain, with the goal of minimizing any adverse environmental impacts (e.g., Green et al., 2012; Zhu & Sarkis, 2004). GSCM seeks to have a long-term effect on future generations (Elkington, 1994; Linton et al., 2007). It is part of the more comprehensive concept of CSR (Golicic & Smith, 2013), defined as a firm's integration of social considerations (e.g., improved working conditions and job satisfaction) and environmental concerns (e.g., minimum waste and resource protection) into its operational activities and external stakeholder interactions, beyond mere regulatory compliance (European Commission, 2001).

Within the CSR literature, analyzing the firm's ability to derive economic benefits from CSR investments has gained popularity (e.g., Carroll & Shabana, 2010; Wood, 2010). In contrast to altruistic or coerced CSR (Husted et al., 2015; Husted & de Jesus Salazar, 2006), this view emphasizes a firm's strategic choice to engage in socially or environmentally responsible behavior to improve its financial performance, evident in increased market share, an improved reputation, efficiency, and first-mover advantages (Siegel, 2009). According to the stakeholder approach to CSR (e.g., Chakravarthy, 1986; Clarkson, 1995; Donaldson & Preston, 1995; Freeman, 2010; McWilliams & Siegel, 2001; Mitchell et al., 1997; Wood & Jones, 1995), these goals can be achieved if firms consistently align their CSR strategy with the most critical concerns of their primary stakeholder groups (Bhattacharya et al., 2009; Brammer & Pavelin, 2006; Branco & Rodrigues, 2006). In the context of GSCM, it follows that firms must implement GSCM practices that correspond to the expectations of the industry's stakeholders. For instance, GSCM practices such as limiting pollution will be more salient for stakeholders in the chemical or heavy manufacturing industries than for those in industries where pollution is less of a concern. Implementing such practices should result in intangible assets for these firms such as customers' willingness to pay premium prices and reduced employee turnover.

There is still no unified framework identifying which initiatives can be categorized as GSCM practices (Tseng et al., 2019; Vachon & Klassen, 2006). These practices have been categorized into different, often overlapping, dimensions such as internal, external, upstream, downstream, eco-design, and investment recovery practices (Golicic & Smith, 2013; Green et al., 2012; Longoni et al., 2018; Zhu et al., 2012, 2013; Zhu & Sarkis, 2004). Synthesizing the findings of previous studies reveals a consensus that internal GSCM practices such as employee training, waste and toxic emission reductions, and eco-design management can be managed independently to reduce environmentally harmful practices within the organization. In contrast, external GSCM practices such as green purchasing, customer cooperation with environmental concerns, and investment recovery require mutual effort from external parties such as suppliers and customers (Gimenez et al., 2012; Gimenez & Sierra, 2013; Longoni et al., 2018). Therefore, both internal and external initiatives must be considered to understand the implementation of GSCM practices.

2.1 | The relationship between GSCM and CFP

Financial benefits are regarded as an important impetus for organizations to green their supply chain activities. Some studies have refuted the existence of a positive relationship between GSCM practices and CFP. According to Walley and Whitehead (1994), environmental activities are costly undertakings due to the major investments and long-term commitments needed. They maintain that it is difficult for companies to recoup their investments in this area. Similarly, Zhu et al. (2005) showed empirically that GSCM practices have an overall negative impact on the financial performance of Chinese manufacturing companies. Furthermore, Montabon et al.'s (2007) content analysis of environmental and business performance data from corporate reports revealed a negative relationship between environmental management practices and return on investment. Walls et al. (2011) found that within the US manufacturing industry, compliance-based environmental practices negatively impact future profitability. Furthermore, proactive practices do not influence a firm's market value. Wang and Sarkis's (2013) study was among the first to use panel data from the top 500 US companies based on *Newsweek*'s green rankings across a 3-year period (2009–2011). Here again, the authors reported a negative relationship between environmental supply chain practices and financial performance outcomes.

Other studies have documented that implementing GSCM practices has no significant impact on CFP. Based on a comparison of 10 pairs of firms in various industries, Watson et al. (2004) argued that environmental stewardship through EMS implementation has no effect, either positive or negative, on a firm's profitability. Zhu et al. (2007) found no significant impact of implemented GSCM practices on the overall economic performance of Chinese automotive companies. More recently, Esfahbodi et al. (2016) also revealed that implementing green initiatives such as sustainable distribution and investment recovery did not generate financial benefits in emerging economies. Similarly, Pinto (2020) indicated no support for the positive influence of internal and external GSCM practices on the economic performance of eight Portuguese manufacturing companies.

In contrast to these findings, a third perspective is that implementing GSCM practices has a positive effect on CFP in various ways. Triggered by Porter and Van der Linde's (1995) "does it pay to be green?" debate, numerous studies have shown that environmental improvements can create long-term financial benefits and competitive advantages. Using GSCM and financial performance data from 186 Chinese manufacturing companies, Zhu and Sarkis (2004) showed that reducing energy use and fees for waste treatment and discharge created beneficial cost savings for these firms. Similarly, Rao and Holt (2005) reported an empirically positive link between GSCM practices and the improved competitiveness and economic performance of ISO14001-certified companies in South Asia. Green et al. (2012) created a comprehensive performance model of GSCM practices and used it to demonstrate the positive impact of GSCM practices on the economic performance of US manufacturing organizations. Chan et al. (2012) determined that an environmental orientation influenced the adoption of GSCM practices that, in turn, had a positive effect on the corporate performance of foreign enterprises in China. Younis et al. (2016) were the first to test the relationship between GSCM and CFP among Middle Eastern manufacturing companies. Their multiple regression analysis revealed a positive effect of green purchasing on reported profits, explained by both a reduction in energy and material consumption and an increase in market share. Recently, Longoni et al. (2018) found that green human resource management (GHRM) practices diffused internal and external GSCM practices within the organization and that GHRM and internal GSCM practices had a positive impact on CFP. Finally, a meta-analysis reviewing 50 empirical studies of the manufacturing industries of emerging countries in Asia supported the strong positive impact of GSCM practices on their financial performance (Geng et al., 2017).

3 | A RESOURCE-BASED VIEW OF STRATEGIC GSCM PRACTICES

Supply chain management is a complex process of coordinating internal and external supply units that cooperate to produce and supply end products to customers. According to the resource-based view (e.g., Barney, 1991; Coff, 1999; Conner, 1991; Nelson & Winter, 1982; Rumelt, 1984; Wernerfelt, 1984), firms that are more effective in managing their supply units' resources and capabilities can generate sustainable competitive and financial benefits (Hitt, 2011; Hult et al., 2007).

Linking valuable firm-specific resources and capabilities to the demands of the social and natural environment has resulted in the natural-resource-based view (Hart, 1995) of GSCM as the effective management of environmentally friendly practices within a firm's supply chain while achieving a competitive advantage and a profit. Accordingly, valuable environmental strategies, such as GSCM practices, are based on a bundle of interwoven tangible and intangible resources and capabilities that can potentially create competitive benefits by reducing production costs, allowing firms to charge higher prices, and creating a positive image. Doing so will lead to improved CFP.

For environmental investments to sustain competitive and financial advantages, GSCM practices and their resource and capability bundles need to be inimitable by competitors (Barney, 1991). Embedding the (natural) resource-based view within the strategic management perspective, the combination of GSCM practices with complementary firm-specific resources and capabilities reinforces the heterogeneity and tacitness of these environmental practices (Christmann, 2000; Hart & Dowell, 2011). Therefore, the firm's complementary environmental management strategy that incorporates GSCM into its core business and organizational structure (Barney, 2002; Barney & Mackey, 2005) can mediate the value-generating potential of GSCM practices as a source of sustainable competitive advantage such as increased CFP. Figure 1 summarizes our research model.

3.1 | GSCM practices as a source of competitive and financial advantages

Environmental strategies, such as GSCM practices, consist of a bundle of resources and capabilities that, through effective deployment, become heterogeneous and tacit (Klassen & Whybark, 1999; Russo & Fouts, 1997). The natural-resource-based view emphasizes *proactive* environmental strategies as a source of competitive advantage and improved financial performance (Hart & Dowell, 2011). While reactive GSCM practices that advocate using specific, publicly available technologies to comply with regulations do not represent a firm-specific capability (Russo & Fouts, 1997), the proactive GSCM practices of pollution prevention and product stewardship combine critical resources and capabilities, such as stakeholder integration, a shared vision, organizational learning, and innovation.

Pollution prevention refers to a proactive strategic capability to minimize waste, emissions, and effluents within a firm's production process. Relatedly, product stewardship focuses on minimizing life-cycle environmental costs and includes extensive stakeholder interactions to infuse the "environmental voice" into each phase of a product's supply chain, from its design to its end-of-life management (Hart, 1995). There is a reciprocal relationship between environmental strategies (i.e., GSCM practices) and a firm's specific resources and

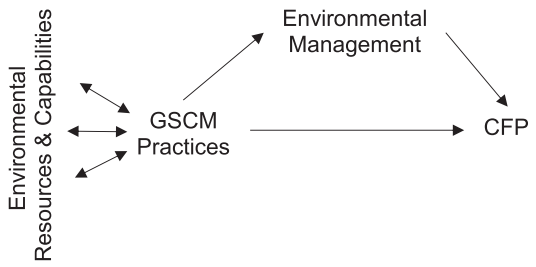

FIGURE 1 Environmental management-embedded GSCM practices and CFP

capabilities. While value-generating environmental practices are contingent on the firm's superior ability to combine valuable resources and capabilities (e.g., Aragón-Correa & Sharma, 2003), the implementation of those practices may lead to developing new resources and capabilities as a source of competitive advantage (e.g., Sharma & Vredenburg, 1998).

Overall, proactive environmental practices combine critical resources and capabilities (Dangelico & Pontrandolfo, 2015; Hart, 1995; Hart & Dowell, 2011; Klassen & Whybark, 1999; Martín-Tapia et al., 2010; Sharma et al., 2007; Sharma & Vredenburg, 1998) to rethink and reinvent various aspects of the supply chain. Examples include production equipment, methods, and procedures, or product designs and delivery mechanisms. Implementing these changes can minimize waste and pollution, improve operational efficiency, increase product differentiation, and create interorganizational networks (Shrivastava, 1995). Consequently, these GSCM practices may lead to the creation of the intangible assets of cost leadership and first-mover advantage, premium pricing, customer loyalty, and a positive image of the firm as possible sources of a competitive advantage and, ultimately, its improved CFP (e.g., Dangelico & Pontrandolfo, 2015; Porter & Van der Linde, 1995; Rao & Holt, 2005; Zhu & Sarkis, 2004; Zhu et al., 2005). Accordingly, we formulate the following hypothesis:

> **Hypothesis 1.** The implementation of GSCM practices will have a positive effect on CFP.

3.2 | The mediating role of an EMS

According to the resource-based view, GSCM practices as environmental resources and capabilities bundles will develop their full value-creating potential only if backed by top management and linked with the firm's strategy and structure, which increases their heterogeneity and inimitability (Barney, 2002; Barney & Mackey, 2005).

An environmentally committed management is willing to reform the firm's strategy and structure to ensure that it can achieve environmental sustainability goals (Epstein & Roy, 1998; Gond et al., 2012). It demonstrates this willingness by allocating specific resources to these goals (Hartmann et al., 2020). Environmental management skills and assets such as the commitment of top management, a centralized authority, policies, and control systems can trigger organizational change and learning to reconfigure and create new resources and capabilities (Albertini, 2019). For instance, firms can leverage their employees' awareness, commitment, skills, and expertise to implement GSCM practices and improve their environmental performance (Albelda Pérez et al., 2007; Berry & Rondinelli, 1998; Epstein & Roy, 1998; Ronnenberg et al., 2011).

In practice, an EMS represents a systematic management approach to incorporating GSCM into a firm's strategy and structure (Curkovic et al., 2000; Darnall et al., 2008; Epstein & Roy, 1998). Such a system integrates a set of internal environmental policies and procedures concerned with training programs, coordination, and monitoring environmental practices, and both internal and external environmental reporting (Melnyk et al., 2003). Furthermore, management can opt to validate the firm's EMS through certification by a third-party organization that audits compliance with the environmental standard set by the International Organization for Standardization such as the ISO 14001 standard (Jiang & Bansal, 2003) or the EU's Eco-Management and Audit Scheme.

While an ISO-certified EMS clearly reinforces the environmental strategy by raising employees' awareness of and management's commitment to sustainability (Albelda Pérez et al., 2007), financial benefits may also follow in terms of international scope, positive image, employee satisfaction, and manufacturing efficiency (Bansal & Hunter, 2003; Corbett & Kirsch, 2001; Darnall et al., 2008; Delmas & Toffel, 2008; Rondinelli & Vastag, 2000; Wagner, 2015). Furthermore, Darnall et al. (2008) and Arimura et al. (2011) argue that adopting a certified EMS involves similar capabilities to those required for implementing GSCM practices, such as continuous improvement of the capabilities of addressing a firm's environmental issues. Therefore, certified EMS adopters may leverage such tacit skills and knowledge when implementing green practices, which can, in turn, lead to reduced costs. Accordingly, we expect that implementing EMS and GSCM practices together improves operational effectiveness and efficiency and, hence, overall firm performance, compared to implementing them separately (Darnall et al., 2008; González et al., 2008; Porter & Van der Linde, 1995; Russo & Fouts, 1997).

An ISO-certified EMS is also contingent on maintaining environmental planning throughout the organization's supply chain (Melnyk et al., 2003) and encouraging its supply chain partners to implement environmental practices and uphold environmental performance (Arimura et al., 2011; Darnall et al., 2008; González et al., 2008). Therefore, EMS certification reduces information asymmetries (King et al., 2005). It also provides proactive decision-makers with internationally recognized environmental management knowledge (Maksimov et al., 2019) to deal with the increased complexity of implementing and coordinating GSCM practices throughout their supply chain (Matos & Hall, 2007).

Setting up an environmental management structure is a "co-specialized" investment and the success of both strategic assets—EMS and GSCM practices—is interdependent (Teece, 1986). An environmental management complements and creates synergies for implementing GSCM practices (Green et al., 2012; Hoejmose et al., 2012; Muduli et al., 2020). For instance, Zhu et al. (2010) and Green et al. (2012) found that the environmental commitment of mid- and senior-level management paves the way for adopting the internal and external GSCM initiatives of eco-design, green purchasing, cooperation with customers, and investment recovery. On the other hand, EMS certification is contingent on the implementation of effective GSCM practices throughout the firm's supply chain.

In summary, building on the resource-based view, we argue that firms that are explicitly committed to environmental management through, for instance, an EMS will more likely develop GSCM practices built on heterogeneous resources and capabilities. They will exhibit better CFP, relative to firms whose GSCM practices remain decoupled from the firm's business strategy and structure. Embedding

GSCM within the corporate strategy and structure increases the firm's social complexity by increasing the interdependence of people and teams. It also creates causal ambiguity by blurring the link between a firm's resources and its competitive advantage. Finally, it increases path dependency in terms of the long-term commitment of management, employees, and supply chain partners to improving their environmental resources and capabilities bundles. Consequently, these bundles become more difficult for competitors to imitate, strengthening the firm's long-term competitive advantage and, hence, its improved financial performance (Aragón-Correa & Sharma, 2003; Eisenhardt & Martin, 2000).

In contrast to generic complementary assets such as innovation and implementation (e.g., Barney & Mackey, 2005; Christmann, 2000; Dey et al., 2019; King & Lenox, 2001; Silva et al., 2019), investments in "co-specialized" complementary assets (Teece, 1986) such as an EMS not only have the potential to increase the value of GSCM practices for CFP. These investments are also a prerequisite for the relationship between best practices and performance. Specifically, a firm's EMS mediates the positive impact of GSCM practices on the firm's achievement of improved CFP. Thus, we posit that:

> **Hypothesis 2.** An EMS mediates the relationship between implementing GSCM practices and CFP.

4 | RESEARCH METHODOLOGY

4.1 | Sample

To test our hypotheses, we used a sample from the manufacturing sector, which is widely recognized as creating more air, water, and land contamination than any other sector (Stead & Stead, 1992). We obtained annual firm data from three databases accessed via Wharton Research Data Services (WRDS). We measured GSCM practices and EMS using the score-rating databases of MSCI ESG RATINGS and MSCI ESG STAT, respectively (formerly known as Kinder, Lydenberg, and Domini Research & Analytics, Inc. or KLD; hereafter MSCI ESG). The financial data for both CFP and the control variables came from the COMPUSTAT North American Database.

The MSCI ESG databases are independent rating services that assess both positive and negative corporate behavior across the three ESG pillars: environmental, social, and governance. The databases provide corporate-level data for publicly traded small-, mid-, and large-capitalization US firms in the S&P 500, the MSCI KLD 400 Index, and the Russell 3000. The databases contain one of the longest running, continuous, publicly available ESG data sets and are considered the de facto standard in the research area of environmental sustainability and corporate social performance (e.g., Kang et al., 2016; Y. Kim et al., 2014; Mattingly & Berman, 2006; Waddock, 2003; Wood, 2010). Increasingly, they are used to study environmental sustainability in supply chains (e.g., Longoni et al., 2018; Markley & Davis, 2007; Miller et al., 2020; Walls et al., 2011).

To create an integrated sample, we carefully matched the MSCI ESG and COMPUSTAT databases based on a unique combination of year and a firm's CUSIP[1] identifier. We verified that only US manufacturing firms with subsidiaries in multiple countries were included in our final sample. In line with a similar panel data study conducted by Wang and Sarkis (2013), we selected only firms with data for each year of the entire sample period to create a balanced panel set. When utilizing an unbalanced panel, the underlying reasons for missing observations need to be justified to rule out the potential existence of selection bias. As this study entirely relies on secondary data, it is very difficult to determine whether missing values are the outcome of non-responses or the design decisions of the survey's creators, potentially resulting in misrepresentation and distorted estimations (Verbeek & Nijman, 1992). Our final sample represents a balanced panel set of 2536 observations from 317 US manufacturing firms with worldwide subsidiaries across an 8-year observation period between 2013 and 2020.

4.2 | Measures

4.2.1 | Dependent variable

We used two accounting-based indicators (ROA and ROE) and one market-based indicator (Tobin's Q) to operationalize our dependent variable of CFP. While prior studies in the field of CSR and sustainability have commonly utilized more than one financial measure (e.g., Hart & Ahuja, 1996; Waddock & Graves, 1997), the combined use of accounting and market-based indicators is rare (e.g., Callan & Thomas, 2009; Wang & Sarkis, 2013). ROA captures a firm's operational efficiency, calculated as net income after tax divided by total assets. ROE reflects a firm's financial performance, calculated as net income after tax divided by the book value of equity. Specifically, ROA reflects a firm's generated profit for each dollar invested in assets, whereas ROE reflects a firm's ability to generate returns by efficiently employing funds invested by shareholders (Palepu & Healy, 2013).

In line with previous studies examining the link between GSCM and CFP (e.g., King & Lenox, 2001; Tamayo-Torres et al., 2019; Walls et al., 2011), we used a simplified measure of Tobin's Q to measure a firm's expected cash flows generated per dollar invested in assets. Tobin's Q is calculated as a composite index by dividing the sum of a firm's equity value, its book value of long-term debt, and its net current liabilities by the book value of its total assets. A Tobin's Q ratio greater than 1 indicates that the firm has higher market valuations relative to the value of the company's recorded assets (Awaysheh et al., 2020). We derived the financial measurements from COMPUSTAT North America.

4.2.2 | Independent variable

Following previous research (e.g., Castillo et al., 2018; Chen & Ho, 2019; Kumar et al., 2019; Kumar & Paraskevas, 2018; Longoni et al., 2018), we measured GSCM practices by retrieving annual data

[1]All proper names employed in this article are pseudonyms, with the exception of municipalities, federal institutions, and the names of public national figures, such as Norberto Odebrecht. All translations from Portuguese to English were done by the author.

from the MSCI ESG RATINGS database. As this study focuses on *proactive* GSCM practices, we considered only the "strength" scores of the database's environmental dimension to proxy for environmental commitment and proactive environmental practices (e.g., Chen & Ho, 2019; Gao & Bansal, 2013; K. Kim, 2018; Kumar & Paraskevas, 2018; Lee & Xiao, 2020; Longoni et al., 2018; Walls et al., 2011). Prior research has criticized the use of composite ESG scores combining the "strength" and "concern" scores, which are distinct constructs and inconsistently related (K. Kim, 2018; Mattingly & Berman, 2006).

Based on the variable descriptions provided by MSCI ESG Research (2020), we grouped the environmental scores into four main GSCM dimensions: (1) pollution and waste, (2) natural capital, (3) environmental opportunities, and (4) climate change. These scores reflect both internal GSCM practices, such as sourcing and using water and energy for core business operations, and external GSCM practices, such as implementing programs with suppliers to reduce their carbon footprint. These indicators are directly linked to a firm's supply chain structure (such as raw material sourcing, a product's carbon footprint, and clean tech), its supply chain capabilities (such as recycling and pollution prevention), and its internal supply chain operations (such as green buildings and energy efficiency). These practices have the potential to result in green product or green process innovations. Table A1 provides an overview of the four categories and their corresponding indicators. Each of the environmental indicators is scored between 0 and 10. Companies that have proactively employed processes to improve the respective key issue score higher, while companies that lack strategies to manage such processes score lower. Aggregating the scores in the four dimensions represents the GSCM practices adopted by the firm, with a higher total score indicating greater overall GSCM engagement.

4.2.3 | Mediating variable

We measured the EMS mediator variable using the strength score of "Environmental Management Systems" from the MSCI ESG STAT database. Given the varying descriptions provided by MSCI ESG Research (2020), we could not determine whether the indicator was assessed based on certified EMS, non-certified EMS, or both. In personal correspondence on March 6, 2021, ESG Client Services verified that firms are assigned a score of 1 when they have an EMS in place that is certified by a third-party standard such as ISO 14001, and 0 otherwise.

4.2.4 | Control variables

We considered several control variables, the data for which we obtained from COMPUSTAT. First, we expected that a firm's SIZE, measured by the natural logarithm of its total assets, would affect its environmental management and financial performance (Elsayed & Paton, 2005; King & Lenox, 2001; Wang & Sarkis, 2013). Larger firms benefit from economies of scope and scale and are less risk averse regarding investment in new opportunities. Hence, they are better able than smaller firms to create stronger competitive capabilities (McWilliams & Siegel, 2001). Larger firms generally face more pressure from external parties to engage in environmental practices and, therefore, are more likely to implement GSCM practices (Zhu et al., 2007). In addition, we included ROA as a proxy for profitability to control for its effect on Tobin's Q when examining the relationship between GSCM and CFP (e.g., Y. Kim et al., 2014; Kumar & Paraskevas, 2018). Within the manufacturing industry, we transformed the three-digit SIC codes into six INDUSTRY dummies to control for different types of industries. Finally, given that our study ranges from 2013 to 2020, we created YEAR dummies for each year to control for changes in economic conditions.

4.3 | Statistical methods

Based on prior research on social and environmental responsibility (Callan & Thomas, 2009; Gao & Bansal, 2013; Hart & Ahuja, 1996; Ruf et al., 2001; Shahzad & Sharfman, 2017; Waddock & Graves, 1997; Wang & Sarkis, 2013), we expected to find an action–reaction effect, such that the benefits of simultaneously adopting GSCM practices and EMS would materialize 1 year later, at the earliest. To eliminate a potential endogeneity effect, we lagged the variables of GSCM practices (lagGSCMP) and EMS (lagEMS) by 1 year. To obtain robust estimates of the effects of the independent variables, we also included lagged dependent variables in each regression estimation model (Wilkins, 2018).

As the number of cross-sectional observations is far larger than the number of time periods in the panel, we used a random effects model to analyze our panel data derived from objective scores to account for the effect of unobserved heterogeneity (Baltagi, 2008; Delmas et al., 2013). In addition, the results of the Breusch Pagan Lagrange Multiplier test we conducted strongly rejected the absence of variance across units. Hence, as other quantitative environmental performance studies have also stressed (e.g., Elsayed & Paton, 2005), the random effects model was more appropriate than the pooled ordinary least squares method.

In order to test the mediation effect of EMS through the relationship between GSCM practices and financial performance, we followed Baron and Kenny (1986) and Hayes (2017) and conducted a multistage regression analysis for each path of the model. We also used bootstrapping with 100 replications to construct the confidence intervals and test for the significance level of the mediation effect (Krull & MacKinnon, 2001; MacKinnon & Luecken, 2008).

Apart from INDUSTRY type, GSCM practices, and EMS certification, to avoid potential distortion from outliers, we winsorized all CFP variables—Tobin's Q, ROA, and ROE—as well as SIZE at the 1% and 99% level. To investigate whether winsorizing significantly influenced the empirical results, we performed a robustness check by running additional regressions with the raw data. When we used the raw data to analyze ROE as the financial measure, we found that various

outliers with exceptionally high or low ROE values influenced the regression results. Therefore, to increase the generalizability of our findings, winsorizing the financial data of the initial sample was important to mitigate the impact of outliers and create robust results.

5 | RESULTS

Tables 1 and 2 report the descriptive statistics of our variables. The largest category of firms are those that operate in the computer, automotive, and aerospace industries. Furthermore, we note that the distribution of the implemented GSCM practices and EMS certification differs across industries (see Table 1). The food, textile, and apparel industries have the highest average intensity of GSCM practices, followed by the forestry and chemical industries. A possible explanation is that international manufacturers of consumer staples may experience more pressure from consumers to deliver environmentally friendly products. Conversely, the refining, rubber, and plastics industries together with the container, steel, and heavy manufacturing industries have the lowest average intensity of GSCM practices and the lowest average for certified EMS adoption as well. Even though these industries have a direct, significant impact on the environment, it is evident that adopting GSCM practices and EMS certification might not be economically worthwhile for them (Zhu et al., 2010). As a result, it is difficult for them to reassure their stakeholders such as wholesalers of high-priced, infrequently purchased products or buyers of industrial goods about their goodwill. Overall, the descriptive statistics suggest that US international manufacturing firms match their environmental strategies with the interests of specific stakeholder groups such as customers within their supply chains.

Table 2 presents the annual panel data we used to gain insights into how the studied variables evolved over time. In general, the sample firms are profitable (ROA = 5.0%, ROE = 14%) and possess higher relative market valuations (Tobin's Q = 1.22), pointing to positive overall financial performance. Furthermore, the sample firms have an average score of 15.24 and 0.36 for GSCM practices and EMS, respectively, and hold assets with an average logarithmized value of 8.06 (equal to USD 1.15 billion). Table 3 displays the correlation matrix of the key variables. Furthermore, we calculated the variance inflation factors (VIFs) to check for multicollinearity. The VIF values are far below the recommended threshold of 10, indicating that our data are not confounded by overlapping covariations (Belsley et al., 1980).

We used the software package STATA 14.0 to run our regressions. Tables 4 and 5 summarize the results for the direct and mediating effects. In Table 4, models M1–M3 represent the impact of the independent variable of lagged GSCM practices (lagGSCMP), as well as the control variables of SIZE, INDUSTRY, and ROA, on three different CFP measures: Tobin's Q (M1), ROA (M2), and ROE (M3). Except for M1, results for the other two models (M2 and M3) show a significant impact of GSCM practices on next year's ROA and ROE ($p < .001$). These results support Hypothesis 1 and are consistent with studies that reveal the positive impact of GSCM measures on ROA or ROE (e.g., Chan et al., 2012; Green et al., 2012). Furthermore, lagging GSCM practices by 2 and 3 years, respectively, did not change our results.

Consistent with Hypothesis 2, in Table 5, all three models (M1 to M3) reveal a positive and significant mediating effect of EMS certification on the relationship between GSCM and the three CFP measures: Tobin's Q ($p < .001$), ROA ($p < .05$), and ROE ($p < .001$). As the direct effect of GSCM practices on next year's ROA and ROE is also significant and positive, we can infer that EMS partially mediates the relationship between GSCM and these two CFP measures. However, due to the insignificant direct effect of GSCM practices on next year's Tobin's Q (see M1 in Table 4), we infer that EMS fully mediates this relationship. In other words, firms may achieve better accounting-based financial performance in terms of their ROA and ROE merely from their GSCM practices. However, only for those with an EMS in place will investing in GSCM practices result in better market-based financial performance in terms of Tobin's Q in addition to better accounting-based financial performance in the next year.

Looking at the models where GSCM practices show a significant direct effect, we can observe mixed results in different industries. Considering the food, textile, and apparel industries as the reference group, their relatively higher average intensity of GSCM practices (see the descriptive results in Table 1) seems to materialize in a higher ROE in the next year than the sampled firms in the computer, automotive, and aerospace industries, along with the refining, rubber, and plastic industries (see M3 of Table 4) that score relatively lower on investments in GSCM practices (see Table 1). In general, the sampled international firms in the food, textile, and apparel industries may compensate for their investment costs with the cost savings and differentiation advantages resulting from more GSCM practices. In contrast, relatively lower levels of GSCM practices (see Table 1) have a stronger positive impact on the ROE of firms in the pharmaceutical and chemical industries than in the food, textile, and apparel industries

TABLE 1 Industry distribution

Industry	N	%	GSCM practices	EMS
Food, textiles, apparel	280	11.04	19.68	0.38
Forest products, paper, publishing	208	8.20	15.56	0.37
Chemicals, pharmaceuticals	400	15.77	15.30	0.41
Refining, rubber, plastic	144	5.68	14.78	0.18
Containers, steel, heavy manufacturing	424	16.72	13.09	0.35
Computers, autos, aerospace	1080	42.59	14.91	0.37

TABLE 2 Descriptive statistics

Panel A: Tobin's Q								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	1.17	1.19	1.21	1.22	1.23	1.23	1.25	1.26
S.D.	0.16	0.16	0.17	0.16	0.17	0.17	0.17	0.18
Min	0.80	0.79	0.71	0.68	0.66	0.72	0.87	0.85
Max	2.05	1.94	2.14	2.13	2.13	2.16	2.11	2.62
Panel B: ROA_aftertax								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	0.05	0.06	0.05	0.05	0.05	0.06	0.06	0.04
S.D.	0.09	0.09	0.09	0.08	0.08	0.10	0.08	0.10
Min	−0.56	−0.81	−0.74	−0.39	−0.69	−0.48	−0.47	−0.46
Max	0.48	0.34	0.35	0.31	0.31	0.49	0.31	0.43
Panel C: ROE_aftertax								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	0.14	0.15	0.13	0.14	0.13	0.15	0.14	0.13
S.D.	0.11	0.11	0.12	0.12	0.11	0.13	0.12	0.13
Min	−0.04	−0.04	−0.04	−0.04	−0.04	−0.04	−0.04	−0.04
Max	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Panel D: GSCM practices								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	12.63	15.06	13.39	14.44	17.02	17.80	15.89	15.69
S.D.	8.83	9.54	10.26	10.73	8.69	8.33	6.48	6.56
Min	0.80	1.50	0.10	0.10	2.50	1.70	1.60	1.60
Max	56.60	56.60	41.00	43.70	43.30	44.00	36.30	36.20
Panel E: EMS								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	0.33	0.37	0.37	0.39	0.39	0.35	0.35	0.34
S.D.	0.47	0.48	0.48	0.49	0.49	0.47	0.47	0.47
Min	0	0	0	0	0	0	0	0
Max	1	1	1	1	1	1	1	1
Panel F: Size								
	2013	2014	2015	2016	2017	2018	2019	2020
Mean	7.84	7.90	7.93	7.99	8.10	8.16	8.23	8.30
S.D.	1.46	1.44	1.44	1.44	1.42	1.40	1.42	1.39
Min	4.20	5.04	5.00	4.87	4.70	5.22	5.11	5.60
Max	12.75	12.76	12.72	12.70	12.76	12.75	12.80	12.71

TABLE 3 Pearson's correlation matrix

	1	2	3	4	5	6
1. Tobin's Q	1					
2. ROA_aftertax	−.180***	1				
3. ROE_aftertax	.190***	.580***	1			
4. LagGSCM practices	.181***	.158***	.278***	1		
5. LagEMS	.150***	.112***	.214***	.446***	1	
6. SIZE	.321***	.148***	.274***	.555***	.457***	1

***$p < .01$.

TABLE 4 Random effects regression results

	M1		M2		M3	
Dependent variable	**Tobin's Q**	***p*-value**	**ROA_aftertax**	***p*-value**	**ROE_aftertax**	***p*-value**
Lag GSCM	−0.000 (0.000)	.960	**0.0006** (0.000)	.001	**0.001** (0.000)	.000
Size	**0.009** (0.001)	.000	−0.0002 (0.001)	.863	**0.009** (0.002)	.000
Industry						
Forest products, paper, publishing	0.006 (0.007)	.359	0.004 (0.006)	.522	0.006 (0.010)	.541
Chemicals, pharmaceuticals	0.009 (0.006)	.112	−0.001 (0.005)	.732	**0.015** (0.008)	.088
Refining, rubber, plastic	0.002 (0.008)	.719	0.000 (0.007)	.919	−**0.020** (0.011)	.087
Containers, steel, heavy manufacturing	−0.000 (0.006)	.939	−0.004 (0.005)	.394	−0.013 (0.009)	.125
Computers, autos, aerospace	−0.000 (0.005)	.971	0.000 (0.004)	.957	−**0.018** (0.007)	.017
Year						
2015	0.007 (0.005)	.221	−**0.010** (0.005)	.046	−**0.019** (0.007)	.011
2016	0.002 (0.006)	.755	−0.001 (0.005)	.722	−0.009 (0.007)	.200
2017	−0.005 (0.006)	.368	−0.006 (0.005)	.246	−**0.013** (0.007)	.069
2018	−0.008 (0.006)	.144	0.002 (0.005)	.592	0.0004 (0.007)	.954
2019	0.005 (0.006)	.358	−**0.009** (0.005)	.066	−**0.014** (0.007)	.053
2020	0.007 (0.006)	.0223	−**0.019** (0.005)	.000	−**0.029** (0.007)	.000
ROA_aftertax	−**0.135** (0.019)	.000				
Constant	**0.06** (0.017)	.000	0.014 (0.010)	.180	0.018 (0.014)	.216
Wald's χ^2	7357.15		1940.50		1665.65	
Rho	0.002		0.000		0.000	
R^2	0.77		0.47		0.43	
Observations	2219		2219		2219	

Note: Standard errors in parentheses. Each firm has lost 1 year of data due to using a 1-year lag for GSCM practices and lag dependent variable (LDV); therefore, $N = 2219$. Bold values indicate variables that are significant, at a level of *p*-value < .1.

TABLE 5 Indirect effect of GSCM practices through the mediation effect of EMS

	M1		M2		M3	
Dependent variable	**Tobin's Q**	***p*-value**	**ROA_aftertax**	***p*-value**	**ROE_aftertax**	***p*-value**
LagGSCM indirect effect through mediation of lagEMS	**0.0007** (0.000)	.000	**0.0002** (0.000)	.019	**0.0006** (0.000)	.000
Proportion of total effect mediated	0.22		0.14		0.18	

Note: Standard errors in parentheses. Bold values indicate variables that are significant, at a level of *p*-value < .1.

(see M3 in Table 4). One explanation could be that international firms in the latter industries are subject to more stakeholder scrutiny regarding their environmentally friendly behavior than pharmaceutical firms, in which the stakeholders emphasize personal well-being and health over environmental concerns.

Comparing the regression results of the YEAR variable with the average yearly GSCM practices of the panel statistics (see Table 2) of the models that show a significant direct effect of GSCM practices on next year's CFP (see M2 and M3 of Table 4) reveals a similar pattern. Except for the average GSCM practices in 2017, in 2015, 2019, and 2020, when yearly average GSCM practices stagnated or declined, they have a negative impact on the firms' ROA and ROE (see M2 and M3 of Table 4), compared to the reference group of 2014, which shows relatively higher yearly increases in GSCM practices (see Table 2). Overall, the industry- and time-specific results underscore the importance of controlling for variations across industries and time in our analysis (Elsayed & Paton, 2005), and implementing GSCM practices to improve a firm's performance. These results support Hypothesis 1.

While SIZE has a positive effect on the next year's Tobin's Q and ROE (see M1 and M3 of Table 4), it has no effect on the next year's ROA (see M2 of Table 4). Finally, the control variable of ROA has a significant but negative impact on the next year's Tobin's Q (see M1 of Table 4). One explanation for this result might be the fact that the ROA relates to past accounting data, whereas Tobin's Q relates to the future market value of a firm. Accordingly, the negative influence of

ROA on Tobin's Q can indicate that, in the context of sustainable behavior, an increase in ROA does not necessarily correspond to an increase in market value if the firm's external stakeholders are unaware of its actions.

Thus, in general, our findings support Hypotheses 1 and 2. The mere investment in GSCM practices helps improve a firm's accounting-based financial performance in terms of the next year's ROA and ROE. In addition, the combined implementation of a certified EMS and GSCM practices is a prerequisite for achieving better market-based performance, evident in Tobin's Q score, and having a positive impact on the ROA and ROE in the next year.

6 | DISCUSSION

The goal of our study is to answer two research questions. First, we analyze whether international manufacturing firms can achieve a competitive advantage by implementing GSCM practices. To this end, we empirically investigated the relationship between a firm's GSCM practices and its CFP (see Figure 1 and Hypothesis 1). Second, we seek to clarify how or under which conditions international manufacturing firms can sustain this positive relationship, which we relate to complementary environmental management resources enabling the effective implementation of GSCM practices within the organization. Grounded in the resource-based view, we argue that the firm's adoption of an EMS constitutes such a complementary resource. Therefore, we investigated the mediating role of having an EMS in place in the relationship between GSCM practices and CFP (see Figure 1 and Hypothesis 2).

In support of Hypothesis 1, our findings indicate that GSCM practices have a positive impact on CFP in terms of the accounting-based efficiency measures, namely, the ROA and ROE of the next year. The US manufacturing firms in our sample can leverage their cost savings and/or differentiation advantages resulting from their investment in GSCM practices, such as the efficient consumption of energy and materials (Zhu et al., 2007) and new market opportunities from environmental product innovations (Rao & Holt, 2005).

In contrast, for market-based financial performance, the positive effect of GSCM practices on next year's Tobin's Q is contingent on the presence of an ISO-certified EMS. When international manufacturing firms have no EMS in place, investments in GSCM practices will have no impact on next year's Tobin's Q. In support of Hypothesis 2, a positive relationship between implementing GSCM practices and an increase in Tobin's Q was evident only among certified EMS adopters. Given that no positive financial impact was found in the absence of the mediating variable, which explained 77% of the variation in our data, our results about the synergistic potential of EMS-embedded GSCM practices offer a possible explanation for the previously reported negative or non-existent direct relationship between implementing GSCM practices and CFP.

The complexity of GSCM practices such as evaluating constantly changing, sometimes irreversible, green technology investments (Matos & Hall, 2007; Rugman & Verbeke, 1998) makes it difficult for decision-makers to successfully manage and implement environmental practices and to derive competitive and financial benefits from them. These difficulties are exacerbated in international firms that must coordinate internal and external supply units according to the applicable formal and informal institutional settings in different countries. Adopting an ISO-certified EMS gives the firm an internationally recognized environmental management mechanism to explicitly integrate environmental sustainability in the form of GSCM practices into the strategy and structure of the organization. It offers a systematic management approach for coordinating, exchanging, monitoring, evaluating, and documenting internal and external GSCM practices throughout a firm's international operations. The synergistic potential of EMS certification, such as in leveraging the environmental resources and capabilities needed to implement novel GSCM practices, increases the heterogeneity and complexity of those environmental management-embedded resources and capabilities bundles, which, according to the resource-based view, are a source of sustainable competitive and financial advantages. By recognizing the synergies between "co-specialized" variables, meaning, the firm's GSCM practices and proactive environmental management strategy, our study answers the persistent calls to integrate environmental sustainability research with a complementary strategic management perspective (Gao & Bansal, 2013; Porter & Kramer, 2006). Thus, it helps improve our understanding of the creation of valuable GSCM practices, resources, and capabilities (Hart & Dowell, 2011), and the mechanism linking GSCM practices with long-term competitive and financial advantages (Hart, 1995).

Consistent with our goal of explaining the achievement of competitive and financial advantages through an integrated GSCM strategy, our results imply that Tobin's Q can capture the creation of intangible assets by international manufacturing firms (Hart, 1995). One example of these assets includes the boost to their image that results from embracing environmental sustainability strategies. As a result of doing so, stakeholders such as investors, consumers, and suppliers reward firms by granting them more legitimacy and buying from them, which improves their financial performance in the following year. Therefore, investing in GSCM practices will be reflected in the firm's financial performance in terms of next year's ROA and ROE for even more than 1 year. However, only an integrated GSCM strategy will meet stakeholders' expectations about how GSCM practices will affect future revenues, evident in Tobin's Q. It is only this method that will create the intangible assets that provide publicly traded companies with the sustainable competitive advantage they need. Therefore, using both accounting- and market-based performance metrics as proxies for CFP helped us clarify the relationship between strategic GSCM practices and CFP (Callan & Thomas, 2009; Tamayo-Torres et al., 2019).

Responding to the need for the explicit integration of environmental sustainability into a firm's core business (Gond et al., 2012; Porter & Kramer, 2006), our study uses clearly defined measurement constructs of environmental management and the most important proactive internal and external GSCM practices from a large, publicly available panel database (Hart & Dowell, 2011). In doing so, it

overcomes some of the limitations of the prior use of varying survey-based items to assess internal and external GSCM practices (e.g., Gimenez et al., 2012; Green et al., 2012; Zhu et al., 2012, 2013) and adds nuance to the existing literature. Our approach allows us to compare changes between the implementation of ISO-certified EMS and GSCM practices and firms' CFP over an 8-year period and across different manufacturing industries. Our findings indicate that the industries that have the most adverse effects on the environment such as refining, rubber, and plastics, heavy manufacturing, computers, autos, and aerospace are the least likely to engage in GSCM practices and adopt an EMS. We can conclude that by failing to respond to their stakeholders' expectations with credible investments in preserving the environment, these firms have failed to develop critical complementary assets such as stakeholder management capabilities, which combine to create heterogeneous and inimitable environmental resources and capabilities that improve their financial performance (e.g., Hart & Dowell, 2011). From the panel data analysis, we can also infer the path-dependent development of resources and capabilities from the consistent combination of GSCM practices with complementary assets, meaning an EMS. It is this combination that increases the learning effect, creates synergies, and improves the rent-yielding potential of the overall environmental strategy and the financial performance of the firm over time (Tang et al., 2012). Overall, we improve the ability to generalize the results of quantitative studies on the mediating role of an explicit environmental management structure, namely, an EMS, in the relationship between holistic (internal and external) GSCM practices and the CFP of US international manufacturers.

6.1 | Managerial implications

From a practical point of view, we advise manufacturing managers to align their corporate strategy with an environmental sustainability strategy that makes mitigating the firm's effect on the environment part of its core business (Shireman, 2003). By considering GSCM practices part of "business as usual," rather than solely philanthropic initiatives to please the public (Porter & Kramer, 2006), employees will be more motivated to internalize sustainable thinking into their daily processes throughout the entire organization. Thereby, firms will develop valuable environmental resources and capabilities that can distinguish them from their competitors and that will become sources of long-term competitive advantage and improved financial performance.

This study revealed that adopting an ISO-certified EMS is one way to integrate environmental sustainability into the firm's strategy and structure. An EMS guides the management in quantitatively assessing the environmental impacts of its business practices (Darnall et al., 2008). In doing so, it enables a firm to apply the most suitable GSCM practices to its business activities and have the strongest environmental impact. By anchoring the environmental practices that offer the most potential to a firm's specific operations throughout the organization, these practices can become a source of opportunity and translate into a competitive advantage.

From an accounting-based financial performance perspective, this study recommends that managers implement GSCM practices to become more efficient and/or differentiate themselves through their environmental sustainability strategy. In addition, when implementing GSCM practices simultaneously with a certified EMS, firms can leverage complementary capabilities and skill sets that both simplify the adoption of additional environmental practices and reduce the initial investment costs (Darnall et al., 2008).

From a market-based financial performance perspective, our study indicates that firms receive a higher market valuation when they simultaneously implement GSCM practices and adopt an EMS. This finding suggests that firms create intangible assets such as the increased satisfaction of employees and supplier networks, more customer loyalty and investor participation, and other forms of stakeholder approval from integrated GSCM practices. Their commitment to environmental protection signaled by the ISO certification ultimately leads to sustainable CFP. Given that certification criteria evolve dynamically (e.g., Slager & Chapple, 2016) while GSCM strategies are relatively public (Barney & Mackey, 2005), managers must continuously adapt GSCM practices and the corporate (EMS) strategy to the changing expectations of their stakeholders.

6.2 | Limitations and future research

This study is subject to several limitations that provide avenues for future research. First, to capture the concept of proactive GSCM practices, we focused only on environmental strength scores. Considering that a firm can implement numerous GSCM initiatives while continuing to release significant amounts of pollutants into the environment, future research could compare both the strength and concern scores to provide additional insights into the relationship between GSCM practices and CFP. In addition, we treated GSCM as a construct consisting of four environmental dimensions. Future studies should use models of decomposed GSCM practices to test for differences in their effects on CFP. Second, despite the extensive use of the MSCI ESG database in prior research, its binary data reflect only the presence of an EMS, not its efficient implementation (e.g., Khan et al., 2021). While providing additional insights into EMS implementation, using primary, survey-based data does not capture the evolution of this implementation over time (Starik & Marcus, 2000). Combining MSCI ESG data with other public data (K. Kim, 2018) could be an option for exploring the extent of this implementation when investigating its influence on CFP over time. Third, our study showed significant differences in the level of adopted GSCM practices over time and across different manufacturing industries. Future longitudinal studies could investigate how the nature of the relationship between GSCM practices and CFP varies among industries. They could also extend the time frame to the years prior to 2013 (e.g., Tsai et al., 2020). Examining the relationship between an EMS-embedded GSCM strategy and CFP in a country other than the United States might provide valuable insights and enhance the external validity of the reported results. For

example, it would be interesting to replicate this study in an emerging-country context given that, besides the United States, countries such as China, India, and Russia are among the world's top polluters. While in our study we examined the delayed effects of GSCM practices on CFP by 1–3 years, our data do not tell us about the actual year of implementation of the GSCM practices and the time-sensitive changes in the effects on CFP. Therefore, it would be interesting if future studies could account for such a dynamic analysis and further clarify if the mediating effect of EMS embedding can mitigate the loss of value due to the imitability of GSCM practices over time. Researchers should also test path models to demonstrate the multidirectional relationship (e.g., Slager & Chapple, 2016) between EMS-embedded GSCM practices and stakeholder engagement such as by third-party auditors, rating agents, investors and other stakeholders, and their interdependent impact on the creation of intangible assets and improved CFP (Mustonen et al., 2016; Nguyen & Adomako, 2021). Finally, our current statistical modules allowed us to include only one dependent variable, one independent variable, and one mediator, without the possibility of including control variables. It would be good if future studies could conduct a multivariate mediation analysis of the relationship between an EMS-embedded GSCM strategy and CFP that addresses such limitations in panel data regression analysis.

7 | CONCLUSION

This study explains the conditions under which GSCM practices lead to increased CFP in international manufacturing firms. Grounded in the resource-based view, an ISO-certified EMS, as an explicit management approach for embedding GSCM into the corporate strategy and structure, complements the development of novel, heterogeneous environmental resources and capabilities as sources of long-term financial advantage. Our results show that the presence of a certified EMS plays a mediating role in the relationship between GSCM practices and CFP. While investing in GSCM practices can increase accounting-based CFP in terms of the next year's ROA and ROE, only in international firms with a certified EMS does implementing GSCM practices have a positive effect on market-based CFP in terms of Tobin's Q for the next year. Therefore, a firm's explicit environmental management is a requisite for developing valuable GSCM practices with the potential to create intangible assets as sources of sustainable competitive and financial advantage. Overall, by recognizing the synergistic potential of management-embedded environmental practices, our study extends the win–win situation of improving corporate performance through responsible behavior by embracing the rationale of "doing good by *being good at* being good."

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APPENDIX A

TABLE A1 GSCM practices overview based on MSCI ESG categories and their descriptions

Environmental categories	Indicators	Description
Pollution and waste	Toxic emissions and waste	This key issue evaluates the extent to which companies are at risk of incurring liabilities associated with pollution, contamination, and the emission of toxic and carcinogenic substances. Companies with strong programs and track record of reducing emissions and waste score higher on this key issue, while companies that create large volumes of toxic and carcinogenic emissions or waste, yet lack programs or policies to reduce or control these substances and have experienced recent incidents of contamination score lower. (Score: 0–10)
	Electronic waste	This key issue is relevant to those companies that produce electronic waste and face risks associated with end-of-life recycling and/or disposal of electronic products. Companies that proactively address e-waste concerns by establishing comprehensive and well-managed product recovery and recycling programs score higher on this benchmark, while companies with a strictly compliance-driven approach score lower. (Score: 0–10)
	Packaging material and waste	This key issue evaluates the extent to which companies are at risk of losing access to markets or at risk of facing added costs to come into compliance with new regulations related to product packaging content and end-of-life recycling or disposal. Companies that proactively reduce the environmental impact of their packaging, including use of recycled content material and establishment of take-back and recycling programs, score higher on this key issue, while companies that have done little to address packaging impacts or have implemented a packaging strategy that is strictly compliance driven score lower. (Score: 0–10)
Natural capital	Water stress	This key issue evaluates the extent to which companies are at risk of water shortages impacting their ability to operate, losing access to markets due to stakeholder opposition over water use, or being subject to higher water costs. Companies that proactively employ water efficient processes, water recycling, and alternative water sources score higher on this key issue, while companies that lack strategies to manage and reduce water use score lower. (Score: 0–10)

(Continues)

TABLE A1 (Continued)

Environmental categories	Indicators	Description
	Biodiversity and land use	This key issue is relevant to companies whose operations risk having a high negative impact on fragile ecosystems. Companies that have policies and programs designed to protect biodiversity and address community concerns on land use score well on this benchmark. Companies with operations that disturb large and/or fragile, bio-diverse areas and lack strategies to minimize and mitigate biodiversity losses score poorly. (Score: 0–10)
	Raw material sourcing	This key issue evaluates the extent to which companies are exposed to risks of damaging their brand value by sourcing or utilizing raw materials with high environmental concerns. Companies that have policies to source materials with lower environmental impact and participate in initiatives to reduce environmental impact of raw materials production score higher on this key issue. Companies that do not utilize sustainably produced raw materials and set no targets for use of such materials in the future score lower. (Score: 0–10)
Environmental opportunities	Opportunities in clean tech	This key issue evaluates the extent to which companies are taking advantages of opportunities in the market for environmental technologies. Companies that proactively invest in product and services addressing issues of resource conservation and climate change score higher on this key issue. Companies lacking strategies and investments targeting these areas score lower on this key issue. (Score: 0–10)
	Opportunities in green building	This key issue evaluates the extent to which companies are taking advantage of opportunities to develop or refurbish buildings with green building characteristics including lower embodied energy, recycled materials, lower energy and water use, waste reduction, and healthier and more productive working environments. Companies that proactively develop or refurbish buildings to achieve green building certifications score higher on this key issue, while companies that ignore opportunities in green buildings score lower. (Score: 0–10)

TABLE A1 (Continued)

Environmental categories	Indicators	Description
	Opportunities in renewable energy	This key issue evaluates the extent to which companies are taking advantages of financial opportunities linked to the development of renewable power production. Companies that proactively invest in renewable power generation and related services score higher on this key issue, while companies lacking any strategic interest in the field score lower. (Score: 0–10)
Climate change	Carbon emissions	This key issue is relevant to those companies with significant carbon footprints. Companies that proactively invest in low-carbon technologies and increase the carbon efficiency of their facilities score higher on this key issue. Companies that allow legal compliance to determine product strategy, focus exclusively on activities to influence policy setting, or rely heavily on exploiting differences in regulatory frameworks score lower. (Score: 0–10)
	Energy efficiency	This key issue evaluates the extent to which companies are managing the risk of increases or volatility in energy costs across their operations. Companies that take proactive steps to manage and improve the energy efficiency of their operations score higher on this benchmark, while companies highly exposed to energy-intensive business activities and ignore opportunities to improve energy efficiency or take a compliance-based approach to energy usage score lower. (Score: 0–10)
	Product carbon footprint	This key issue evaluates the extent to which companies are exposed to higher input or production costs for their carbon-intense products due to increased energy costs in a carbon-constrained world. Companies that measure and reduce carbon emissions of their products throughout the value chain and implement programs with their suppliers to reduce carbon footprint score higher on this key issue. Companies that fail to identify or evaluate the carbon footprint of their products or that lack programs to reduce carbon emissions throughout the supply chain and distribution score lower on this key issue. (Score: 0–10)

(Continues)

TABLE A1 (Continued)

Environmental categories	Indicators	Description
	Financing environmental impact	This key issue measures the extent to which companies are at risk of credit defaults resulting from poor due diligence processes related to environmental concerns. Companies that proactively address the environmental risks embedded in their financing decisions score higher on this key issue, while companies that have not articulated a strategy for managing indirect environmental risks score lower. (Score: 0–10)
	Climate change vulnerability	This key issue evaluates insurance companies' exposure to risks to insured assets or individuals associated with the effects of climate change. Companies that have integrated climate change effects into their actuarial models while developing products to help customers manage climate-change-related risks score higher on this issue, while companies that are highly exposed to climate change but do not consider it to pose a business risk score lowest. (Score: 0–10)