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# Corporate Social Responsibility of Chinese Manufacturing Companies' effect on Green Business Strategy, Innovation and Performance

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**Abstract.** The purpose of this paper is to study the influence of Chinese manufacturing companies in implementing corporate social responsibility, to verify how it affects environmental and export performance, and to explore the mediating effect of green business strategy and innovation. To this end, this paper uses structural equation modeling on a data set of 226 Chinese manufacturing companies to test the study hypotheses. The results show that CSR positively affects green business strategy, innovation, export and environmental performance. The results also support the partial mediation effect of green business strategy and innovation on the relationship between CSR, export and environmental performance. The findings may better help manufacturing enterprises understand how CSR, green business strategy, innovation are important forces for manufacturing companies to achieve outstanding business activities and contribute to social development.

**Keywords.** CSR, green business strategy, innovation, export performance, environmental performance

## 1. Introduction

A plethora of studies on corporate social responsibility (CSR) has been published during the past few decades, causing CSR to become a universal business practice in recent decades (Xiang et al., 2020). There is numerous research on the subject. However, most of the existing literature focuses on enterprises in developed nations, giving little or no insight into companies in emerging economies. Moreover, some scholars claimed that the public's positive response to CSR is limited. Enterprises may increase the cost and restrict product development to fulfilling corporate social responsibilities, which in turn leads to a negative influence on business profits (Bragdon & Marlin, 1972; Aupperle et al., 1985). On the other hand, some scholars claimed that CSR can improve environmental and economic performance (Al-Abdin et al., 2018). Hence, CSR can bring financial benefits only under particular situations (Bhardwaj et al., 2018). This paper tries to explore these certain conditions.

With the rapid development of the world economy, environmental problems are increasing day by day. Pollution and ecosystem destruction are occurring as a result of climate change and an increase in industry-generated waste. The manufacturing industry has

contributed to the development of the global economy. It has brought about the excellent material richness and satisfies people's daily requirements as an essential engine (Guang et al., 2012). There is no doubt that the continuous development of science and technology brings benefits to humanity, but it is also causing environmental pollution and resource waste.

Manufacturing companies have a substantial impact on the environment, and the industry is a significant contributor to problems such as climate change, waste, and depletion of natural resource, air and water contamination. According to Zailani (2012), the level of contamination caused by manufacturing enterprises endangers the existence of life on Earth. As a result, encouraging environmental performance is important. As a country with a powerful manufacturing industry, China is facing international pressures to curb its carbon emissions, and stakeholders are putting a lot of pressure on companies to reduce the environmental impact of their industrial processes (Yu et al., 2017).

Thus, developed countries have introduced environmental trade regulations such as eco-friendly certification systems in a dual dimension to protect the environment and maintain human health. The Green Trade Barrier, a non-tariff trade barrier used for international trade, currently enforces such regulations (Li & Bang, 2020). As a result, Chinese export manufacturers are enduring difficulties due to rising wages and the Sino-US trade war, despite the abolition of traditional tariffs after China joining the WTO in 2001. In addition, due to Europe, Japan and other major import countries' green trade barriers and high consumer preference for eco-friendly products, the traditional management of Chinese export manufacturing companies has shown limitations as they struggle to maintain their competitive edge (Zhu et al., 2008).

In oversea markets, these corporations encounter environmental issues including environmentally sensitive consumers, strict regulatory compliance, legal codes, and public concerns of social and environmental problems (Leonidou et al., 2015). As a result, businesses have begun to alter their strategic planning and take advantage of green related opportunities (Buysse & Verbeke, 2003). Hence, firms are under growing pressure to adapt their management strategies in order to introduce socially and ecologically responsible practices to their businesses. Public organizations, including various authorities and environmental organizations, have set rules and guidelines for businesses that have an influence on the world's key materials. The commitments that a firm takes on in order to satisfy these expectations is referred to as corporate social responsibility (Cholette et al., 2014). CSR is based on the ethical and moral ideologies of each individual company, and a considerable number of companies worldwide carrying out influential CSR by embracing social issue and acknowledging that their company's ongoing activities are related to social commitment.

From the resource-based view (RBV) perspective, specific company resources that are valuable, scarce, inimitable, and non-substitutable, improve company performance (Barney, 1991). Hart (1995) extends this perspective by analyzing the consequences of the natural environment, asserting that firms must build new resources to adapt to changing environmental conditions (Bıçakcıoğlu, 2018). Even though literature based on export traditionally emphasizes the value of company resources in connection to a company's financial position in the global market (Bıçakcıoğlu & Theoharakis, 2019). According to Hernández et al., (2020), CSR's importance has expanded the necessity to carry out trade in a novel way, intentionally integrating environmental, social, and economic considerations in organization activities and plans.

Arrive et al., (2019) reported that due to the increased attention on the environment, CSR philosophy is now increasingly influential and crucial for businesses. Although Ali et al.

(2020) claimed that researchers have used CSR to assess financial performances for decades, Kraus et al. (2017) emphasized that little consideration has been dedicated to CSR within the domain of environmental performance. Furthermore, studies have discovered that corporate social responsibility has made significant strides in organizational performance (Javed et al., 2020; Long et al., 2020). Smith et al. (2007) identified that despite this CSR has had little impact on the success of organizations. Despite the fact that studies have used CSR to predict a company's performance, academics continue to focus on this link between corporate social responsibility and performance due to inconsistent results.

Based on Christmann (2004), enterprises that incorporate environmental concerns into their strategies are more likely to have core competencies. Hence, a company's green business strategy has gradually become a prerequisite for achieving sustainable development. A corporate sustainability strategy combines various abilities that are neither replicable nor comparable (Teece et al., 1997). As a result, Aragon-Correa & Sharma (2003) suggested that a green business strategy should include a company's impact on the environment to be in line with contemporary ideas of resources and capabilities; this enables a company to respond to changes in the external environment and has a favorable influence on the company's growth.

Hauser et al. (2006) stated that one of the most essential fields of business studies is innovation or the procedure of introducing new goods to market. It brings value to businesses by producing new goods and services, and new businesses and capabilities (Cui & O'Connor, 2012). The principle of newness is fundamental to the idea of innovation, and it is founded on the combination of novel and diverse information, knowledge, and capabilities. Innovation is also accountable for reducing prices and improving product and service quality (Hauser et al., 2006).

Roome (1992) mentioned the necessity of environmental management to create new value for customers and exerts a positive influence improving processes and innovation. Based on Matos & Silvestre (2013), the role of innovation in promoting sustainability is another significant issue addressed in the corporate sustainability discussion. A company's ability to innovate is quickly becoming a major source of its competitive advantage (Bartlett & Ghoshal, 1990). Because of contemporary technology and expertise, it is simple to replicate a competitive advantage and break down market barriers between regions and nations, as well as swiftly gain information about items and their pricing. Therefore, sustainable businesses must implement processes and product innovation to improve energy efficiency, and reduce material consumption (Bansal, 2002).

As Leonidou et al. (2015) and Zeriti et al., (2014) pointed out, despite the importance of green business strategy, present investigation into the factors that encourage exporting enterprises and the impact of employing these strategies is limited when compared to domestic studies, and green business strategy has received little attention from studies when determining environmental performance. According to the small number of prior research that has been done in this sector (Leonidou et al., 2015), only a few external and internal reasons lead organizations to implement green business strategies. Zeriti et al., (2014) mentioned that there are untapped opportunities for further investigation because only some components were addressed in the literature. Furthermore, because green business strategy has yet to be completely investigated in an international corporate setting, exploratory research that enables the development of uncertain findings was seen as more appropriate for identifying emergent factors.

Additionally, as the environment has become increasingly complicated and fast, radical innovations have emerged as a strategic role for firms seeking to achieve a competitive edge. During 40 years of fast expansion, the scope of Chinese manufacturing has come into the

world's spotlight. In 2018, its GDP hit 26.4 trillion Yuan, accounting for roughly 30 percent of the domestic economy (National Bureau Statistics of China). Nevertheless, manufacturing organizations face numerous challenges, including a lack of critical organizational innovation, high reliance on crucial core competencies and high-end machinery, low quality of products, an absence of internationally-recognized companies, poor sources of energy and fuel efficiency, and serious environmental contamination. These flaws have had a significant impact on the growth of China's manufacturing industry, and its modeling approach desperately needs to be improved in a sustainable way (Qiu et al., 2019).

Enterprises that prioritize CSR practices have a competitive edge over their rivals that do not emphasize such actions (Bhardwaj et al. 2018). However, literature such as Galbreath & Shum (2012) shows that there is no definite link between CSR and performance. Based on Surroca et al. (2010), several scholars advocated for the use of mediators or moderators between corporate social responsibility and company performance, notwithstanding the findings of previous studies. As a result, this paper adds two mediators between CSR and performance: green business strategy and innovation. Innovation is seen as a key factor in influencing a company's success (Qiu et al., 2020) and green strategy is favorably associated with financial performance (Fousteris et al., 2018). According to Walker et al. (2014), a firm's green business strategy is a crucial component in evaluating a firm's performance. However, researchers have given less attention to green business strategy and innovation in determining export and environmental performance manufacturing firms in China. Thus, this research aims to close the gap.

The purpose of this study is to find out the relationship between corporate social responsibility, green business strategy, innovation, and performance. To explore how corporate social responsibility affects green business strategy, innovation, environmental and export performance, and to explore the mediating effect of green business strategies and innovation. This research has both theoretical and practical implications. It has the potential to deepen and strengthen the theoretical underpinnings of corporate social responsibility, green business strategy, and innovation. Moreover, it demonstrates critical management implications for directing Chinese companies in effectively implementing corporate social responsibility, cultivating green business strategy, innovation capabilities, increasing corporate competitiveness, improving corporate export and environmental performance. It is critical to assist in the improvement and optimization of the Chinese manufacturing industrial structure. And it may also help manufacturing companies in developing countries, which are in a similar situation to China, to better their performance.

The remainder of this paper is organized as follows: to begin, this paper will figure out the connection between corporate social responsibility, green business strategy, innovation, environmental and export performance, and hypothesize their relation. Then, it will objectively examine whether the hypotheses work in the fast-changing Chinese business environment. Lastly, this study will sum up its discoveries and give concluding remarks.

## **2. Theoretical background and hypotheses**

### **2.1 Corporate social responsibility**

As stated in the resource-based view, business performance is closely related to the availability of strategic resources that are valuable, scarce, inimitable, and non-substitutable (Barney, 1991). The resource-based development strategy analyzes the resources and capabilities that enable enterprises to obtain sustainable competitive advantages. It believes that the difference in profits among enterprises comes from their ability to obtain resources that are compatible with their development strategies. Hart (1995) extended this perspective by

analyzing the consequences of the natural environment, asserting that firms must build new resources to adapt to changing environmental conditions (Bıçakcıoğlu & Theoharakis, 2019). Hamel & Prahalad (1994) claim that firms are viewed as a collection of resources that support products and commerce activities. Hart & Dowell (2011) found that natural resources and capabilities boost profitability by the reduction of pollution. In addition, they recognized that environmental resources, strategies about pollution prevention, and organizational capabilities enhance sustainable performance.

Firms are under increasing pressure to adapt their management strategies by introducing socially and ecologically responsible practices to businesses. Hence, CSR has emerged as a prominent business activity in recent decades (Xiang et al., 2020). It has raised the necessity for the business to carry on but in more novel ways, intentionally incorporating social, environmental and economic issues into business strategies and actions (Hernández et al., 2020). Stern (2006) and Joseph Desjardins (2007) pointed out that going green may become the most important social responsibility issue for businesses, and so management should make their firms more socially responsible, environmentally friendly, and commercially competitive. As a result, organizations must improve their ability to integrate their organization's business and green initiatives (Baron, 2001). As Melay & Kraus (2012) declared, the term "eco-entrepreneur" refers to someone who works to shield and avoid environmental problems in different organizations, as well as to present environmentally friendly products and processes to the markets. Pekovic & Vogt (2021) argued that only a few companies are faced with pressure from stakeholders such as rivals, clients, employees, and the government to take a stand about environmental and social problems. This pressure could lead to a shift toward more sustainable and environmentally friendly innovative products, processes, and strategies in a company's overall strategy. Vallaster et al. (2019) showed that taking notice of 'green' concerns has been a major motivator for professionals in industry and academics in recent decades.

Utilizing Heckman's (1979) approach, we find that adopting strategic CSR is a factor of long-term innovation implementation (Poussing, 2018). There is a beneficial relationship between CSR and product and process innovations which provide additional value (Wagner, 2010). It is also emphasized that the effect of CSR on the social commitment of innovations, coining the phrase "corporate social innovation" to relate to CSR activities which lead to innovations that provide extra advantages (Kanter, 1999).

Bocquet et al. (2013) found that enterprises which engage in CSR activities are more inclined to be creative in regards to both processes and product development. A companies' CSR activities have a favorable impact on their process innovation (Fatemi et al. 2015). Based on Hull & Rothenberg (2008), enterprises that participate in CSR practices improve their performance by implementation of innovation-related practices. They suggest that CSR practices particularly improve enterprises' innovation capability, allowing them to distinguish and achieve competitive advantages (Hart, 1995; Russo & Fouts, 1997). CSR can be a positive element of innovation and competitive edge, and they have developed these concepts into the concept of shared value creation (Kramer & Porter, 2011). Among the companies that were studied they found proof that competitive edge and profitability are linked to CSR activity (Saedi et al. 2015).

Long et al. (2020) emphasized that a handful of research workers have investigated the impact of CSR on corporation performance and discovered that CSR fosters improvement. According to Málovics et al. (2008), corporate social responsibility has risen in relevance in the corporate world. Hernández et al. (2020) noticed that research workers recently investigated CSR and economic success in micro, small, and medium-sized businesses, and discovered that

CSR greatly enhances economic performance. Using case studies from 3M and Intel, Herrera (2015) suggests that integrating CSR and formalizing innovation may help enterprises gain a competitive edge while enhancing their social and environmental performance.

On the other hand, Orazalin (2020) indicated that there is still not enough concrete evidence to actually conclude that export and environmental performance are improved by CSR. Some scholars claimed that the public's positive response to CSR is limited. Enterprises may increase the cost and restrict product development to fulfilling corporate social responsibilities, which in turn leads to a negative influence on business profits (Bragdon & Marlin, 1972; Aupperle et al., 1985). However, the governments of China have aggressively promoted the significance of CSR to companies, encouraging them to adopt CSR activities. When manufacturing companies carry out CSR activities, they will pay more attention to social and environmental issues, which can help them adapt to market demands faster and lessen the environmental impact of their goods. Hence, gaining and maintaining support from consumers worldwide is quite simple, which in turn transforms potential chances into business advantages.

In this regard, the hypotheses are presented as follows:

H1. CSR has a positive impact on the implementation of green business strategy within Chinese manufacturing companies.

H2. CSR has a positive impact on the export performance of Chinese manufacturing companies.

H3. CSR has a positive impact on the environmental performance of Chinese manufacturing companies.

H4. CSR has a positive impact on innovation within Chinese manufacturing companies.

## 2.2 Green business strategy

Green business strategy has gradually become a prerequisite for companies to achieve long-term competitive advantages. Businesses have traditionally focused on profit, but times are changing, and businesses should focus on the environment. As a result, environmental issues are not just about the environment but are gradually connected to economic activities and the role they play in economic activities is also becoming important (Rao & Holt, 2005).

Green business strategy is a critical approach for organizations seeking environmental sustainability (Zhu et al. 2004). Hitchcock (2012) analyzes major client marketplaces like China and the United States. As the consumer market expands, so do their providers, and the legitimate drivers like regulations, particularly the introduction of contracting consistency between stakeholders and clients, and pressures of low-carbon and green production processes are the most significant challenges to sustainable development.

Vallaster et al. (2019) showed that taking notice of 'green' concerns has been a major motivator for professionals in industry and academics in recent decades. When a company expands beyond its national borders, the need to implement green business strategy becomes more pronounced (Leonidou et al., 2017). Companies respond to increased regulatory pressure and public concern by adopting sustainable paradigms aimed at protecting the natural environment (Buisse & Verbeke, 2003; Zeriti et al., 2014). As a consequence, environmentally conscious clients put pressure on emerging economy companies to lower energy and water usage by redesigning their processes and gaining environmental management certifications such as ISO14001 (Hsu et al., 2016). Accordingly, in order to improve their competitiveness, businesses must fulfill the requirement of stakeholders' requirements (Garces-Ayerbe et al.,

2012). Hence, green strategies are becoming increasingly important in terms of reducing natural resource use and accomplishing superior performance (Chang, 2016; Hart & Dowell, 2011).

According to Ameer & Othman (2012), firms that implement sustainability strategies have higher return on investment. Likewise, when companies apply policies to develop ecologic products, they are obligated to follow the rules and regulations, reduce material waste and pollution, and design the product to be recyclable. Green production strategies, in this sense, lead to better environmental performance (Qiu et al., 2019). Companies can also improve their environmental performance by implementing green purchasing strategies (Gold et al., 2010), which also aid in pollution control by reducing waste material.

Depending on the existing literature, the hypotheses are presented as follows:

H5. The implementation of green business strategy has a positive impact on export performance in Chinese manufacturing companies.

H6. The implementation of green business strategy has a positive impact on environmental performance in Chinese manufacturing companies.

### 2.3 Innovation

Innovation redefines market boundaries by providing new values to buyers in the existing market, significantly increasing purchasing value and making competition itself meaningless by items that can create new markets (Kim & Mauborgne, 1999). Innovation is the answer for the fast-changing environment by strengthening usual capacities in terms of efficiency, superiority, flexibility and speediness (Bon & Mustafa, 2013). Furthermore, innovation gives rise to the awareness of contemporary and forthcoming standings of business (Perdomo-Ortiz et al., 2009).

Process and product innovation does more than reduce a business's negative environmental impact, it also enhances a company's social and financial performance by reducing expenses and garbage (Weng et al., 2015). Evidence from case studies from 3M and Intel, Herrera (2015) suggest that integrating CSR and formalizing innovation may help enterprises gain a competitive edge while enhancing their social and environmental performance. Corsino & Gabriele (2011) employ novel, unparalleled statistics related to semiconductors marketed worldwide between 1998 and 2004; at the company level, the latest innovations have a prominent effect on productivity. Product innovations have a stronger impact on business profitability at the business level than at the company level.

Yiu et al. (2007) claimed that innovation that encompasses product and process development, may provide existing infrastructure and competencies that are required for globalization from a resource standpoint. Eden & Miller (2004) put forward that such capabilities and competencies support a comparative edge which is critical for mitigating the liabilities of abnormalities. Similarly, Flor & Oltra (2005) addressed that earlier research has offered evidence for the theory that technology skills improve export success.

Furthermore, Edeh et al. (2020) discovered that innovation helps to improve export performance significantly. As Ferreira et al. (2020) declared, innovation and technology transfers can also hurt the environment. However, the studies mentioned above are unable to assess how well innovation influences export and environmental performance. Chiou et al. (2011) claimed that managerial innovation has little impact on environmental performance, but technical innovation has a substantial influence. As a result, the connection between innovation, export and environmental performance is indecisive and requires further investigation. Hence, this paper aims to close that void by studying Chinese manufacturing companies.

Depending on the existing literature, this paper presents the following hypotheses:

H7. Innovation has a positive impact on export performance in Chinese manufacturing companies.

H8. Innovation has a positive impact on environmental performance in Chinese manufacturing companies.

As Porter & Linde (1995) state, the most competitive firms are not those with the lowest priced inputs or the biggest scales, but those with the ability to innovate more. They discuss several examples of how environmental regulations have caused firms to innovate for solutions, resulting in a cost advantage. Firms that pursue green strategies proactively stand to benefit in many ways beyond just profitability. A green competitive advantage is the ability to improve environmental performance. The importance of intangible assets in business success is increasing and that the quality and environmental attributes of products and services are intangibles (Orsato, 2006).

Shrivastava (1995) suggested that environmentalist organizations strive to create harmonious connections between their social and ecological environment. They aim to consistently regenerate environmental capital while reducing harmful emissions. Montiel (2008) pointed out that a variety of factors have been used to highlight sustainability initiatives, like the presence of emission reduction systems, the extent to which a company preserves environmental capital, sustainability renovation, eco-design processes, or the structured recycling of materials and pollution from processes. Hart (1997) mentioned that green business strategy assumes a company's full responsibility for its products, from the extraction or acquisition of raw materials to the finished use and disposal of the product. Handfield et al. (1997) and Zsidisin & Siferd (2001) denote the application of environment protection principles to the complete customer order cycle, such as design, procurement, manufacturing and assembly, packaging, logistics, and distribution, these are all considered important aspects.

As Das (2014) claims, it incorporates sustainable development through the "Cradle to Cradle" layout for reusing and recycling, source decrease by lowering waste and pollution, innovation by seeking new advanced technologies, illustrated economic advantages through the protection of the environment, and decrease of the human impact on the environment by creating ways through environmental sustainability.

Depending on the existing literature, this paper presents the hypothesis:

H9. The implementation of green business strategy has a positive impact on carrying out innovation in Chinese manufacturing companies.

#### 2.4 Environmental performance and export performance

In general, there is a shortage of research on environmental performance and company performance that concentrates on growing economies. According to Demirci (2014), organizations that limit the negative environmental consequences of their goods and operations, as well as reuse post-consumer trash, are prepared to grow their businesses. Chinese enterprises are increasingly exploring outside their traditional home markets and working to develop export markets to boost their competitiveness. To achieve these Chinese businesses must enhance their environmental performance, particularly after joining the World Trade Organization. Exportation is a significant driver for Chinese enterprises to enhance their environmental performance (Christmann & Taylor, 2001). Furthermore, improved global business efforts will be rewarded from enhanced environmental performance throughout all stages of industrial processes, such as reduced energy and harmful environmental consumption, enhanced environmental image, upgraded sewage disposal, and lowered emissions (Chen et al., 2006). As stated by Zhu et al. (2013), these environmental enhancements, in turn, contribute to improved business advantages, a company's reputation and image, and increased market share.

However, Ural (2009) viewed exporting as a component of a company's marketing strategy. Darnall & Edwards (2006) also stressed that this may generate expenses, such as those connected with the implementation of environmental management systems, the expenses of contaminated air, and higher operating costs. Shi et al. (2012) mentioned that this may have a negative impact in the short term, but in the long run, the benefits, such as energy efficiency, reduced waste, and improved operational efficiency, vastly exceed the expenses and enhance a company's image, contributing to profit gain, which allows a company to achieve their business performance and fulfill environmental requirements.

Depending on the existing literature, this paper presents the hypothesis:

H10: Environmental performance has a positive impact on export performance in Chinese manufacturing companies.

### **2.5 The mediating effect**

The previous research on the relationship between corporation social responsibility, green business strategy, innovation, export and environmental performance suggested that CSR impacts green business strategy and that innovation results in improved performance. According to the literature Long et al. (2020), CSR enhances organizational performance significantly. Requirements should be met for businesses to improve their performance through CSR activities. Based on Sarkar (2008), corporate activities in respect to the environment have progressed, and the tendency currently is to shift from responding to environmental problems to green strategic approaches. There is a strong and significant link between green initiatives and a firm's competitiveness (Gimenez Leal et al. 2003). Companies always adopt environment protection practices to assure that a company's operations the impacts on the environment are monitored and controlled rigorously, and hence building and maintaining a firm's reputation with outside stakeholders and ensuring relevant stakeholders acknowledge the concept of ecological preservation and sustainability (Walley & Whitehead, 1994). Even so, Hernández et al. (2020) discovered a conflicting connection between corporate social responsibility and performance. Hart (1995) advises that the link between natural endowments and competitive edge is explained by green business strategy based on natural RBV theory. As a result, green business strategies are used as a mediator between corporate social responsibility and environmental performance.

Ueki et al. (2016) said that CSR practices can advance one major innovation. As Luo & Du, (2015) and Vilanova et al. (2009) pointed out that CSR may facilitate or enhance innovation, resulting in a competitive edge. As proposed by Bocquet et al. (2017), product and process innovation has a mediated influence on CSR activities and economic performance. Brulhart et al. (2017) discovered that innovation acts as a mediator for environmental activities and economic performance. Reverte et al. (2016) stated that innovation serves as a mediator between CSR activities and performance in manufacturing firms.

Depending on the existing literature, the following hypotheses are proposed:

H11. The implementation of green business strategy plays a prominent role in mediating the relationship between CSR and export performance.

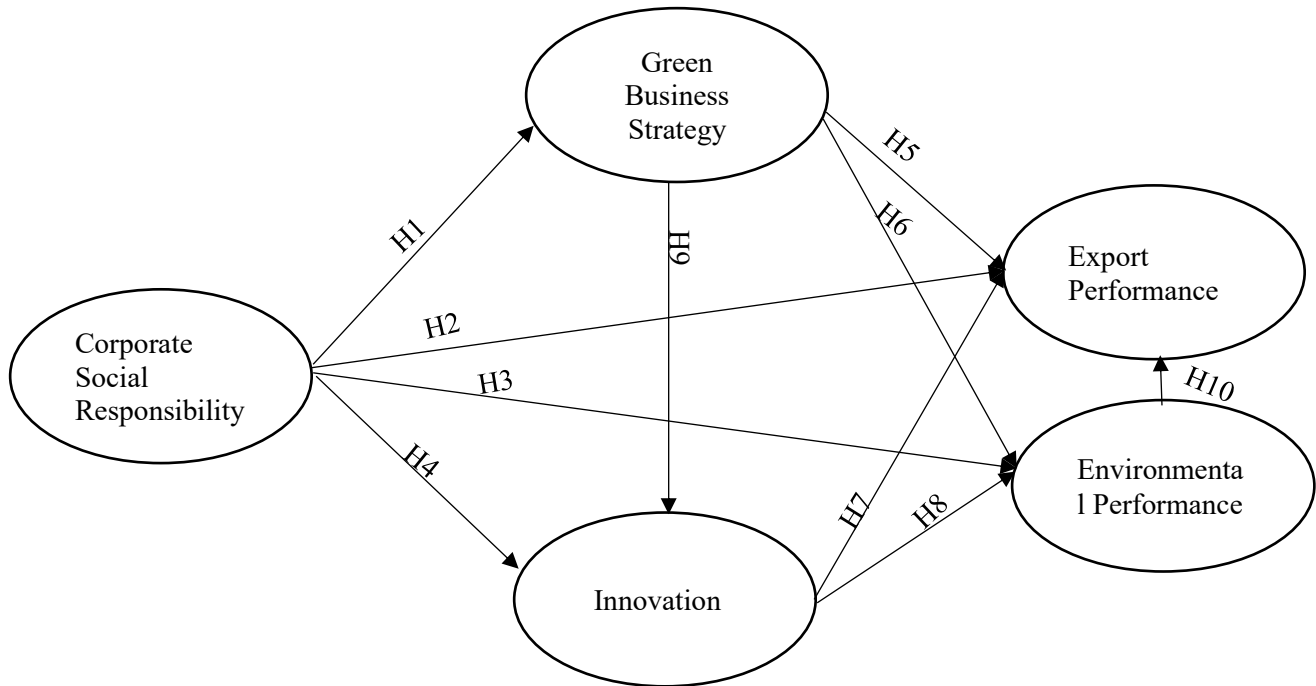
H12. The implementation of green business strategy plays a prominent role in mediating the relationship between CSR and environmental performance.

H13. Innovation plays a prominent role in mediating the relationship between CSR and export performance

H14. Innovation plays a prominent role in mediating the relationship between CSR and environmental performance.

The research model is shown in Figure 1

**Figure 1** The research model



### 3. Method

#### 3.1 Research method

This research is concerned with the relationship between CSR, green business strategy, innovation and performance. In the business management field, researchers apply quantitative analysis or qualitative analysis. Both quantitative and qualitative analyses have their own advantages and limitations. Despite efforts to improve qualitative research techniques, quantitative research remains the mainstream for various studies (Teagarden et al., 1995). Hence, this paper will use quantitative analysis to test the relationship between CSR, GBS, IN and performance.

Quantitative technique focuses on the measuring of things that can be counted. Used in this type of research, the predetermined categories encompass the construct that the statistical analysis attempts to evaluate. Using existing theories and literature, quantitative technique conducts the research through carefully designed questions (rigorous measurement and evaluation) to prove or disprove researcher’s argument, and test the generalization of an abstract based on the evidence.

A survey method can be very effective in collecting demographic data and drawing a broad picture of research objects. Through the survey, the researcher can gather a wide range of information from a large number of samples. Thus, the quantitative research method using questionnaire were from the administered questionnaire and all variables were standardized prior to the development of indices.

In this paper, the collected data was inputted in SPSS 24 and AMOS 24 program to test the hypotheses, and a 5-point Likert scale was used to assess all constructs. To begin with, a sampling analysis was performed to better understand the general features of each sample. Second, factor analysis and reliability analysis were performed to confirm the validity and reliability of each measured item. Third, correlation between each dimension was examined in

to better understand the links between the variables utilized in the study. Finally, regression analysis was performed to validate the study's hypotheses.

### 3.2 Sample and data collection

In order to study the impact of corporate social responsible on performance in China, this paper conducted a questionnaire survey. The survey includes two aspects of performance in the implementation of corporate social responsible, and how does green business strategy and innovation affect the relationship between CSR on export and environmental performance in Chinese manufacturing companies.

Guangdong Province is the most well-known place for manufacturing in China. So the questionnaires were distributed to export manufacturing companies in Guangdong Province for about two months from November 7 to December 29, 2021. The data was collected by WENJUANXING, a professional Chinese research company. A total of 1000 copies of the questionnaire were distributed, and 226 copies with detailed content were brought back with the 22.6% effective rate, excluding unanswered and uncompleted answers or suspected unreal answers. The basic characteristics of the sample in this study are shown in Table 1.

Table 1 shows the general characteristics of this study. First of all, in terms of company size, companies with more than 500 employees are the most, with 69 (30.5%). Then there are 49 (21.7%) companies with more than 100 employees and less than 200 employees, 41 people under 100 (18.1%). More than 300 people and less than 500 people were 34 (15%). Secondly, middle-level executives accounted for the highest proportion at 121 (53.5%), followed by 77 (34.1%) full-time employees and 28 (12.4%) senior-level executives. In terms of tenure, the number of people working for more than 5 years and less than 10 years is the largest, 71 (31.4%), followed by 66 (29.2%) for 3 to 5 years or less, 59 (26.1%) for 1 to 3 years or less, 20 (8.8%) for 10 years or more, and 10 for 1 year or less (4.4%). Finally, in terms of companies' type, computer, communication and other electronic equipment manufacturing is the largest, 169(74.8), followed by 38(16.8) automotive manufacturing and 19(8.4) pharmaceutical manufacturing.

**Table 1** The basic characteristics of the samples

	n	%
<i>size of the company's number of employees</i>		
<100	41	18.1
100-200	49	21.7
200-300	33	14.6
300-500	34	15
>500	69	30.5
<i>Age of the companies</i>		
<1	10	4.4
1-3	59	26.1
3-5	66	29.2
5-10	71	31.4
>10	20	8.8
<i>Position of participants in the companies</i>		
Senior-level executive	28	12.4
Middle-level executive	121	53.5
Employee	77	34.1
<i>Type of the companies</i>		

Computer, communication and other electronic equipment manufacturing	169	74.8
Pharmaceutical manufacturing	19	8.4
Automotive manufacturing	38	16.8

#### 4. Empirical results

##### 4.1 Reliability analysis

To ensure the validity of the questionnaire, the data was analyzed with statistics software. In this paper, the Cronbach's  $\alpha$  value is calculated for corporate social responsibility (0.851), green business strategy (0.885), innovation (0.825), export performance (0.90) and environmental performance (0.838) as shown in table 2. The analysis showed that the Cronbach's  $\alpha$  value of all variables are above 0.7, indicating that there was no problem in the reliability of questionnaire in this study.

The KMO test value indicates the degree to which the correlation between variables is explained by other variables. The Bartlett sphericity test indicates whether the established factor analysis model is suitable. In the KMO's sample suitability test, result is 0.879 and Bartlett's test of sphericity verification values are 4574.664,  $df=703$  and  $sig=0.000$  showing that factor analysis can be judged appropriate.

**Table 2** Construct and survey items

Constructs	Cronbach's $\alpha$	M	SD
Corporate social responsibility(CSR)	0.851	4.025	0.85
Bacinello et al (2020)	ER1	Our firm complies with indications of stakeholders like customers, workers, environmental groups, and so on.	
Martinez-Conesa et al (2016)	ER2	Our company strives to reduce operating costs from the perspective of social responsibility.	
	ER3	Our firm is conscious of product safety and R&D.	
	ER4	Our firm creates spin-off technologies that can be profitably applied to other areas of the business.	
	SR1	Our firm tries to establish a healthy work-life balance and family-friendly workplace.	
	SR2	Our firm invests in people, such as employee advancement and training.	
	SR3	Our firm tries to create equitable chances in the workplace, such as hiring handicapped persons and/or elevating women to top management roles.	



	SR4	Our firm tries to better staff health and safety.			
	SR5	Our firm engaged in altruistic actions, such as charitable giving.			
	ENR 1	Waste emitted by our firm complies with environmental regulations.			
	ENR 2	Our firm gives statistics about process management energy and fuel consumption.			
	ENR 3	Environmentally friendly materials are employed in large amounts in the development of goods.			
	ENR 4	The corporation has specialized energy-saving measures in place, including water and electricity.			
	ENR 5	Our firm uses certifications on environmental aspects (e.g. ISO 14000) as well as for suppliers' evaluation.			
<b>Green business strategy(GBS)</b>			<b>0.885</b>	<b>3.95</b>	<b>0.845</b>
Bıçakcıoğlu, 2019	GBS 1	Our firm has included environmental concerns into our strategic planning process.			
	GBS 2	In our firm, quality includes minimizing the environmental effect of goods and operations			
	GBS 3	At our firm, we make efforts to align environmental aims with our other corporate objectives.			
	GBS 4	Our company is working to create goods and methods that have a low environmental effect.			
	GBS 5	The conservation of the environment is the driving factor behind our company's strategies.			
	GBS 6	We constantly keep the environment in mind, when developing new goods.			
	GBS 7	Our firm creates goods and processes that lower environmental effect.			
<b>Innovation(IN)</b>			<b>0.825</b>	<b>4.04</b>	<b>0.84</b>
Zhu et al., 2018;	PD1	The amount of new or upgraded products/services introduced to the market exceeds the industry average.			
Martinez-Conesa et al.,2016	PD2	The changes made to our goods over the previous three years have been significant.			
	PD3	Our firm pays attention to emerging environmental and social development			



		issues and requirements to drive innovation in technology, goods, and services.			
	PD4	The quality of the company's product is more energy-efficient than the competition.			
	PC1	In the recent three years, new product lines have been introduced.			
	PC2	Compared to our competitors, our company is actively introducing new technologies and equipment for manufacturing and process improvement.			
	PC3	The amount of new or upgraded standard processes is beyond the industry average.			
	PC4	In the last three years, introduce innovation and improvement in production, logistics, or distribution.			
<b>Export performance(EXP)</b>			<b>0.90</b>	<b>3.67</b>	<b>0.95</b>
Carneiro et al., 2016	EXP	When compared to rivals, our company has obtained a high proportion of revenues from exported items during the last three years.			
Bıçakcıoğlu, 2019	1				
	EXP	When compared to rivals, our export market share has risen over the last three years.			
	2				
	EXP	When compared to rivals, the ratio of exported items has grown over the last three years.			
	3				
	EXP	When compared to rivals, the number of nations to which we export has risen in the previous three years.			
	4				
	EXP	When compared to rivals, our company has exceeded its export goals during the previous three years.			
	5				
<b>Environmental performance(ENP)</b>			<b>0.838</b>	<b>4.17</b>	<b>0.798</b>
				<b>7</b>	
Chien, 2014	ENP	When compared to rivals, our firm has lowered air emissions during the last three years.			
	1				
	ENP	When compared to rivals, our firm has reduced energy and wastes consumption during the last three years.			
	2				
	ENP	When compared to rivals, our firm has reduced consumption of hazardous/harmful/toxic materials during the last three years.			
	3				

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ENP 4	When compared to rivals, our firm has improved its green image/position during the last three years.
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#### 4.2 Exploratory factor analysis

According to Minglong (2010), scholars can do factor analysis depending on the degree of the scales and the item variables contained in the degree after establishing predictions on the scales rather than on the entire scale. The requirement, however, is that the scale is constructed based on reading relevant literature and theories, with numerous sub-dimensions of the scale specified and the items contained in each sub-dimension well described. As a result, the exploratory factor analysis of corporate social responsibility is conducted individually here, followed by factor analysis of other components.

##### 4.2.1 Factor analysis of corporate social responsibility

The KMO value of CSR is 0.848. This indicates that the correlation between the item's different factors is excellent, making factor analysis a good fit. The Bartlett sphericity test has a statistical significance probability of 0.000, indicating that these data are eligible for factor analysis. The principal component analysis approach is then used to extract factors, followed by the Varimax approach to deal with the rotation of relevant variables of CSR. Table 3 shows the rotated component matrix after extracting three common components.

**Table 3** Rotated component matrix of CSR

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	Component		
	1	2	3
ER1	.065	.106	.862
ER2	.208	.141	.708
ER3	.121	.242	.750
ER4	.182	.049	.810
SR1	.105	.774	.035
SR2	.267	.700	.119
SR3	.122	.713	.107
SR4	.109	.776	.109
SR5	-.026	.711	.202
ENR1	.786	.171	.194
ENR2	.801	.122	.011
ENR3	.787	.083	.152
ENR4	.769	.078	.175
ENR5	.743	.112	.127

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##### 4.2.2 Factor analysis of innovation

The KMO value of innovation is 0.84. This indicates that the correlation between the item's different factors is excellent, making factor analysis a good fit. The Bartlett sphericity test has a statistical significance probability of 0.000, indicating that these data are eligible for factor analysis. The principal component analysis approach is then used to extract factors, followed by the Varimax approach to deal with the rotation of relevant variables of innovation. Table 4 shows the rotated component matrix after extracting two common components.

**Table 4** Rotated component matrix of innovation

	Component	
	1	2
PD1	.025	.829
PD2	.298	.588
PD3	.146	.781
PD4	.331	.721
PC1	.685	.243
PC2	.791	.255
PC3	.788	.095
PC4	.834	.150

### 4.3 Confirmatory factor analysis

Exploratory Factor Analysis (EFA) is a statistical technique that analyzes the correlation between multiple variables and explains these variables through common underlying dimensions. In this study, principal component analysis was used through factor analysis of the variables, and it shows the degree of correlation with the Varimax method, which is a rotation method of factors. Also, to increase the validity of each component of factor analysis, items with factor loading values of 0.5 or higher were considered.

Average Variance Extracted (AVE) is higher than 0.5 but we can accept 0.4. Because Fornell and Larcker said that if AVE is less than 0.5, but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981).

Table 5 shows the outcome of convergent validity. Each item has a standardized factor loading value between 0.573 and 0.847, suggesting that the fundamental adaption index is ideal. All variable CR values are more than 0.6, and AVE values are greater than 0.4, indicating that the model has good internal quality. Furthermore, the correlation coefficients of each factor are all smaller than the square root of AVE, indicating that discriminant validity is good (Table 6).

Structural model applicability verification is the process of verifying the validity of the theoretical model proposed in the study. If the model's fit is poor, the model cannot be considered valid (Hair et al. 1998). Table 7 shows the results of model fit. As a result of the analysis,  $\chi^2/df=1.63$  ( $\chi^2 = 1062.377$ ,  $df = 650$ ) is less than 3. Furthermore, CFI=.901, IFI=.902, TLI=.893, meeting the 0.8 standard and above the minimum value of 0.8. The root mean square error of approximation values are lower than 0.08. The other fit index like PNFI and PCFI are higher than 0.5, indicating that the overall fit of the model is judged to be appropriate.

**Table 5** The outcome of convergent validity

			Standardized factor load	CR	AVE
Green business strategy	GBS1		0.778	0.8859	0.5271
	GBS2		0.632		
	GBS3		0.723		
	GBS4		0.681		
	GBS5		0.744		
	GBS6		0.787		
	GBS7		0.725		
	EXP1		0.630	0.8851	0.6086



Export performance	EXP2	0.847		
	EXP3	0.799		
	EXP4	0.785		
	EXP5	0.821		
Environmental performance	ENP1	0.763		
	ENP2	0.820	0.8424	0.5729
	ENP3	0.714		
	ENP4	0.726		
Economic responsibility	ER1	0.727		
	ER2	0.804	0.8216	0.5363
	ER3	0.669		
	ER4	0.723		
Social responsibility	SR1	0.751		
	SR2	0.685		
	SR3	0.699	0.8306	0.4957
	SR4	0.652		
	SR5	0.729		
Environmental responsibility	ENR1	0.632		
	ENR2	0.796		
	ENR3	0.731	0.8501	0.5328
	ENR4	0.749		
	ENR5	0.732		
Product innovation	PD1	0.685		
	PD2	0.573	0.7413	0.4185
	PD3	0.666		
	PD4	0.658		
Process innovation	PC1	0.815		
	PC2	0.662	0.8405	0.5698
	PC3	0.758		
	PC4	0.776		

**Table6** The results of discriminant validity

	(1)	(2)	(3)	(4)	(5)
(1)CSR	0.726				
(2)Green business strategy	.578**	0.780			
(3)Innovation	.502**	.482**	0.757		
(4)Environmental performance	.471**	.471**	.544**	0.722	
(5)Export performance	.517**	.544**	.484**	.480**	0.703

**Table 7** Model fit indices

	X <sup>2</sup> /df	CFI	IFI	TLI	RMSEA	PNFI	PCFI
Recommended values	<3.0	>0.8	>0.8	>0.8	<0.08	>0.5	>0.5
Model values	1.64	0.901	0.902	0.893	0.053	0.723	0.833

#### 4.4 Regression analysis

From the correlation coefficient in the discriminant validity evaluation, it can be seen that there is a certain correlation between the independent variable and the mediating variable, so there is likely to be multicollinearity in the structural model. In this regard, the model collinearity is calculated by calculating the VIF value. The test results are shown as table 8.

It can be seen from the results that the VIF values of independent variables and the mediating variables are far less than 10. Therefore, the structural model in this study does not have multicollinearity.

**Table 8** Multicollinearity test

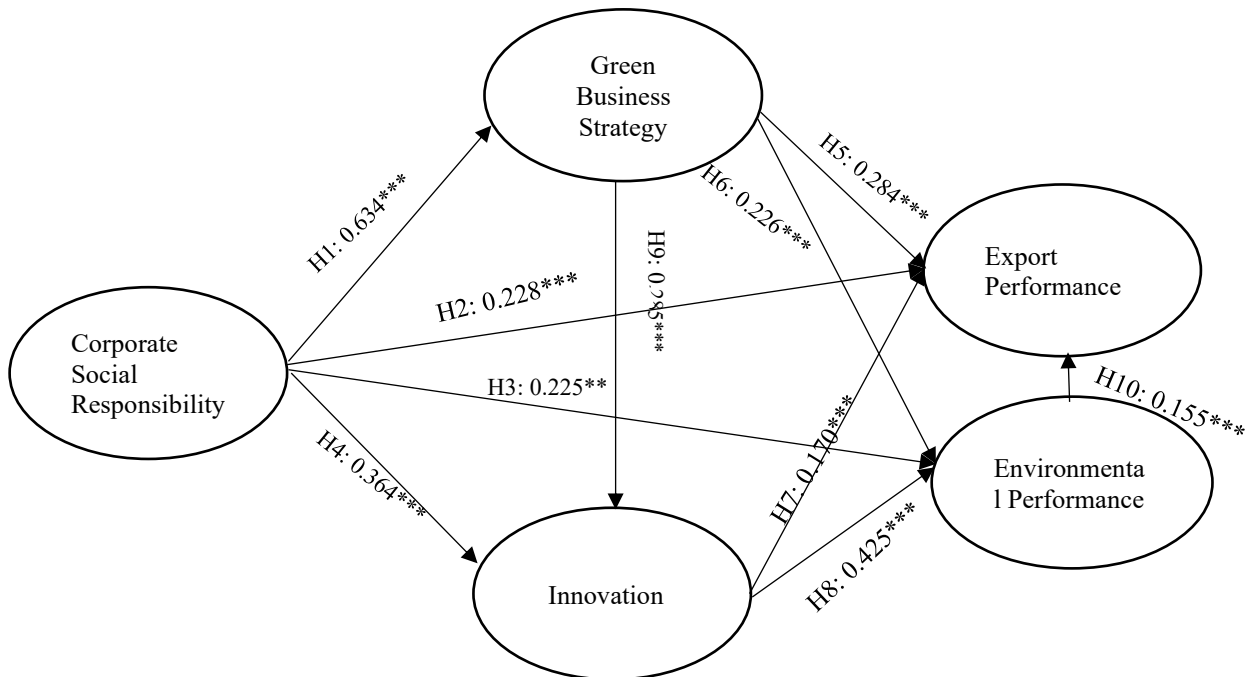
	Unstandardized coefficients		Standardized coefficients Beta	t	Sig.	Collinearity statistics	
	B	SE				Toleranc e	VIF
(Constant )	0.983	0.277		3.546	0.000		
CSR	0.228	0.078	0.198	2.932	0.004	0.583	1.715
GBS	0.284	0.07	0.271	4.040	0.000	0.594	1.683
IN	0.17	0.07	0.161	2.418	0.016	0.605	1.652
ENP	0.155	0.059	0.172	2.643	0.009	0.629	1.591

CSR: corporate social responsibility; GBS: green business strategy; IN: innovation; ENP: environmental performance.

Figure 2 shows the results of hypotheses H1 (0.634,  $p < 0.01$ ), H2 (0.271,  $p < 0.01$ ), H3 (0.225,  $p < 0.05$ ), H4 (0.364,  $p < 0.01$ ), H5 (0.315,  $p < 0.01$ ), H6 (0.226,  $p < 0.01$ ), H7 (0.170,  $p < 0.01$ ), H8 (0.425,  $p < 0.01$ ), and H9 (0.285,  $p < 0.01$ ), displaying the path coefficients and their levels of significance. All hypotheses are supported by the statistical model's results.

The mediating effect test is carried out by the SPSS extension PROCESS provided by Hayes (2017) (Table 9). Among the indirect effects, bootstrap 95% CI are (0.0941, 0.3196), (0.0268, 0.1634), (0.0123, 0.0828), (0.0257, 0.2737), (0.0699, 0.2578), (0.0341, 0.1267) and the interval do not contain 0. The mediating effect is statistically significant. The bootstrap 95% CI of CSR's direct effect on export and environmental performance are (0.1098, 0.4156) and (0.0526, 0.3974). As the confidence interval does not contain 0, they are a partial mediating effect.

**Figure 2** Empirical results



\*p<0.10; \*\*p<0.05; \*\*\*p<0.01

**Table 9** The indirect effect of CSR on export and environmental performance

		Effect	BootSE	BootLLCI	BootULCI
CSR on export performance	TOTAL	0.3305	0.0678	0.2032	0.4698
	Ind1: CSR→GBS→EXP	0.202	0.0575	0.0941	0.3196
	Ind2: CSR→IN→EXP	0.0859	0.0347	0.0268	0.1634
	Ind3: CSR→GBS→IN→EXP	0.0427	0.0181	0.0123	0.0828
CSR on environmental performance	TOTAL	0.3746	0.0781	0.2291	0.5358
	Ind1: CSR→GBS→ENP	0.1431	0.0627	0.0257	0.2737
	Ind2: CSR→IN→ENP	0.1546	0.048	0.0699	0.2578
	Ind3: CSR→GBS→IN→ENP	0.0768	0.0239	0.0341	0.1267

CSR: corporate social responsibility; GBS: green business strategy; IN: innovation; ENP: environmental performance.

### 5. Discussion and conclusion

This paper explores the connection between CSR, export, and environmental performance, taking into account the mediating effect of green business strategy and innovation. Using 226 reliable surveys gathered from Chinese manufacturing companies. The key results of this study are as follows:

First, CSR has a positive impact on the export and environmental performance. The governments of China have aggressively promoted the significance of CSR to companies,

encouraging them to adopt CSR activities. When manufacturing companies carry out CSR activities, they will pay more attention to social and environmental issues, which can help them adapt to market demands faster and lessen the environmental impact of their goods. Hence, it transforms potential chances into business advantages. The findings are consistent with Martinez-Conesa et al., (2016); Bacinello et al., (2019) who discovered that CSR noticeably improves corporate performance. The results of this paper are also similar to the RBV theory, which states that environmental resources considerably improve business performance (Hart, 1995). CSR has a positive impact on the implementation of green business strategy. Economic, environmental, and social issues are motivation factors that a company can adopt to integrate its business structure and strategy (Martinez-Conesa et al., 2016). CSR has a positive impact on innovation. These results suggest that CSR is an essential force for organizations to become more economical, innovative, and successful.

Second, the implementation of green business strategy has a positive impact on export and environmental performance. Manufacturing businesses can use environmental goods or services in the green development by utilizing current and recently gained environmental resources and capabilities to improve the commercial success of companies (Chen et al., 2015). The implementation of green business strategy has a positive impact on carrying out innovation. This will practically guarantee the finished product's safety for customers, improve the firm's eco-friendly reputation and green advantages, decrease the cost of waste management, enhance environmental rules, better customers' acceptance of the changing environment, and create organizations' competitive edge in the international market.

Third, innovation has a positive impact on export performance. The development of innovative abilities may assist Chinese companies in competitive and the growth of emerging markets. The advantages contain a higher profit margin, increased sales, new market expansion, improved business image, and product diversification. The findings support RBV theory by demonstrating that innovation improves long-term performance (Barney, 1991).

Forth, environmental performance has a positive impact on export performance. This finding may reflect that the majority of firms sell their products to nations that place a high priority on environmental problems. It also shows that by upgrading their environmental performance, manufacturing enterprises minimize the costs of bad environmental performance in the form of penalties, charges, and sanctions. Hence, this improves their green reputation and credibility, which is shown in increased export performance.

Finally, green business strategy and innovation prominently mediate the relationship between CSR and export and environmental performance. The hypotheses are consistent with RBV theory, which states that green business strategy and innovation clarify the connection between CSR and export and environmental performance. As businesses grow more educated in terms of corporate sustainable development, they become more conscious of the collaborative efforts between environmental conservation (Hansen et al., 2009). The shift to sustainable development demands continuous innovation (Tomsic et al., 2015) and green business strategy (Al-Ghwayeen et al., 2018), which should be viewed as key business activities critical to the long-term performance of businesses.

These findings have various implications for theories and research on CSR export and environmental performance. If in a society government aggressively promote CSR activities, companies should pursue CSR activities that are appropriate for their development by continuously identifying distinctive green business, product and process strategies, acquiring capabilities, constructing or revolutionizing core competencies, and integrating ecological sustainability into manufacturing.

Companies cultivate the corporate charitable cultural atmosphere, which helps to achieve a win-win situation for corporate values and social values. Liu Ying (2015) found that corporate philanthropy can not only enhance the corporate reputation of social responsibility but also contribute to the corporate image of capabilities. It can also enhance corporate reputation and repair the adverse effects of company irresponsible behavior in society to a certain extent (Brammer & Millington, 2005).

Companies must also pay close attention to the environmental concerns of stakeholders. To lessen the ecological footprint of goods throughout their product lifecycle by eco-friendly design, it is essential in developing a favorable work relationship with clients, partners, and regulatory authorities for design for the surroundings to sincerely be an essential part of green activities. Environmental collaboration with partners and clients implies that firms need to go beyond environmentally friendly purchasing and attempt to enhance the environmental performance of their clients and suppliers, as well as build cooperative green initiatives (Eltayeb, T.K., 2010). Actively collaborating with their major consumers, suppliers, academic institutions, and the like, instead of solely depending on internal resources (De Marchi, 2012).

Furthermore, the authority should energetically formulate appropriate environmental standards policies, encouraging the adoption of CSR activities in manufacturing companies to cultivate green business strategies, enhance innovation, and improve manufacturing companies' competitive advantage.

Based on some of the limitations of this study, the future direction of research can be suggested as follows. First, the corporate social responsibility of this study can be a variable that is difficult to be reflected in performance in the short term. Therefore, in future studies, if the surveyed companies are reinvestigated after a certain period and compared with the current results, it is possible to more accurately and concretely find out the performance improved by corporate social responsibility. This is expected to be a very meaningful study in the study of corporate social responsibility, export and environmental performance. Second, the present study was conducted in China, which has its distinctive character; future studies can be conducted in other nations to discover if there are any differences. Future studies might also examine the significance of green entrepreneurial orientation and green capability as a mediating variable between CSR, export and environmental performance.

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