Uncertain Supply Chain Management 10 (2022) 807–818

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

The effect of corporate social responsibility on green supply chain management and firm performance

Thi Thu Thuy Nguyen[a], Thi Thu Trang Nguyen[b], Thu Trang Tran[b], Tuan Anh Luong[c] and Khanh Cuong Luu[d*]

[a]*School of Economics and Management, Hanoi University of Science and Technology, Vietnam*
[b]*Foreign Trade University, Vietnam*
[c]*East Asia University of Technology, Vietnam*
[d]*University of Economics – Technology for Industries, Vietnam*

A B S T R A C T

Corporate social responsibility and green supply chain management are sustainable strategies that all enterprises always aim to improve firm performance and sustainable development. The objective of the study is to evaluate the impact of social responsibility on green supply chain management and performance of Vietnamese construction enterprises. The study collected data of Vietnamese construction enterprises through online and in-person surveys, then analyzed the data using Smart PLS software. The results show that social responsibility has a positive and statistically significant impact on green supply chain management and performance of construction enterprises on all three aspects of economy, society and environment. However, green supply chain management only has a statistically significant impact on environmental performance. From there, it shows that businesses should implement social responsibility and participate in green supply chains and practice green supply chain management to improve business efficiency and sustainable development.

Article history:
Received December 5, 2021
Received in revised format December 27, 2021
Accepted March 30 2022
Available online March 31 2022

Keywords:
Corporate social responsibility
Green supply chain management
Firm performance

1. Introduction

Among sectors, construction has been identified as a major contributor to climate change and natural resource depletion (GhaffarianHoseini et al., 2013) since the construction industry generates 39% of total carbon emissions and 40% of global waste. In addition, the construction sector uses more energy and consumes more raw materials than any other economic activities, specifically, using a third of resources, 40% of total energy and 25% of total water worldwide (Devi et al., 2017). With increasing urbanization, around 70% of the world's population is expected to live in urban areas by 2050 which will inevitably lead to an increase in construction activity. The environmental consequences could be even greater in the future. This is especially acute in developing countries or emerging economies. Therefore, minimizing the negative environmental impact of the industry or greening the construction industry has become essential. Green supply chain management can be seen as a viable option to solve this problem. However, the 2020 Global Competitiveness Report, surveyed by the World Economic Forum in 37 countries, stated that the construction of green infrastructure has taken place quite slowly. They are finding it difficult to balance access to cheap and efficient energy with reduced environmental impact.

Corporate social responsibility is now becoming the mainstream in connecting sustainable development and core values in business activities, to create a common value for economic and for society as a whole. Social responsibility activities promote businesses to participate in green supply chains, practice green supply chain management, especially in the construction industry.

* Corresponding author Tel: +84 0983 083 536
E-mail address kcuong@uneti.edu.vn (K. C. Luu)

doi: 10.5267/j.uscm.2022.3.013

In the context of research in Vietnam, the author finds that there are few documents that comprehensively analyze green supply chain management in the construction industry under the impact of corporate social responsibility while still recorded in other industries. The closest related although in a narrower scope is the study of Le et al. (2019) with the topic of influence of green supply chain management practices on sustainable performance in Vietnamese building material manufacturing enterprises. In addition, there are a few other studies investigating green buildings - an aspect of green supply chain management. Thus, at present, compared to other countries, the understanding, and efforts to research and implement green supply chain management in the construction industry in Vietnam are still very limited.

2. Literature review

2.1. Supply chain management

The literature review shows that there are many definitions of supply chain, such as Christopher (1999) who argues that a supply chain is a network of related organizations, through upstream and downstream linkages, in different processes and activities that create value in the form of goods/services in the hands of the end consumer. Or Min and Galle (1997) conceptualize it as an integrated system that synchronizes a series of interdependent business processes to: (1) supply raw materials and parts; (2) transform raw materials and parts into finished products; (3) activities that add value to products; (4) distributing and promoting products to retailers or consumers; (5) exchange of information between different business entities (such as suppliers, manufacturers, distributors, logistics providers and retailers). There exist two different views of the two groups of authors when considering the focus of the supply chain, namely the first group focuses on process integration. Meanwhile, the second group is geared towards the interests of consumers.

The concept of supply chain management is receiving increasing attention from researchers, consultants, and business managers. This is a general concept mentioned and researched on aspects of management, supply chain and supply chain management. Supply chain management is key to building a sustainable competitive advantage for your goods and services in today's competitive marketplace. The understanding and practice of supply chain management becomes a prerequisite for achieving profitable growth for all businesses. The concept of supply chain management is considered from multiple perspectives such as purchasing and sales, logistics and transportation, operations management, marketing, organizational theory, and management information systems.

On the other hand, supply chain management is the planning and control of the process of linking partners in the supply chain to meet the needs of customers quickly, reliably, with optimal efficiency cost and flexibility, specifically: providing the right item, delivering it to the right place, in the right quantity, at the right time, and at the right price. However, the goal of supply chain management is not only to increase the value contribution to customers, but also to improve competitiveness, minimize costs and maximize profits of the suppliers in the supply chain. This means businesses will work closely to bring about beneficial outcomes for all parties including customers. Therefore, to achieve this end goal, it is necessary to integrate and synchronize the activities of supply chain actors at all levels, from strategy to operations.

2.2. Green supply chain management

The concept of a green supply chain is a multidisciplinary concept, which mainly derives from the implementation of environmental management in the context of the supply chain (Zhu & Sarkis, 2006). Similarly, Beamon (1999) also states that a green supply chain is created by extending a traditional supply chain to include activities that reduce the environmental impact of a product over the entire life cycle, such as equipment eco-design, save resources, reduce harmful materials, recycle and reuse products. Youni et al. (2016) added the understanding that “a green supply chain is a supply chain that creates biodegradable products, using the minimum of resources while generating the lowest amount of waste”. As such, a sustainable green supply chain is the process of using environmentally friendly inputs and turning the by-products of use into something that can be improved or recycled in the current environment. This process makes it possible for outputs and by-products to be reused at the end of their life cycle and creates a sustainable supply chain. The whole idea of a sustainable supply chain is to reduce costs and be environmentally friendly. Greening the entire supply chain represents an improvement in environmental assessments focusing on specific business impacts, which are part of sustainability efforts for many organizations. In general, the green supply chain can be understood to refer to environmental considerations, and greening will cover many stages in the supply chain.

Sustainability and supply chain management are two concepts that have generated much debate over the past few decades. The two terms used most closely linked between them are green supply chain management and sustainable supply chain management. There are also other names such as environmental supply chain management or supply chain environmental management. Many researchers have used these terms interchangeably.

Green supply chain management lies in the combination of elements of enterprise environmental management and supply chain management (Zhu & Sarkis, 2004). Originating from concepts to different practices, the field is increasingly evolving through case studies and theoretical studies. One of the commonly used definitions of green supply chain management provided by Srivastava (2007) states that green supply chain management is “the integration of environmental thinking into supply chain management, including product design, raw material sourcing, manufacturing process, final product delivery to consumers as well as end-of-life management of the product after use”. This is a definition that is fully accepted and inherited

by many other authors at the next stage of research (Pagell & Wu, 2009). In addition, green supply chain management incorporates the term "innovation" in supply chain management. This term refers to the environmental orientation, aiming to increase energy efficiency, reduce the dependence of businesses on fossil fuels and introduce renewable energy sources.

Businesses adopt green supply chain management practices to meet stakeholder needs for environmentally sustainable products and processes (Green et al., 2012). Azevedo et al. (2011) defines "green supply chain management practice as any action taken within the supply chain, within a business or involving external partners, to eliminate or minimize the negative impact of to the environment". This is also the idea that the author inherited in his research.

Green supply chain management practices are generally divided into two categories including internal green practices and external green practices (Zaid et al., 2018). Internal green practices reflect corporate decisions about environmentally friendly actions (Azevedo et al., 2011). For example, implementation of an environmental management system (Zaid et al., 2018), commitment from managers, ISO 14001 certification, environmental audit, multi-functional integration in environmental issues (Zhu et al., 2012), the use of environmentally friendly materials and equipment, green policy (Yang et al., 2013), green marketing, green transportation (Yang et al., 2013), green research and development (Balasubramanian, 2012). Meanwhile, external green practice often requires some degree of collaboration with stakeholders (Jabbour et al., 2014). Enterprises can participate in training, share information and jointly set environmental goals (Gimenez & Tachizawa, 2012) or buy green (Zaid et al., 2018), cooperate with customers, cooperate with partners, cooperate with suppliers (Vachon & Klassen, 2008).

2.3. Firm performance

The narrowest concept of performance, financial alone, was adopted by Venkatraman (1989). It specifies a measure of business performance including growth, profit and is measured by asking respondents to indicate the degree of change in revenue performance, sales profit performance within three years. These are two indicators that have been widely used and popularized in business studies.

Li et al. (2004) inherits the above concept and continues to expand the understanding of business performance. Specifically, the authors argue that performance refers to how well a business achieves its market-oriented goals as well as its financial goals. The short-term goals are primarily to increase productivity and reduce inventory cycles, while the long-term goals are to increase market share and profitability for all members of the supply chain. Li et al. (2004) summarize and find that a number of previous studies have measured operating performance by both financial and marketing criteria, including return on investment, market share, return on sales, growth return on investment, sales growth, market share growth and overall competitive position. In addition to the above economic results, based on the approach of sustainable development, many researchers later proposed other aspects of performance including: environmental results and social outcomes.

Economic results are considered a decisive factor for enterprises applying environmental management activities through more advanced management and control mechanisms for environmental risks, capacity development and improvement continuously (Zhu et al., 2008). Zhu et al. (2008) identified economic outcomes referring to improved financial and marketing results in implementing green supply chain management in order to improve the position of enterprises relative to the industry average. Economic performance refers to a company's performance against its shareholders' financial goals in order to increase shareholder wealth. Economic performance is considered to be a representative of the business performance of the enterprise through the measurement of financial indicators. Those metrics include return on assets (ROA), return on investment (ROI), return on capital employed (ROCE), and return before interest and tax (EBIT). In addition to the above metrics, economic performance is also measured by managers' perceptions of four metrics: revenue growth, profit growth, market share growth, and return on assets growth. They are therefore measure of effective information generation using self-report techniques.

The environmental aspect has a lot to do with factors such as resource consumption, compliance with regulations, processes, goods and services of the enterprise towards the environment (Sharma & Vredenburg, 1998). In fact, organizations cause both direct and indirect impacts on the natural environment. Environmental impact as any change in the environment, whether adverse or beneficial and caused by an organization's activities in the production of goods/services. Improved environmental performance refers to the ability to reduce harmful impacts on the natural environment. Specifically, reducing emissions, wastewater, solid waste or the amount of harmful chemicals into the air and water, reducing the consumption of hazardous and toxic materials, reducing water treatment costs emissions and discharges as well as reducing the frequency of environmental accidents, improving environmental sustainability through increased use of renewable energy and sustainable fuels, increasing reporting of environmental issues (Abdel et al., 2019), reduce environmental fees, increase revenue from environmental taxes, reduce energy consumption, reduce water consumption, reduce the occurrence of occupational accidents, protect biodiversity (Abdel et al., 2019).

Social outcomes are the profiles of business organizations in terms of social responsibility principles, policy response processes, social programs, and observable outcomes as they relate to social relationships (Abdel et al., 2019). Abdel et al., (2019) argue that social outcomes are quantified by the results of green supply chain management practices in terms of increasing product and corporate image, protecting employee health and safety and ensuring ensure customer loyalty and satisfaction. The social aspect regarding the image of enterprises and products from the point of view of different stakeholders

such as suppliers, employees, customers and the public. Social outcomes are represented by social outcomes through employees and outcomes related to the community. Social outcomes through employees are reflected in terms of reducing employee remuneration inequality (Zhu et al., 2016), improving health, safety, working and living conditions of employees (Zhu et al., 2016) allows employees to develop capabilities within the organization. Meanwhile, outcomes related to the community are described in terms of the social image of enterprises improving the employment or business opportunities of the surrounding community, improving the quality of life level of education, knowledge, safety and health of the community (Zhu et al., 2016), develop economic activities, create incentives to participate community works and reduce the adverse impact of the product on the community (De Giovanni, 2012).

2.4. Corporate social responsibility (CSR)

The term CSR has been mentioned since the early 20th century. Scholars have offered different ways to define this concept. For example, Friedman (1970) argued that the only CSR of a business is how to maximize profits and increase business value in an honest and fair competition market. He believes that CSR belongs to the State, so business owners should only implement CSRs that they desire and have approved by shareholders. Davis (1973) has given a fairly broad concept, CSR is the concern and response of businesses to issues beyond satisfying legal, economic, and technological requirements. Meanwhile, Carroll (1979) argues that CSR has a broader scope, including economic, ethical, legal, philanthropic and other responsibilities that society expects from business in every certain time. Along with this point of view, Matten & Moon (2004) argue that CSR is a cluster concept, including many different concepts, such as business ethics, charitable enterprises, employees, sustainability and environmental responsibility.

Some businesses choose to approach CSR from a strategic point of view instead of business ethics as before. Enterprises actively use CSR as a strategic tool to respond to pressures from the market and customers with actions that exceed the provisions of the law on environment and society (Carroll & Shabana, 2010; Wood, 2010). The International Business Council for Sustainable Development (WBCSB) defines CSR as the commitments of businesses towards sustainable economic development through the treatment of employees and their families and local communities. Therefore, the most basic meaning of CSR is that businesses need to fulfill their responsibilities to satisfy the needs of their stakeholders (Waddock et al., 2002).

2.5. Corporate social responsibility and green supply chain management (GSCM)

The study used the stakeholder CSR framework for this study to measure CSR (Le et al., 2019). CSR refers to activities that focus on management practices for employees (Farooq et al., 2017). Integrating green initiatives into supply chain management (Foo et al., 2018), GSCM can help businesses reduce resource waste and improve ecological efficiency throughout the supply chain management (Foo et al., 2018). CSR promotes employees to have a positive attitude towards the business (Phan et al. 2020), which can trigger employees to optimize business processes. Thus, staff effort can lead to successful implementation of GSCM (Rajabion et al., 2019). On the other hand, CSR associated with corporate culture (El Akremi et al., 2018) helps businesses have a good corporate culture atmosphere, which can help companies stay at the forefront of innovation to save money, energy, reduce emissions and improve efficiency (Tellis et al., 2009). Besides, CSR with external stakeholders (i.e. community, environment or consumers, suppliers. Businesses that implement CSR with external stakeholders will create value for businesses), environment and society (Boulouta & Pitelis, 2014) GSCM is one of the organizational strategies to minimize harms to the environment (Hervani et al., 2005). Therefore, CSR has a positive impact on GSCM, from which, we propose the hypothesis:

H_1: *CSR has a positive impact on GSCM.*

2.6. Green supply chain management and firm performance

Lee et al. (2012) explore the relationship between implementing green supply chain management practices and business performance. Using answers from a survey questionnaire completed by 223 SMEs in the electronics industry in Korea, the authors conclude that there is no direct relationship. Younis (2016) examines the influence of a set of green supply chain management practices including ecological design, green procurement, environmental cooperation and reverse transportation on different aspects of performance. The author used both quantitative and qualitative methods after a survey to obtain analytical data from ISO 14001 certified and non-certified businesses in the United Arab Emirates (UAE). The study results indicated that the eco-design was found to have no impact on any aspect of performance. Large &Thomsen (2011) surveyed 109 purchasing and supply managers in Germany. Then the authors used a variety of statistical methods (including factor analysis, structural equation modeling, linear regression) to provide evidence of a negative relationship between green cooperation with supplier level and purchasing performance.

De Giovanni (2012) states that green supply chain management is not only a tool to reduce the environmental impact of products and activities, but also a unique strategy to bring economic benefits as well as enhancing social welfare. Green et al (2012) used a sample size of 159 managers in manufacturing industries in the US to examine and assess the impact of adopting green supply chain management practices including environmental management, internal environment, green procurement, green information system, customer cooperation, investment recovery, eco-design to performance. Using the linear structural

model, the authors found a positive relationship between them. This study is considered as a pioneer in introducing phased green supply chain management implementation.

A study conducted by Diabat et al (2013) to explore the relationship between green supply chain practice initiatives and performance outcomes through the use of survey questionnaires from 50 participants in industry. Research shows that three green supply chain management practices, eco-design, customer collaboration and reverse logistics, can positively impact economic outcomes. The results obtained from the questionnaire survey and Huang (2013) provide strong evidence that the implementation of internal environmental management applies to small and medium-sized manufacturing enterprises in China proven to have a significant positive impact on business results. Meanwhile, green procurement also positively affects environmental results, economic results, but not to a great extent. Eco-design improves environmental outcomes, partnering with customers improves both environmental outcomes and economic outcomes for small businesses. Younis (2016) shows that reverse logistics has a beneficial effect on corporate social outcomes, while green procurement is also considered an important green supply chain practice because it can improve financial performance. Laari et al. (2016) points out that while internal green supply chain management practices have the strongest impact on environmental outcomes, both environmental cooperation with customers and environmental cooperation with suppliers are both direct lead to improved financial performance. Liu et al. (2012) used structural equation models for a sample of 296 Chinese manufacturers. The authors find that green supply chain management both positively affects economic outcomes and environmental outcomes of businesses.

Zaid et al (2018) study the link between green human resource management and green supply chain management as well as their impact on sustainable performance (environmental, social and economic aspects). Abdel et al (2019) use the first case study from the oil and gas industry in Egypt and the second case study from manufacturing enterprises in China to evaluate green supply chain management in a way that new approach. Through this, the authors conclude that green supply chain management leads to waste reduction, cost reduction, economic advantages, and more efficient use of resources. Thus, green supply chain management can play an important role in developing organizations that are both economically and environmentally beneficial.

According to the evolution of the relationship between GSCM and firm performance, we propose the hypothesis:

H_2: *GSCM has a positive impact on firm performance.*

2.7. Corporate social responsibility and firm performance

The direct impact of CSR on firm performance: Currently, research results on the relationship between CSR and firm performance are a matter of interest to researchers and scholars. However, up to now, research on the relationship between CSR and firm performance has not been consistent with the following three groups of results: (i) Positive relationship between CSR and firm performance; (ii) Negative relationship between CSR and firm performance; (iii) There is no relationship between CSR and firm performance.

Therefore, there is a need for empirical studies to clarify the relationship between CSR and firm performance. Indirect impact of CSR on firm performance: In addition to the direct relationship between CSR and firm performance, Fombrun et al., (2000) argue that there cannot be a simple relationship between CSR and firm performance because of activities. Social responsibility affects profits through intermediary relationships.

The intermediate benefits when implementing CSR have been shown through many studies including: (i) Customer satisfaction; (ii) Reputation; (iii) Sustainable competitive advantage of enterprises. These are also the mediating factors affecting the relationship between CSR and firm performance. Several recent studies have suggested a mediating role for GSCM. Therefore, we propose the hypothesis:

H_3: *CSR has a positive impact on firm performance.*

H_4: *GSCM has a mediate role in the relationship between CSR and firm performance.*

2.8. Theories

Resource-Based Theory was developed by Acedo et al. (2006). It can be said that this is the dominant management theory in explaining differences in business performance. It assumes that the special resources that the business possesses will create a competitive advantage over competitors and thereby, help the business to gain a monopoly position in the market. Resource-based theory assumes that there is no uniformity in resources and resource deployment capabilities among enterprises. Firms will maintain a competitive advantage only if these resources are both inimitable and non-substitutable. The resources mentioned here include structure, process, people, culture, knowledge, relationships. Therefore, Acedo et al., (2006) pointed out the existence of resources. There are three main trends in this theory, namely: Resource-Based View, Knowledge-Based View and Relationship View.

Resource-based theory is widely used in explaining the relationship between green supply chain management and corporate performance. The practice of green supply chain management is a strategic resource in the set of certain resources of an enterprise (Golicic & Smith, 2013) and it helps to improve firm performance (Choi & Hwang, 2015). This is caution green

activities based on knowledge and experience make it difficult for competitors to imitate. According to resource-based theory, a green supply chain management practice system cannot be built overnight. Therefore, any business that can be built will be in line with the trend, creating positive results in the long term.

3. Research method

3.1. Sample

Vietnam, as a developing country, has realized that, with economic growth and an emphasis on exports, investment in environmental protection becomes increasingly important. However, the current situation of researching and implementing business activities of enterprises based on a sustainability perspective in Vietnam is described as being at an early stage. This may be due to the long-standing dominant assumption that firms are still heavily focused on profit maximization. In addition, Vietnam is also an emerging country participating in the global supply chain, so practical reports are quite limited, especially in the case of construction enterprises. Although Vietnam's construction industry was born early, it only really changed dramatically when our country changed its mechanism from a centrally planned economy to a market economy. Currently, Vietnam's construction industry is at the end of the growth phase, preparing to enter the restructuring phase. Over the past decade, the industry's highest growth rate reached 10.80% in 2015 and has tended to decrease from 2016 to present. Although Vietnamese construction enterprises are considered an important pillar of the economy, there are still negative impacts on the environment and society.

This study is an enterprise-level study, and we collect data from Vietnam's construction industry. Target respondents are management-level employees (senior managers, middle managers, and operations managers) who are familiar with jobs related to supply chain management, including purchasing, warehousing, inventory, etc. Each manager represents a business and comes different from construction enterprises. To collect data, the study conducted a survey through questionnaires. The total number of survey questionnaires distributed and sent through both direct and indirect survey methods was 800 votes, collecting 568 votes, corresponding to a response rate of 71.00%. However, out of which 18 votes were invalid, the final result was 550 valid votes used.

3.2. Measures

Building on previous research, we developed an original English version questionnaire that included five main constructs to measure the variables in our model. To improve the reliability and validity of the measurement, we used a multi-item scale to evaluate each construct. We used a 5-point Likert-type scale to evaluate the structure being analyzed and used the reflectivity index to measure all variables except control variables.

This study has applied translation and decompile methods to ensure the validity of the translation process. We invited three bilingual business researchers specializing in CSR and GSCM to translate the questionnaire. First, the two researchers independently translated the original English questionnaire into Vietnamese, and finally reached agreement on the final Vietnamese version of the questionnaire through several rounds of discussions. The Vietnamese version of the questionnaire was then translated into English by a third professional interpreter. Finally, three bilingual business researchers revised the Vietnamese version of the questionnaire by comparing the differences between the two English versions and reached agreement.

The dependent variable is the firm's performance, which reflects how effectively a company can achieve its three economic, social and environmental goals. The enterprise performance variable is composed of three aspects: environmental results, economic results and social results. The author inherits the scale of the dependent variable from the studies of Zhu et al., (2008); Flynn et al., (2010), and Zaid et al., (2018). Economic performance is measured using a four-item scale, which includes sales growth, return on investment, growth in return on investment, and return on sales. Environmental results are measured by 4 items: Hazardous emissions have been reduced; Controlled solid and liquid wastes; Our company does well in saving energy for its production/supply of goods/services; Our business has reduced the consumption of hazardous materials/materials for the production of goods/services. Social outcomes are measured by 4 items: Our company ensures good health and safety conditions for employees; Our business ensures good health and safety conditions for the community (including customers, partners and surrounding residential areas); Our business creates many job opportunities for the local community where we operate; Our business has well limited the adverse activities of products and processes with the local community. The scale is based on a firm's self-assessment of its performance relative to its main competitors over the past three years.

Our independent variables are CSR, which refers to businesses' ability and positive behavior to integrate social and environmental concerns into their business operations (Dahlsrud, 2008). CSR is measured by 5 items developed from Turker (2009), Hoang et al. (2021) Nguyen et al. (2021), such as “Our company supports employees who want to learn more”; “Our company contributes to campaigns and projects that promote the welfare of society”.

The mediate variable, GSCM reflects the activities of integrating green initiatives into supply chain management. We have approved five items ranging from green purchasing process, setting up an environmental management system and developing environmentally friendly products to measure GSCM (Longoni et al., 2018).

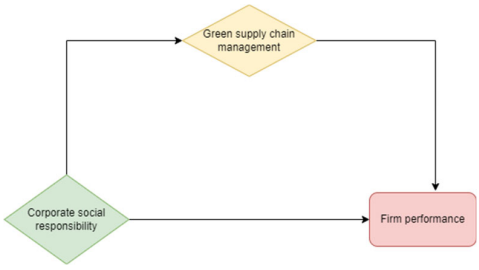

Fig. 1. Research model

Source: Authors

4. Results

The results of running the reliability test of the scale show that the reliability coefficients of Cronbach's Alpha are all greater than 0.7 and meet the requirements. All the component variables have a correlation coefficient with the total variable greater than 0.3. Thus, achieving reliability (Hair et al., 2014). The results of the second KMO test show that the KMO value of 0.826 is greater than 0.5 and the Sig of Bartlett's Test is 0.000 less than 0.05, showing that this observed variable is correlated with each other and is completely consistent with the factor analysis (Hair et al., 2014). For the second exploratory factor analysis results, the total variance extracted is 60.432% greater than 50% and the eigenvalues of the factors are all greater than 1, so using the exploratory factor analysis method is fit and qualified for the subsequent analysis.

Table 1
Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Corporate social responsibility	0.934	0.934	0.948	0.752
Firm performance_Economic	0.925	0.926	0.939	0.657
Firm performance_Environment	0.840	0.851	0.904	0.758
Firm performance_Social	0.829	0.837	0.880	0.594
Green supply chain management	0.860	0.860	0.893	0.543

The results show that all research variables satisfy the conditions of reliability and validity (Hensler et al., 2009, 2015).

Table 2
Discriminant Validity (Fornell-Larcker Criterion)

	Corporate social responsibility	Firm performance_ Economic	Firm performance_ Environment	Firm performance_ Social	Green supply chain management
Corporate social responsibility	**0.867**				
Firm performance_Economic	0.510	**0.811**			
Firm performance_Environment	0.492	0.261	**0.871**		
Firm performance_Social	0.405	0.296	0.261	**0.771**	
Green supply chain management	0.211	0.442	0.447	0.307	**0.737**

The results in Table 2 show that the values on the diagonal are larger than the values outside the diagonal, so the variables in the research model ensure the discriminant validity to perform the next analysis (Hair et al. al., 2017).

Table 3
Heterotrait-Monotrait Ratio (HTMT)

	Corporate social responsibility	Firm performance_ Economic	Firm performance_ Environment	Firm performance_ Social	Green supply chain management
Corporate social responsibility					
Firm performance_Economic	0.546				
Firm performance_Environment	0.554	0.291			
Firm performance_Social	0.456	0.335	0.300		
Green supply chain management	0.486	0.493	0.520	0.359	

Heterotrait-Monotrait discriminant team values are satisfied for further analysis.

Table 4
The summary of the Fit results

	Saturated Model	Estimated Model
SRMR	0.050	0.053
d_ULS	0.072	0.215
d_G	0.451	0.455
Chi-Square	2279.546	2297.412
NFI	0.867	0.866

The results of the model fit show that the SRMR value is less than 0.08 and the d_G values are all less than 95% and the NFI is greater than 0.8, showing that the research data is consistent with the research model (Hair et al., 2014).

Table 5
R Square

	R Square	R Square Adjusted
Firm performance_Economic	0.263	0.261
Firm performance_Environment	0.249	0.247
Firm performance_Social	0.165	0.164
Green supply chain management	0.658	0.658

The R-square results show that the variables in the model explain nearly 70% of the variation in green supply chain management, which is a very good model (Hair et al., 2014). The results of the impact coefficients through the PLS test are as follows:

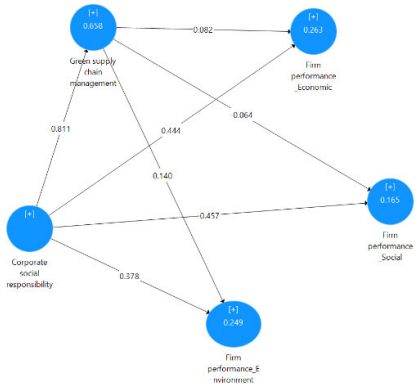

Fig. 2. The results of path effect

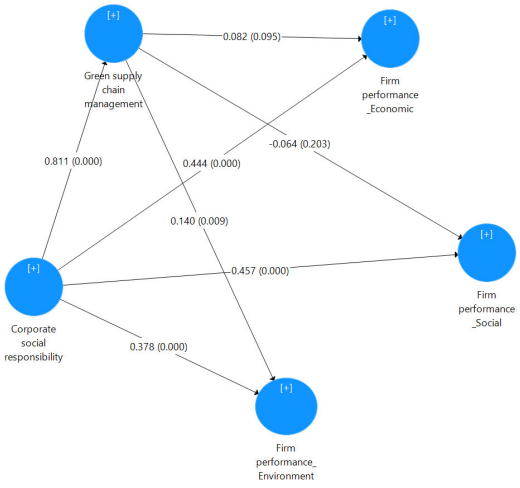

Fig. 3. The results of Bootstrapping

The results in Fig. 3 show that CSR has a positive and negative impact on all three aspects of performance with a significance level of 1% (P_value = 0.000). With the coefficients affecting the three dimensions of economic outcomes, social outcomes and environmental outcomes, respectively, 0.444; 0.457 and 0.378. This proves that Vietnamese construction enterprises that carry out social responsibility activities will bring better business results. Yes, when businesses carry out social responsibility activities, they will create a good image, good reputation, attract high-quality human resources to help activities achieve high labor productivity, and minimize negative impacts to the environment and the community, the same with Li et al. (2019), Liu et al. (2020); Liu & Zhang (2017). Thereby, improving the performance of enterprises in terms of economic, social and environmental aspects. Besides, social responsibility activities also have a strong impact on green supply chain management with an impact coefficient of 0.811 at 1% significance level (P_value = 0.000). Social responsibility activities with suppliers, customers and within the business help businesses participate in green supply chains more effectively. Therefore, corporate social responsibility activities have a positive impact on green supply chain management. Finally, for construction enterprises in Vietnam, green supply chain management only has a positive effect on firm performance_environment at the level of 0.140 at the significance level of 15 (P_value = 0.009) but has not had a statistically significant impact on firm performance_Economic and firm performance_Social, the results the same with Rombe and Hadi, (2022). In the context of Vietnamese construction enterprises, competition is still very fierce in the supply chain. Therefore, the practice of green supply chain management brings economic and social benefits but only helps to reduce negative impacts on the environment, such as reducing smog at construction sites, reducing noise and reduce waste during construction. However, construction enterprises in Vietnam still have a great impact on social life, for example, at construction sites, increasing traffic congestion, labor accidents, ... and economic losses. such as compensation value, site clearance is too large.

The study summarizes the results of hypothesis testing in Table 6:

Table 6
The summary of the path coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Corporate social responsibility → Firm performance_Economic	0.444	0.445	0.045	9.787	0.000
Corporate social responsibility → Firm performance_Environment	0.378	0.378	0.054	7.009	0.000
Corporate social responsibility → Firm performance_Social	0.457	0.461	0.047	9.785	0.000
Corporate social responsibility → Green supply chain management	0.811	0.813	0.016	51.237	0.000
Green supply chain management → Firm performance_Economic	0.082	0.083	0.049	1.668	0.095
Green supply chain management → Firm performance_Environment	0.140	0.141	0.053	2.630	0.009
Green supply chain management → Firm performance_Social	-0.064	-0.066	0.050	1.273	0.203

Table 7
The summary of the specific indirect effects

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Corporate social responsibility → Green supply chain management → Firm performance_Economic	0.066	0.067	0.040	1.662	**0.097**
Corporate social responsibility → Green supply chain management → Firm performance_Social	-0.052	-0.054	0.041	1.263	**0.207**
Corporate social responsibility → Green supply chain management → Firm performance_Environment	0.114	0.115	0.043	2.626	**0.009**

The results of testing the intermediary role of green supply chain management in the relationship between CSR and firm performance show that green supply chain management only has a statistically significant intermediary role in the relationship between CSR and firm performance_Environment.

Table 8
The summary of the path coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Corporate social responsibility → Green supply chain management	0.773	0.774	0.027	29.122	0.000
Firm performance_Economic → Corporate social responsibility	0.358	0.358	0.020	17.968	0.000
Firm performance_Economic → Green supply chain management	0.040	0.040	0.023	1.769	0.077
Firm performance_Environment → Corporate social responsibility	0.343	0.343	0.026	13.352	0.000
Firm performance_Environment → Green supply chain management	0.065	0.065	0.024	2.731	0.006
Firm performance_Social → Corporate social responsibility	0.209	0.211	0.026	7.911	0.000
Firm performance_Social → Green supply chain management	-0.036	-0.035	0.020	1.800	0.072

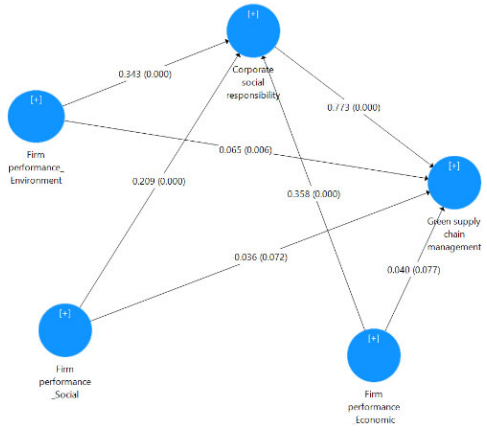

Fig. 4. The results of back test results

The summary of research hypotheses when testing the inverse hypothesis is given in Table 8. On the other hand, there are many studies arguing that if businesses have good performance, they will have the potential to carry out social responsibility activities and participate in green supply chains. Therefore, we have examined the negative impact of operational efficiency on corporate social responsibility and green supply chain management in Fig. 4. When we carried out the backtest of the impact of performance on CSR and GSCM showed that the positive impact on CSR was both at 1% significance level (P_value = 0.0000) the same with Aityassine et al. (2021). However, only firm performance_Environment had a statistically significant impact on GSCM with an impact coefficient of 0.065 at 1% significance level (P-value = 0.006).

5. Conclusions

Considering the context of Vietnam in the coming time, surely the construction industry will continue to grow because of the available advantages and great contributions that it brings. However, many experts predict that the expansion of the construction industry will lead to adverse effects on the environment and society, even threatening the health and safety of the community. This raises the difficulty that businesses face is how to balance between three goals: both protecting the environment and performing social responsibility while ensuring increased economic efficiency. This is really an important topic, attracting interest from many sides including individuals, governmental or non-governmental organizations at home and abroad and not only in the present but also in the future. Therefore, the requirements and policies related to green supply chain management are getting more and more attention. As a result, for State agencies, the law will be stronger, with the community in general, people's awareness will be improved, and especially with businesses in the construction industry, their understanding will also be improved. will be expanded at the same time they have access to innovative technology and financial resources to successfully implement green supply chain management. Regarding the above three development trends, it can be seen that the content of green building development and the concept of energy efficient construction have been mentioned as part of the national strategy. Vietnam has also implemented mandatory standards and regulations for equipment or buildings. In addition, the Government encourages businesses to operate in the direction of energy saving and apply renewable energy through tax exemption. Thus, the participation of State management agencies is one of the most essential and effective ways to promote construction enterprises in Vietnam to catch up with the inevitable green trend. The relationship between corporate social responsibility, green supply chain management and performance of construction industry enterprises is a global topical research topic. However, in the context of a developing country like Vietnam today, it has not received much attention.

Acknowledgement

This research result is the scientific product of the ministry-level project “Research on innovative activities of social enterprises in Vietnam”, code B2020-NTH-04.

References

Abdel-Baset, M., Chang, V., & Gamal, A. (2019). Evaluation of the green supply chain management practices: A novel neutrosophic approach. *Computers in Industry*, *108*, 210-220.

Acedo, F. J., Barroso, C., & Galan, J. L. (2006). The resource-based theory: dissemination and main trends. *Strategic management journal*, *27*(7), 621-636.

Aityassine, F., Aldiabat, B., Al-rjoub, S., Aldaihani, F., Al-Shorman, H., & Al-Hawary, S. (2021). The mediating effect of just in time on the relationship between green supply chain management practices and performance in the manufacturing companies. *Uncertain Supply Chain Management*, *9*(4), 1081-1090.

El Akremi, A., Gond, J. P., Swaen, V., De Roeck, K., & Igalens, J. (2018). How do employees perceive corporate responsibility? Development and validation of a multidimensional corporate stakeholder responsibility scale. *Journal of management*, *44*(2), 619-657.

Azevedo, S. G., Carvalho, H., & Machado, V. C. (2011). The influence of green practices on supply chain performance: A case study approach. *Transportation research part E: logistics and transportation review*, *47*(6), 850-871.

Balasubramanian, S. (2012), A hierarchical framework of barriers to green supply chain management in the construction sector, *Journal of Sustainable Development*, 10 (5), 15-27.

Beamon, B. M. (1999). Designing the green supply chain. *Logistics information management*, *10(2),* 63-89.

Boulouta, I., & Pitelis, C. N. (2014). Who needs CSR? The impact of corporate social responsibility on national competitiveness. *Journal of business ethics*, *119*(3), 349-364.

Carrol, A. B. (1979). A three-dimensional conceptual model of social performance. *The Academy of Management Rev.—1979.—4 (4)*.

Carroll, A. B., & Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews*, *12*(1), 85-105.

Choi, D., & Hwang, T. (2015). The impact of green supply chain management practices on firm performance: the role of collaborative capability. *Operations Management Research*, *8*(3), 69-83.

Christopher, M., & Ryals, L. (1999). Supply chain strategy: its impact on shareholder value. *The international journal of logistics management*, *10*(1), 1-10.

Davis, K. (1973). The case for and against business assumption of social responsibilities. *Academy of Management journal*, *16*(2), 312-322.

Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate social responsibility and environmental management*, *15*(1), 1-13.

De Giovanni, P., & Vinzi, V. E. (2012). Covariance versus component-based estimations of performance in green supply chain management. *International Journal of Production Economics*, *135*(2), 907-916.

Devi, L. P., & Palaniappan, S. (2017). A study on energy use for excavation and transport of soil during building construction. *Journal of cleaner production*, *164*, 543-556.

Diabat, A., Khodaverdi, R., & Olfat, L. (2013). An exploration of green supply chain practices and performances in an automotive industry. *The International Journal of Advanced Manufacturing Technology*, *68*(1), 949-961.

Farooq, O., Rupp, D. E., & Farooq, M. (2017). The multiple pathways through which internal and external corporate social responsibility influence organizational identification and multifoci outcomes: The moderating role of cultural and social orientations. *Academy of management journal*, *60*(3), 954-985.

Fombrun, C. J., Gardberg, N. A., & Barnett, M. L. (2000). Opportunity platforms and safety nets: Corporate citizenship and reputational risk. *Business and society review*, *105*(1), 85-106.

Foo, P. Y., Lee, V. H., Tan, G. W. H., & Ooi, K. B. (2018). A gateway to realising sustainability performance via green supply chain management practices: A PLS–ANN approach. *Expert Systems with Applications*, *107*, 1-14.

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of operations management*, *28*(1), 58-71.

Friedman, M. (1970), *The Social Responsibility of Business Is to Increase Its Profits.* New York Times Magazine, 13 September 1970, 122-126.

GhaffarianHoseini, A., Dahlan, N. D., Berardi, U., GhaffarianHoseini, A., Makaremi, N., & GhaffarianHoseini, M. (2013). Sustainable energy performances of green buildings: A review of current theories, implementations and challenges. *Renewable and Sustainable Energy Reviews*, *25*, 1-17.

Gimenez, C., & Tachizawa, E. M. (2012). Extending sustainability to suppliers: a systematic literature review. *Supply Chain Management: an international journal*, *17*(5), 531-543.

Golicic, S. L., & Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of supply chain management*, *49*(2), 78-95.

Green, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: impact on performance. *Supply Chain Management: An International Journal*, *42*(5), 150-176.

Hervani, A. A., Helms, M. M., & Sarkis, J. (2005). Performance measurement for green supply chain management. *Benchmarking: An international journal*.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Harrison, J. S., & Freeman, R. E. (1999). Stakeholders, social responsibility, and performance: Empirical evidence and theoretical perspectives. *Academy of management Journal*, *42*(5), 479-485.

Hensler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, *20*(1), 227-320.

Hoang, T., Nguyen, T., & Phan, T. (2021). Government environmental regulation, corporate social responsibility, ecosystem innovation strategy and sustainable development of Vietnamese seafood enterprises. *International Journal of Data and Network Science*, *5*(4), 713-726.

Huang, X. (2013). *Green supply chain management in manufacturing small and medium-sized enterprises: Perspectives from Chang Chiang Delta* (Doctoral dissertation, University of Liverpool).

Large, R. O., & Thomsen, C. G. (2011). Drivers of green supply management performance: Evidence from Germany. *Journal of Purchasing and Supply Management*, *17*(3), 176-184.

Laari, S., Töyli, J., Solakivi, T., & Ojala, L. (2016). Firm performance and customer-driven green supply chain management. *Journal of cleaner production*, *112*, 1960-1970.

Lee, S. M., Kim, S. T., & Choi, D. (2012). Green supply chain management and organizational performance. *Industrial Management & Data Systems*, 112 (8), 1148-1180.

Le, T., Nguyen, T., Phan, T., Tran, M., Phung, X., Tran, T., & Giao, K. (2019). Impact of corporate social responsibility on supply chain management and financial performance in Vietnamese garment and textile firms. *Uncertain Supply Chain Management*, *7*(4), 679-690.

Le, T., Nguyen, T., Phan, T., Tran, M., Phung, X., Tran, T., & Giao, K. (2019). Impact of corporate social responsibility on supply chain management and financial performance in Vietnamese garment and textile firms. *Uncertain Supply Chain Management*, *7*(4), 679-690.

Li, J., Sikora, R., Shaw, M. J., & Woo Tan, G. A. (2005). Strategic analysis of inter-organizational information sharing. Decis. Support Syst., 2006, 42, 251–266. Li, S., Ragu-Nathan, B., Ragu-Nathan, TS, & Rao, SS (2006). *The impact of supply chain management practices on competitive advantage and organizational performance. Omega*, *34*(2), 107-124.

Li, G., Li, L., Choi, T. M., & Sethi, S. P. (2020). Green supply chain management in Chinese firms: Innovative measures and the moderating role of quick response technology. *Journal of Operations Management*, *66*(7-8), 958-988.

Liu, J. Y., Low, S. P., & He, X. (2012). Green practices in the Chinese building industry: drivers and impediments. *Journal of technology management in China*, 7 (1), 50-63.

Liu, X., & Zhang, C. (2017). Corporate governance, social responsibility information disclosure, and enterprise value in China. *Journal of Cleaner Production*, *142*, 1075-1084.

Liu, J., Chen, M., & Liu, H. (2020). The role of big data analytics in enabling green supply chain management: a literature review. *Journal of Data, Information and Management*, *2*(2), 75-83.

Longoni, A., Luzzini, D., & Guerci, M. (2018). Deploying environmental management across functions: the relationship between green human resource management and green supply chain management. *Journal of Business Ethics*, *151*(4), 1081-1095.

Matten, D., & Moon, J. (2004). Corporate social responsibility. *Journal of business Ethics*, *54*(4), 323-337.

Min, H., & Galle, W. P. (1997). Green purchasing strategies: trends and implications. *International Journal of Purchasing and Materials Management*, *33*(2), 10-17.

Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. *Journal of supply chain management*, *45*(2), 37-56.

Phan, T., Lai, L., Le, T., & Tran, D. (2020). The impact of audit quality on performance of enterprises listed on Hanoi Stock Exchange. *Management Science Letters*, *10*(1), 217-224.

Rajabion, L., Khorraminia, M., Andjomshoaa, A., Ghafouri-Azar, M., & Molavi, H. (2019). A new model for assessing the impact of the urban intelligent transportation system, farmers' knowledge and business processes on the success of green supply chain management system for urban distribution of agricultural products. *Journal of Retailing and Consumer Services*, *50*, 154-162.

Rombe, E., & Hadi, S. (2022). The impact of supply chain capability and supply chain performance on marketing performance of retail sectors. *Uncertain Supply Chain Management*, *10*(2), 593-600.

de Sousa Jabbour, A. B. L., de Oliveira Frascareli, F. C., & Jabbour, C. J. C. (2015). Green supply chain management and firms' performance: Understanding potential relationships and the role of green sourcing and some other green practices. *Resources, Conservation and Recycling*, *104*, 366-374.

Srivastava, S. K. (2007). Green supply-chain management: a state-of-the-art literature review. *International journal of management reviews*, *9*(1), 53-80.

Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic management journal*, *19*(8), 729-753.

Tellis, G. J., Prabhu, J. C., & Chandy, R. K. (2009). Radical innovation across nations: The preeminence of corporate culture. *Journal of marketing*, *73*(1), 3-23.

Turker, D. (2009). Measuring corporate social responsibility: A scale development study. *Journal of business ethics*, *85*(4), 411-427.

Vachon, S., & Klassen, R. D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International journal of production economics*, *111*(2), 299-315.

Venkatraman, N. (1989). The concept of fit in strategy research: Toward verbal and statistical correspondence. *Academy of management review*, *14*(3), 423-444.

Wood, D. J. (2010). Measuring corporate social performance: A review. *International journal of management reviews*, *12*(1), 50-84.

Waddock, S. A., Bodwell, C., & Graves, S. B. (2002). Responsibility: The new business imperative. *Academy of management perspectives*, *16*(2), 132-148.

Yang, C. S., Lu, C. S., Haider, J. J., & Marlow, P. B. (2013). The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, *55*, 55-73.

Younis, H., Sundarakani, B., & Vel, P. (2016). The impact of implementing green supply chain management practices on corporate performance. *Competitiveness Review*.

Zaid, A. A., Jaaron, A. A., & Bon, A. T. (2018). The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. *Journal of cleaner production*, *204*, 965-979.

Zhu, Q., Sarkis, J., & Lai, K. H. (2012). Examining the effects of green supply chain management practices and their mediations on performance improvements. *International journal of production research*, *50*(5), 1377-1394.

Zhu, Q., Feng, Y., & Choi, S. B. (2017). The role of customer relational governance in environmental and economic performance improvement through green supply chain management. *Journal of Cleaner Production*, *155*, 46-53.

Zhu, Q., & Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of operations management*, *22*(3), 265-289.

Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: drivers and practices. *Journal of cleaner production*, *14*(5), 472-486.

Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International journal of production economics*, *111*(2), 261-273.