



Evaluation of Factors Affecting Sustainable Performance Using PLS-SEM Method and IPMA Chart: A Case Study in Vietnam

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Abstract

In a dynamic world, understanding the indirect impacts of green strategies on a company's sustainable performance through corporate social responsibility and green innovation is essential for the environmental management of the workplace. This paper proposes a conceptual SEM model for examining the mediating role of corporate social responsibility and green innovation on the relationship between green strategies and the sustainable performance of manufacturers and Importance-Performance Map Analysis (IPMA) represents the independent variables acting on the same dependent variable on the graph with one axis being performance, the other being importance. The findings indicated that corporate social responsibility and green innovation play significant mediating roles in the linkage between green strategy and sustainable performance, as well as positively influencing sustainable performance. In this study, we surveyed managers and directors of 432 publicly listed manufacturers in Vietnam; their responses were used to conduct hypotheses tests regarding the relationships among corporate social responsibility, green innovation, green strategies, and sustainable performance. The findings of this study revealed the importance of strategic thinking for finding a sustainable balance between economic, social, and environmental interests through which company leaders are motivated to perform actions that improve the long-term environmental performance of their businesses.

1. Introduction

Economic growth and globalization are linked to environmental-related issues such as “air and water pollution”, “greenhouse effect emission” and “global warming” (Ansu-Mensah et al., 2021). Public and stakeholders' concerns connected to such issues have been increasing steadily. Society is really in need of actions to prevent environmental pollution (Bretschger and Pittel, 2020). In recent

years, the business community is gradually becoming more attentive with environmental performance as well as has considerable attempts towards environmentally friendly practices (Le, 2022). However, these efforts are not sufficient to solve environmental issues sustainably if business organizations only perform eco-friendly practices in short-term period. It is difficult to convince businesses, especially small and medium enterprises, because when carrying out

long-term environmentally friendly activities, those enterprises have to bear a high costs while they do not reap any short-term economic benefits. (Fernando et al., 2019). Therefore, if they delay long-term green initiatives, it is mean that they are not incentive enough to take actions to protect environment. Obviously, environmental problems cannot be solved quickly by one stakeholder, one organization or one community. (Abbas and Sağsan, 2019). Therefore, to change consciousness of business organizations about the importance of environmental protection in long-term, we need to introduce environmental strategies for achieving green targets (Allen et al., 2021).

Environmental strategy or green strategy is known as a complementary operational strategy to assist companies in the decision-making process so that they can benefit from environmental sustainability. (Freeman et al., 2021; Olson, 2008). Green strategy helps the companies fulfill the environmental responsibilities to match their stakeholder's expectation. Green strategy is important for both companies and their stakeholders. However, green strategy alone is not sufficient to shift a short-term profited-oriented to a long-term oriented company focusing on three key points (profit-people-planet); More action is needed to be in line with "the green strategic direction and achieve sustainable effectiveness" (Le,2022). In this context, green innovation and corporate social responsibility are considered as the most suitable factors to be associated with green strategy (Abbas and Sağsan, 2019; Freeman et al.,2020). However, to evaluate the existing literature on green strategy reveal that there is a scarcity of researches examining the interactions among green strategy, there are few studies the interactions between green strategy, green innovation and corporate green responsibility in general and their effects on with the company's sustainable performance.

For example, the study of Padilla-Lozano and Collazzo (2021) shows that, only assessing the impact of corporate social responsibility and green innovation on competitive advantage in the manufacturing sector. The findings provide evidence to demonstrate that corporate social responsibility and green innovation have positive impact on competitive advantage (Le, 2022). However, green strategy was not included in this study. Yannan et al. (2021)

studied the impacts of corporate social responsibility, green investment and economic innovation on growth of revenue. In this study, green innovation was replaced by economic innovation and sustainable performance was replaced by growth of revenue. The study of Shahzad et al. (2019) evaluated the influence of corporate social responsibility on green innovation. However, that study did not address the general green strategy with corporate social responsibility for green innovation. Kraus et al. (2020) examined the impact of corporate social responsibility on green innovation, green strategy and sustainable performance. (Abbas) The results of this study have shown that corporate social responsibility has positive effect on green innovation. However, that study could not assess the relationship between green strategy and sustainable performance of enterprises. Therefore, it can be said that existing literatures have not yet considered the integration of green strategy, corporate social responsibility and green innovation in promoting sustainable performance (Kuo et al., 2021).

Based on these vacancies in the existing literature, our study will propose a theoretical model to describe how green strategy affects corporate social responsibility in promoting innovation green to achieve sustainable performance, where corporate social responsibility and green innovation mediate the relationship between green strategy and sustainable performance. In this context, we focus on surveying small and medium size manufacturers in developing countries like Vietnam for following reasons. At first, manufacturers are correlated with greenhouse gas emissions. Although, in 2020, Vietnam's manufacturing sector accounts for about 25.13 percent of the country's total GDP, it is responsible for 20% of carbon emissions (Duong, 2020). Therefore, there is urgent need for manufacturers to address the challenges of decarbonization (Govindan, 2018). Second, the major manufacturers in Vietnam, 98%, are small and medium size firms (Tuan, 2020), thus, improve their environmental performance would contribute significantly environmental improvement at national level. Moreover, green strategy and corporate social responsibility are still primitive concepts in Vietnam that have not been widely disseminated, therefore, our research results will provide valuable evidence to consider green innovation in manufacturing sector. (Abbas

and Sağsan)

With the above description, the goal of this article is to expand our understanding of the mechanism by which green strategy affects corporate social responsibility and thereby green innovation to achieve sustainable performance. Therefore, we would employ three theories, resource-based view, stakeholder theory and legitimacy theory to explain relationships mentioned in above.

The SEM model is a second-generation statistical analysis technique developed to analyze multidimensional relationships between many variables in a model (Haenlein & Kaplan et al. 2004). It allows for the appearance of latent variables in the model, which has many benefits in scientific research such as testing hypotheses about causal relationships, testing the relationships between observed and unobserved variables, estimation of concept validity, and improving poorly fitting models. SEM models provide valuable tools such as predicting models, generating hypotheses, and testing them statistically. (Albort-Morant et al.) From there, the measurement information is used to correct the hypothetical relationships between the latent variables. Importance-performance map analysis (IPMA) evaluates the importance of a latent variable's relationship and its performance in the model. It found that the independent (non-normalized) variable had the same mean (means) as the dependent variable, while the important but low efficient variable had the same value. The researcher needs to consider increasing the mean score of the variable to identify the most important details. IPMA also shows the independent variables acting on the same dependent variable on the graph with one axis being performance, the other being importance, and the third being more efficiency. (Allen, Zhu, and Sarkis)

This article has four main contributions. First, it contributes to the existing sustainability literature on green strategy by showing the active mediating role of social responsibility, entrepreneurship and green innovation in the relationship between green strategy and green strategy. efficiency. This is first finding providing evidence that offer an insight as to why small and medium manufacturers in developing countries like Vietnam engage in the integration of green strategy, corporate social responsibility and green innovation. Second, this paper supports the resource-based and stakeholder perspective theory

by clarifying the direct impact of green strategy, corporate social responsibility, and innovation. (Ansu-Mensah et al.) Greening the sustainable practices of small and medium-sized producers in Vietnam, respectively. Third, the article also expands on the theory of legitimacy when it comes to verifying why Vietnamese manufacturers should engage in green strategies. Finally, this study confirms the mediating role of green innovation on the relationship between corporate social responsibility and sustainable performance. Overall, assertions about the mediating role of green innovation and corporate social responsibility in a conceptual model addressing the current resource shortage on the integration of green innovation, social responsibility of business and green innovation in driving SMEs to achieve sustainable performance (Albort-Morant et al., 2017).

The rest of this article is organized as follows. Section 2 presents literature review. Section 3 proposes hypothesis development and research methodology. Section 4 interprets result and findings. Section 5 present discussion. Section 6 show conclusion and limitations and further researches are presented in section 7.

2. Literature Review

2.1. Resource-based view

According to Barney (1991), resource-based view is an approach used to determine “valuable”, “rare”, “inimitable” and “irreplaceable” strategic resources that would help company achieve long-term competitive advantages. In this paper, green strategies are considered as a strategic resource of the company, it makes an important contribution in developing a sustainable competitive advantage or improving sustainable performance through promoting innovative initiatives of corporate social responsibility and the implications of green innovation towards addressing the environmental concerns of stakeholder. (Arfara and Samanta)

2.2. Stakeholder theory

The stakeholder theory is a theory of organizational management that emphasizes the interrelationships between a business organization and its customers, employees, suppliers, shareholders, communities and others who have a stake in organization (Freeman, 2010). The theory argues that a company should create value for all stakeholders (Freeman, 2010). In this study, stakeholder theory provides

a foundation for explaining efforts by the contributions of the green strategy and corporate social responsibility in balancing interests of various stakeholders concerning environmental issues. (Barney)

2.3. Legitimacy theory

Suchman (1995, p. 574) considered that “legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions”. In this study, legitimacy refers to the corporate initiative to undertake social responsibility for its business activities that have an impact on the environment, and to continue to pay attention to the environmental issues of stakeholders. Tran et al. (2020) suggests that solving stakeholders’ environmental concerns must be given priority. Le (2022) proposes that green strategy regarding legitimacy is needed to be integrated into the making decision process and corporate culture to promote corporate social responsibility and green innovation for sustainable performance. So the theory of legitimacy is used to explain why companies pursue a green strategy. (Bekmezci)

2.4. Green strategy

An organization’s green strategy is complementary to the key business and wealth strategies the organization already has a good understanding of. It enables organizations to make informed decisions that can result in positive environmental impacts (Le, 2022). Importantly, green strategy is implemented voluntarily as corporate social responsibility towards environmental protection (Güner, 2018). Therefore, in this study, green strategy is considered a corporate social responsibility to stakeholders and environmental management by integrating environmental issues into corporate culture and processes sustainable business decisions. (Bretschger and Pitel)

According to Arfara and Samanta (2020), to maximize the positive impact of green strategy on sustainable performance, green strategy should be considered to be an important strategy in order to maintain long-term business operation and to fulfill responsibilities expected by the stockholders. In essence, green strategy would have powerful influence on how the company produces environmentally friendly products, disposes waste properly and save natural resources (Olson, 2008). In general, green

strategy is approached as a guideline to address environmental emergencies. (Chen, Lai, and Wen)

2.5. Corporate social responsibility

Corporate social responsibility is a management philosophy whereby businesses integrate social and environmental issues into their business operations and interactions with stakeholders (Ikram et al., 2019; Le et al., 2021). According to Singh and Misra (2021), the corporate social responsibility definition has been upgraded over time to explain more clearly how a company may achieve a balance of economic, environmental and social benefits. In our study, corporate social responsibility is considered to have best association with green strategy to promote green innovation to improve sustainable performance. (De Roeck and Delobbe)

In recent years, the environmental problems are challenging the profit-orientation companies operating at cost of environmental degradation (Le and Ikram, 2022). These environmental issues change the consciousness of stakeholders about the importance of environmental protection, and, force them to shift profit orientation to the orientation of balancing economic, environmental and social benefits. To achieve such balance orientation, we need incorporate green strategy into corporate social responsibility practices that would help companies to reduce environmental costs, save natural resources, enhance corporate image and improve customer loyalty (De Roeck and Delobbe, 2012). However, the existing literatures show that the results of current studies on this incorporation have not yet reached a consensus. (Duong) For example, Indriastuti and Chariri (2021) argued that corporate social responsibility has positive influences on sustainable performance, while Oyewumi et al. (2018) confirm that corporate social responsibility has negative impact on economic performance. In addition, Hirigoyen and Poulain-Rehm (2017) found that corporate social responsibility has negative association with competitive advantage while corporate social responsibility positively affects business growth (Nyame-Asiamah and Ghulam, 2019; Yannan et al., 2021).

2.6. Green innovation

Green innovation refers to all forms of innovation that minimize environmental degradation. Green innovation is associated with practices that improve

firm's sustainable performance such as reducing energy use, controlling air and water pollution, recycling waste and design green products (Yurdakul and Kazan, 2020). Why do firms tend to shift towards green innovation? This is not only a result of stringent law and social pressure but also because implementing green innovation initiatives provide various opportunities for companies (Le, 2022). Practicing green innovation may improve economic performance through reductions in waste, attract new customers who love green or eco-friendly products or services, minimize production time and enhance corporate reputation (Khalil and Nimmanunta, 2022). Therefore, green innovation is key factor that enable sustainable development as it may lead to a cleaner world. (Fernando, Jabbour, and Wah)

2.7. Sustainable performance

Sustainable performance means coordinating economic, environmental and social objectives in implementing core business activities to maximize corporate value (Indriastuti and Chriri, 2021). Economic or financial objective refers to how to maximize revenue and profit (Abbas, 2020). Environmental objective refers to practices that can minimize environmental degradation (Testa et al., 2015). Social objective refers to social practices that are beneficial to community and region in which a company run its business (Testa et al, 2015). In this research, we focus on sustainable performance measurements rather than solely on environmental or economic performance, because sustainable performance pertains to both financial-related and non-financial-related criteria as results of green innovation through corporate social responsibility practices that motivated by green strategies (Wang, 2019; Abbas, 2020).

3. Hypotheses development

3.1. Green strategy and sustainable performance

The existing literatures show that there are not many empirical researches on the linkage between green strategy and sustainable performance. Therefore, in our article, we employ stakeholder theory and resource-based view to explain this linkage. According to stakeholder theory, in order to ensure that company may maintain long-term competitive advantage, its operations need the continuous support from its stakeholders (Tantalo and Priem, 2016).

To keep continuous supports from various stakeholders, the company must practice green strategies that help it to differentiate itself from its competitors (Arfara and Samanta, 2020). As a result, this leads to improve both economic and non-economic performance. (Freeman, Phillips, and Sisodia) Likewise, from the perspective of resource-based view (Barney, 1991), green strategies are considered as strategic resources of the company that contribute important role for driving corporate social responsibility initiatives and green innovation implementation to achieve sustainable performance. Based on discussion in above, we propose the following hypothesis:

H1: Green strategy has positive impact on sustainable performance

3.2. Corporate responsibility strategy, green innovation and sustainable performance

According to Shahzad et al. (2019), corporate social responsibility practices have positive influence on green innovation. The existing literatures provide evidences that prove that corporate social responsibility play important role in promote innovation activities that generating values for both company and its stakeholders (Grigoriou and Rothaermel, 2017). In addition, according to Le (2022), the focus of company on corporate social responsibility leads "positive responses" from stakeholders and improves "the ability to access useful resources about green innovation", thereby improving corporate capabilities towards a green direction that facilitates green innovation implementation. Therefore, the hypothesis is proposed as the following:

H2: Corporate social responsibility has positive impact on green innovation

The prior researches proposed that the outcome of green innovation implementations would help company access to green and premium market share (Sellito et al., 2020), increase productivity (Tu and Wu, 2020), and enhance company image (Bekmezci, 2015), thereby improving sustainable performance (Abbas, 2020; Lu et al., 2016; Zhang et al., 2019). Therefore, we suggest the hypothesis as the following:

H3: Green innovation has positive influence on sustainable performance.

3.3. Green strategy, corporate social responsibility and sustainable performance

Through incorporating green strategies into practice of corporate social responsibility, company may save natural resource, increase renewable energy use and dispose waste properly (Arfara and Samanta, 2020). Furthermore, by performing environmental protection activities, company may enhance company reputation and image and shape customer loyalty (De Roeck and Delobbe, 2012). As a result, company may maintain long-term competitive advantages and improve financial performance (Russo and Fouts, 1997). Based on the discussions in above, the relationship between green strategy and corporate social responsibility, and, corporate social responsibility and sustainable performance are hypothesized as follows:

H4: Green strategy has positive effect on corporate social responsibility

H5: Corporate social responsibility has positive influence on sustainable performance

3.4. The mediating role of corporate social responsibility and green innovation

Based on the discussion regarding to four hypotheses in above, the mediating mechanism of corporate social responsibility and green innovation on the relationship between green strategy and sustainable performance can be explained as the follows. Green strategy is considered as a company’s attempt to fulfill its responsibility to stakeholders when focusing on their environmental concerns (Sellitto et al., 2020). In turn, this generate values for company such as enhancing the its reputation and image and enhancing long-term competitive advantages (Zhang et al., 2019; Lu et al., 2016; Bekmezci, 2015; Ong et al., 2019; Soewarno et al., 2019). On this basis, we propose that green strategy have positive influence on corporate social responsibility initiatives that facilitate green innovation implementation towards improving both economic and environmental performance. (Govindan) The hypotheses of the mediating role of corporate social responsibility and green innovation on the relationship between green strategy and sustainable performance are proposed in below:

H6: Corporate social responsibility mediates the linkage between green strategy and sustainable performance

H7: Green innovation mediates the linkage between corporate social responsibility and sustainable performance

H8: Corporate social responsibility and green innovation simultaneously mediate the linkage between green strategy and sustainable performance

3.5. Conceptual model

Based on hypotheses developed in above, paper is designed conceptual model as figure 1

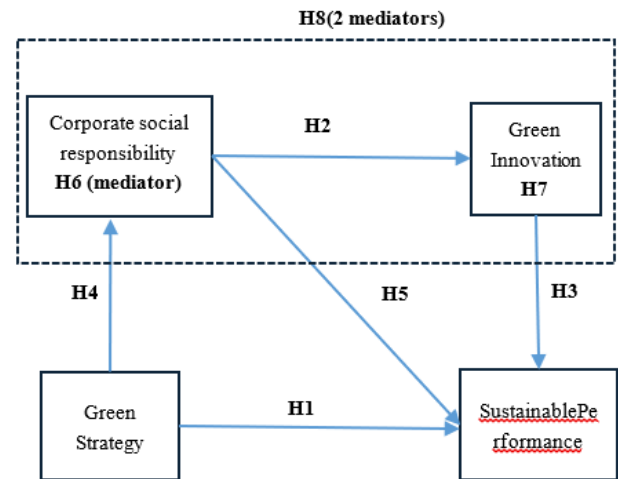


FIGURE 1. Conceptual model

4. Methodology

4.1. Sample size determination

According to Vietnamese general statistical office (VGSO), in 2021, the number of manufacturers in Vietnam were 86,750 and 98.5% of total number are small and medium size companies (less than 300 employees). However, it is impossible to collect huge data from small and medium size manufacturers across Vietnam due to limited time, costs and human resource. Therefore, we decide to select all manufacturers that are publicly listed in Ho Chi Minh Stock Exchange and Hanoi stock exchange as target population. The State Securities Commission of Vietnam provides a total of 831 publicly-listed manufacturers. In this study, no sampling method is performed, we considered target population as the sample.

4.2. Measures

The questionnaire used in the study was built based on proven scales. “ Since the survey was conducted in Vietnam, two academic domain experts fluent in both Vietnamese and English were recruited for the

translation process. The questionnaire was pretested in meetings with ten academic experts and ten senior managers. The purpose of the pretest was to assess the substantive validity of measures and make sure that respondents understood the instructions, items, and scales.” Throughout the questionnaire, 5-point Likert scales were used, ranging from 1 (very strongly disagree) to 5 (very strongly agree).

Firstly, the measurements of green strategy are developed and validated by Olson (2008). Next, the measurements of corporate social responsibility are adapted from Trumpp *et al.* (2015) and Henriques and Sadorsky (1999); Furtherly, the measurement scales of green innovation were developed based on the study of Rahman and Post (2012) and Chen *et al.* (2006). Lastly, measurements scales were adapted from the study of Wang (2019) and Abbas (2020). All items are available below.

Questionnaire items:

- **Green strategy** Olson (2008)

[1] The company is consistent in developing friendly environmentally product and services

[2] The company is consistent in training and developing human resources towards environmental protection

[3] The company is consistent with marketing strategies towards educating consumers how to recognize and supports eco-friendly products or services.

[4] The company is consistent with strategies that improving in saving energy and natural resources

[5] The company is consistent with strategies that improving the information and data transparency about environmental reports.

[6] The company is consistent with strategies that ensuring the green standards of machinery, equipment, facilities.

[7] The company is consistent with strategies that ensuring the green working environment.

[8] The company is consistent in thinking and actions to pursue the goal of improving environmental performance.

- **Corporate social responsibility** Trumpp *et al.* (2015) and Henriques and Sadorsky (1999)

[1] The company enhance the quality of development activities of green production.

[2] The company is committed to no using toxic ingredients in our product.

[3] The company pay attention to energy saving during operation and production

[4] The company is committed to not using resources that are depleted

[5] The company is committed to provide the environmental reports transparently

[6] The company is committed to motivate the employees in increasing the consciousness of environmental protections

- **Green innovation** Rahman and Post (2012) and Chen *et al.* (2006).

[1] The company promote research and Development (R&D) activities that is continuously improved towards green standards

[2] The company apply energy saving technology

[3] In production process, company prefer consuming renewable energy to natural energy

[4] The company is committed to use packaging that is environmentally friendly

[5] The company is committed to apply waste treatment technology in accordance with international standard.

[6] The company is committed to apply recycling technology in accordance with international standard.

- **Sustainable performance** Wang (2019) and Abbas (2020)

[1] Sale is growing steadily in recent 5 years.

[2] Profit is growing steadily in recent 5 years.

[3] New eco-friendly products or services is recommended every year.

[4] The market shares of green products or services are growing every year.

[5] The customer satisfaction is improved every year

[6] The social benefit of employee is improved every year.

4.3. Data collection and description

There are two sampling methods. Probabilistic sampling method is error controlled and highly representative of the population, this method is used when

conducting descriptive research and assessing causal effects. Non-probability sampling method is time and cost saving, it is used for visit study. This study uses probability sampling method. Two parameters used to evaluate the appropriate sampling method for the study are the quality of the sample size (Eq .1) and the number of samples (Eq .2).

$$n = \frac{(q(1-q)] Z_{\alpha}^2}{D^2} \tag{1}$$

Where: q : Shows the occurrence rate of the elements in the sampling unit exactly as the sampling target $0 \leq q \leq 1$.

$$n = \left(\frac{Z \cdot s}{a \cdot \bar{x}} \right)^2 \tag{2}$$

Where: Z : The statistical value corresponds to the reliability. s : Standard deviation of the original sample. \bar{x} : Average of the original sample. a : The sample bias rate, depends on the sensitivity of the research results. The process of carrying out the survey is shown in Table 2.

A survey of publicly listed companies was conducted between December, 2021 and May, 2022. The targeted respondents are directors and senior managers. 473 responses were directly collected from 831 distributed questionnaires. After excluding missing data and outliers based on boxplot analyses, finally, 432 responses were retained for analysis.

below demonstrates the sample composition in terms of the types of industry that manufacturers are operating, the number of employees, and revenue in 2021. The majority of respondents work in the manufacturing sector employing intensive workforces such as consumer discretionary (23.1%), textile (12%), construction material (10%) and agriculture (37%) while there are minority of respondents who are working in hi-tech industry such as ICT (4%). Demographic information also indicated that 59.5% of companies have 300-900 employees, and 98.7% of companies have revenue of less than 400 million USD.

5. Results

5.1. The result of the construct reliability evaluation

At first, authors used SPSS version 26 to examine Cronbachalpha (α) (Eq .3) for reliability anal-

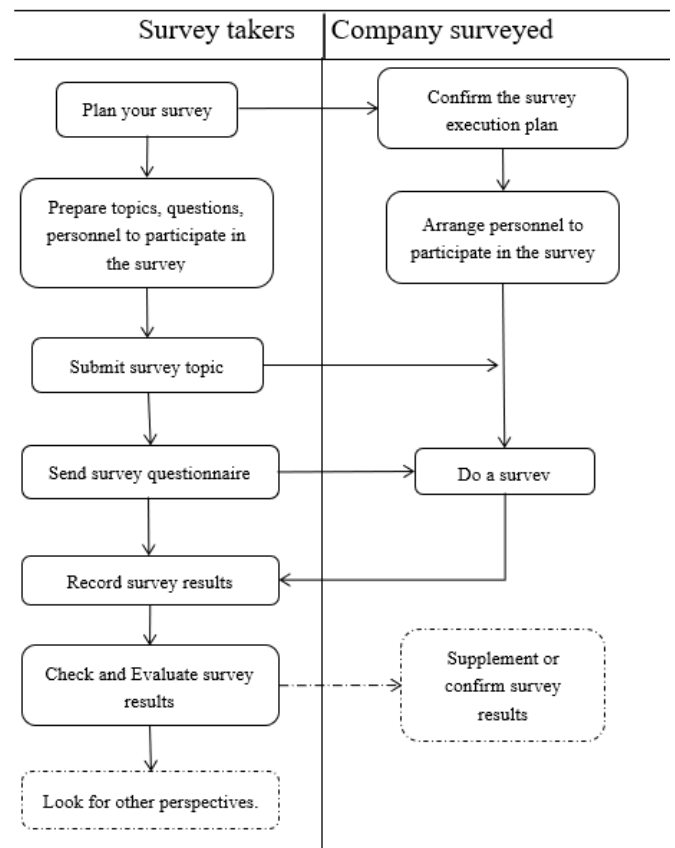


FIGURE 2. Process to prepare to take a survey

ysis in order to measure the internal consistency of the measurement scales. “The acceptable value of α must be above 0.6 (Hair et al., 2017). The article uses the exploratory factor analysis (EFA) technique to conduct dimensionality analysis indicated by the factor loading score (Eq .4). The general purpose of factor analytic techniques is to condense the information contained in the original construct into a smaller set of new composite dimensions or factors. All factorloading scores with a suggested level of 0.5 result in the satisfaction of the condition of uni-dimensionality confirmation (Hair et al., 2017).

$$\alpha = \left(\frac{k}{k-1} \right) \left(1 - \frac{\sum_{i=1}^k \sigma_y^2}{\sigma_x^2} \right) \tag{3}$$

Where: k : the number of items in the measure, σ_y^2 : variance associated with each, σ_x^2 : variance associated of the total scores.

$$X_i = W_{i1}F_1 + W_{i2}F_2 + W_{i3}F_3 + \dots + W_{im}F_m + W_iU_i \tag{4}$$

Where: X_i : Score of factor i, W_{im} : Factor score, F : Standardized measurement value, U_i : Standardized

TABLE 1. Demographic profile

	Categories	Frequency	Percent	Cumulative
Type of Industry	ICT Construction material	15	3.5%	3.5%
	Consumer Discretionary	45	10.4%	13.9%
	Textile	100	23.1%	37%
	Beverage	50	12.0%	49%
	Energy	17	4%	53%
	Agriculture	45	10%	63%
	Total	160	37%	100%
Number of employees	300-500	40	9.3%	9.3%
	400-700	60	13.9%	23.2%
	700-900	157	36.3%	59.5%
	>900	175	40.5%	100%
Total Sale (million USD)	<50	137	31.7%	31.7%
	50-100	150	34.7%	66.4%
	101-200	90	21%	87.4%
	200-400	45	10.4%	97.8%
	>400	10	2.2%	100%
Total		432	100%	

TABLE 2. Factor loading and construct reliabilities

Factors	Factor loadings	(α)
Green Strategy (GS)		0.821
Green strategy 1(GS 1)	0.712	
Green strategy 2(GS 2)	0.691	
Green strategy 3(GS 3)	0.813	
Green strategy 4(GS 4)	0.780	
Green strategy 5(GS 5)	0.658	
Green strategy 6(GS 6)	0.803	
Green strategy 7(GS 7)	0.751	
Green strategy 8(GS 8)	0.813	
Corporate Social Responsibility (CSR)		0.782
Corporate social responsibility 1(CSR 1)	0.663	
Corporate social responsibility 2(CSR 2)	0.643	
Corporate social responsibility 3(CSR 3)	0.703	
Corporate social responsibility 4(CSR 4)	0.715	
Corporate social responsibility 5(CSR 5)	0.820	
Corporate social responsibility 6(CSR 6)	0.681	
Green Innovation(GI)		0.742
Green innovation 1(GI 1)	0.730	
Green innovation 2(GI 2)	0.826	
Green innovation 3(GI 3)	0.694	
Green innovation 4(GI 4)	0.802	
Green innovation 5(GI 5)	0.704	
Green innovation 6(GI 6)	0.692	
Sustainable Performance (SP)		0.816
Sustainable performance 1(SP 1)	0.656	
Sustainable performance 2(SP 2)	0.701	
Sustainable performance 3(SP 3)	0.864	
Sustainable performance 4(SP 4)	0.721	
Sustainable performance 5(SP 5)	0.664	
Sustainable performance 6(SP 6)	0.708	

regression coefficient of characteristic factor i for variable i . m : Number of factors.

In our study, with an original set of 34 measurement items, there were only 26 items that qualified the factor loading score threshold of 0.5 with a minimum score of 0.643 and α of green strategy, corporate social responsibility, green innovation and sustainable performance are above 0.6.” Therefore, the results in Table 4 below satisfy reliability conditions.

5.2. The result of convergent and discriminant validity evaluation

In this study, we employ confirmatory factor analysis (CFA) technique to evaluate the goodness of fit of the conceptual model with the help of AMOS software. “Regarding overall model fitness, to make sure data fit to model well, root means the

square error of approximation (RMSEA) should be smaller than or equal to 0.083, Goodness-of-fit index (GFI)(Eq .5), and Comparative fit index (CFI) should satisfy thresholds of 0.91 (Hair et al., 2017). The test resulted acceptable fit for data set (GFI =0.919, CFI = 0.935 and RMSEA = 0.054).

$$GFI = 1 - \frac{F_t}{F_n} = 1 - \frac{x_t^2}{x_n^2} \quad (5)$$

Where: x_t^2 : The chi-square of the target model, x_n^2 : The chi-square of the null model, F: The corresponding minimum fit function value.

Furtherly, we continue to the CFA technique to examine convergent and discriminant validity. Two types of validity, namely convergent and discriminant validity, were examined to evaluate construct validity.

Convergent validity is evident when each measurement item correlates strongly with its theoretical construct. (Hair et al., 2017). The convergent validity of the construct is examined via average variance extracted (AVE)(Eq. 6) and composite reliabilities (CRs)(Eq .7). Acceptable convergent validity is achieved when AVE and CRs are higher than the suggested level of 0.5 and of 0.7, respectively (Hair et al., 2017).

$$AVE = \frac{\sum_{i=1}^k \partial_i^2}{\sum_{i=1}^k \partial_i^2 + \sum_{i=1}^k Var(e_i)} \quad (6)$$

Where: k is the number of items, ∂_i : the factor loading of item i, $Var(e_i)$: the variance of the error of item i.

$$CR = \frac{(ld_1 + ld_2 + \dots + ld_m)^2}{(ld_1 + ld_2 + \dots + ld_m)^2 + \sigma_1^2 + \sigma_2^2 + \dots + \sigma_m^2}$$

Where: CR: composite reliability CR of latent variable A, ld_1, ld_2, ld_m : the normalized load coefficient of the observed variable belonging to the latent variable A, m: number of observed variables of latent variable A, $\sigma_1^2, \sigma_2^2, \sigma_m^2$: variance of the measurement error of the observed variable belonging to the latent variable A with $\sigma_m^2 = 1 - ld_m^2$.

According to information are provided in Table 4. The AVE of all constructs is larger than 0.5, and The CRs of all constructs are also larger than 0.7. Therefore, convergent validity is satisfied.

Discriminant validity is achieved when the square root of Average Variance Extracted (AVE) Values

TABLE 3. AVE and CRs

	CRs	AVE
Green strategy	0.719	0.618
Corporate social responsibility	0.845	0.646
Green innovation	0.812	0.571
Sustainable performance	0.903	0.699

are greater than the inter-construct correlations (Hair et al., 2017). This means that the shared variance between each construct and its indicators is greater than the variance shared among other constructs (Hair et al., 2017). Discriminant validity was examined through the correlation matrix of constructs present in Table 6. The results in table 5 below show that the square root of AVE as the diagonal elements are larger than the off-diagonal correlations in rows and columns. Hence, the discriminant validity at the construct level is supported.” In sum, the reliability and validity of reflective construct measurements have been confirmed.

TABLE 4. Discriminant Validity

	GS	CSR	GI	
GS	0.786			
CSR	0.615	0.804		
GI	0.639	0.461	0.756	
SP	0.701	0.532	0.560	0.836

*Highlighted values in diagonal are square root of AVE and correlation are off-diagonal. Abbreviation: Green Strategy (GS), Corporate Social Responsibility (CSR), Green Innovation: (GI), Sustainable Performance (SP).

5.3. The result of hypothesis tests in conceptual models

5.3.1. The test of direct effects

The study uses the structural equation modeling (SEM) technique (Fig .2) to test direct relationships, Confident interval (Eq .8) and the outcomes of the tests are shown in table 6.

$$CI = \left(\bar{x} - \frac{cs}{\sqrt{n}}, \bar{x} + \frac{cs}{\sqrt{n}} \right) \quad (8)$$

As shown in table 7, green strategy ($\beta =0.412$; p-value < 0.05), green innovation ($\beta = 0.332$; p-value < 0.05) and corporate social responsibility ($\beta = 0.334$; p-value < 0.05) have positive impact on sustainable performance, respectively, so, H1, H3

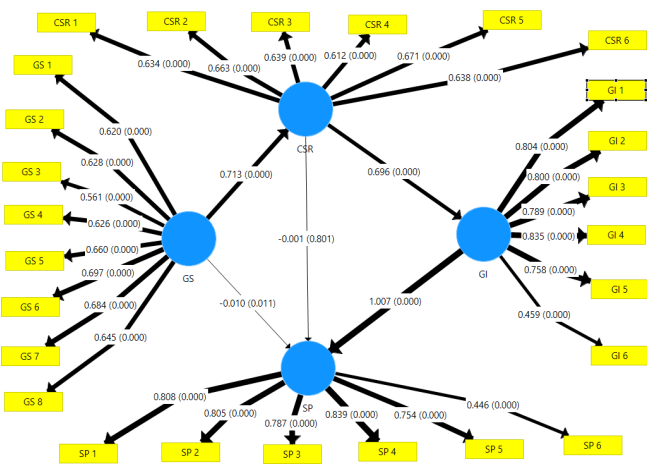


FIGURE 3. PLS-SEM analysis result

and H5 are supported. Next, the result of hypothesis test show that corporate social responsibility ($\beta = 0.504$; $p\text{-value} < 0.05$) has positive influence on green innovation, so, H2 is confirmed. Likewise, the effects of green strategy ($\beta = 0.682$; $p\text{-value} < 0.05$) on corporate social responsibility is significant, so, H4 is supported.

TABLE 5. Direct effects

Hypothesis	B (Beta)	SE	P values	Significance ($p < 0.05$)
H1: GS => SP	0.412	0.043	0.000	Yes
H2: CSR => GI	0.504	0.046	0.000	Yes
H3: GI => SP	0.332	0.039	0.000	Yes
H4: GS => CSR	0.682	0.176	0.000	Yes
H5: CSR => SP	0.334	0.142	0.000	Yes

Abbreviation: Green Strategy (GS), Corporate Social Responsibility (CSR), Green Innovation (GI), Sustainable Performance (SP).

5.3.2. The mediating effect of corporate social responsibility and green innovation

in below shows that green strategy has the indirect effect on sustainable performance through the mediating role of corporate social responsibility, so, H6 is supported. Likewise, corporate social responsibility also has the indirect impact on sustainable performance through the mediating role of green innovation, so, H7 is confirmed. Moreover, the results

of the hypothesis tests also confirm that corporate social responsibility and green innovation simultaneously play a partial mediating role on the linkage between green strategy and sustainable performance, so, H8 is supported.

TABLE 6. Mediating effects

Hypothesis	P values	SE	Confident interval	Significance ($p < 0.05$)?
H6: GS => CSR => SP	0.000	0.026	[0.378, 0.983]	Yes
H7: CSR => GI => SP	0.001	0.013	[0.459, 0.593]	Yes
H8: GS => CSR => GI => SP	0.000	0.037	[0.332, 0.815]	Yes

Abbreviation: Green Strategy (GS), Corporate Social Responsibility (CSR), Green Innovation (GI), Sustainable Performance (SP).

6. Discussion

Firstly, the paper supports the prior researches of Abbas and Sagsan (2019) and Indriastuti and Chariri (2021) who proposed that green strategy has a positive influence on sustainable performance.

Secondly, the article confirms that corporate social responsibility practices have significant and positive impact on green innovation directly which is same line with the researches of Le (2022), Padilla-Lozano and Collazzo (2021) and Shahazad et al. (2019). In addition, the result of this study also suggests that the outcomes of green innovation implementations would help company differentiate from competitors through producing eco-friendly products or services. As a result, this lead to enhanced competitive advantages and improved sustainable performance. this suggestion is also consistent with finding opinion of Abbas (2020), Lu et al. (2016), Ong et al. (2019), Le (2022). and Zhang et al. (2019).

Thirdly, the finding of this study supports the researches of Khalil and Nimmanunta (2021) and Le (2022) that propose that corporate social responsibility affect positively and directly on sustainable

performance. However, it contradicts with the findings of Oyewumi et al. (2018) and Huang et al. (2020) who said that corporate social responsibility does not have significant and positive effect sustainable performance because corporate social responsibility practices are considered as costs, not long-term investment.

Finally, the key finding of this article is the mediating role of corporate social responsibility and green innovation on the relationship between green strategy and sustainable performance. This finding indicates that incorporating both economic and non-economic benefits into the decision-making process may promote the corporate social responsibility activities and green innovation implications in manufacturers that, in turn, have positive impacts on sustainable performance. In current literatures, green strategy, corporate social responsibility and green innovation are explored non-collectively. Moreover, although the existing literatures provide evidences to prove that corporate social responsibility and green innovation contribute direct impacts on sustainable performance, the mediating role of these two constructs are rarely mentioned in current studies. Therefore, discussions in above reinforces the view that this paper is the first one that examine collectively the mediating role of the mediating role of corporate social responsibility and green innovation on the relationship between green strategy and sustainable performance.

Firstly, this paper extends the resource-based view and stakeholder theory through providing evidences that prove that green strategy, corporate social responsibility and green innovation are strategic resources for achieving sustainable performance as well as balancing the stakeholders' interests, respectively. Secondly, the findings of this article suggest that corporate social responsibility and green innovation mediate significantly the linkage between green strategy and sustainable performance. This indicate that addressing the environmental concerns of stakeholders in an ethical manner would drive company towards a long-term development. This, in turn, reduces the gap of legitimacy theory.

7. Conclusion

This article has the following practical implications. At first, this study provide insight into how

green strategy has indirect effect sustainable performance through corporate social responsibility and green innovation in developing country like Vietnam. The manufacturers are motivated to provide training activities about how to protect environment which help them adaptable with changing environment. In addition to financial objectives, companies should include environmental and social objectives in practicing key performance indicators (KPIs). In this way, manufacturers will save energy, dispose waste properly, improve efficiency of production and develop environmentally friendly products or services. In turn, this leads to balancing stakeholders' interests, differentiating themselves from competitors and enhancing corporate reputation and image.

Secondly, globalization and economic growth are two key drivers of the global warming (Razzaq et al., 2021). Globalization is inevitable and economic growth is imperative for viability. Therefore, how a company maintain sustainable development is an increased concern for its stakeholders. Moreover, due to rapid advances in information and communication technology, especially booming in e-commerce and social networks, customers have more power in buying decisions. The business environment is more competitive than ever before, thus, there is a call for practicing green innovation to enhance company image and legitimacy in customer's mind. All the above analytical results are consistent with the analysis results according to the IPMA model (Fig.3)

Finally, in the context of an emerging economy like Vietnam where major manufacturers are small and medium size and profit-oriented companies. In addition, they are highly correlated with environmental issues because their production activities consume natural resource and energy generating air pollution and carbon dioxide (CO₂) emissions. Therefore, shifting profit-oriented to green-oriented business is compulsory choice for Vietnamese manufacturers, if they want to survive and development in long-term.

8. Limitations and further researches

The paper has limitations that should be considered when interpreting the results, and these limitations also open avenues for further research. First, this study is conducted in the context of the Vietnamese

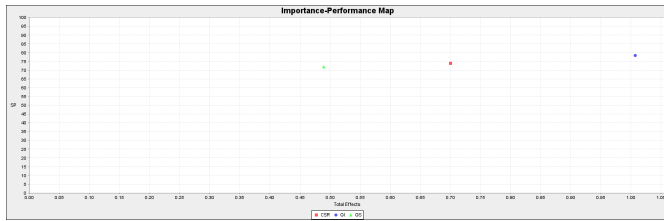


FIGURE 4. IPMA analysis chart

manufacturing sector only while different characteristics of other or multiple sectors may have impacts on the study to some extent. Further researches should consider the contexts of multiple sectors. Secondly, in this paper, we did not examine the direct association between green strategy and green innovation, so, further research will examine this association. Lastly, the research method applied in this study is the quantitative method, thus, future research may carry out the qualitative method or consider the combination of both methods to diversify research approaches for this field.

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