

THE IMPACT OF GREEN RELATIONSHIP MANAGEMENT ON CORPORATE GREEN PERFORMANCE: THE MEDIATING ROLE OF GREEN OPERATIONS MANAGEMENT IN MANUFACTURING ENTERPRISES IN VIETNAM

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ABSTRACT

This study aims to explore the relationship between green relationship management, green operations management, and green performance in manufacturing enterprises in Vietnam. This study surveyed 400 executives and senior managers of manufacturing enterprises in Vietnam using a regional quota sampling method to collect data on variables such as green relationship management, operations management green, and green performance. The structural equation model was analyzed using SmartPLS software. Research results show that green relationship management has a positive impact on corporate green performance, and green operations management plays a mediating role in this relationship. This shows that focusing on building green relationships with stakeholders along with good management of green operations in the enterprise will help improve green performance. The study contributes to the theory and practice of green management, providing empirical evidence on the impact of green relationship management and the mediating role of green operations management on corporate green performance.

1. INTRODUCTION

In the context of climate change and increasing environmental concerns, the adoption of green management practices has become very important for manufacturing enterprises. Green relationship management and green operations management are considered key factors affecting the green performance of enterprises. This study aims to explore the mediating role of green operations management

in the relationship between green relationship management and the green performance of enterprises in manufacturing enterprises in Vietnam.

Green relationship management involves building and maintaining relationships with stakeholders (e.g., customers, suppliers, governments, etc.) to create value and efficiency in the use of resources while minimizing adverse environmental impacts

(Eiadat et al., 2008; Zhu et al., 2008). Green operations management involves the design, implementation, and control of green-oriented production processes (Diabat & Govindan, 2011; Mollenkopf et al., 2010). The green performance of a business refers to the extent to which a business achieves environmental goals such as emission reduction, energy, and resource consumption, as well as compliance with environmental standards and regulations (Zhu et al., 2012). Previous studies have shown that green relations management (GR) and green operations management (GO) play an important role in improving the green performance (GP) of manufacturing enterprises (Eltayeb et al., 2011). In addition, Ng et al., (2013) also affirmed that green relationship management (GR) helps create green value for the organization, thereby improving the green performance of the enterprise. However, most of this research has been conducted in developed economies, and few studies have focused on manufacturing enterprises in Vietnam. As we know Vietnam is one of the fastest-growing economies with increasing industrial production, so research on green management in this field is essential.

The author surveyed 400 executives and senior managers of manufacturing enterprises in Vietnam using a regional quota sampling method to collect data on variables such as green relationship management, green operations management, and green performance. The results of the study show that green relationship management has a positive effect on the green performance of enterprises, and green activity management plays a mediating role in this relationship. This study provides empirical evidence on the key role of green relationship management and green operations management on the green performance of enterprises in Vietnam. The results of the study can help policymakers and

manufacturing enterprises better understand how to develop and implement effective green management strategies, thereby contributing to the sustainable development of the manufacturing industry in Vietnam.

2. THEORETICAL BACKGROUND AND RESEARCH METHOD

2.1. Theoretical background

2.1.1. Green relationship management

Green relationship management (GR) focuses on building and managing relationships with stakeholders to support and promote green activities in businesses (Rao & Holt, 2005). This includes enhancing collaboration and information sharing with stakeholders, facilitating their participation in decision-making, and solving environmental problems (Sarkis et al., 2010). At the same time, businesses need to ensure transparency and accountability in green activities, creating trust for stakeholders (Seuring & Müller, 2008; Vachon & Klassen, 2008). The author identifies questions to assess green relationship management (external connections) based on the research of Laari et al., (2016), as follows:

2.1.2. Green operations management

Green operations management (GO) is an important concept in implementing a business's sustainable development strategy. GO refers to the design, operation, and improvement of business processes to minimize negative impacts on the environment (Zhu & Sarkis, 2004). According to Srivastava (2007), GO includes activities such as green product design, green procurement, green supply chain management, green manufacturing, green logistics, and waste management. These activities aim to optimize the use of natural resources, energy, and other resources during business operations, thereby minimizing

negative impacts on the environment (Kuo et al., 2019). One of the basic theories related to GO is agency theory. This theory posits that when there is a division between owners and operators, problems of incentive and information asymmetry arise, leading to inappropriate behavior by the operator (Jensen

& Meckling, 1976). In the Green operations management context, this theory explains how managers may not pay attention to environmental issues without appropriate control and motivation from owners (Surroca et al., 2010).

Table 1. Scale questions "Green Relationship Management"

Variable name	Question
GR ₁	Our company collaborates with suppliers to take environmental issues into account in product design
GR ₂	Our company develops inbound logistics with suppliers to be more environmentally friendly
GR ₃	Our company and our suppliers have a clear understanding of their responsibilities regarding environmental issues
GR ₄	Our company prioritizes suppliers with environmental management systems
GR ₅	Our company works together with customers to take environmental issues into account in product design
GR ₆	Our company and our customers have a clear and mutual understanding of responsibilities regarding environmental issues.
GR ₇	Customers have asked us for information about our environmental compliance
GR ₈	Our customers have asked our company to ensure the sustainable practices of our suppliers
GR ₉	Our customers asked us to implement an environmental management system

[Source: The research of Laari et al., (2016)]

In addition, resource-based view theory is also an important foundation of GO. According to this theory, the distinct resources and capabilities of an enterprise will affect its sustainable competitiveness (Barney, 1991). In the GO context, capabilities related to environmental management such as waste treatment capabilities, energy-saving capabilities, etc. Can become a source of competitive advantage for businesses (Paulraj, 2011).

The authors identify questions to evaluate Green operations management (internal

connection) based on research by (Ninlawan et al., 2010) and Hsu et al., as follows:

2.1.3. Green performance

According to (Zsidisin and Siferd, 2001): “Green performance is defined as the positive results of green initiatives for the natural environment inside and outside the company”. This includes the environmental impacts and improvements resulting from a company's internal sustainability activities as well as the impacts of its external green supply chain activities. This comprehensive assessment of green performance allows organizations to assess the overall environmental impact of their

supply chain management efforts by considering the environmental outcomes of their operations. The company's internal and cooperative relationships with suppliers, distributors, etc., and other partners, can gain a more comprehensive understanding of the company's green achievements. This integrated view of green performance is important for

guiding supply chain sustainability strategies and assessing progress toward environmental goals.

The author identifies the questions for green performance assessment based on the research of (Cousins et al.,2019) and (Zhu et al.,2008) as follows:

Table 2. Questions about the "Green Operations Management " scale

Variable name	Question
GO ₁	Our company's packaging is reusable
GO ₂	Our company's packaging uses as little material as possible
GO ₃	Our company evaluates environmental impact for product development/improvement
GO ₄	Our company develops products with recyclable raw materials
GO ₅	Our company develops products with the lowest resource consumption
GO ₆	Our company develops products with long service life.
GO ₇	Our company purchases based on environmental specifications established by product design
GO ₈	Our purchasing process is carried out with ISO 14001-certified partners
GO ₉	Our purchasing process follows procedures that minimize environmental impact
GO ₁₀	Our purchasing process follows product labeling standards to minimize environmental impact

[Source: Ninlawan et al., 2010 and Hsu et al.,]

Table 3. Questions about the "Green Performance" scale

Variable name	Question
GP ₁	Our company has increased material recycling over the past three years
GP ₂	Our company has reduced emissions over the past three years
GP ₃	Our company has reduced resource use/waste over the past three years
GP ₄	Our company has reduced the use of toxic/environmentally harmful materials over the past three years

[Source: the research of Cousins et al.,2019 and Zhu et al.,2008]

2.2. Hypotheses development

2.2.1. The impact of green relationship management on green performance

According to some recent studies, it can be seen that green relationship management (GR) refers to building, maintaining, and promoting green relationships with stakeholders, including suppliers and customers, customers, and communities (Alkhidir & Zailani, 2020). Research by Alkhidir and Zailani (2020) shows that GR has a positive and significant impact on green performance. In particular, GR helps create cooperation and green information sharing between parties, promoting the sharing of green resources and technology, thereby improving green capacity and minimizing the environmental impact of activities business. Similarly, Zaid et al., (2021) study concluded that GR has a positive influence on green performance through promoting information sharing, collaboration, and green activities with stakeholders. This contributes to improved environmental management, efficient use of resources, and reduced organizational emissions (Zaid et al., 2021). In addition, research by Ojo et al., (2019) shows that GR also has an indirect impact on green performance through promoting green innovation and green capabilities of the organization. Green relationships with stakeholders help facilitate the sharing of green knowledge, technology, and resources, thereby enhancing an organization's green innovation and capabilities (Ojo et al., 2019). In summary, studies have shown that green relationship management plays an important role in enhancing the green performance of organizations through promoting cooperation and sharing information and green resources between related parties.

Based on the above findings, the authors propose the following hypothesis:

H₁: green relationship management has a positive impact on green performance.

2.2.2. The mediating role of green operations management (GO) between green relationship management (GR) and green performance (GP)

Although green relationship management plays an important role in green performance, it also depends on green operations management. Green relationships between organizations have a significant impact on their green practices and environmental sustainability efforts.

According to research by Zaid et al., (2021), GR has a positive impact on green operations management (GO), including activities such as green management, green procurement, green production, and green distribution. Green relationships with stakeholders help facilitate and promote the implementation of these green operations management. GO then contributes to improving green performance through efficient use of resources, minimizing environmental impact, and enhancing the ability to meet customers' green requirements (Zaid et al., 2021). Similarly, Ahmad et al., (2020) study also showed that GO plays a mediating role in the relationship between GR and green performance. Specifically, GR promotes green activities such as green supply management, green production, and green distribution. These green activities then help improve the organization's green performance by reducing emissions and saving energy and resources (Ahmad et al., 2020). The study of Zaid and Bon (2018) also showed the mediating role of GO in the relationship between GR and green performance. GR has a positive impact on GO, including activities such as green procurement, green production, and green logistics. These

green activities then have a positive impact on the organization's green performance (Zaid & Bon, 2018). In summary, studies have shown that green operations management (GO) plays an important mediating role in the relationship between green relationship management (GR) and green performance. Green relationship management promotes green operations management, so contributing to improving an organization's green performance. Therefore, referring to the existing literature, the author hypothesized that::

H_{2a}: Green relationship management has a positive impact on green operations management.

H_{2b}: Green operations management has a positive and significant impact on green performance

H_{2c}: Green Relationship management significantly impacts green performance

2.3. Research method

The author conducted an interdisciplinary survey of manufacturing enterprises in Vietnam. Target users are managers from departments related to supply or purchasing. The study used a quota sampling method, with equal proportions of participants from the North, Central, and South regions. The survey was conducted from early March 2024 to late May 2024 using an online questionnaire designed using Google Forms. Data were collected through a survey of executives and senior managers of manufacturing enterprises in Vietnam. The author received a total of 400 responses, of which 368 were ultimately usable (response rate approximately 56.5%). The structural model was analyzed through many stages using SmartPLS software. The model synthesizing the impact of green relationship management on the green performance of

manufacturing enterprises in Vietnam is shown in Figure 1 below.

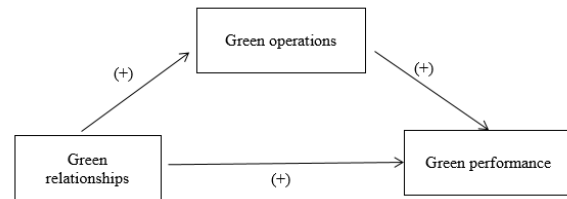


Figure 1. Proposed research model

3. FINDINGS AND DISCUSSION

3.1. Measuring variables

The variables in this study were developed based on previous research and measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The analysis results excluded 9 variables (GO1, GR4; GR1; GR6; GR9; GO7; GO8; GR8; GO5) due to loading factor below 0.7.

Table 4. The analysis results excluded 9 variables

GO ₁	Our company's packaging is reusable
GO ₅	Our company develops products with the lowest resource consumption
GO ₇	Our company purchases based on environmental specifications established by product design
GO ₈	Our purchasing process is carried out with ISO 14001-certified partners
GR ₁	Our company collaborates with suppliers to take environmental issues into account in product design
GR ₄	Our company prioritizes suppliers with environmental management systems
GR ₆	Our company and our customers have a clear and mutual understanding of responsibilities regarding environmental issues.
GR ₈	Our customers have asked our company to ensure the sustainable practices of our suppliers
GR ₉	Our customers asked us to implement an environmental management system

This decision was made to ensure the reliability and validity of the constructs. The suitability and fit of the remaining variables and the overall structural model are presented in detailed statistical analyses, including Table 5 and Figure 2, which provide evidence of the research methodology's rigor and quality.

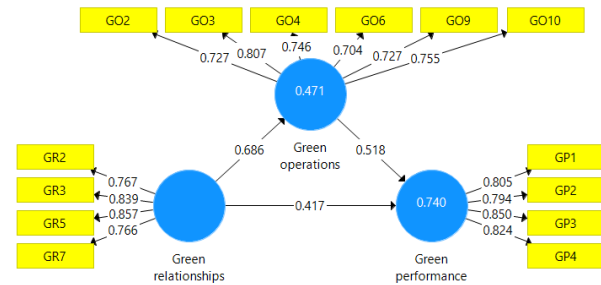


Figure 2. Model parameters

Table 5. Confirmatory factor analysis

Structure	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)	Outer Loadings	VIF
Green operations	0.839	0.841	0.882	0.555		
GO ₂					0.727	1,660
GO ₃					0.807	2,116
GO ₄					0.746	1,737
GO ₆					0.704	1,506
GO ₉					0.727	1,616
GO ₁₀					0.755	1,690
Green relationships	0.823	0.826	0.883	0.654		
GR ₂					0.767	1,699
GR ₃					0.839	2,197
GR ₅					0.857	2,136
GR ₇					0.766	1,528
Green performance	0.836	0.839	0.890	0.670		
GP ₁					0.805	1,737
GP ₂					0.794	1,729
GP ₃					0.850	2,040
GP ₄					0.824	1,808

3.2. Analysis of reliability and validity

The study used Confirmatory Factor Analysis (CFA) to test the validity and reliability of the constructs. Table 5 also presents the results of the Confirmatory Factor Analysis, showing the factor loadings, average variance extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha (CA).

The appropriate fit indices of the model are $\chi^2 = 848.911$, NFI = 0.904 (>0.9) and SRMR = 0.073 (<0.08), showing that the model fit level is acceptable on All constructs are greater than 0.7 and are significant at the $p < \text{level } 0.05$, indicating convergence of the constructs (Fornell and Larcker, 1981). Composite reliability and Cronbach's Alpha confirm the reliability of the measures used in the study,

with all values exceeding the acceptable threshold of 0.7.

3.3. Common method variance

The phenomenon of common variance occurs when a common factor related to the measurement method influences different assessments. In the study, the authors used Harman's single-factor analysis, a Post Hoc procedure, to test whether an individual factor contributed to differences in outcomes. data (Chang et al., 2010). The result of testing the variance of the first component is 43,855 < 50% (Table 6), showing that there is no common variance of the method.

Table 6. Results of common method variance analysis

Component	Initial Eigenvalues		
	Total	Variance %	Cumulative %
1	6.140	43,855	43,855
2	1.165	8,318	52,173
3	.860	6.146	58,319
4	.796	5,687	64,006
5	.737	5,263	69,269
6	.641	4,577	73,847
7	.559	3,994	77,841
8	.550	3,926	81,767
9	.529	3,775	85,542
10	.518	3,702	89,245
11	.431	3,080	92,325
12	.402	2,871	95,195
13	.366	2,616	97,811
14	.306	2.189	100,000

Extraction Method: Principal Component Analysis

3.4. Evaluate the structural model

In structural modeling, both the causal relationship and the measurement model are evaluated simultaneously. The results show that all indicators meet the requirements: SRMR=0.073 < 0.08; GoF = 0.616 > 0.36, considered significant (Vinzi et al., 2010). All hypotheses were supported by the data at a significance level of $p < 0.05$ (Table 7). These findings confirm that the structural model is suitable with high predictive ability.

Table 7. Hypothesis testing results

Relationship	GR→GO	GO→GP	GR→GP
Original Sample (O)	0.686	0.518	0.417
Sample Mean (M)	0.685	0.522	0.414
t Statistics	26.572	15.549	11.286
P Values	0.000	0.000	0.000

Based on the experimental results, we can conclude that the effects of the variables are proportional:

- Effect of green relationships on green activities: $\beta=0.686$ ($p=0.000$).
- Effect of green activities on green performance: $\beta=0.518$ ($p=0.000$).
- Effect of green relationships on green performance: $\beta=0.417$ ($p=0.000$).

Therefore, the hypotheses H1, H2a, and H2b have been proven to be completely consistent.

3.5. Analyze the role of mediating variables

To test hypothesis H2c, the author analyzed the mediating role. The results for Green Relationship Management significantly impact green performance ($\beta = 0.686$; $t = 26.572$; $p < 0.001$) (Table 8). Therefore, green performance management plays a positive mediating role in the relationship between

green relationship management and green performance.

Table 8. Results of analyzing the role of mediating variables

Relationship	GR→GO	GO→GP	GR→GP
Original Sample (O)	0.686	0.518	0.773
Sample Mean (M)	0.685	0.522	0.772
t Statistics	26,572	15,549	39,720
P Values	0.000	0.000	0.000

4. DISCUSSION AND CONCLUSION

4.1. Discussion and conclusion

In this study, I studied the impact of green relationship management on corporate green performance: The mediating role of green operations management in manufacturing enterprises in Vietnam shows all the indicators. The numbers meet the necessary criteria, confirming its suitability with highly intelligent prediction capabilities.

This study provides valuable empirical evidence on the important role of green relationship management (GR) and green operations management (GO) in enhancing corporate green performance (GP) at manufacturing enterprises in Vietnam. The results of the study show that green relationship management has a positive impact on green operations management, and green operations management has a positive effect on the green performance of enterprises. Moreover, green operations management plays an intermediary role in the relationship between green relationship management and the green performance of manufacturing enterprises in Vietnam.

This result is consistent with previous studies on the impact of green relationship

management on green operations management. This study contributes to expanding previous studies by examining the intermediary role of green operations management in the relationship between green relationship management and the green performance of manufacturing enterprises in Vietnam.

The research results show that green relationship management has a positive and significant impact on green operations management, which shows that establishing and maintaining green relationships with stakeholders such as suppliers, customers, and government will promote green operations management in businesses. In addition, green operations management was also found to have a mediating role in the relationship between green relationship management and green performance, demonstrating that green operations management is an important mechanism through which green relationship management influences green performance.

The research results have practical implications for business managers and policymakers as follows:

First, the research results show that building and maintaining green relationships with stakeholders such as suppliers, customers, and government will help promote green operations management in businesses. Therefore, businesses need to focus on building sustainable green relationships with strategic partners. Businesses need to focus on activities such as information sharing, joint planning, and collaboration on green initiatives with their partners to strengthen green relationship management.

Second, the research results also show that green operations management such as green production, green procurement, green logistics, etc., play an important intermediary role in promoting enterprises' green

performance. Therefore, businesses need to prioritize investing and implementing green operations management to improve green performance. In sum, the combination of green relationship management and green operations management will help manufacturing enterprises in Vietnam achieve better green.

From a policy perspective, this study suggests that the government needs to have policies and measures to support businesses in establishing, green relationships management and implementing green operations management, thereby promoting green performance and green economic development in Vietnam.

4.2. Limitations and future research

This study only focuses on manufacturing enterprises in Vietnam, so the results may not apply to other types of businesses such as services or commerce. Therefore, more research is needed in other industries to test the universality of the model. The study uses cross-sectional data, so it is not possible to determine the cause-and-effect relationship between variables. To further clarify this relationship, further longitudinal studies are needed in the future. Besides, the study only used self-report scales so it may be affected by the subjective bias of respondents. Combining other data sources such as observations, in-depth interviews or secondary data will help enhance the objectivity of the results. Finally, this study only explores the mediating role of green operations management, but there may be other mediating factors such as environmental competence, leadership green commitment, etc. that need further research.

Despite the above limitations, this study still provides important and useful evidence for managers and policymakers in promoting the green development of manufacturing enterprises in Vietnam.

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