

Uncertain Supply Chain Management

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Green supply chain management and firm efficiency in an emerging economy

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Developing green supply chains is a solution that many countries pursue to improve supply chain efficiency and thereby make businesses and the economy more efficient and optimal. Researching the impact of green supply chain management on the performance of businesses in Vietnam, the study conducted a survey of 210 businesses operating in Vietnam and through quantitative analysis, the research results showed that the green supply chain practices help the supply chain develop more sustainably and thus can improve business performance. Research also suggests that business leadership and strategic planning ability have a positive impact on business performance.

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1. Introduction

The problem of environmental pollution is becoming one of the global problems, it affects all countries, including developing or developed countries (Nguyen et al, 2013). Consumption of fossil energy sources, production dependent on energy sources and human activities increase the possibility of emissions into the environment and thus negatively affect environmental conditions and quality of life. In recent years, human influence on the environment has increasingly degraded environmental quality and thus directly affected human health, longevity and quality of life. Therefore, countries need to have appropriate policies to promote production and consumption activities to ensure environmental sustainability and sustainable development. The concern of people and businesses for the environment is also increasing, showing that the whole society should be responsible for environmental issues to implement sustainable economic development strategies. In production activities, the role of the supply chain is indispensable (Nguyen et al., 2018). The benefits of the supply chain are reflected in the ability to supply raw materials and fuel inputs for production activities at low costs, and thus create a competitive advantage for the product. Furthermore, an effective supply chain also helps the product consumption process become timely and brings higher economic efficiency to businesses. Therefore, businesses always choose the right supply chain for their business to improve production and business efficiency and create profits for the business, shareholders and the economy.

The problem of environmental pollution has become urgent in the current period, requiring countries to have new development strategies when implementing sustainable growth and development strategies. That is, economic development needs to be associated with environmental protection to help promote sustainable economic growth and long-term development, especially the advantages of the fourth technological revolution affirmed by Chatchawanchanchanakij et al. (2023). According to Le et al. (2022) who believed that promoting renewable energy consumption solutions can be a useful solution to help economies become cleaner. However, research by Asante-Darko and Osei (2024) suggested that promoting the development of green supply chains is an urgent pursuit for all countries, including Vietnam. As is known, Vietnam is considered a country with a deep level of economic integration, an attractive place for foreign direct investors to choose to expand investment, therefore Vietnam's import and export South growth is strong. By 2023, Vietnam's total trade will exceed 600 billion USD

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and make Vietnam one of the countries with high levels of trade in the region and the world. Therefore, developing an effective supply chain becomes an important goal to turn Vietnam into a country with a higher level of economic development, and achieve the goal of becoming a middle-income country. average level by 2045. From those arguments, it can be seen that developing green supply chains to optimize economic activities becomes important, promoting business operations more effectively, and is desirable. that the Vietnamese government in general and Vietnamese businesses in particular want to aim for. Therefore, researching the impact of green supply chain practices on business operations is urgent in order to evaluate strategies to promote green growth in Vietnam in recent times, and thereby help scientists, administrators and Vietnam evaluate the impact of green supply chain practices on the economy, especially business operations. The research results help to more fully evaluate the effectiveness of green supply chains and strategies to promote green supply chains in the current period.

2. Literature review

Supply chain development in the current period has become extremely important to increase the level of contribution to socio-economic development. When the supply chain develops, it helps the economy reduce operating costs and helps businesses have more resources to invest in development. Therefore, countries all want to improve their logistics and supply chain systems to increase economic efficiency and at the same time businesses also benefit. The fourth industrial revolution affirms the benefits of supply chains for economic development. Furthermore, transforming and developing green supply chains both ensures development goals and sustainability goals. Therefore, Nguyen et al. (2019) and Nguyen et al. (2024) believed that developing more renewable energy sources in Vietnam is a process that helps make the economy greener. Research on the benefits of green supply chain management has been researched by a number of authors, but is still lacking in Vietnam. Research all confirms the benefits of green supply chains for businesses and affirms that policies to promote effective supply chains are urgent. Research by Asante-Darko and Osei (2024) suggests that businesses are starting to pay attention to sustainability as a factor that constitutes supply chain competitiveness and development in the current period and affirms its ability to Company effort determines the development of a sustainable supply chain and thereby improves the company's financial performance. Therefore, companies with high leadership and management capacity are able to more quickly promote the benefits of sustainable supply chain development and contribute to the development of businesses in the marketplace.

The study by Fu et al. (2022) argues that socio-economic changes change customer lifestyles and organizational operations, and supply chain performance plays an important role in production, service, and fulfillment on social, economic and environmental goals. Especially developing the supply chain with the goal of sustainable development to help businesses achieve their goals of overcoming challenges in a fluctuating business environment and being economically effective. Meanwhile, technological advances and high competition in business force organizations to use appropriate strategies to streamline business operations. Specifically, a sustainable green supply chain helps significantly improve the financial performance of businesses, and also affirms that the green supply chain has the ability to effectively promote overall business strategy operations to optimize profits. beneficial for businesses and the economy. Especially in the context of an increase in environmental pollution increasing the burden on businesses and society, therefore promoting green supply chains to reduce unnecessary costs and indirectly help production output becomes more optimal. Research by Govindan et al. (2020) affirms that the sustainable development of supply chains and company performance have become closely linked, and more and more companies are applying sustainable activities in supply chains and services. services, and most believe there is a positive relationship between sustainability and company performance, suggesting that increasing supply chain sustainability through building a sustainable supply chain can brings many benefits to businesses and the economy. The study also suggests that manufacturing industries have a greater level of impact than service industries, partly showing that manufacturing enterprises are more affected by the supply chain, thereby improving supply chain performance. It shows that the supply chain management promotes the efficiency of manufacturing enterprises more than service enterprises. This benefit also shows that countries with developed manufacturing industries and industrial development trends can receive many benefits when developing green supply chains.

Given that environmental factors are becoming a concern for countries and businesses to implement their development plans, development linked to the environment has the potential to improve the quality of life today. Abbas (2024) argued that companies and their leaders focus on improving resource efficiency and at the same time minimizing negative impacts on society, health, productivity and the environment, promoting value-creating activities. In the context of the supply chain causing a number of environmental dangers including transportation, production and use of packaging plastic, greening must be implemented in supply chain activities. Green supply chain practices therefore help counter the growing pressures in the sustainable manufacturing sector. First, businesses apply advanced, environmentally friendly methods and technology to minimize the adverse impacts of products and services while also considering the ability to comply with sustainable standards. Also consider transformational and transactional leadership for green supply chains and corporate performance. Indeed, transformational leadership has a significant impact on green supply chain practices and corporate performance, confirming the importance of senior management involvement in green initiatives and supply chain maturity to improve business performance and ensure sustainability in development.

Given that sustainable development and green supply chain management are considered, especially in developing economies in Asia, the study by Amjad et al. (2022) asks whether green supply chain management has the potential to increase competition and investment efficiency. Based on 350 surveys of businesses in Pakistan, the study suggests that green supply chain management activities have a positive impact on company performance, including increasing business competitiveness and investment efficiency. Therefore, increasing green supply chain activities increases investment efficiency, then business efficiency is improved to meet the requirements of bosses, shareholders and business development. Khan et al. (2024) argued that businesses must strive to improve operational efficiency by enhancing organizational image and limiting negative impacts on the environment. Therefore, organizations focus on sustainable organizational performance based on economic, social and environmental performance, thereby increasing revenue and profits, improving organizational image, and reducing threats. Understanding the environment is the desired goal of many businesses in the current period. Furthermore, improving green supply chain efficiency helps improve reputation, customer satisfaction and loyalty, and economic efficiency. Khan et al. (2024) also believed that ecological design has a positive relationship with social and environmental performance. Green production and green logistics are positively related to social and environmental performance, and increased cooperation with customers has a positive impact on social performance. At the same time, improving green supply chain efficiency improves business efficiency. Through this study, the research results confirm the practical and theoretical benefits of green supply chains for business development. This result requires governments to have solutions to develop green supply chains to reduce social costs and improve operational efficiency of businesses and the economy.

From the results of the above studies, the studies mostly confirm the positive impact of green supply chain practices on business performance, and at the same time green supply chain practices are inevitable to help countries Join together to limit the impact of climate change and negative impacts on the environment that reduce economic efficiency. Therefore, economies need to transform the traditional growth model to a modern one, which emphasizes the role of science, technology and innovation in the economy while minimizing the impact of economic growth. effects of excessive energy consumption, converting fossil energy to renewable energy, promoting green supply chains to boost the performance of businesses in particular and the economy in general. Therefore, the goal of this study is to quantify the impact of green supply chain practices on business financial performance, and thereby quantify each factor affecting business operations.

3. Data and methodology

In this study, we surveyed 210 businesses operating in northern Vietnam, which have clear and surveyable supply chain operations. The sample size is determined to ensure quality regression when the minimum sample size is not less than 5 times the number of scales, so a sample size of 210 is completely capable of meeting the requirements when conducting research. save this. During the data collection process, the study also focused on handling errors during the survey and making adjustments to suit the research objectives, taking that as the basis for performing estimated regression analysis. The regression equation is expected to be as follows:

$$PROFIT_t = \beta_0 + \beta_1 GSCM_t + \beta_2 LEAD_t + \beta_3 SUPER_t + \beta_4 STRA_t + \varepsilon_t$$

In which, $PROFIT_t$ is a factor that shows the efficiency of an enterprise's business operations, measured through the enterprise's ability to achieve efficiency in business.

$GSCM_t$ is a factor demonstrating green supply chain management, a factor reflecting the level of greening the supply chain in economic activities;

$LEAD_t$ is a factor that represents the elements of the board of directors, expressed through the leadership orientation of the business;

$SUPER_t$ is a factor that demonstrates an enterprise's ability to supervise its general operations. Enterprises with effective supervision mechanisms often have high economic benefits;

$STRA_t$ is a factor that reflects the development strategy of an enterprise. When an enterprise implements a clear and appropriate development strategy, it has the opportunity to develop and achieve high financial efficiency;

4. Results

4.1. Descriptive statistics

According to descriptive statistical analysis, the fields of operation of businesses in this survey mainly come from manufacturing, construction and trading businesses, accounting for 23.81%, 42.86% and 21.43% respectively. There are only a few businesses outside the above group. This also accurately reflects that businesses in Vietnam mainly come from construction, manufacturing and trading businesses. Regarding where businesses operation, research results show that most businesses come from Hanoi, accounting for 41.90% (inner city of Hanoi) and 29.52% (outer suburbs of Hanoi), respectively, and also reflects that Hanoi is the capital of Vietnam and a city with a large number of businesses. Regarding annual revenue, most of the businesses in this study have revenue of less than 10 billion when there are 145 businesses corresponding to

69.05% of the number, followed by 48 businesses with revenue between 10 and 50 billion and corresponding to the rate of 22.86%. There are not really many large enterprises in this survey.

Table 1
Descriptive statistics

	No.	Quantity	Percentage
Field of activity	Construction	90	42.86%
	Manufacturing	50	23.81%
	Trading business	45	21.43%
	Others	15	7.14%
Place of operation of the business	Inner Hanoi	88	41.90%
	Skirts of Hanoi	62	29.52%
	Bac Ninh	52	24.76%
	Other areas	8	3.81%
Annual revenue	Under 10 billion	145	69.05%
	10 to 50 billion	48	22.86%
	50 to 100 billion	17	8.10%
	Over 100 billion	10	4.76%

Source: Authors' analysis

4.2. Cronbach's alpha

To evaluate the reliability of the scale, the study performed Cronbach's alpha analysis, with the following results:

Table 2
Cronbach's alpha

Variable	Scales	Cronbach's alpha
PROFIT	4	0.803
GSCM	4	0.812
LEAD	5	0.798
SUPER	4	0.842
STRA	5	0.810

Source: Authors' analysis

Table 3
Rotated Component Matrix

Scales	Rotated Component Matrix			
	1	2	3	4
GSCM1	0.843			
GSCM3	0.822			
GSCM2	0.803			
GSCM4	0.786			
SUPER1		0.824		
SUPER3		0.812		
SUPER4		0.798		
SUPER2		0.776		
LEAD1			0.802	
LEAD4			0.788	
LEAD3			0.767	
LEAD2			0.754	
LEAD5			0.743	
STRA2				0.756
STRA1				0.724
STRA3				0.710
STRA5				0.698
STRA4				0.672

Source: Authors' analysis

Table 4
KNO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.803
Bartlett's Test of Sphericity	Approx. Chi-Square	4654.121
	df	278
	Sig.	.000

Source: Authors' analysis

Table 2 shows that Cronbach's alpha values are all greater than 0.6, thereby showing the reliability of the scale and variables selected in this regression model, therefore, these variables can be used to perform analysis. Factor discovery analysis. The results of factor discovery show that the values converge and ensure the reliability of the research results. According to KMO, Bartlett's Test also shows that the analytical model is guaranteed.

4.3. Results

Table 5

Results

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	Multilinearity	
		B	S.E	Beta			Tolerance	VIF
1	Cons	3.125	0.277		3.743	0.000		
	GSCM	0.324	0.054	0.345	2.853	0.000	0.914	1.0941
	LEAD	0.287	0.043	0.298	3.764	0.000	0.953	1.0493
	SUPER	0.213	0.042	0.289	0.923	0.301	0.932	1.0730
	STRA	0.241	0.048	0.276	3.346	0.000	0.956	1.0460

Source: Authors' analysis

The regression results show that green supply chain practices (GSCM) have a positive and statistically significant impact, confirming the positive impact of green supply chain practices on business performance. This result supports the hypothesis that economies should implement greening activities to increase benefits for businesses and economic efficiency. Indeed, the effects of climate change due to deterioration of living environment quality have increased costs for businesses and society, and thus reduced business performance. Therefore, increasing green supply chain practices helps supply chain activities become less environmentally impactful and thus reduces the cost burden on businesses and society, so the economy should be more effective. This evidence supports Vietnam's strategy of promoting green growth through improving supply chain efficiency, which in turn helps the economy become more efficient due to less disruptive activities. affect the environment. This result is consistent with Amjad et al. (2022) arguing that green supply chain management has the potential to increase competition and investment efficiency. Govindan et al. (2020) affirmed that the sustainable development of the supply chain and the company's performance become closely intertwined and thus improve supply chain efficiency through green supply chain development solutions that have the ability to improve the performance of businesses and the economy.

The research results also confirm that business leadership, especially the performance of the board of directors, helps improve business performance. The effectiveness of the board of directors helps implement business strategy more effectively, and thus brings positive benefits to the business and increases its operational efficiency. This conclusion supports the view that it is necessary to improve the operating efficiency of enterprises through the operating mechanism of the board of directors. Therefore, businesses need to increase the activities of the board of directors, expand the participation of many members, especially the participation of independent members and foreign members to add criticism channels to the board of directors' activities and make the business more efficient.

5. Conclusion

Environmental pollution is becoming a social problem, so economic activities need to shift to being less dependent on energy consumption or consuming cleaner energy sources. At the same time, countries implement policies to promote green growth to green the economy, including implementing green supply chain management to help optimize supply chain operations and reduce costs for economic activities and thereby improve supply chain efficiency. Therefore, the benefits of green supply chain practices are urgent and a goal pursued by many countries, including Vietnam. Researching the impact of green supply chains on business performance in Vietnam, the study suggests that green supply chain practices help the supply chain develop more sustainably and therefore have the ability to improve performance of the enterprise. Research also suggests that business leadership and strategic planning ability have a positive impact on business performance.

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