

# Uncertain Supply Chain Management

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## The role of green supply chain management (GSCM) on the competitiveness and performance of Indonesian manufacturing companies

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### ABSTRACT

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There are several environmental issues that are in the spotlight globally, including: global warming, depletion of the ozone layer, the greenhouse effect, and acid rain. This problem is a concern and needs serious action for human survival. Supply chain activities are suspected of contributing to environmental damage. The purpose of this study is to analyze the effect of Green Supply Chain Management on competitiveness, the effect of Green Supply Chain Management on Performance and the effect of competitiveness on Performance. The study used quantitative methods and research data were obtained using online questionnaires distributed via social media. The research respondents were managers of manufacturing companies in Indonesia and the number of samples used was 540 respondents who were determined using a purposive sampling technique. Data analysis in this study used Structural Equation Modeling (SEM) and software used for data processing by SmartPLS. The results showed that Green Supply Chain Management had a positive and significant effect on competitiveness, Green Supply Chain Management did not have any positive and significant effect on Performance and competitiveness had a positive and significant effect on Performance.

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### 1. Introduction

In the Industrial Revolution 4.0 the development of the manufacturing industry sector in Indonesia is growing rapidly and involves various manufacturing activities. Current industrial developments result in more complex competition between industrial sectors. This creates various positive and negative impacts on various aspects, one of which is the environment. Environmental impacts experienced during the production process, starting from the procurement of raw materials, then continuing in the production process, to the stage of product reuse at the final stage (Zhang et al., 2022). The environmental management system was developed to provide basic guidelines so that business activities run in harmony with the environment (Affandi et al., 2020). Environmentally friendly supply chain management emphasizes environmentally friendly purchasing processes, manufacturing and material management activities, environmentally friendly distribution and marketing and reserve logistics processes (Yunus & Michalisin, 2016). The goal of green supply chain management is to consider the environmental impact of the manufacturing process. Green supply chains can maximize profits by considering the impact on a manufacturing process by knowing the condition of a supply chain performance. One of the manufacturing industries to pay attention to is the food industry (Yang et al., 2013). Industrial developments and increasing consumer concern for the environment as well as issues regarding the concept of an environmentally sound industry have forced the industry to make adjustments to the concept of green industries in every business process, which later developed into a Green Supply Chain Management (GSCM).

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Green Supply Chain Management (GSCM) is an important strategy to achieve sustainable development for companies (Yang et al., 2013). The GSCM concept is supply chain management related to environmental aspects. Supply chain management based on “green” is important to implement because so far supply chain performance measures usually do not pay attention to the impact on the environment and identification to improve performance. Meanwhile, performance measurement is defined as the process of measuring the effectiveness and efficiency of actions. Companies also will not be able to compete or survive unless they develop strategies to achieve cost reduction, quality improvement and productivity improvement. The problem is how to manage the interrelationships between strategies because usually implementing strategies to achieve cost reductions can have a negative impact on quality or result in reduced productivity (Astawa et al., 2021).

According to Novitasari et al. (2021); Tseng et al. (2021) every company will make every effort to increase productivity, efficiency, fast and easy service, and create various new innovations to remain superior and survive in the market. If the company wants to at least survive in business competition, then the company must achieve this advantage by producing good performance. To get good performance, companies are required to provide appropriate strategic planning. This must be realized immediately because technological developments that are increasingly innovative and varied make the development of the company. According to Testa and Iraldo (2010) companies in implementing supply chain management need to increase competitiveness which is manifested in improving operational performance. Information sharing is an important element in supply chain management, since transparent and accurate information sharing can speed up the supply chain process from suppliers to markets or consumers. Supply chain management has a positive and significant effect on company performance (Rao & Holt, 2005). Supply chain management affects performance, and supply chain management affects competitiveness (Sheu & Chen, 2012). In addition, supply chain management has a positive and significant effect on company performance (Tan et al., 2019).

## 2. Literature Review and Hypothesis Development

### 2.1 Green supply chain management (GSCM)

According to Novitasari et al. (2021), green supply chain management is the integration of environmental thinking into systems, including product design, material purchasing and supplier selection, manufacturing processes, delivery of final products to consumers and product management. An environmentally friendly supply chain aims to limit waste in industrial systems to save energy and prevent dissipation of hazardous materials into the environment. Tan et al. (2019) and Tseng et al. (2021) defines supply chain management (SCM) as a network of suppliers, manufacturing, assembly, distribution, and logistics facilities that form the function of purchasing materials, transforming materials into semi-finished goods and finished products as well as the distribution process of products it to consumers. SCM is an activity which includes coordination, scheduling and control of procurement, production, inventory and delivery of products or services to customers which includes daily administration, operations, logistics and information processing from customers to suppliers. Green supply chain is very important for the successful implementation of industrial ecosystem and industrial ecology (Testa & Iraldo, 2010). All activities along the supply chain have risks and negative impacts on the environment (Sheu & Chen, 2012). The objective of environmentally conscious supply chain management is to consider the final and present environmental impacts of all products and processes in order to protect the natural environment (Tseng et al., 2021).

The basic principles of SCM should include five things, namely: (1) The principle of integration, which means that all the elements involved in the SCM series are in one compact unit and are aware of their interdependence; (2) The principle of networking, which denotes that all elements are in a harmonious working relationship; (3) End to end principle, which implies that the operational process includes the most upstream supplier elements to the most downstream consumers; (4) The principle of interdependence. Each element in SCM realizes that mutually beneficial cooperation is needed to achieve competitive advantage; (5) The principle of communication. This means that data accuracy becomes the blood of the network to become information and material accuracy (Khaksar et al., 2016; Laari et al., 2018).

### 2.2 Company competitiveness

Company competitiveness is part of the company's ability to produce products or services to meet international and national market needs (Mukhsin & Suryanto, 2022). So, it is not imaginary that the existence of company competitiveness is carried out in order to obtain high profits and it is hoped that it will be sustainable. Company competitiveness is part of the existence of a form of capability or advantage that is used as a strategic plan in creating part of the accumulated value of the company, is not carried out by competitors and is difficult to imitate by competitors (Yang et al., 2013; Zhang et al., 2022). Company competitiveness is part of the degree to which a corporation can easily meet market demands, both domestically and internationally, in terms of producing goods and services. Competitiveness is the ability to produce goods and services that meet international testing, and at the same time can maintain a high and sustainable level of income, or the ability of the region to generate high levels of income and employment opportunities while remaining open to external competition (Yunus & Michalisin, 2016; Zhang et al., 2022). According to Purwanto et al. (2020) and Vafaei et al. (2019), national competitiveness is a contribution of a country's ability to achieve, or maintain an advantageous position compared to other countries in a

number of its key sectors. World Economic Forum (WEF), an institution that regularly publishes the “Global Competitiveness Report” defines competitiveness as the ability of a national economy to achieve sustainable high economic growth. Its components include appropriate policies, appropriate institutions, other supporting economic characteristics, the realization of high and sustainable economic growth. There are several factors that support the competitiveness of an industry, including the expertise or education level of workers, entrepreneur skills, availability of capital, good organizational and management systems (according to business needs), availability of technology, availability of information, and availability of other inputs such as energy, raw materials, etc. (Zhang et al., 2022).

### 2.3 Performance

Company performance is a description or condition of the company which are the results of management activities. Company performance can be measured using financial analysis tools. The information used to measure company performance is taken from financial reports or other reports (Masoumik et al., 2014). This is done to find out the good and bad of a company which will later reflect work performance in a certain period. Company performance is a result achieved by the company in a certain period. Measurement and assessment of financial performance are interconnected with each other. Performance measurement is a measure of the efficiency and effectiveness of a company in operating its business during the accounting period. Financial performance is the result or achievement that has been achieved by company management in carrying out its function of managing company assets effectively during a certain period (Mukhsin & Suryanto, 2022). Financial performance is needed by companies to find out and evaluate the level of success of the company based on the financial activities that have been carried out. Company performance is the ability of a company to manage the existing resources so that it can provide value to the company. By knowing the performance of a company, it is easy to measure the level of efficiency and productivity of the company. Besides, it is also useful to evaluate company performance to find out how far a company has developed. The definition of performance is a function of the worker's ability to accept work goals, the level of goal attainment and the interaction between goals and worker abilities (Laari et al., 2018; Marhamati & Azizi, 2017). The definition of performance appears to be complicated since it recognizes performance as a function of the abilities possessed by workers with the aim of the work to be carried out. Performance is a general term used for some or all of the actions or activities of an organization in a period with reference to standard amounts such as past or projected costs, on the basis of efficiency, accountability or management accountability (Wanasida et al., 2020).

## 3. Hypothesis Development

### 3.1 Green supply chain management relationship and competitiveness

Supply chain design, planning, and operating decisions play an important role in determining the success or failure of an organization. The application of supply chain management at a higher level plays an important role in increasing the company's competitive advantage. Laari et al. (2018) found that green supply chain management had a positive and significant effect on company competitiveness and performance. Therefore, we propose the following hypothesis,

**H<sub>1</sub>:** *Green supply chain management has a significant effect on competitiveness.*

*The relationship between green supply chain management, competitiveness and performance*

Zhang et al. (2022) stated based on the competency approach that competitive resources come from strategy, structure, competency, innovation, and tangible and intangible resources. The findings of this study are both descriptive and indicator measurement models. Production quality is a priority in its application according to respondents' assessment and has a dominant contribution in reflecting the company's competitiveness. High quality performance is very important for the success of operations and can affect the company's competitive advantage position. The competitiveness measurement model is adopted from the measurement indicators. Therefore, we propose the following,

**H<sub>2</sub>:** *Green supply chain management has a significant effect on company performance.*

**H<sub>3</sub>:** *Competitiveness has a significant effect on company performance.*

## 4. Method

This study used quantitative methods and research data were obtained using online questionnaires distributed via social media. The research respondents were managers of manufacturing companies and the number of samples used was 540 respondents who were determined using a purposive sampling technique. Data analysis in this study used Structural Equation Modelling (SEM) and software used for data processing by AMOS 26.

5. Result and Discussion

Reliability and Average Variance Extracted (AVE)

Reliability of each variable shows the high coefficient in terms of Cronbach’s Alpha and Composite Reliability (more than 0.700) and also Average Variance Extracted (AVE – measured the convergent validity) of each variable has met the criteria of validity (more than 0.500) as described in the table below.

**Table 1**  
Reliability and AVE

No	Variables	Cronbach’s Alpha	Composite Reliability	AVE
1	Green supply chain management	0.846	0.901	0.634
2	Competitiveness	0.950	0.952	0.771
3	Performance	0.934	0.953	0.835

Path Coefficients

Path Coefficients on Research Framework of Achievement Motivation can be described in figure below.

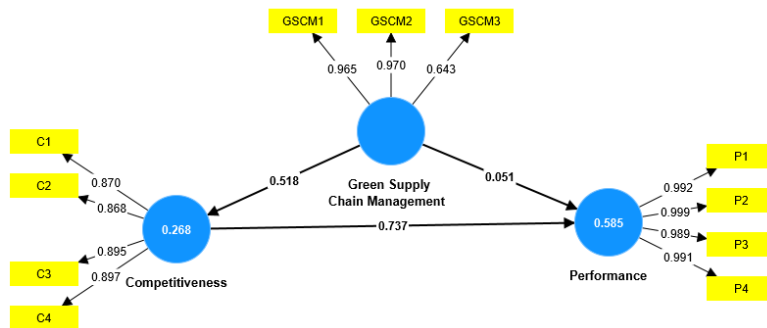


Fig. 1. Validity Testing

Research Hypotheses Tested

Based on the path coefficients mentioned above it can be found that all research hypotheses were tested as described on the Table 2 below.

**Table 2**  
Hypotheses Tested

No	Hypoteses	Path Coefficients	Significant Level	Results
1	H1: Green supply chain management - competitiveness	0.518	p<0.050	Supported
2	H2: Green supply chain management - performance	0.051	p>0.050	Not supported
3	H3: Competitiveness - performance	0.737	p<0.050	Supported

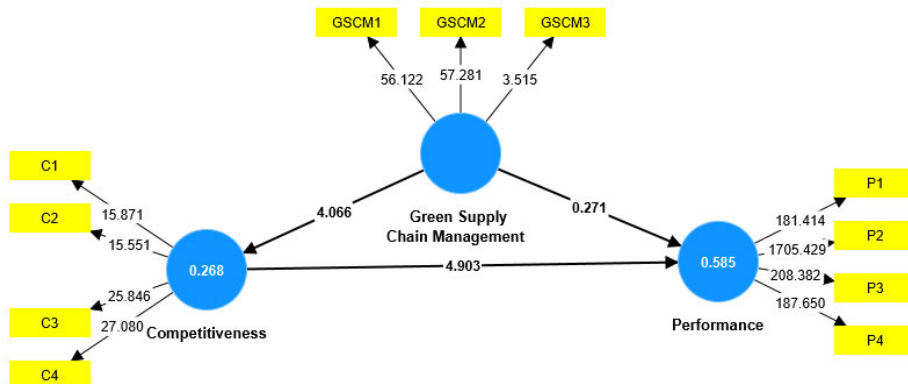


Fig. 2. Hypothesis Testing

Based on the results of the study, the direct influence test and the hypothesis the research aims to answer whether the proposed hypothesis can be accepted or rejected. The results of testing the direct effect hypothesis can be explained as follows:

### *5.1 The effect of green supply chain management on competitiveness*

Based on the results, we understand that the estimated value of the path coefficient of the direct influence of supply chain management integration on competitiveness was 0.518 (p-value = 0.050). The results of this study are in line with Masoumik et al. (2014) and Mukhsin and Suryanto (2022). Supply chain design, planning, and operating decisions play an important role in determining the success or the failure of an organization. According to Khaksar et al. (2016) and Laari et al. (2018), green supply chain management had a positive and significant effect on company competitiveness and performance. These results were reinforced by the results of Marhamati and Azizi (2017), Martusa (2013) and Masoumik et al. (2014) but the results are not consistent with the results of Laari et al. (2018) and Marhamati and Azizi (2017), that the supply chain has no significant effect on competitive advantage in small companies.

### *5.2 The effect of green supply chain management on company performance*

The results of testing have indicated that the estimated value of the path coefficient of the direct influence of green supply chain management on firm performance was 0.051 (p-value > 0.050). The test results can prove the reality that occurs to rejected the hypothesis. Khaksar et al. (2016) and Laari et al. (2018) also found that green supply chain management had a positive and significant effect on company competitiveness and performance. These results were reinforced by the results of research by Marhamati and Azizi (2017) who also found that supply chain management has a positive contribution to performance and competitiveness. Another opinion by Permana and Soediantono (2022) states that green supply chain management has a positive and significant effect on the competitiveness and performance of companies. The results of this study support the statement of Baah and Jin (2019) that GSCM has a significant effect on financial performance, operational performance and customer satisfaction. Then it also supports its findings that provide evidence that GSCM is the main driver of the company's operational performance, that a successful GSCM strategic vision is built on the foundation effective management leadership, which creates and communicates the strategic vision of the company's GSCM.

### *5.3. The effect of competitiveness on company performance*

The results of testing the direct effect of competitiveness on operational performance obtained an estimated path coefficient value of 0.737 (p-value < 0.050). The test results indicate that there is sufficient evidence to accept the hypothesis (H3) which states that competitiveness has a significant effect on company performance. The positive path coefficient means that high competitiveness can support increased company performance. The findings of this study are able to prove the existence of the theory of competitive advantage by Porter that competition is the essence of the success and failure of the company and determines the accuracy of company activities that can support operational performance company. In addition, the findings of this study are consistent with the opinion of Zhang et al. (2022) who stated that competitive resources come from strategy, structure, competency, innovation, and tangible and intangible resources.

Besides, it supports the opinion that high quality performance is very important for the success of operations and can affect the company's competitive advantage position. The competitiveness measurement model is adopted from the measurement indicators. The results of interviews with respondents stated that the flexibility of the company and business partners especially suppliers in meeting supply needs can increase the company's ability to serve diverse consumer demands and tastes resulting in reductions in costs, stock outs, and lead times. In addition, the company's operational performance can always be achieved in accordance with the planned targets by company management. The conclusion that can be formulated is that competitiveness brings benefits to improving company performance. The results of this study are consistent with the findings of several previous researchers such as Vafaei et al. (2019); Cahyono et al. (2023) and Zhang et al. (2022).

Arijanto (2022) reported that through the implementation of the GSCM concept, the company will have the opportunity to increase the efficiency of logistics activities thereby reducing the company's total logistics costs. In an effort to provide products and services that are environmentally friendly, many companies focus only on their internal production processes in reducing energy use and the resulting waste. Khaksar et al. (2016) state that green initiatives cannot be carried out without the involvement of the supply chain management function, where the function of a company's supply chain management is to provide products and services from outside, so it is important for these companies to guarantee the quality of their supply, including compliance with green criteria. In addition to ensuring the quality of its supply, supplier competence can be used to improve overall green performance.

## **6. Conclusion**

Based on the results of the discussion and research findings, several conclusions can be put forward. Green supply chain management has a significant effect on company competitiveness. This proves that the implementation of GSCM in the manufacturing industry has been going well even though it has not been maximized so that the level of competitiveness is still

relatively moderate. So, it is hoped that there will be seriousness from managers and improvements in implementing production processes and the use of environmentally friendly raw materials. Green supply chain management has a significant effect on company performance, it is proven that the better the green supply chain management, the better it will improve company performance. These results indicate that the better the interactions carried out by the company with suppliers and customers in setting delivery standards and responding to customers can improve cost efficiency as a form of operational performance. Competitiveness has a significant effect on company performance. The results have proved that the stronger the company's competitiveness, the better the company's operational performance. The results of this study have also indicated that competitiveness embodied in the company's ability to produce high quality products directly affects the company's ability.

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