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\*Corresponding author: Ali Akbar,  
Department of Management, Faculty  
of Economics and Business,  
Universitas Trisakti, Jakarta,  
Indonesia.

E-mail: [aliakbarhus@gmail.com](mailto:aliakbarhus@gmail.com)

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## The Influence of Green Supply Chain Management Practices on Customers and Suppliers on Product Quality and Production Costs

Ali Akbar<sup>1</sup>, Wahyuningsih Santosa<sup>2</sup>, Ratna Darasih<sup>3</sup>

<sup>1,2,3</sup> Department of Management, Faculty of Economics and Business, Universitas Trisakti, Jakarta, Indonesia. Email: [aliakbarhus@gmail.com](mailto:aliakbarhus@gmail.com), [wahyuningsih@trisakti.ac.id](mailto:wahyuningsih@trisakti.ac.id), [ratnadarasih@gmail.com](mailto:ratnadarasih@gmail.com)

**Abstract:** This study aims to examine the effect of Green Supply Chain Management (MRPH) practices on product quality and production costs. As the concern for environmental sustainability increases, MRPH has become an important element in managing an effective and efficient supply chain. This study evaluates how the implementation of MRPH with customers and suppliers affects product cost and quality. This study found that MRPH provides significant benefits in reducing production costs and improving product quality through internal environmental management and green innovation. The results show that MRPH with suppliers contributes to operational flexibility and cost reduction, while MRPH with customers enhances positive product perception and company reputation. In addition to economic benefits, green practices in the supply chain also play an important role in minimizing environmental impacts, potentially increasing the company's competitiveness in an increasingly environmentally conscious market. This study provides insights on the importance of MRPH integration in their business strategy to achieve cost efficiency and long-term operational sustainability.

**Keywords:** Green Supply Chain Management, Product Quality, Production Cost.

### 1. INTRODUCTION

A global leader in digital transformation in energy management and automation, is calling for the importance of revamping the upstream-downstream supply chain of a company or industry to achieve sustainability amidst the world's megatrends that are bringing many changes to the business sector. In recent times, Green Supply Chain Management (GSCM) has grown into a concern from upstream to downstream supply chains. The phenomenon in Indonesia is "emphasizing the importance of reorganizing the upstream-downstream supply chain to achieve sustainability" (Electric, 2023).

Previous research shows that Green Supply Chain Management Practices can have a positive impact on product quality and company production costs. According to research by (Kumar, 2022), it shows that Green Supply Chain Management Practices can have a positive impact on product quality and company production costs. Some of the benefits that can be obtained by companies through internal environmental management practices are cost savings and increased company efficiency and improved product quality. In addition, the relationship between internal environmental management and quality management systems has also been proven in the literature. For example, an Environmental Management System (EMS) can have a positive impact on operational performance measures, such as quality, cost, and reduction of production waste. Proactive environmental management practices can also improve cost and delivery competitiveness. Green logistics management practices have also been shown to benefit companies in terms of performance. Therefore, it can be concluded that Green Supply Chain Management Practices can have a positive impact on product quality and production costs of companies based on the findings in the research that has been conducted.

## 2. LITERATURE REVIEW

Green supply chain management practices involve businesses taking steps to become more environmentally friendly in the way they manufacture and distribute products. These practices aim to reduce harm to the environment and promote sustainability (Mupfiga et al., 2024). Meanwhile, according to Firdiansyah et al (2021) Green Supply Chain Management practices can lead to improved corporate reputation, allowing businesses to reap many benefits, such as obtaining more permits and financial resources. It can be concluded that this is a form of action for harm reduction to the environment. Meanwhile, according to Yu et al (2014) Supply chain management practices with suppliers mean efforts to manage and coordinate activities between the focal company and its suppliers in the supply chain. Meanwhile, according to Kumar (2022) supply chain management with suppliers means working with companies that provide materials and goods to ensure everything is done in an environmentally friendly way. It focuses on the part of the supply chain where materials enter the company.

Green Supply Chain Management practices with customers are the application of supply chain management concepts and strategies that focus on environmental sustainability and customer satisfaction. According to (Chatzoudes & Chatzoglou, 2023) to guarantee a smooth flow of products or services throughout the supply chain, companies and their customers must collaborate and plan joint activities, called supply chain management with customers. This includes understanding customer demands, preferences, and requirements and organizing the supply chain to meet those needs. Product quality refers to how well a product performs its intended function and how well it is made (Irawan & Sitinjak, 2024). Meanwhile, according to Mikul & Mittal (2024) the characteristics and features of a product that determine its ability to meet customer expectations and meet their needs are referred to as product quality. Factors that affect perceived quality include brand reputation, product attributes, customer reviews, and consistency in delivering quality (Setyadi et al., 2024). Production Cost is the cost incurred by a company to produce a product or service. The product price is determined based on the cost of producing and marketing the product plus a certain amount to cover direct costs, overhead costs, and profit (Kotler and Keller, 2016). In this case, production costs are one of the factors determining the price value of goods and services.

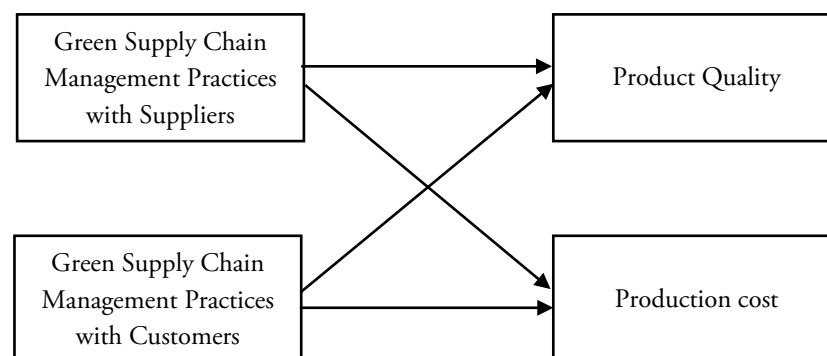


Figure 1. Conceptual Framework and Hypothesis

***H1: Green Supply Chain Management Practices with Suppliers have a positive effect on Product Quality***

Supply chain management practices that pay attention to environmental aspects by involving suppliers can make a positive contribution to product quality. A number of studies have highlighted the relationship between supply chain integration with suppliers and improved product quality. For example, a study by Kumar (2022) showed that close cooperation with suppliers in green practices can optimize production processes, reduce product defects, and improve overall quality. The study

confirms that the implementation of strict environmental standards can encourage suppliers to provide high-quality raw materials, which in turn can improve the quality of the products produced.

### ***H2: Green Supply Chain Management Practices with Customers have a positive effect on Product Quality***

A number of studies have highlighted the potential for reducing production costs through close collaboration between companies and customers in the context of green supply chain management. (Kumar, 2022) in his research found that supply chain integration with customers can reduce production costs by improving process efficiency and reducing waste. It can be interpreted that customer involvement in sustainable supply chain activities can result in more stable and reliable demand, reduced financing and inventory risks, thus potentially reducing overall production costs.

### ***H3: Green Supply Chain Management Practices with Suppliers have a positive effect on Product Costs***

Green Supply Chain Management practices with suppliers have a positive influence on production costs. This is supported by several studies that have been conducted. For example, research conducted by Chatzoudes & Chatzoglou (2022) shows that supply chain integration involving suppliers can reduce production costs. Similarly, research conducted by Kumar (2022) found that collaboration with suppliers in environmental management can improve manufacturing performance.

### ***H4: Green Supply Chain Management Practices with Customers have a positive effect on Product Cost***

Green Supply Chain Management practices with customers have a positive influence on production costs. This is supported by several studies that have been conducted. For example, research conducted by Chatzoudes & Chatzoglou (2022) shows that supply chain integration involving customers in environmental management practices can improve operational performance and reduce production costs. Another study conducted by Yu et al (2014) also found that collaboration in the supply chain that focuses on environmental management can improve manufacturing performance and reduce production costs.

## **3. RESEARCH DESIGN AND METHOD**

The data that will be obtained from this research based on the distribution of questionnaires to be carried out is primary data that will be used in research. While secondary data is used as a literature study (Library Research) by studying previous research that has been done. In determining the number of samples of respondents in this study, which refers to the Hair formula, namely by multiplying the total number of indicators in the questionnaire by a minimum of 5 and a maximum of 10 (Hair et al., 2019). In this study there are 13 indicators and will be multiplied by 10. So that the minimum limit of respondents is 130. This research uses a quantitative approach and this research design uses hypothesis testing. There are two types of variables that will be tested for their relationship and influence, namely. MRP practices with suppliers and MRP practices with customers as independent variables and production costs as dependent variables. This type of research uses data analysis methods. Data analysis methods refer to certain techniques or procedures used to process, understand, and interpret data collected in a study or project. Various data analysis methods are used depending on the type of data obtained and the research questions being asked. This study uses the Structural Equation Model (SEM) method, according to (Hair, 2019) is a multivariate statistical method that combines factor analysis and is used to examine the structural correlation between constructs and variables involved in the study. This study uses the Structural Equation Model (SEM) method, according to (Hair, 2019) is a multivariate statistical method that combines factor analysis

and is used to examine structural correlations between constructs and variables involved in research. SEM is used when proving and analyzing a hypothesis by testing the p-value with a confidence level of 5% ( $\alpha = 0,05$ ), so the conditions for making decisions are as follows (Hair, 2019):

- a. If the P-value is  $\leq \alpha = 0,05$  then the hypothesis is supported.
- b. If the P-value is  $> \alpha = 0,05$  then the hypothesis is rejected.

#### 4. RESULT AND DISCUSSION

##### 4.1. Respondent Characteristics

This research questionnaire was allowed to respondents who were employees of PT X as many as 160 employees. Respondents consisted of 42% (68 employees) Male and 58% (94 employees) Female, then respondents aged <20 there were 5.6% (9 employees), 20-30 there were 27.2% (44 employees), 31-40 there were 55.6% (90 employees), then 41-50 there were 10.5% (17 employees) and age > 50 there were 1.2% (2 employees). Based on the length of work, the results are <1 year there are 6.2% (10 employees), 1-5 years there are 40.1% (65 employees), 6-10 years there are 42.6% (69 employees), 11-15 there are 8.6% (14 employees) and >15 years there are 2.5% (4 employees). If based on education, employees whose last education level is SMA / SMK there are 37.7% (61 employees), D3 23.5% (38 employees), S1 32.7% (53 employees) and S2 / S3 6.1% (10 employees). If based on position, there are 96.3% (156 employees) of ordinary employees, 2.5% (4 employees) of managers and 1.2% (2 employees) of branch heads.

##### 4.2. Prerequisites Test

Table 1. Validity Test

No.	Statement	Factor Loading	Description
<b>Green Supply Chain Management Practices with Suppliers</b>			
1	Our company provides design specifications to suppliers that meet the environmental requirements for purchased goods.	.879	Valid
2	Our company cooperates with suppliers for environmental purposes.	.894	Valid
3	Suppliers are selected by our company using environmental criteria.	.897	Valid
4	Our company conducts environmental audits for internal management of suppliers	.890	Valid
<b>Green Supply Chain Management practices with customers</b>			
1	Our company works with customers to reduce the environmental impact of customer-related business activities.	.778	Valid
2	Our company cooperates with customers for green packaging.	.914	Valid
3	Our company works with customers to use less energy during product transportation.	.871	Valid
<b>Product Quality</b>			
1	Our company produces high-quality products that meet customer needs.	.913	Valid
2	Our company produces consistent quality products with low defect rates.	.907	Valid
3	Our Company's products can be relied upon to meet customer needs.	.891	Valid
<b>Product Cost</b>			
1	Our company produces products at low cost.	.858	Valid
2	Our company produces products with low overhead costs.	.868	Valid
3	Our company offers prices as low as or lower than competitors.	.904	Valid

The results of the validity test indicate that all indicators, starting from the Green Supply Chain Management Practices indicator with Suppliers to Product costs are all valid, so they can proceed to the next stage, namely the reliability test stage.

**Table 2. Reliability Test**

No.	Statement	Cronbach Alpha	Description
1	Green Supply Chain Management Practices with Suppliers	0.910	Reliable
2	Green Supply Chain Management practices with customers	0.817	Reliable
3	Product Quality	0.887	Reliable
4	Product Cost	0.850	Reliable

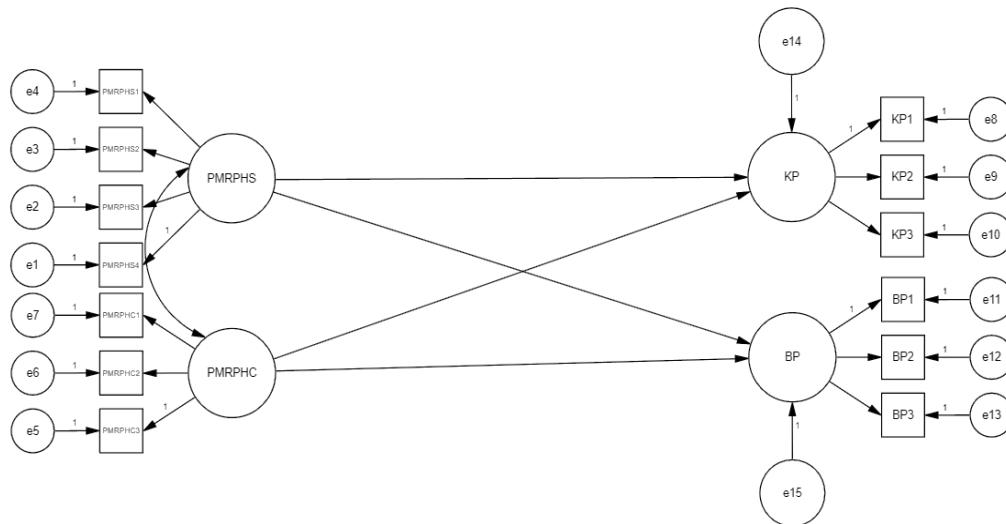
The Reliability Test results show that the variables of Green Supply Chain Management Practices with Suppliers, Green Supply Chain Management Practices with Customers, Product Quality, and Product Costs are reliable so that they can proceed to the next stage.

4.3. Goodness of Fit Test

**Table 3. Goodness of Fit Test**

Type Measurement	Indicator Measurement	Value	Recommended acceptance limits	Result
Absolut fit measures	P-Value	0.004	$\geq 0.05$	Poor fit
	ECVI	0.965	Closer to the Saturated value than independent	Goodnes of Fit
	RMSEA	0.059	$\leq 0.1$	Goodnes of Fit
Incremental fit Measures	IFI	0.976	$\geq 0.90$	Goodnes of Fit
	NFI	0.935	$\geq 0.90$	Goodnes of Fit
	TLI	0.968	$\geq 0.90$	Goodnes of Fit
	CFI	0.975	$\geq 0.90$	Goodnes of Fit
	RFI	0.915	$\geq 0.90$	Goodnes of Fit
	RMR	0.031	The smaller the better	Goodnes of Fit
Parsimonious fit measures	CMIN/DF	93.372	Lower limit 1, upper limit 5	Poor fit
	AIC	155.372	Closer to Saturate value than independent	Good of Fit

Based on the test results as listed in Table 3, it can be seen that the Goodness of Fit test results show variations in the suitability of the research model. Based on absolute measurements, a P-value of 0.004 indicates poor fit because the value is at 0.05. However, the ECVI value of 0.965 and RMSEA of 0.059 indicates Goodness Fit, in accordance with the criteria that the ECVI value is close to saturation value and RMSEA is less than 0.1. In the incremental fit measurement, the IFI, NFI, TLI, CFI, RFI values respectively have values of 0.976, 0.935, 0.968, 0.975, and 9.15, which means they have Goodness of Fit results because the values exceed 0.90. Then the RMR value also has Goodness of Fit results because the value is very small. Parsimonious fit measures show a CMIN/DF value of 93.372, which means Poorfit because it does not meet the criteria, namely the lower limit is 1 and the upper limit is 5. Meanwhile, AIC has a Goodness of Fit result because it has a value of 155.372 which is closer to saturated than independent. The following is the framework used for Hypothesis Testing:



**Figure 2. AMOS Calculation Result**  
(Sources: AMOS output, 2024)

4.4. Hypothesis Test

**Table 4. Hypothesis Test**

Hypothesis	Estimate	P-Value	Decision
Green Supply Chain Management practices with suppliers have a positive influence on product quality	-0.003	0.952	H1 is not supported
Green Supply Chain Management practices with customers have a positive influence on product quality	0.17	0.744	H2 is not supported
Green Supply Chain Management practices with suppliers have a positive influence on production costs	0.823	0.000	H3 is supported
Green Supply Chain Management practices with customers have a positive influence on production costs	0.712	0.000	H4 is supported

Hypothesis 1 in this study tests whether Green Supply Chain Management Practices with suppliers have a positive effect on Product Quality at at PT. YIMM. The results of the analysis show an estimated relationship of -0.003 with a P-Value of 0.952. Given that this study uses a two-tailed hypothesis test, the P-Value is divided by two, resulting in 0.476. This value is still far above the general significance limit of 0.05, indicating that the relationship being tested is not statistically significant. Therefore, the decision taken is that H1 is not supported, which means that Green Supply Chain Management Practices with suppliers do not have a positive effect on Product Quality at at PT. YIMM. This interpretation shows that efforts to improve product quality through green supply chain management practices have not provided significant results in this company. Hypothesis 2 in this study tests whether Green Supply Chain Management Practices with customers have a positive effect on product quality at at PT. YIMM. The results of the analysis show an estimated relationship of 0.17 with a P-Value of 0.744. Since this study uses a two-tailed hypothesis test, the P-Value is divided by two, resulting in a value of 0.372. This value is still far above the general significance limit of 0.05, indicating that the relationship being tested is not statistically significant. Therefore, the decision taken is that H2 is not supported, which means that Green Supply Chain Management Practices with customers do not have a positive effect on product quality at at PT. YIMM. This interpretation shows that although the company has implemented green supply chain management practices with customers, it has not had a significant impact on improving product quality in this company. Hypothesis 3 tests whether Green Supply Chain Management Practices with suppliers have

a positive effect on product quality at PT. YIMM. The results of the analysis show an estimated relationship of 0.823 with a P-Value of 0.000. Given that this study uses a two-tailed hypothesis test, the P-Value is divided by two, but still produces a value of 0.000, which is still far below the general significance limit of 0.05. This shows that the relationship being tested is very statistically significant. Therefore, the decision taken is H3 is supported, which means that Green Supply Chain Management Practices with suppliers have a significant positive effect on product quality at PT. YIMM. This interpretation shows that the implementation of green supply chain management practices with suppliers contributes significantly to improving the quality of the company's products. This indicates that cooperation with suppliers in environmentally friendly practices is effective in improving product quality at PT. YIMM. Hypothesis 4 in this study focuses on the effect of Green Supply Chain Management Practices with customers on production costs at PT. YIMM. Based on the results of the analysis in table 4.18, the estimate value of 0.712 indicates a positive effect between Green Supply Chain Management Practices with customers on production costs. With a p-value of 0.000 in the two-tailed analysis, which after being divided by two becomes  $0.000/2 = 0.000$ , this result is very significant because the p-value  $< 0.05$ . This indicates that Green Supply Chain Management Practices with customers are positively related to increasing production costs at PT. YIMM. These results can help PT YIMM understand the importance of green collaboration with customers for cost effectiveness, although it has the potential to increase production costs.

#### 4.5. Descriptive Statistics

**Table 5. Descriptive Statistics of Variables Related to Green Supply Chain Management and Product Metrics**

Statement	Mean	Std. Deviation
Green Supply Chain Management Practices with Suppliers	162	0.87341
Green Supply Chain Management Practices with Customers	163	0.75166
Product Quality	163	0.67811
Product Cost	163	0.76594

The mean value of the variable green supply chain management practices with suppliers is 162, green supply chain management practices with customers 163, product quality 163 and product cost 163. The standard deviation value of green supply chain management practices with suppliers is 0.87341, green supply chain management practices with customers is 0.75166, product quality is 0.67811 and product cost is 0.76594.

## 5. CONCLUSION

Green Supply Chain Management practices at PT. YIMM produced mixed findings related to their impact on product quality and cost efficiency. The implementation of green collaboration with suppliers did not have a significant positive impact on product quality. This shows that environmentally friendly efforts implemented through collaboration with suppliers tend to focus more on environmental sustainability aspects rather than directly influencing the quality standards of the final product. Likewise, green collaboration with customers also did not have a positive impact on product quality, even though these efforts had adopted environmentally friendly practices. However, Green Supply Chain Management practices with suppliers were proven to have a positive impact on product quality. This collaboration allows for the creation of better quality standards through the implementation of sustainable materials and processes that meet sustainability principles. In addition, green collaboration with customers has a positive impact on production cost efficiency. Steps such as the use of environmentally friendly materials, recycling, and optimization of production processes not only reduce waste but also reduce operational costs. These results show the importance of choosing a strategic approach in implementing green supply chain management. With the right focus, companies

can achieve a balance between environmental sustainability, improving product quality, and cost efficiency, which ultimately contributes to overall business sustainability.

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