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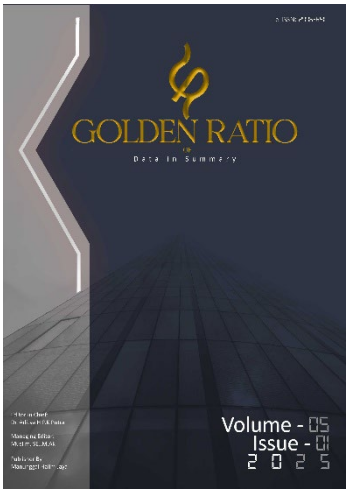

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DATA IN SUMMARY | ACCOUNTING, MANAGEMENT, BUSINESS, ECONOMIC

The Effect of the Implementation of Internal Green Supply Chain Management on Operational Flexibility, Delivery, Product Quality and Production Costs in Convection SME in Bogor City, Indonesia

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Abstract: This study aims to examine the effect of internal green supply chain management practices on operational flexibility, product quality, delivery efficiency, and production costs in convection SME in Bogor City. In the digital era and increasing awareness of sustainability, SME are required to adopt more environmentally friendly business practices to remain competitive. This study used a questionnaire method distributed to 153 respondents from convection SME in Bogor City. The results showed that the implementation of internal green supply chain practices had a significant effect on improving operational flexibility, product quality, and delivery efficiency, and was able to reduce production costs. These findings indicate the importance of integrating sustainability aspects in supply chain management to improve operational performance and competitiveness of SME.

Keywords: Internal Green Supply Chain Management, Operational Flexibility, Delivery, Product Quality, Production Cost.

1. INTRODUCTION

Technological developments, shifting cultural values, and demands for sustainability have become major factors driving social change in Indonesia (Surjanti et al., 2022). This phenomenon creates the foundation for changes in various aspects of life, including business practices and supply chain management. In today's digital era, technology plays a crucial role in shaping the way companies operate, with the adoption of digital solutions to improve the efficiency and sustainability of their operations. Shifting cultural values also influence the dynamics of business and supply chain management. Increasingly concerned about the environment and sustainability society influences consumer demand, which in turn drives companies to change their business practices to be greener. This is reflected in the increasing consumer interest in products and services produced with attention to environmental and social impacts. The demand for sustainability is also increasingly pressing. Climate change and global environmental issues are at the forefront of international forums, and countries, including Indonesia, are facing pressure to reduce their carbon footprint and implement more sustainable business practices. As a developing country with rich natural resources, Indonesia also has a responsibility to ensure that the country's economic growth does not have a negative impact on the environment. Operational flexibility is becoming a critical aspect in responding to rapid changes in an ever-changing business environment. Technology and innovation play a key role in creating this flexibility, with companies using automation and data analytics to improve their

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responsiveness to market changes (Ilmiyati & Munawaroh, 2016). Operational flexibility is becoming increasingly important in the context of complex and dynamic supply chains. Delivery efficiency, product quality and reducing production costs are also key areas of focus in the context of sustainability. Companies are seeking to improve their delivery efficiency to reduce their carbon emissions and operating costs. Product quality is also becoming an important aspect, with increasingly sustainability-conscious consumers opting for green and high-quality products. Reducing production costs through more sustainable practices is also becoming a priority for companies in the face of increasing economic and environmental pressures. Changes in business practices and supply chain management are also reflected in companies' efforts to build stronger relationships with stakeholders. More and more companies are integrating environmental, social and corporate governance considerations into their decisions, in response to increasing demands for transparency and accountability from stakeholders. This represents a paradigm shift in how companies view their role in society and the environment (Fatih & Zhang, 2023).

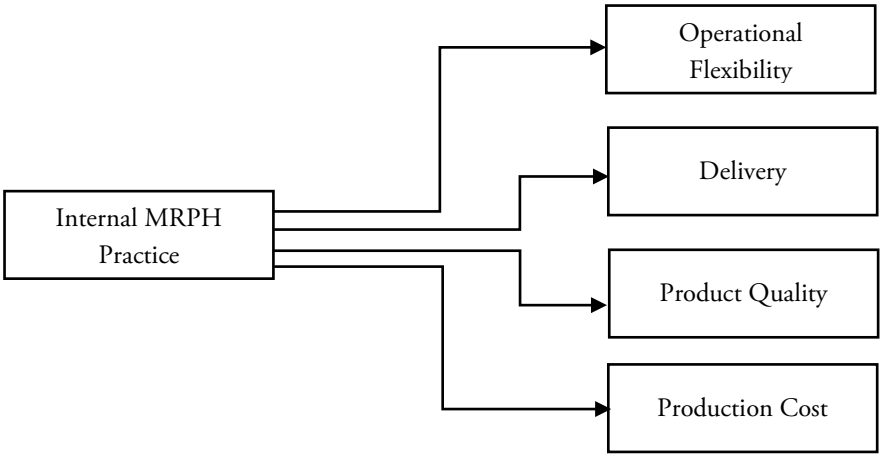

Figure 1. Conceptual Framework

H1: Internal Green Supply Chain Management Practices are positively related to Operational Flexibility.

Previous studies have shown that Internal Green Supply Chain Management Practices are positively related to operational flexibility, such as research conducted by (Razak & Ibrahim, 2020). showed that by integrating green approaches into their operations, businesses can not only reduce their environmental impact but also improve their ability to adapt and respond effectively to changing circumstances. Other studies have also shown that Internal Green Supply Chain Management (GSCM) Practices play a significant role in enhancing operational flexibility within a Company, Companies that focus on internal environmental management in their supply chain practices are better positioned to adapt and respond to changing operational needs. This practice helps organizations streamline their processes and optimize resource utilization to enhance operational flexibility. This alignment leads to a more sustainable and resilient supply chain, enabling better operational flexibility in a dynamic market environment (Nabila et al., 2022).

H2: Internal Green Supply Chain Management Practices are positively related to Delivery

Internal Green Supply Chain Management Practices are positively related to Shipping according to previous studies. Aligning Green Supply Chain Practices with internal environmental capabilities

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not only supports sustainable environmental goals but also contributes to improving operational shipping effectiveness in the industry. In addition, other studies have shown that internal green supply chain management practices can have a positive impact on shipping operations within a company (Haryanto & Lunarindiah, 2023). By incorporating a green approach in supply chain management, companies can optimize their shipping processes to be more efficient and environmentally friendly. Sustainable logistics practices help reduce carbon emissions and improve shipping reliability by streamlining transportation and distribution operations. Embracing green practices in logistics can contribute to better inventory management, reducing delays and increasing on-time delivery. Overall, integrating green supply chain practices internally can lead to more sustainable and effective shipping operations, benefiting both the company and the enviroment (Andini & Pratiknyo, 2017)

H3: Internal Green Supply Chain Management Practices are positively related to Product Quality.

Internal Green Supply Chain Management Practices are positively related to product quality, meaning that when companies focus on internal environmental management in their supply chain practices, it leads to better product quality. Previous research has shown that by emphasizing internal environmental management, companies can have a positive impact on their product quality and overall economic outcomes. Other research has also shown that implementing internal green supply chain management practices can have a positive impact on product quality; by focusing on environmentally friendly methods in the supply chain, companies can improve the overall quality of their products. Sustainability measures in operations can lead to better control over processes, which can result in higher product standards and consistency. Companies that prioritize sustainability internally are better positioned to deliver high-quality products that meet market demand and customer expectations (Sampepajung & Sumardi, 2022).

H4. Internal Green Supply Chain Management Practices are positively related to Production Costs.

By adopting internal green supply chain management practices, it will have a positive impact on production costs. By adopting sustainable strategies internally, companies can streamline processes, reduce waste, and lower energy consumption, all of which can lead to cost savings. Green initiatives such as using energy-efficient technologies and recycling materials can directly impact production costs by reducing costs. By optimizing internal operations with sustainable practices, companies can increase efficiency and reduce costs associated with resource consumption and waste management. Previous research has shown that companies that prioritize sustainability in their operations tend to experience improved cost management and operational performance. Other studies examining the same aspect have also shown similar results, this study shows that understanding the positive relationship between Internal Green Supply Chain Management helps in implementing this practice strategically, which has the potential to lead to cost efficiencies in the production process. By aligning Green Supply Chain Practices with internal environmental capabilities, companies can not only achieve their sustainability goals, but they can also reduce production costs through increased utilization (Khazaini et al., 2024).

Operational management is an activity that produces value in the form of goods and services by converting inputs into outputs. Meanwhile, according to operational management, it is an application of management science to organize production activities so that they are carried out effectively and

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efficiently (Givari, 2023). Supply chain management is about planning, designing, and managing the processes and information that connect all parties in the supply chain, with the aim of achieving common business goals with maximum efficiency and effectiveness (Afrizal Miradji, 2014). But according to Martin (2016) supply chain management is about getting the right product or service, in the right quantity, to the right place, at the right time, and at the right cost.

2. RESEARCH METHOD

This study uses a quantitative approach. This study uses the hypothesis testing method. This research design focuses on the influence of the relationship between characteristics of variables to provide a clearer picture. There are 3 variables to be tested, namely Internal MRPH Practices (independent variable), Operational Flexibility (dependent variable), Delivery (independent variable), Product Quality (dependent variable) and Production Costs (dependent variable). In this study, data collection used Cross Sectional because the distribution of surveys and data collection were carried out at one time. The Unit of Analysis used in this study were SME business actors in Bogor City. The population is not only humans but also objects and other natural objects. The population is also not just the number of objects or objects studied but includes all the characteristics or properties possessed by the subject or object. In this study, the samples taken came from the population of SME convection in Bogor City (Mudhifatul Jannah & Rahmawati, 2020).

This study uses a non-probability sampling method design and uses a purposive sampling technique. In this study, the criteria for determining respondents were SME convection actors in Bogor City. In determining the number of respondents in this study, it refers to the Hair formula, namely the total of all indicators in the questionnaire and a minimum multiplied by 5 and a maximum multiplied by 10 (Hair et al., 2019). In this study, there are 12 indicators and will be multiplied by 8 so that the minimum number of research samples is 144 respondents. The data were analyzed using SEM (Structural Equation Model) with AMOS software. The validity and reliability of the instrument were tested using CFA (confirmatory factor analysis) and Cronbach Alpha. The results of the validity test are determined based on the factor loading value, and a reference value ≥ 0.50 is considered valid. Data analysis methods include the Goodness of Fit test using various metrics such as chi-square, RMSEA, and CFI.

3. RESULTS AND DISCUSSION

3.1. Data Demography

In this study, primary data in the form of questionnaires submitted to employees and owners of SMEs in the Convection sector in the City of Bogor. This questionnaire not only asks for information related to variables, but also asks for information about gender, namely most respondents are male (70.6%) while women are (29.4%). In terms of age, most respondents are 20-30 years old, namely 67.5%. In terms of education, most respondents have a bachelor's degree (S1) as much as 46.4%, High School / Equivalent as much as 34.6%, Diploma as much as 17% and S2 / S3 as much as 2%. Based on the position, the majority are employees (58.2%) and owners (41.8%). Meanwhile, based on the length of time the business has been established, most businesses have been running for 1-5 years (51.3%), 6-10 years as much as 30.9%, and the rest less than 1 year (8.6%), 11-15 (6.6%), and more than 15 years (2.6%). Then finally, the characteristics based on the number of employees, most businesses have 11-15 employees (46.1%), then 1-5 (25%), 6-10 (23%), 16-20 (3.3%) and more than 20 (3.3%).

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3.2. Descriptive Statistics

The mean value of internal supply chain management practices is 4.183, which means that SME have a fairly good level of practice. While the mean value of operational flexibility is 2.6248, this shows that SME can adapt to changes in the market and meet customer needs. The mean value of product costs is 4.03483, this shows that SME can produce products at low costs and offer competitive prices to customers. The mean value of product quality is 2.8998, this shows that SME products have several advantages, but there is still room for improvement. And the mean value of delivery is 4.3355, this shows that SME can meet customer expectations in terms of delivery timeliness, reliability, and order fulfillment time.

3.3. Instrument Test and Goodness of Fit

Tabel 1. Loading Factor Result

No.	Measurement	Factor Loading	Information
Internal Green Supply Chain Management Practices			
1	Cross-functional cooperation for environmental improvement has been implemented in our SME	.844	Valid
2	Compliance programs and environmental audits have been well implemented in our SME	.830	Valid
3	Our SME have received environmental management certification in accordance with local government regulations	.842	Valid
4	An effective environmental management system has been implemented in our SME	.815	Valid
5	Internal performance evaluations in our SME have included environmental factors.	.824	Valid
6	Our SME prepare environmental reports periodically for internal evaluation	.681	Valid
Operational Flexibility			
1	Our SME are able to quickly modify products and services to meet customer needs.	.836	Valid
2	New products and services can be quickly introduced to the market by our SME.	.924	Valid
3	Our SME can quickly respond to changes in market demand.	.920	Valid
Delivery			
1	Our SME have an excellent record of on-time delivery to customers.	.782	Valid
2	Reliable delivery is provided to customers by our SME.	.901	Valid
3	The time for fulfilling customer orders by our SME is in line with expectations.	.846	Valid
Product Quality			
1	Our SME products have high performance that meet customer needs	.831	Valid
2	Our SME produce products with consistent quality and few defects.	.844	Valid
3	The reliability of our SME products meets customer needs.	.898	Valid
Product Cost			
1	Our SME can produce products at low cost.	.810	Valid
2	Low overhead costs have been successfully implemented by our SME in product production.	.723	Valid
3	The prices offered by our SME are comparable to or lower than those of our competitors.	.877	Valid

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The results of the validity analysis of statements related to SME management and operational practices show that all statements are valid with a loading factor value above 0.45. In the Internal Green Supply Chain Management Practices category, cross-functional cooperation (0.844), environmental compliance and audit programs (0.830), and environmental management certification (0.842) indicate good environmental management practices. Performance evaluation and environmental reports are also valid with values of 0.824 and 0.681. In the Operational Flexibility category, SME demonstrates rapid adaptation by modifying products and services (0.836), introducing new products quickly (0.924), and responding to changes in demand (0.920). The Delivery category shows on-time delivery (0.782), reliable delivery (0.901), and order fulfillment according to customer expectations (0.846). In the Product Quality category, SME have high-performance products (0.831), consistent quality (0.844), and high reliability (0.898). The Product Cost category shows lowcost production capability (0.810), low overhead cost (0.723), and competitive price (0.877). These results indicate that SME operate efficiently with quality products and competitive costs.

Table 2. Reliability Test Result

No	Measurement	Cronbach Alpha	Information
1	Internal Green Supply Chain Management Practices	.890	Reliable
2	Operational Flexibility	.875	Reliable
3	Delivery	.796	Reliable
3	Product Quality	.819	Reliable
4	Product Cost	.719	Reliable

The results of the reliability analysis using the Cronbach Alpha value show that all categories have good reliability, with values above 0.6. Internal Green Supply Chain Management Practices have the highest value (0.890), followed by Operational Flexibility (0.875). The Delivery (0.796) and Product Quality (0.819) categories show good reliability, while Product Cost has the lowest value but is still reliable (0.719). Overall, all categories are consistent and reliable in measuring the intended aspects. The Goodness of Fit test shows how well the research model fits the data (Hair et al., 2019). Although not all suitability criteria must be met, the more criteria are met, the better the model's suitability value.

Table 3. Goodness of Fit Test Results

Measurement Type	Measurement Indicators	Value	Recommended admission limit	Conclusion
Absolut fit measures	P-Value	0.000	≥ 0.05	Poor fit
	ECVI	1.904	Close to the value of Saturated compared to independent	Good fit
	RMSEA	0.063	≤ 0.1	Good fit
Incremental fit Measures	IFI	0.939	≥ 0.90	Good fit
	NFI	0 .851	≥ 0.90	Marginal fit
	TLI	0 .927	≥ 0.90	Good fit
	CFI	0 .937	≥ 0.90	Good fit
	RFI	0.826	≥0.90	Marginal fit
	RMR	0.054	The smaller the better	Good fit
Parsimonious fit measures	CMIN/DF	1.598	Lower limit 1, upper limit 5	Good fit
	AIC	289.364	Close to Saturate value compared to independent	Good fit

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The results of the model fit measurements show that, although there are some measures that show marginal or poor fit, most measures show goodness of fit, indicating that this model is quite good. In Absolute Fit Measures, the P-Value value of 0.000 indicates poor fit, but the ECVI value of 1.904 and RMSEA of 0.063 indicate goodness of fit. In Incremental Fit Measures, the IFI value of 0.939, TLI of 0.927, CFI of 0.937, and RMR of 0.054 indicate goodness of fit, while NFI of 0.851 and RFI of 0.826 indicate marginal fit. In Parsimonious Fit Measures, the CMIN/DF value of 1.598 and AIC of 289.364 indicate goodness of fit. Overall, these results indicate that this model can be considered reliable and representative to describe the relationship between the existing variables.

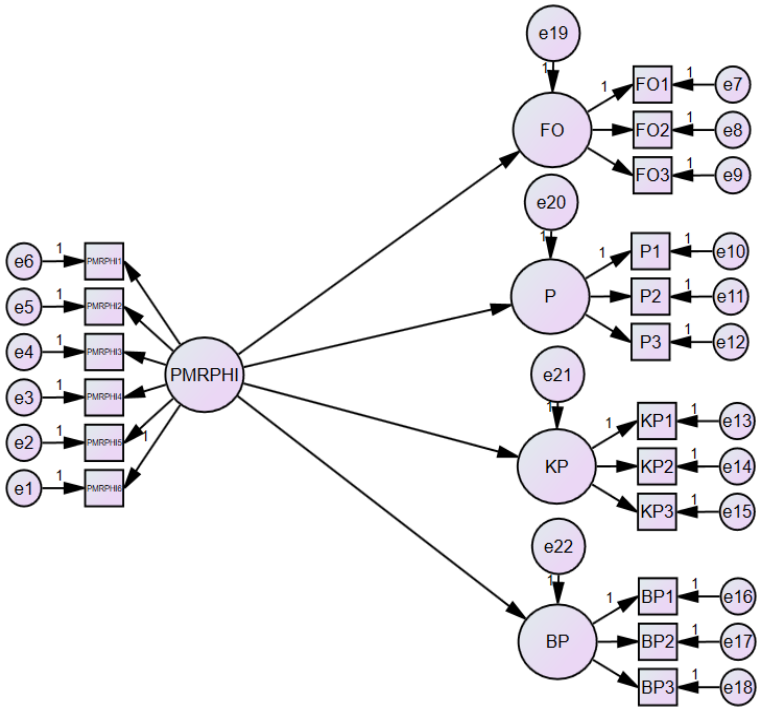

Figure 2. SEM-AMOS Result

Table 4. Hypotheses Result

Hypothesis	Estimate	P-Value	Result
Internal Green Supply Chain Management Practices have a positive impact on Operational Flexibility	-0.483	0.002	H1 Not Supported
Internal Green Supply Chain Management Practices have a positive impact on Delivery	-0.062	0.555	H2 Not Supported
Internal Green Supply Chain Management Practices have a positive impact on Product Quality.	-0.168	0.263	H3 Not Supported
Internal Green Supply Chain Management Practices have a positive impact on Production Costs	0.253	0.017	H4 supported

The results of the analysis show that Internal Green Supply Chain Management Practices have no positive effect on Operational Flexibility (Estimate: -0.483, P-Value: 0.002), Delivery (Estimate: -0.062, P-Value: 0.555), and Product Quality (Estimate: -0.168, P-Value: 0.263), with all of these hypotheses not supported. However, Internal Green Supply Chain Management Practices have a positive effect on Production Cost (Estimate: 0.253, P-Value: 0.017), so this hypothesis is supported. Overall, these findings indicate that good environmental management practices are related to production cost efficiency but do not directly improve operational flexibility, delivery, or product quality.

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4. CONCLUSION

Based on the research results, it can be concluded that Internal Green Supply Chain Management Practices do not have a positive effect on operational flexibility, which indicates that environmentally friendly strategies do not always increase operational adaptability. Additionally, this practice also did not have a positive effect on delivery, indicating that green strategies do not necessarily improve delivery speed or reliability. Internal Green Supply Chain Management practices also do not have a positive effect on product quality, which shows that environmentally friendly strategies do not always improve product quality. However, Internal Green Supply Chain Management Practices have a positive effect on product costs, which shows that environmentally friendly strategies can reduce production costs and increase economic efficiency.

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