

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm**Performance of green supply chain management: Investigating the role of reverse logistics and green procurement aspects in SMEs****Lili Dahliani^{a*}, B. Laksito Purnomo^b, Salmah Pattisahusiwa^c, Devita Aryasari^d, Nurul Anggraeni Shinta Ilahi^e, Wursan Wursan^f, Sri Risma Yenny^g and Nur Intan Rochmawati^h**^a*IPB University Bogor, Indonesia, Indonesia*^b*Universitas Atmajaya Yogyakarta, Indonesia*^c*FEB Universitas Mulawarman, Indonesia*^d*Universitas Bina Darma, Indonesia*^e*Universitas Indonesia, Indonesia*^f*Universitas Siliwangi, Indonesia*^g*Institut Maritim Prasetya Mandiri, Indonesia*^h*Universitas Ngudi Waluyo, Indonesia***ABSTRACT***Article history:*

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The purpose of this study is to analyze the relationship between the performance of Reverse Logistics and Green Supply Chain Management, to analyze the relationship between Green Procurement Aspects and the performance of Green Supply Chain Management. This research method is quantitative, the analysis of research data uses the partial least square structural equation model (SEM-PLS) with a statistical data processing tool, namely SmartPLS 4.0 software. Research data was obtained by distributing online questionnaires through social media designed using a Likert scale of 7. Respondents in this study were 670 SMEs owners in Java Island, Indonesia. The stages of data analysis are validity test, reliability test and significance test or hypothesis test. The results of this study indicate that Reverse Logistics has a positive and significant effect on the performance of Green Supply Chain Management, Green Procurement Aspects has a positive and significant effect on the performance of Green Supply Chain Management. The novelty of this study is the relationship model between Reverse Logistics variables, the performance of Green Supply Chain Management and Green Procurement in SMEs which was not found in previous studies. Culinary SMEs are expected to be able to participate in supporting environmentally sound development. This is because the concept of Green Supply Chain Management (GSCM) is a concept that aims to minimize the negative impact of an organization and its supply chain on the environment related to climate change, pollution and resources that are not too large. In order to support GSCM, it is necessary to evaluate the extent to which this concept is carried out by Culinary SMEs. By conducting this evaluation, it is hoped that the constraints and obstacles faced by SMEs in carrying out GSCM can be identified. For this reason, it is necessary to have support from related parties, in this case the government, to conduct socialization and counseling and assistance in implementing GSCM.

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1. Introduction

Industrial development in Indonesia is very rapid so many investors set up their own companies in Indonesia since they believe that Indonesia is a country with a dense population and industrial development in Indonesia will continue to grow. The number of medium and large-scale manufacturing industry companies will reach around 29 thousand (Directory of the Manufacturing

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Industry in 2021). The large number of industrial companies certainly has positive and negative impacts, there are several positive impacts that we can summarize, including, being able to create jobs to reduce unemployment, helping the welfare of the people around industrial areas, fulfilling the goods needed by the community, saving state foreign exchange, and improving the economy of the community around the industrial area. According to Haris et al. (2023), the negative impacts of the many industrial companies include, liquid waste resulting from industrial activities which is directly disposed into rivers without further management, and they can cause river pollution, the large amount of vacant land used as production factory locations is blamed for the large number of illegal logging trees in the forest causes a reduction in the number of trees. In addition, the smoke produced from industrial activities can cause air pollution, which results in global warming due to more and more industrial activities. Indonesia needs to carry out green industrial activities to reduce the resulting negative impacts so that industrial companies can minimize the impact on the surrounding environment. The development of the green industry itself has been regulated in Law No. 3 of 2014 concerning Industry. The green industry is a manufacturing company which in its production process prioritizes efforts to use resources efficiently and effectively in a sustainable manner in line with the Making Indonesia 4.0 program (Arijanto, 2022; Saini et al., 2023).

The green industry (Ali & Shoaib, 2023) is an industrial activity that does not only prioritize efficiency and effectiveness but also pays attention to the surrounding environment, usually industrial companies that can carry out green industrial activities can manage industrial waste products properly and can utilize natural resources effectively, for example a paper company that replants 1000 trees. every year so that the preservation of trees in nature is maintained. To support the green industry program, the government gives awards to industrial companies in Indonesia. Industrial companies that can run green industry programs to increase the added value and competitiveness of the national industry. Apart from that, this is a form of preventing climate change from getting worse and can damage the environment.

In this era of competition, companies with world-class standards have devoted their attention to managing reverse logistics as a strategy to increase the company's competitive advantage. Large companies have been successful in implementing reverse logistics management concerns over resource consumption and other environmental issues have resulted in the creation of sustainable development initiatives. This initiative aims to achieve economic growth today without depleting resources for future generations. One method to achieve sustainable growth is to increase the amount of product materials that come from waste recovery by using reverse logistics. Reverse Logistics is one of the processes of the supply chain to recover value that can be recovered as a new value. One example that can be given is product refilling where the company will take a value from a product and turn it back into a complete product. So Reverse Logistics is not only to return defective or damaged products, but also a form of service to customers where the company can restore the value of a product and protect the environment by reducing the waste generated from production. Activities carried out in the supply chain include the entire process of the flow of materials and goods, starting from suppliers, production processes, transportation, and distribution of products from manufacturers to distributors, retailers, to consumers. In Green Supply Chain Management, it integrates supply chain management with environmental management so that it can assess and measure the environmental impacts that will occur from supply chain activities.

2. Literature Review and hypothesis development

2.1 Green supply chain management

Permana et al. (2023) define green supply chain management as the integration of environmental thinking into supply chain management (SCM), including product design, material purchasing and supplier selection, manufacturing processes, delivery of final products to consumers and product management. An environmentally sound supply chain aims to limit waste in industrial systems to save energy and prevent dissipation of hazardous materials into the environment. Pires et al. (2001) define 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, and the distribution process of these products to consumers. SCM is an activity that 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. All activities along the supply chain have risks and negative impacts on the environment. According to Sunarya et al. (2023), Soemadi et al. (2022), the objective of environmentally conscious SCM is to consider the final and present environmental impacts of all products and processes to protect the natural environment. According to Misni et al. (2017), Nureen et al. (2023), Saini et al. (2023), Sheng et al. (2023), Sunarya et al. (2023) and Wibowo et al. (2022), the basic principles of SCM should include five things, namely: (1) The principle of integration. This 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. This means that all elements are in a harmonious working relationship; (3) End to end principle. This means 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. In the implementation of Green Supply Chain Management there are several operational functions and supporting activities including: (1) green procurement, (2) green manufacturing, (3) green distribution.

2.2 Reverse logistics

According to Rizki et al. (2022), Saini et al. (2023), the essence of Reverse Logistics (RL) is an effort to get value from products that are no longer used. When a product has lost its value, RL activities can recover the product to become a new product again by recycling some parts or components of the product. RL includes all activities in which there is planning, processing, reduction, disposal of hazardous or non-hazardous waste from the production, packaging and use of products. All of these activities include the process of reverse distribution. Since the movement of the flow of goods is opposite to the flow in a conventional supply chain, RL is often also called “backward logistics”, where the forward flow of goods flows from suppliers to manufacturers and retailers to consumers. RL deals with all the flows of goods and information necessary to collect product usage, packaging materials, production cancellations, and so on. Then take it to storage where it can be reused, remanufactured, recycled or destroyed. According to Gechevski et al. (2016), Lutfi et al. (2023), Liu et al. (2023), LR activities consist of several stages, including: product collection at collection points, sorting, reprocessing, and disposal of parts that cannot be reused. Management of RL activities at each stage needs to be handled properly, so that economic opportunities and environmental utilization from RL activities can be achieved. Logistics management is important in the supply chain, the purpose of the logistics system is the main logistics function and the main requirement for integrated supply chain management (supply chain management). According to Martínez et al. (2023), there are three driving factors that can lead to reverse logistics, namely (1) Economy-Product returns can be used as a source for value recovery by reusing products, remanufacturing is a part that will be used as a reserve or recycled residue to recover material value ; (2) Legislation is meant where there is a regulation that requires companies to improve; (3) Good-Corporate Citizenship emphasizes a value or principle where the encouragement of the organization or company involved is responsible for RL. A company can be called good corporate citizenship seen from good behavior for the people around it. RL is the process of sending products from the customer back to the original sender, or seller. RL occurs when consumers want to return goods they have received. Typically, reverse logistics is divided into two processes, namely management of returns, and then repair or remanufacturing.

Consumers will be happier when buying products that have easy and flexible return terms. Therefore, an efficient reverse logistics process is very useful to prevent losses that may occur due to high order return rates.

H₁: *Reverse Logistics has a positive and significant effect on Green Supply Chain Management performance.*

2.3 Green procurement

According to Sunarya et al. (2023), Wibowo et al. (2022), green procurement relates to the state of the buying environment which consists of engaging in purchase reduction, reuse, and recycling of materials in the purchasing process. Green procurement is one of the solutions for environmentally and economically conservative businesses and the concept of obtaining a choice of products and services that minimize environmental impact. The activities in green procurement include (a) Selection of suppliers In the green procurement system, suppliers where to purchase materials are only from "green partners" who have environmental quality standards and pass the audit process and consider suppliers who have obtained ISO and certificates related to achievement in the concept greens; and (b) Promote recycling activities in an effort to increase environmental awareness and reduce the use of materials that are harmful to the environment. According to Yusuf et al. (2022) Green manufacturing is a production process that uses inputs with low environmental impact, is highly efficient and produces little or no waste or pollution. The benefits of implementing green manufacturing are that it can reduce raw material costs, gain production efficiency and improve corporate image. Activities in green manufacturing include: (a) Controlling the use of hazardous substances, maintaining water quality and input quality control before processing; (b) Energy efficiency technology, namely by reducing power consumption in products, increasing product life span to increase efficiency and productivity, increasing machine capacity, product design, etc.; (c) Promote reuse/recycling, increase environmental awareness and reduce the use of materials that are harmful to the environment. According to Ferreira et al. (2023), Liu et al. (2023), Mandal et al. (2023), green distribution Activities in green distribution are green packaging and green logistics. Green packaging, including saving packaging, using environmentally friendly materials, working with vendors to standardize packaging, minimizing the use of materials and time to unpack and promoting recycling programs. Green logistics, including direct delivery to site users, use of alternative fuel vehicles and distributing products in large batches.

H₂: *Green Procurement Aspects has a positive and significant effect on Green Supply Chain Management performance.*

3. Method

This research method is quantitative, analysis of research data uses structural equation modeling of partial least squares (SEM-PLS) with statistical data processing tools, namely SmartPLS 4.0 software. The research data was obtained by distributing online questionnaires through social media which were designed using a Likert scale of 7. The respondents in this study were 670 SMEs owners in Java Island, Indonesia. The stages of data analysis are validity test, reliability test and significance test or hypothesis test.

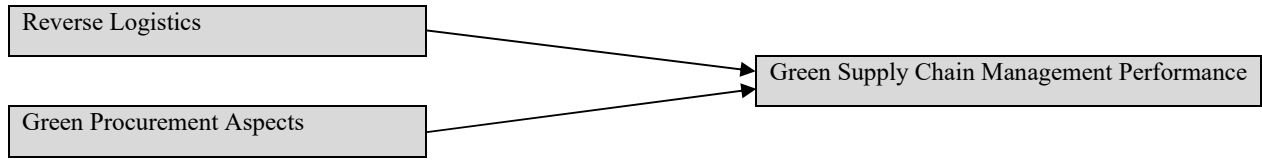


Fig. 1. The research model

4. Result and Discussion

4.1 Respondent Profile

Respondents in this study were 670 SME owners in Java, Indonesia. As for the distribution of respondents, most of the respondents were male, most of the respondents were aged 41 to 50 years, most of the respondents had a diploma level of education and most of the respondents had worked for less than 5 years.

Table 1
Respondent Profile

	Criteria	Total	%
Gender	Male	432	64%
	Female	238	36%
Age	< 30 Years	232	35%
	31 - 40 Tears	134	20%
	41-50 Years	234	35%
	> 51 Years	70	10%
Education	Senior High School	134	20%
	Diploma	232	35%
	Bachelor's degree	123	18%
	Master	89	13%
	PhD	92	14%
Work Experiences	< 5 Years	342	51%
	6 - 10 Years	98	15%
	11-15 Years	134	20%
	> 16Years	96	14%

4.2 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 have met the criteria of validity (more than 0.500) as described in the table below.

Tabel 2
Reliability and AVE Testing

No	Variables	Cronbach's Alpha	Composite Reliability	AVE
1	Reverse Logistics	0.846	0.901	0.634
2	Green Procurement Aspects	0.950	0.952	0.771
3	Green Supply Chain Management performance	0.934	0.953	0.835

4.3 Path Coefficients

Path Coefficients on Research Framework of Acievement Motivation can be described in Fig. 2.

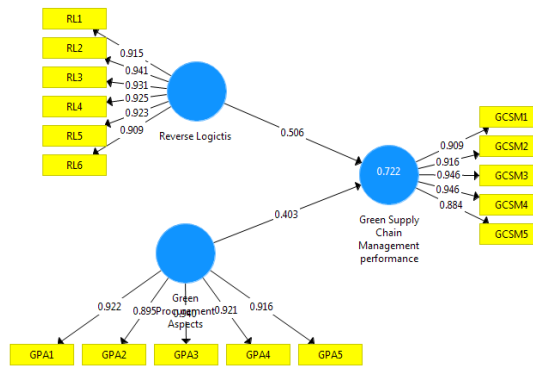


Fig. 2. Validity Testing

Inner model test

The inner model test contains an explanation of the R-Square, while the R-square value in this study is as follows:

Table 3

The results of the R Square

Variables	R Square	R Square Adjusted
Green Supply Chain Management	0.722	0.712

From the R-Square table, it can be concluded that 72.2 % of green supply management performance is influenced by Green procurement aspects and Reverse Logistics, while the remaining 27.8% % is influenced by other variables outside the study.

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 4 below.

Table 4

Hypotheses Testing

No	Hyphoteses	Path Coefficients	Significant Level	Results
1	Reverse Logistics → significant effect on Green Supply Chain Management performance	0.518	p<0.050	Accept the Hypothesis
2	Green Procurement Aspects → Green Supply Chain Management performance	0.521	P<0.050	Accept the Hypothesis

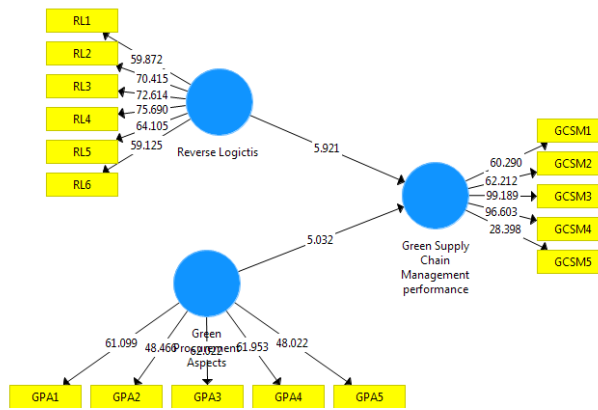


Fig. 3. Hypothesis Testing

f² Effect Sizes Evaluation

According to Purwanto et al. (2022), the guidelines for assessing f² are those values of 0.02 (= small), 0.15 (= moderate), and 0.35 (= large), respectively, represent small, medium, and low effects. large (Hair et al. 2020).

Table 5

f² Effect Sizes Evaluation

	Green Supply Chain Management
Reverse Logistic	0.42
Green Procurement Aspects	0.33

For the Reverse Logistic variable, the f² value of 0.42 represents a big effect for the Green Procurement Aspects variable, the f² value of 0.33 also represents a relatively large effect for the Green Procurement Aspects variable.

Q² Evaluation

Q² value is greater than 0 indicates that the model has predictive relevance for certain endogenous constructs. Conversely, values of 0 and below indicate a lack of predictive relevance (Purwanto et al., 2022).

Table 6
Q² Evaluation

Construct	Q ²
Green Supply Chain Management	0.524

The value of Q² for the Green Supply Chain Management variable is 0.524 > 0.000, meaning that this variable has predictive relevance.

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:

Reverse Logistics and performance of Green Supply Chain Management

Based on the analysis of the structural equation model, the results obtained a p value of 0.000 < 0.50 so that Reverse Logistics has a positive and significant effect on the performance of Green Supply Chain Management. This result is in line with Martínez et al. (2023), Mousazadeh et al. (2014), Misni et al. (2017), Mukaromah et al. (2022) that Reverse Logistics has a positive and significant effect on the performance of Green Supply Chain Management and is supported by Ferreira et al. (2023), Haudi et al. (2022), Rudyanto et al. (2020) that Reverse Logistics has a positive and significant effect on the performance of Green Supply Chain Management.

Aspects of Green Procurement and Green Supply Chain Management performance

Based on the analysis of the structural equation model, the results obtained a p value of 0.000 < 0.50 so that the Green Procurement Aspects has a positive and significant effect on the performance of Green Supply Chain Management, this result is in line with Gechevski et al. (2016), Lutfi et al. (2023) and Liu et al. (2023). Green Procurement Aspects have a positive and significant effect on the performance of Green Supply Chain Management supported by Aziz et al. (2023), Cai et al. (2023); Choudhary et al. (2011), El Ayoubi et al. (2023), Esfahbodi et al. (2023) that Green Procurement Aspects has a positive and significant effect on the performance of Green Supply Chain Management.

Companies that implement reverse logistics can improve customer service and responsiveness to customers, reduce environmental impact by reducing waste and increase overall corporate social responsibility. However, many companies ignore reverse logistics because they think that reverse logistics is just a burden. This should not need to happen, for example, for Cisco Systems to benefit from a reverse logistics strategy that can contribute to financial, environmental, and social benefits for the company. The green procurement process can be defined as a process that formally introduces and integrates environmental issues into the purchasing process, in this case the raw materials or goods purchased for the production process have minimal environmental impact. In other words, the raw materials or inputs purchased for the production process are environmentally friendly and the resulting output is also environmentally friendly. Specifically, to minimize environmental impacts on supply chain processes related to procurement points, the approach taken includes purchasing eco-labelled materials or inputs, adopting environmental criteria for suppliers involved in the production process, and collaborating to apply a green-minded control process with involved suppliers. For the procurement process, based on the results of data processing, it indicates that culinary SMEs have not applied a green-minded process. In this case, every indicator in the procurement process that has a green perspective is still low.

There are many advantages of reverse logistics such as financial benefits and provide social and environmental benefits, such as: Enables manufacturers to accept product returns from consumers or send unsold merchandise back to factories to be collected separately, sorted, rearranged or recycled to minimize overall costs. Reverse logistics can generate benefits in increasing product life cycles, supply chain complexity, consumer preferences that must be improved to maintain productivity and company performance growth in the long run. Reverse logistics can increase production speed, reduce costs (transportation, administration, and maintenance, repair and replacement), retaining customers by improving service objectives and meeting sustainability objectives. More value can be extracted from used/returned goods rather than wasting labor, time, and raw material costs involved in the supply chain. Increasing satisfaction and loyalty to customers by paying more attention to damaged goods and merchandise repairs. Reverse logistics can include getting feedback to make improvements and to increase understanding of the real reasons for product returns. From looking at the advantages and importance of reverse logistics, we can understand that reverse logistics plays a vital role in the growth of an organization, providing many financial, environmental and social benefits.

5. Conclusion

The results of this study have indicated that RL has a positive and significant effect on Green Supply Chain Management performance, Green Procurement Aspects has a positive and significant effect on Green Supply Chain Management performance. Culinary SMEs are expected to be able to participate in supporting environmentally sound development. This is because the concept of Green Supply Chain Management is a concept that aims to minimize the negative impact of an organization and its supply chain on the environment related to climate change, pollution and non-renewable resources. To support GSCM, it is necessary to evaluate the extent to which this concept is carried out by Culinary SMEs. By conducting

this evaluation, it is hoped that the constraints and obstacles faced by SMEs in carrying out GSCM can be identified. For this reason, it is necessary to have support from related parties, in this case the government, to conduct socialization and counseling and assistance in implementing GSCM. A smooth reverse logistics process is very important for a business to be able to maintain their reputation. The supply chain is not just the process of sending goods to consumers. In reverse logistics, companies can reduce existing costs, losses and waste more efficiently.

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