Investigating the role of reverse supply chain performance and the government policy on the performance of the manufacturing firms

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A B S T R A C T

The purpose of this study is to analyze the relationships between supply chain leadership and reverse supply chain performance, government policy and reverse supply chain performance, and finally, government policy and supply chain leadership. The research methodology is analytical, namely survey research that aims to collect, compile, analyze, interpret, and finally draw conclusions. The approach used is quantitative, which includes the development of an empirical model and its measurement based on theoretical studies. Research respondents are managers who are responsible to manage the reverse supply chain operations such as supply chain, warehouse, transportation/distribution, production, planning and control of production and inventory planning and control, procurement, and marketing in manufacturing companies. The research data was obtained by distributing online questionnaires to 560 supply chain managers of manufacturing companies who were determined using the simple random sampling method and the questionnaires were designed using a Likert scale. Data analysis used structural equation modeling (SEM) with SmartPLS 3.0 software tools. The stages of data analysis are validity test, reliability test and hypothesis testing. The results indicate that supply chain leadership had a significant effect on reverse supply chain performance, government policy had a significant effect on reverse supply chain performance and, finally, government policy had a significant effect on supply chain leadership.

1. Introduction

In the economic competition in the era of industrial revolution 4.0, supply chain management manages the movement and change of raw materials from suppliers to final customers (Dev et al., 2020). Supply chain activities also manage the backflow of raw materials from customers to originating suppliers, including both reprocessing and disposal (Mokhtar et al., 2019). On the other hand, laws and regulations on the environment require companies to be responsible for their waste, while waste disposal costs are increasing. In this era of competition, companies with world-class standards have devoted their attention to managing the reverse supply chain as a strategy to increase competitive advantage (de la Fuente et al., 2008). Companies such as Xerox, Hewlett-Packard, Eastman Kodak, and others have been successful in implementing reverse supply chain management. Concerns over resource consumption and other environmental issues have resulted in the creation of sustainable

development initiatives (Doan et al., 2019). 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 a reverse supply chain (Govindan & Popiuc, 2014).

Supply chain integration policies can maintain sustainable company growth and benefit (Pushpamali et al., 2021). This causes companies to always try to operate efficiently and flexibly in their supply chains to be competitive (Shin & Park, 2021). Supply chain systems are the art and science of managing and controlling the flow of goods, energy, information and other resources, such as products, services and people, from sources of production to markets with the aim of optimizing the use of capital (Afum et al., 2019). Supply chain is associated with part of the supply chain management process that plans, implements, and manages the efficient, effective flow and storage of products, services, and related information from raw materials to finished goods (Permana et al., 2022). Supply chain is one of the activities concerned with aspects of planning and development, procurement, storage, transfer, distribution, maintenance, evacuation and removal of equipment for transfer, evacuation and personnel equipment procurement or manufacture, implementation of maintenance and removal of processing facilities or provision of services/assistance (Turrisi et al., 2013). Supply chain activities are developing integrated operations from procurement or collection of materials, transportation or transportation, storage, packaging and distribution, and regulation of these activities.

According to Masse et al. (2020) indirect economic potential is savings in supply chain operational costs, such as reducing the costs of reverse distribution and reverse supply chain processing/transactions which are managed effectively to help improve after-sales service. Good after-sales service, which is responsive to complaints and able to provide assurance of resolving returns, will enhance the company's positive image. On the other hand, an effectively managed reverse supply chain to control after-sales goods helps control the negative impact on the environment. For example, environmental requirements requiring companies to take over responsibility for waste management, by minimizing, re-using and recycling the waste of goods or packaging they have sold, can significantly reduce environmental pollution (Agrawal & Singh, 2020). According to Mokhta et al. (2019) companies that are able to reduce the negative impact on the goods they have marketed will have a positive image in the eyes of their supply chain partners. Based on the above phenomenon, the question that needs to be studied is how the management of a reverse supply chain which is complex and requires large costs, can be carried out efficiently and effectively so that it can benefit the company economically and can enhance the company's positive image (Gobbi, 2011). To answer this question, some studies were conducted on the resources and capabilities required by the company, so that it can handle the reverse supply chain efficiently and effectively in an effort to gain economic benefits and a positive image (Arijanto, 2022).

2. Literature Review and Hypothesis Development

2.1 Supply Chain Leadership

Leadership in the supply chain management system is associated with close relationships among members of the supply chain (Soemadi et al., 2022). However, close relationships do not come very easily. Top management leadership and commitment play a key role in developing and maintaining a corporate environment, in which everyone works towards achieving supply chain performance objectives. Existing literature has provided evidence supporting the impact of quality leadership on supply chain performance, finding that supply chain performance management methods predict successful supply chain performance, and that management creates higher quality products. They can verify that quality leadership has a direct impact on achieving superior quality supply chain performance through various quality management approaches. According to Rizki et al. (2022) supply chain leadership is always described as behavior and personal traits that are unconsciously needed in influencing the process of a relationship. This causes the manager's leadership style to be an important factor in supply chain leadership as researched by Larsen et al. (2018) and Liu et al. (2022) which not only affects the company but also the entire supply chain including suppliers. Based on theoretical studies and previous research, the following hypothesis is obtained:

H1: *Supply Chain Leadership has a significant effect on Reverse Supply Chain Performance.*

2.2 Government policy

According to Jermsittiparsert and Srihirun (2019), government policy export development is influenced by the strategy chosen by developing countries in carrying out industrialization. The industry cannot be said to hinder export development, but the strategy chosen influences export growth which also has an impact on economic growth. An export-oriented country will export based on the principle of comparative advantage, a country will tend to produce more goods whose production processes are relatively more efficient and export them in turn exchanging them for other goods which have relatively few advantages (Gosling et al., 2016). The role of the government in export promotion is the initial capital for companies to introduce their products to enter international markets, so that this policy can encourage companies to improve their export performance (Cifra et al., 2022). Besides, policies through protection of new industries are more dominant, where the government forces new industries to use export targets to produce quickly at world price levels (Turrisi et al., 2013). Based on theoretical studies and previous research, the following hypothesis is obtained:

H₂: *Government Policy has a significant effect on Reverse Supply Chain Performance.*

H3: *Government Policy has a significant effect on Supply Chain Leadership.*

2.3 Reverse supply chain Performance

Liu et al. (2022) define reverse supply chain as the process of efficiently planning, implementing, and controlling the flow of raw materials, work in process, finished goods, and related information from the point of consumption to the point of origin with the aim of creating value or proper disposal of products/goods in a cost-effective manner. Reverse supply chain refers to all related procedures for product return, repair, maintenance, recycling, and disassembly for products and materials. Overall, the reverse supply chain combines products to travel backwards through the supply chain to obtain maximum value. Companies that implement a reverse supply chain can improve customer service and response rates to customers, reduce environmental impact by reducing waste and improve overall corporate social responsibility. Yet many companies ignore the reverse supply chain because they think that reverse supply chain is just a burden (Reyes & Meade, 2006). This should not need to happen, for example, for the system to make a profit from a reverse supply chain strategy that can contribute to financial, environmental, and social benefits for the company (Fontoura & Coelho, 2020).

According to Larsen et al. (2018) reverse supply chain is the process of planning, implementing, and controlling the efficient and effective flow of goods (raw materials, work-in-progress, or finished goods) and related information, from the point of consumption back to the point of origin. The goal of reverse supply chain is to capture or re-create value or to dispose of goods that flow back. Reverse supply chain includes all supply chain activities, but all goods handled flow in the opposite direction (return goods) (Shin & Park, 2021). Handling the reverse supply chain is more complicated, because the time for goods to return is uncertain and difficult to predict and arrives faster than the processing time. Most of the returned goods are not identified and the acceptance authority is not standard, the condition of the goods and/or packaging is not uniform, damaged or incomplete. Reverse supply chain is the process of taking products from end consumers for the purpose of increasing value and proper disposal. Activities in the reverse supply chain include collection, combined inspection/selection/sorting, recovery, redistribution and disposal (Yusuf & Soediantono, 2022).

3. Method

The research methodology is analytical, namely survey research that aims to collect data, compile data, analyze data, interpret data and finally draw conclusions based on data analysis. This type of research is causal correlation, which is used to test the hypothesis about the existence of a relationship between the independent variable and the dependent variable, whose description is associative, namely research that aims to determine the relationship between two or more variables. The type of research conducted to answer the questions above is cross-sectional research using explanatory methods, namely trying to explain the interrelationships between variables through hypothesis testing. The approach used is quantitative, which includes the development of an empirical model and its measurement based on theoretical studies, data is collected using a questionnaire, and testing of the hypotheses that are built. Research respondents were management ranks with positions at manager level and above who were authorized to manage the reverse supply chain, namely supply chain, warehouse, transportation/distribution, production, planning and control of production and inventory planning and control, procurement, and marketing in manufacturing companies. The research data was obtained by distributing online questionnaires to 560 supply chain managers of manufacturing companies who were determined using the simple random sampling method, the questionnaires were designed using a Likert scale of 1 to 7. Data analysis used structural equation modeling (SEM) with SmartPLS 3.0 software tools. The stages of data analysis are validity test, reliability test and hypothesis testing. Fig. 1 shows the structure of the proposed study.
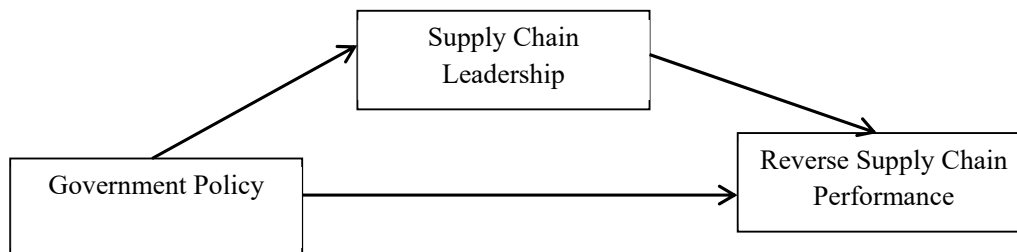

Fig. 1. Research Model

4. Results and discussions

4.1 Partial Least Square (PLS) Analysis

Outer Model Test The outer model is a model that specifies the relationship between latent variables and their indicators, or it can be said that the outer model defines how each indicator relates to its latent variables. The outer model is interpreted by

looking at several things, including convergent validity values, discriminant validity values, composite reliability, Average Variance Extracted (AVE) and Cronbach's alpha. The convergent value is measuring the magnitude of the loading factor for each construct where a loading factor above 0.70 is highly recommended, however a loading factor between 0.5 - 0.60 can still be tolerated if the model is still in the development stage. The PLS Algorithm model and the complete indicator loading value. After the Outer loading test is carried out, the outer loading value is obtained in the table above. The results show that all indicator values have met the requirements, namely > 0.70.
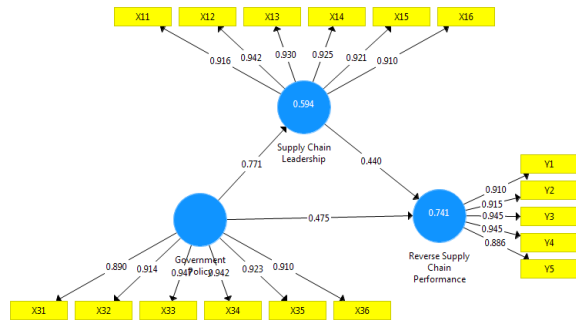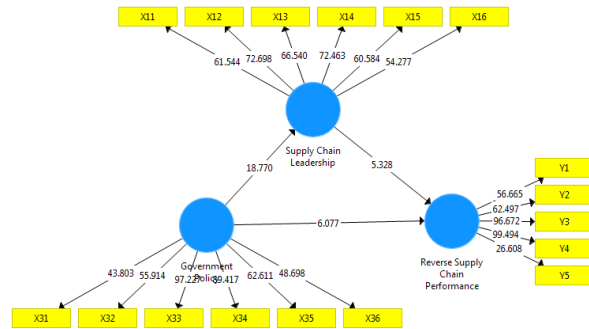

Fig. 2. Validity Testing   **Fig. 3.** Hypothesis Testing

4.2 Reliability and Validity

As shown in Table 1, all values of Cronbach's alpha, composite reliability, and rho-A are well above the threshold of 0.70 (Hair et al., 2019). These results signify that the constructs are reliable and performed well. AVE for each construct is above 0.50, indicates the convergent validity (Hair et al., 2019). Finally, all the VIF values are less than 3, establishing the lack of multicollinearity issues among the study constructs.

Table 1
Reliability Analysis

Variables	Cronbach'sAlpha	Composite Reliability	Average Variance Extracted
Supply Chain Leadership	0.817	0.849	0.719
Government Policy	0.809	0.818	0.739
Reverse Supply Chain Performance	0.829	0.824	0.618

Hypothesis Testing a) Direct Influence Analysis Whether or not a proposed hypothesis is accepted, it is necessary to test the hypothesis using the Bootstrapping function on SmartPLS. The hypothesis is accepted when the significance level is less than 0.05 or the t-value exceeds the critical value. Or the t statistics value for a significance level of 5% if the t-statistic value is > 1.96 then the null hypothesis (H0) is rejected. The results of the PLS Bootstrapping Model are presented in the Fig. 3.

Table 2
Hypothesis Testing

Hypothesis	Coefficient	t- values	Sig	Decision
Supply Chain Leadership → Reverse Supply Chain Performance	0.440	5.328	0.000	Positive and Significant
Government Policy→Reverse Supply Chain Performance	0.475	6.077	0.000	Positive and Significant
Government Policy→Supply Chain Leadership	0.771	18.770	0.000	Positive and Significant

5. Discussion

5.1 The effect of supply chain leadership on reverse supply chain performance

Based on the results of the analysis of hypothesis testing, a p value of 0.000 <0.050 was obtained, so it was concluded that supply chain leadership has a significant effect on reverse supply chain performance. Supply chain leadership styles are generally differentiated into transactional leadership styles and transformational leadership styles. This causes the manager's leadership style to be an important factor in supply chain leadership as researched, which not only affects the company but also the entire supply chain including suppliers. Handling the reverse supply chain is more complicated, because the time for goods to return is uncertain and difficult to predict. Most of the returned goods are not identified and the acceptance authority is not standard, the condition of the goods and/or packaging is not uniform, damaged, or incomplete. Reverse supply chain is the process of taking products from end consumers for the purpose of increasing value and proper disposal. Effective reverse

supply chain management not only reduces waste but also reduces operational costs, can also have an impact on increasing company profitability and can even improve the company's public image.

5.2 Relationship of Government Policy to Reverse Supply Chain Performance

Based on the results of the analysis of hypothesis testing, a p-value of 0.000 <0.050 is obtained, so it is concluded that government policy has a significant effect on reverse supply chain performance. According to Hu et al. 2016), government policy has a significant effect on reverse supply chain performance. According to Larsen et al. (2018), an export-oriented country will export based on the principle of comparative advantage, a country will tend to produce more goods whose production processes are relatively more efficient and export them in turn exchanging them for other goods which have relatively few advantages. The role of the government in export promotion is the initial capital for companies to introduce their products to enter international markets, so that this policy can encourage companies to improve their export performance. Besides, policies through protection of new industries are more dominant, where the government forces new industries to use export targets to produce quickly at world price levels (Turrisi et al., 2013). Reverse logistics is an important part of sustainable and responsible supply chain management. By optimizing the return flow of products, companies can reduce costs, increase customer satisfaction and contribute to environmental sustainability. In facing current economic and environmental challenges, implementing reverse logistics is a smart and efficient strategy for modern companies.

5.3 Relationship of Government Policy to Supply Chain Leadership

Based on the results of the analysis of hypothesis testing, a p-value of 0.000 <0.050 is obtained, so it is concluded that government policy has a significant effect on supply chain leadership. broad application of supply chain management strategies.

The managerial implication of this research is that company managers need to conduct supplier quality audits, namely by checking and evaluating the quality of products, having detailed information about supplier performance, namely by knowing whether suppliers carry out work according to scheduling standards and agreements in quantity and quantity, delivery that has been agreed with the company. Company managers can provide flawless products to consumers, can reduce delays and damage in fulfilling customer orders, deliver orders to consumers on time, and can fulfill orders according to the amount ordered. Company managers also need a leader who can always involve employees in improving activities, is able to learn concepts and skills, always participates in improving management and quality processes, and always involves suppliers in improving quality management activities. Company managers need to improve supply chain quality management practices, especially quality leaders in improving quality performance.

The practical implications for companies to provide reverse logistics services are as follows:

- Pick-up and collection of reverse products can be collected from customers by providing drop-in services in strategic locations, such as office areas, housing, industry, markets, schools and crowd centers, depending on the characteristics of the type of reverse product and user segment. For reverse products in the consumer goods category, drop-in placement for product reverse in residential areas or public places is very appropriate. Meanwhile, for industrial products, pick-up services are more appropriate.
- Checking incoming goods, checking incoming goods obtained from drop-ins for reverse products or product reverse pickup services needs to be checked and sorted. For reverse products categorized as dangerous goods, proper handling is required.
- Distribution to repair or recycling centers, after the products are sorted, then reverse products can be repaired for products that need repair, and some reverse products are recycled.
- Repackaging and labeling, after the reverse product has been repaired, it is repackaged and labeled for further processing, either stored or transported by other modes of transportation to be distributed to certain locations.
- Shipment tracking. Several companies provide delivery tracking services for the pick-up, delivery to repair, and reverse product distribution processes.
- Repair and reverse product repair services can also be carried out by the company in collaboration with repair services according to the type of product. This repair service will shorten the product reverse handling process and accelerate product reverse placement back into the market.

The limitations of this research are partly because it was only conducted in Indonesia and only looked at manufacturing companies, not the overall market response. Then this research is also limited by the dimensions of the independent variable supply chain quality management. So, the researcher provides suggestions and recommendations for further researchers in order to expand the sector in research, for example research engaged in food, pharmaceuticals and others, because the findings of previous studies used in various types of institutions may not be identical to this research, additional research will use other independent variables that may have a greater impact. The research results have several implications. This study examines whether there is a relationship between reverse supply chain performance and supply chain leadership and government policy. The results of this study help company decision makers to understand the importance of supply chain leadership and

government policy. Decision makers can prioritize implementation supply chain leadership and government policy to improve reverse supply chain performance.

6. Conclusion

The conclusion of this study is that supply chain leadership has a significant effect on reverse supply chain performance, government policy has a significant effect on reverse supply chain performance, government policy has a significant effect on supply chain leadership. The novelty of this research is the creation of a reverse supply chain performance relationship model, supply chain leadership and government policy which did not exist in previous studies. The theoretical implications of this study strengthen previous theories that reverse supply chain performance is influenced by supply chain leadership and government policy, which supports the theories and results of previous research that supply chain leadership and government policy will encourage an increase in reverse supply chain performance. The practical implication of this research is to improve reverse supply chain performance. So manufacturing management must encourage an increase in supply chain leadership and government policy variables. For further research, it is necessary to analyze other variables not discussed in this study. There are some research limitations. First, the study only uses cross-sectional data, not longitudinal. Future research should use longitudinal data, so that more objective research results can be obtained. Second, research only focuses on local industries, future research should examine foreign multinational companies, so that comparisons between countries can be made. Future research can examine other variables, such as organizational culture, supply chain structure, and supply chain length. In order to avoid method bias, future research could collect data from multi-respondents from each company (e.g. managers, engineers and executives in the Supply Chain Management department or the Supply chain Department). This research only compares manufacturing companies and service companies. Future research can examine the influence of organizational attributes, such as company size and company type (local, foreign, and joint venture).

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