Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

The Role of Eco Supply Chain on Environment and Operational Performance of Indonesian Defense Industry

Ade Indra Permana [1], Dwi Soediantono[2]

[1,2]Sekolah Staf dan Komando TNI Angkatan Laut
Corresponding email : adeindra5206@gmail.com

Abstract

The purpose of this study is to analyze the relationship between Eco supply chain management and operational performance, the relationship between Eco supply chain and environmental performance, and the relationship between environmental performance and operational performance. This research is quantitative with survey technique as a data collection tool. The sampling technique was proportional random sampling using an online questionnaire as a data collection tool with 250 staff of industry managers as respondentsThe data analysis technique uses Partial Least Square with SmartPLS 3.3.3 software tools. Based on the analysis concluded that Eco supply chain management has a positive effect on operational performance, Eco supply chain has a positive effect on environmental performance, Environmental performance has a positive effect on operational performance, environmental performance mediates the effect of eco supply chain on operational performance.

Keywords: Eco Supply Chain; Environment and Operational Performance; Defense Industry

Introduction

According to Agyabeng-Mensah et al. (2020) In this era of the industrial revolution, rapid economic growth and massive industrial expansion make humans tend to drain and use natural resources at a higher rate than before. At the same time, development and the pollution it produces cause enormous damage to the environment which can then damage the ecology. Environmental pollution is a major problem that has the potential to cause the extinction of living things on earth if not addressed immediately. According to Guo et al. (2020) Several sectors that continue to grow and contribute to the decline in the quality of the world's environment are industrial processes, transportation, waste, agricultural products, power stations, land use and biogass burning, fossil fuel, housing, tourism and others. Every company cannot simply ignore this environmental issue, but must be responsible for the waste produced so that it can reduce environmental pollution. According to Dubey et al. (2015) Companies that care about the environment will have an impact on high awareness of consumers so that the level of competition in the market is no longer oriented to quality, price and delivery but environmental issues. This certainly needs serious attention from the company to manage a supply chain.

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

According to Haudi et al. (2021) The supply chain is a network of the entire organization from suppliers to end users and activities related to the flow and transformation of goods, information and money. While Supply Chain Management (Supply Chain Management) is the integration of business processes in the form of collaboration between supply chain partners in providing products, services, and information to improve company performance and provide added value to customers and other stakeholders. According to Fernando et al. (2017); Guo et al. (2020) The supply chain consists of five parts, namely raw materials, industry, distribution, consumers, and waste. Every link in the Supply Chain can lead to pollution, waste and other hazards to the environment. Starting from the concept stage until the goods are destroyed, there is always an excessive use of resources which results in the total cost of logistics being more expensive and has an impact on environmental sustainability.

Eco Supply Chain Management (GSCM) is an important strategy to achieve sustainable development for the company. According to Jermsittiparsert et al. (2019). The concept of GSCM is supply chain management related to environmental aspects. Eco-based supply chain management is important to implement because so far supply chain performance measures usually do not pay attention to the impact on the environment. According to Jafarzadeh-Ghoushchi (2018), the issue of environmentally friendly supply chains is seen as critical for the successful implementation of industrial ecosystems and industrial ecology. Waste and emissions released by supply chains have become a major source of environmental problems including global warming and acid rain. According to Haudi et al. (2021); Islam et al. (2018);Jafarzadeh-Ghoushchi (2018);Jermsittiparsert et al. (2019). Environmental performance is one of the company's performances that aims to improve or reduce the impact of environmental damage caused by the company. The more the company's contribution to the environment, the better the company's image in the eyes of the community. A company that has good environmental performance and discloses its environmental performance can affect investors' views of the company, which in turn can affect the company's financial/operational performance. In addition to companies, the Defense industry also has an impact on environmental sustainability, such as indiscriminate disposal of garbage that causes unpleasant odors and also kills the surrounding plants, waste disposal. According to Haudi et al. (2021) In general, what is called waste is residual or waste material produced by a production process, both household and industrial scale where its presence is undesirable because it has no economic value. If this waste is discharged into the environment, it can have a negative impact. This research was conducted in the Defense industry in Tangerang with the aims: 1) to analyze whether eco supply chain management has an influence on operational performance, 2) to analyze whether eco supply chain management has an influence on environmental performance, 3) to analyze whether environmental performance has an influence on environmental performance. operational performance.

Hypothesis Development

Several studies related to eco supply chain have been carried out. According to Yuliantoro et al. (2019); Zhu et al. (2007) revealed that Environmentally friendly suppliers make a high contribution to organizational performance. According to Tundys et al. (2018); Wijaya et al. (2021); Younis et al. (2020)

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

in his research found that only green purchases played a role in improving economic performance. According to Younis et al. (2020); Yu et al. (2018); Yuliantoro et al. (2019); Zhu et al. (2007) obtained similar findings with previous researchers that the implementation of eco supply chain has an effect on financial performance. Based on these studies, hypothesis 1 is formulated

H1: Eco supply chain management has an effect on operational performance.

Furthermore, Rudyanto et al. (2021) in their research on the application of Eco Supply Chain Management to improve company performance, found that ESCM (procurement, production, delivery and return) has an impact on performance. According to Purba et al. (2021); Pramono et al. (2021) found that environmental performance directly affects performance. According to Rehman et al. (2021); Rudyanto et al. (2021) Eco supply chain has an effect on environmental performance. Based on these studies, a hypothesis can be formulated

H2 : Eco supply chain has an effect on environmental performance.

Several studies related to environmental performance with operational performance are revealed in According to Masudin et al. (2018) states that environmental performance has an effect on financial performance. According to Kazancoglu et al. (2020); Kaliani Sundram et al. (2018);Kumar et al. (2019); Masudin et al. (2018) found that environmental performance has an effect on operational performance. Then, Kazancoglu et al. (2020); Kaliani Sundram et al. (2018) revealed that environmental performance has an impact on financial performance. Based on some of these studies, the formulation of hypothesis 3:

H3 : Environmental performance affects operational performance.

Research related to eco supply chain, environmental performance and operational performance is revealed in According to Kumar et al. (2019); Masudin et al. (2018) found that good environmental performance as an impact of eco supply chain affects operational performance. According to Kazancoglu et al. (2020); Kaliani Sundram et al. (2018) revealed that eco supply chain has an effect on environmental performance and encourages operational performance. Also According to Kazancoglu et al. (2020); Kaliani Sundram et al. (2018) in his research results confirm that environmental performance as an impact of eco supply chain implementation mediates financial performance. Based on some of the research findings, a hypothesis can be formulated

H4: Environmental performance mediates the effect of eco supply chain on operational performance.

Method

This research is quantitative with survey technique as a data collection tool. The sampling technique was proportional random sampling using an online questionnaire as a data collection tool with 250 Defense industry staff as respondents . The data analysis technique uses Partial Least Square with SmartPLS 3.3.3 software tools.

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

The hypotheses in this study are:
H1: Eco supply chain management has an effect on operational performance.
H2: Eco supply chain has an effect on environmental performance.
H3 : Environmental performance affects operational performance.
H4: Environmental performance mediates the effect of eco supply chain on operational performance.

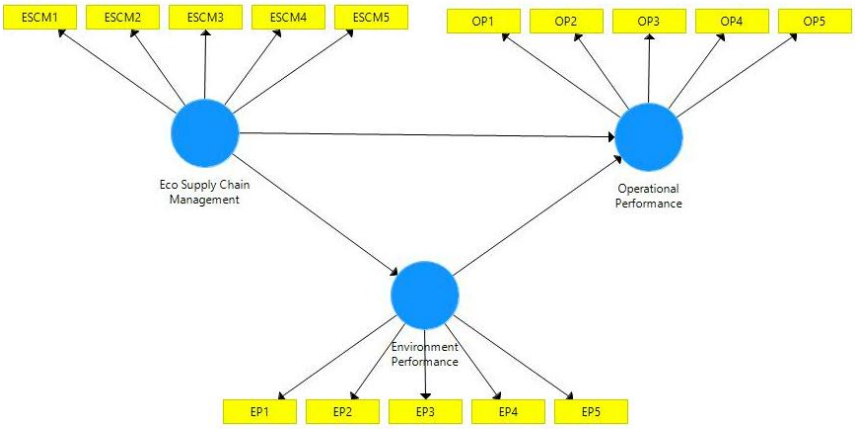

Fig 1. Research Model

Result and Discussion

The measurement model test was conducted to assess the validity and reliability of the model which was carried out with convergent validity, discriminant validity, and composite reliability. Convergent validity aims to measure the suitability between the indicators of the measurement results of the variable and the theoretical concepts that explain the existence of indicators of these variables. The convergent validity test can be evaluated in three stages, namely by looking at the outer loadings, composite reliability and Average Variance Extracted (AVE). Outer loadings is a table containing loading factors to show the correlation between indicators and latent variables. The loading factor validity can be accepted if the value is > 0.60. The tests carried out in the analysis of variance based SEM have two stages, namely the outer model and the inner model test.

Test Outer Model
The convergent validity test on the outer model aims to determine whether the indicators with latent variables are valid, with a validity value above 0.70 (Purwanto et al., 2021).

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

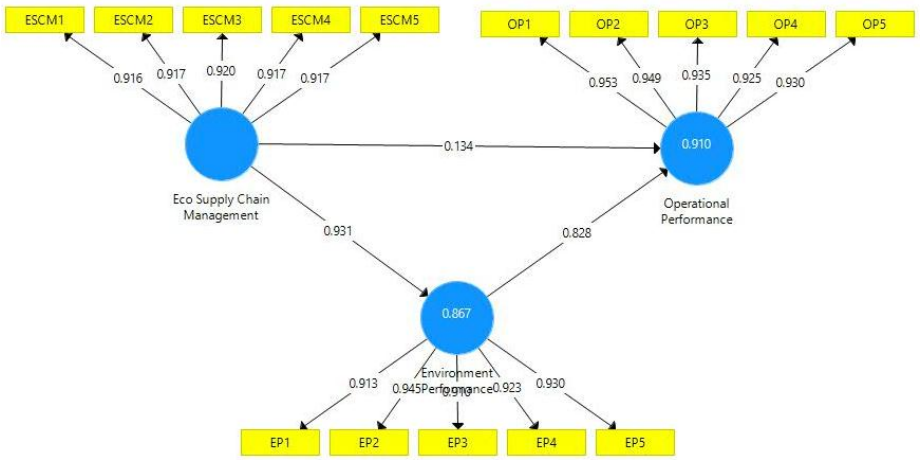

Figure 2. Convergent Testing

Figure 2. shows that the validity value of each indicator is above 0.7, so all research indicators are declared valid. In the outer model test in addition to convergent validity, there is also a validity reliability test, namely a test that aims to determine the reliability of indicators in measuring the variables, while the variables are said to be valid if they have an AVE value above 0.5 and a Cronbach Alpha value above 0.7 (Purwanto et al., 2021), the following is a discriminant validity test in this study:

Table 1. Average Variance Extracted (AVE)

Variables	Cronbach's Alpha	Composite Reliability	(AVE)
Eco supply chain management	0.765	0.813	0.612
Operational performance	0.763	0.815	0.638
Environment performance	0.713	0.835	0.618

Table 1 shows that all Cronbach alpha and average variance extracted values exceed the minimum limit so that all variables are declared valid

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 2. R Square

Dependent variables	R Square	R Square Adjusted
Operational performance	0.910	0.905

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

Environment performance	0.867	0.823

From the R square table it can be concluded that 91.0% Operational performance is influenced by Environment performance and eco supply chain management , while the remaining 9% is influenced by other variables outside the study. Variable of Environment performance Influenced by eco supply chain management by 86.7% while the remaining 13.3% is influenced by other factors outside the theme of this study.

In addition to reliability in the inner model test, there is also a hypothesis test, while the hypothesis testing in this study is as follows:

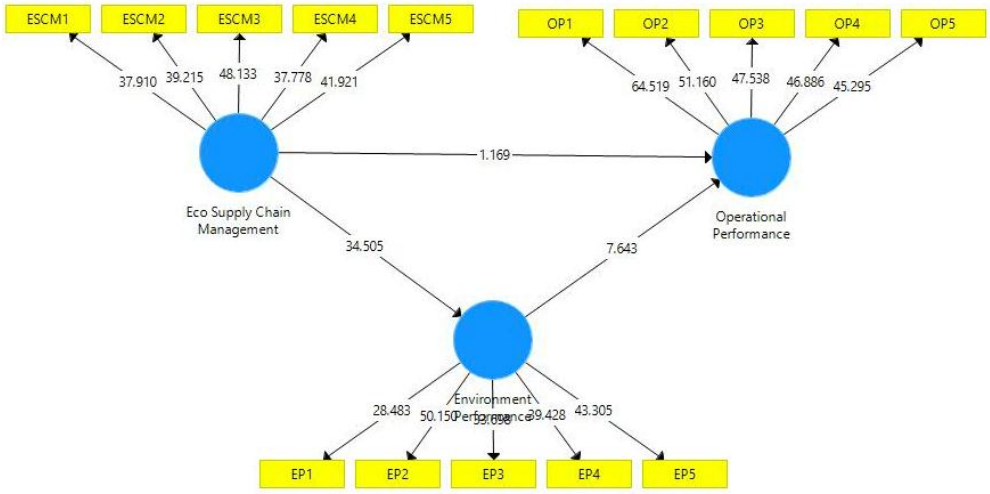

Figure 3. Hypotheses Testing

Table 3. Hypothesis Testing

Correlation	Original Sample (O)	P Values	Conclusion
Eco supply chain management->Operational performance	0.134	0.000	Supported
Eco supply chain management-> Environment performance	0.931	0.001	Supported
Environment performance -> Operational performance	0.828	0.002	Supported

f^2 Effect Sizes Evaluation

According to Hair (2017) explains that the guidelines for assessing f^2 are that values of 0.02 (= small), 0.15 (= moderate), and 0.35 (= large), respectively, represent small, medium, and low effects. large (Hair et al. 2020).

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

Table 4. f^2 Effect Sizes Evaluation

	Performance
Eco supply chain management	0.27
Operational performance	0.22
Environment performance	0.28

For the Eco supply chain management, the f^2 value of 0.27 represents a large effect, for the Operational performance, the f^2value of 0.22 represents a large effect, for the Environment performance variable, the f^2 value of 0.28 represents a large effect.

Q^2 Evaluation
Q^2 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 (Hair et al 2017).

Table 5. Q^2 Evaluation

Construct	Q^2
Operational performance	0.543
Environment performance	0.523

The value of Q^2 for the Operational performance variable is 0.543> 0.000, meaning that this variable has predictive relevance. The Q^2 value of the Environment performance variable is 0.523> 0.000, meaning that this variable has predictive relevance. From the value of the hypothesis testing table, it is known that all hypotheses in the study are accepted because they have a p-value below 0.05.

Eco supply chain management has an effect on operational performance.
Based on the results of the SEM analysis, it was found that the p value was 0.000<0.050 so it was concluded that Eco supply chain management had a positive and significant effect on the operational performance. This means, the better the eco supply chain management, the better the level of operational performance. This finding is in line with the research of Yuliantoro et al. (2019); Zhu et al. (2007) which states that by implementing ESCM the company has increased the financial performance of efficient companies. Furthermore, in line with research According to Tundys et al. (2018); Wijaya et al. (2021); Younis et al. (2020); Yu et al. (2018) which explains that eco procurement has a positive effect and plays a very important role in improving the company's economic performance. Also supports research results According to Younis et al. (2020); Yu et al. (2018) that eco supply chain has an effect on operational performance.

Eco supply chain has an effect on environmental performance.

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

Based on the results of the SEM analysis, it was found that the p value was 0.000<0.050 so it was concluded that Eco supply chain management had a positive and significant effect on the environmental performance. second, namely: eco supply chain management has a significant effect on environmental performance. This finding proves that eco supply chain management is important to improve environmental performance. The better the eco supply chain management, the better the level of environmental performance or the level of concern for the Defense industry for the surrounding environment. Eco supply chain management (GSCM) will become an environmentally friendly supply chain aimed at limiting waste and preventing the dissipation of hazardous and toxic waste (B3) into the environment. This study is in line with research According to Rehman et al. (2021); Rudyanto et al. (2021) which states that implementing GSCM has had a positive impact on environmental, economic and organizational performance for stakeholders. In addition, it supports the research results. According to Purba et al. (2021); Pramono et al. (2021) which explains that eco procurement in ESCM makes a high contribution to organizational performance, namely environmental performance.

Environmental performance affects operational performance.
Based on the results of the SEM analysis, it was found that the p value was 0.000<0.050 so it was concluded that environmental performance had a positive and significant effect on the operational performance. This third research hypothesis shows that environmental performance has no effect on operational performance. This study contradicts the research of Agyabeng-Mensah et al. (2020); Dubey et al. (2015); Fernando et al. (2017); Guo et al. (2020) which states that environmental performance directly affects operational performance. These results indicate that the information that has been issued by the Ministry of Environment regarding environmental performance cannot affect operational performance. Even though the company or the Defense industry has made the required environmental management efforts as stipulated in the legislation, it does not guarantee that the company's financial performance will improve. This is due to the quality or quantity of services that have not been in accordance with the expectations of the community or consumers, besides that the Defense industry is not concerned about environmental sustainability and the welfare of the surrounding community, causing the Defense industry to get a negative image from the public or consumers. This has the effect of not increasing operational performance in the Defense industry. The positive image of the Defense industry is very important for the sustainability of the Defense industry, therefore the Defense industry must strive to gain good legitimacy from the public or consumers in order to get a positive image. If the Defense industry has received good legitimacy from the public or consumers, the Defense industry will get a positive image that will improve the performance of the Defense industry operationally.

Environmental performance mediates the effect of eco supply chain on operational performance
Based on the results of the SEM analysis, it was found that the p value was 0.000<0.050 so it was concluded that environmental performance had a positive and significant effect on the operational performance

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

The results of the analysis are the fourth hypothesis that environmental performance is not able to be a mediating variable on the effect of eco supply chain management on operational performance. The results of this study are not in line with the research According to Fernando et al. (2017); Guo et al. (2020) which states that implementing ESCM has had a positive impact on environmental, economic (operational) and organizational performance for stakeholders. From the path analysis that has been carried out, it shows that environmental performance has a significant effect on eco supply chain management (ESCM) but does not have a significant effect on operational performance, so environmental performance is not a mediating variable that lies between the independent variable and the dependent variable, so that the independent variable is not directly affect the change or emergence of the dependent variable . Therefore, the fourth hypothesis which states that eco supply chain management has no effect on operational performance with environmental performance as a mediating variable is rejected also contradicts the opinion of Agyabeng-Mensah et al. (2020); Dubey et al. (2015) on the results of research conducted on Implementing Environmental Practices for Accomplishing Sustainable Eco Supply Chain Management.

Conclusion

Based on the results of the study, it can be concluded that eco supply chain management has an influence on operational performance. This shows that eco supply chain management is important to improve operational performance. The better the eco supply chain management is implemented, the higher the level of operational performance. Eco supply chain management has an influence on environmental performance. This shows that eco supply chain management is important to improve environmental performance in the Defense industry. The better the eco supply chain management, the higher the level of environmental performance or the level of concern for the Defense industry for the surrounding environment. Environmental performance has no effect on operational performance. This shows that environmental performance cannot affect operational performance, although the Defense industry has made environmental management efforts as required by law, it does not guarantee that the company's financial performance will improve. This is because the quality or quantity of service is not in accordance with the expectations of the community or consumers. Environmental performance is not able to be a mediating variable between the influence of eco supply chain management and operational performance.

Rerefences

Agyabeng-Mensah, Y., Ahenkorah, E., Afum, E., Agyemang, A. N., Agnikpe, C., & Rogers, F. (2020). Examining the influence of internal green supply chain practices, green human resource management and supply chain environmental cooperation on firm performance. Supply Chain Management: An International Journal.

Dubey, R., Gunasekaran, A., & Ali, S. S. (2015). Exploring the relationship between leadership, operational practices, institutional pressures and environmental performance: A framework for green supply chain. International Journal of Production Economics, 160, 120-132.

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

Fernando, Y. (2017). An empirical analysis of eco-design of electronic products on operational performance: does environmental performance play role as a mediator?. International Journal of Business Innovation and Research, 14(2), 188-205.

Guo, X., Cheng, L., & Liu, J. (2020). Green supply chain contracts with eco-labels issued by the sales platform: profitability and environmental implications. International Journal of Production Research, 58(5), 1485-1504.

Haudi, H., Rahadjengb, E. R., Santamoko, R., Putrac, R. S., Purwoko, D., Nurjannahe, D., & Purwanto, A. (2021). The Role of E-Marketing and E-Crm on E-Loyalty of Indonesian Companies During Covid Pandemic and Digital Era. Uncertain Supply Chain Management, 10, 2022

Islam, M. S., Tseng, M. L., Karia, N., & Lee, C. H. (2018). Assessing green supply chain practices in Bangladesh using fuzzy importance and performance approach. Resources, Conservation and Recycling, 131, 134-145.

Jafarzadeh-Ghoushchi, S. (2018). Qualitative and quantitative analysis of Green Supply Chain Management (GSCM) literature from 2000 to 2015. International Journal of Supply Chain Management, 7(1), 77-86.

Jermsittiparsert, K., Namdej, P., & Somjai, S. (2019). Green supply chain practices and sustainable performance: moderating role of total quality management practices in electronic industry of Thailand. International Journal of Supply Chain Management, 8(3), 33-46.

Kazancoglu, Y., Sagnak, M., Kayikci, Y., & Kumar Mangla, S. (2020). Operational excellence in a green supply chain for environmental management: A case study. Business Strategy and the Environment, 29(3), 1532-1547.

Kaliani Sundram, V. P., Rajagopal, P., Bahrin, A. S., & Subramaniam, G. (2018). The role of supply chain integration on green practices and performance in a supply chain context. a conceptual approach to future research. International Journal of Supply Chain Management, 7(1), 95-104.

Kumar, N., Brint, A., Shi, E., Upadhyay, A., & Ruan, X. (2019). Integrating sustainable supply chain practices with operational performance: an exploratory study of Chinese SMEs. Production Planning & Control, 30(5-6), 464-478.

Masudin, I., Wastono, T., & Zulfikarijah, F. (2018). The effect of managerial intention and initiative on green supply chain management adoption in Indonesian manufacturing performance. Cogent Business & Management, 5(1), 1485212.

Muhajir, Mukaromah,H. , Fathudina , Purwanti,K.L, Ansoria,Y., Fahlevi,M., Rosmayati,S.,Tanjung, R., Budiarti ,R.H.S,Rosyadi and Purwanto,A.(2021). The role of buzz and viral marketing strategic on purchase intention and supply chainperformance. Uncertain Supply Chain Management,10(2), 1-8.

Micheli, G. J., Cagno, E., Mustillo, G., & Trianni, A. (2020). Green supply chain management drivers, practices and performance: A comprehensive study on the moderators. Journal of Cleaner Production, 259, 121024.

Purwanto, A., & Juliana (2021). The effect of supplier performance and transformational supply chain leadership styleonsupply chain performance in manufacturing companies. Uncertain Supply Chain Management, 10(2), 1-8

Purwanto, A., Asbari, M., Santoso, T. I., Paramarta, V., & Sunarsi, D. (2020). Social and Management Research Quantitative Analysis for Medium Sample: Comparing of Lisrel, Tetrad, GSCA, Amos, SmartPLS, WarpPLS, and SPSS. Jurnal Ilmiah Ilmu Administrasi Publik: Jurnal Pemikiran Dan Penelitian Administrasi Publik.

Purwanto, A., Asbari, M., Santoso, T. I., Haque, M. G., & Nurjaya, N. (2020). Marketing Research Quantitative Analysis for Large Sample: Comparing of Lisrel, Tetrad, GSCA, Amos, SmartPLS, WarpPLS, and SPSS. Jurnal Ilmiah Ilmu Administrasi Publik: Jurnal Pemikiran dan Penelitian Administrasi Publik.

Purba, J., Samuel, S., & Budiono, S. (2021). Collaboration of digital payment usage decision in COVID-19 pandemic situation: Evidence from Indonesia. International Journal of Data and Network Science, 5(4), 557-568.

Pramono, R., Sondakh, L. W., Bernarto, I., Juliana, J., & Purwanto, A. (2021). Determinants of the small and medium enterprises progress: A case study of SME entrepreneurs in Manado, Indonesia. The Journal of Asian Finance, Economics, and Business, 8(1), 881-889.

Qorri, A., Mujkić, Z., Gashi, S., & Kraslawski, A. (2018). Green supply chain management practices and company performance: A meta-analysis approach. Procedia Manufacturing, 17, 317-325.

Rehman Khan, S. A., & Yu, Z. (2021). Assessing the eco-environmental performance: an PLS-SEM approach with practice-based view. International Journal of Logistics Research and Applications, 24(3), 303-321.

Rudyanto, R., Pramono, R., & Purwanto, A. (2021). The influence of antecedents of supply chain integration on company performance. Bagchi, PK & Chun HB (2005). Supply Chain Integration: a European survey. The International Journal of Logistics Management, 16(2), 275-294.

Tundys, B., & Wiśniewski, T. (2018). The selected method and tools for performance measurement in the green supply chain—survey analysis in Poland. Sustainability, 10(2), 549.

Wijaya, O., Sulistiyani, S., Pudjowati, J., Kurniasi, N., & Purwanto, A. (2021). The role of social media marketing, entertainment, customization, trendiness, interaction and word-of-mouth on purchase intention: An empirical study from Indonesian smartphone consumers. International Journal of Data and Network Science, 5(3), 231-238.

Journal of Industrial Engineering & Management Research
Vol.3 No.3 (2022) DOI: https://doi.org/10.7777/jiemar.v3i3
http://www.jiemar.org e-ISSN : 2722-8878

Younis, H., Sundarakani, B., & O'Mahony, B. (2020). Investigating the relationship between green supply chain management and corporate performance using a mixed method approach: developing a roadmap for future research. IIMB Management Review, 32(3), 305-324.

Yu, Z., Golpîra, H., & Khan, S. A. R. (2018). The relationship between green supply chain performance, energy demand, economic growth and environmental sustainability: An empirical evidence from developed countries. LogForum, 14(4).

Yuliantoro, N., Goeltom, V., Juliana, I. B., Pramono, R., & Purwanto, A. (2019). Repurchase intention and word of mouthfactors in the millennial generation against various brands of Boba drinks during the Covid 19 pandemic. African Journal of Hospitality, Tourism and Leisure, 8(2), 1-11

Zhu, Q., & Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices and performance. International journal of production research, 45(18-19), 4333-4355.