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The Effect of Supply Chain Resilience and Collaboration on The Firm Performance: Moderating Effect of Uncertainty

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ABSTRACT

This study aims to examine and analyze the effect of Supply Chain Resilience and Collaboration on Manufacturing Firm Performance in various industrial sectors in Jabodetabek area moderated by Supply Chain Uncertainty. The data collection method used was by distributing questionnaires to 289 respondents, using purposive sampling technique. The data analysis method used in this study is the Partial Least Square Structural Equation Model (PLS-SEM) method using SPSS 22 and PLS 3 application. The variables used in this study are the independent variables, namely Supply Chain Collaboration (SCC), the moderating variable is Supply Chain Uncertainty (SCU), the dependent variables are Supply Chain Resilience (SCR), Supply Chain Performance (SCP) and Firm Performance (FP). The study indicates that SCC affects SCR, and SCP affects FP, while SCR and SCC was not proven to have an influence on SCP, SCU was not proven to have a moderating effect on the relation of SCR on SCP, and SCC on SCP. Management and all of the supply chain members hoped to collaborate on information, communication, and matching goals. Management also hoped to make strategic decisions regarding the enhancement of Supply Chain Performance to enhance their Firm Performance.

KEYWORDS -Collaboration, Firm Performance, Resilience, Supply Chain, Uncertainty

1. INTRODUCTION

The monetary value of supply chain spending is highest in manufacturing companies (Dey et al., 2011). With many uncertainties such as post-pandemic recovery, geopolitical conditions, and global economic conditions, manufacturing companies are required to maintain their supply chain conditions to maintain and improve company performance. In developing countries, supply chain resilience is very important because it is more easily affected by uncertainty and supply chain resilience (Lopes et al., 2022). Resilience indices are also used to evaluate the ability of supply chains to operate under demand uncertainty (Cardoso et al., 2015). In a previous study, it was found that a lean supply chain is more influential than supply chain resilience (Ruiz et al., 2018). In previous research, antecedents of supply chain resilience (SCR) were also used with the criteria of flexibility, agility, and robustness (Alshahrani et al., 2022). Agility affects the speed of the supply chain to return to normal conditions when there is a disruption (Cardoso et al., 2021). Robustness is the company's ability to proactively anticipate changes before they occur (Wieland et al., 2012). Meanwhile, flexibility is the reactive ability of the company to build and balance supply and demand (Siagian et al., 2021). Robustness criteria do not support marketing/sales performance for micro, small, and medium enterprises in Saudi Arabia (Alshahrani et al., 2022). This study will use the antecedent of flexibility as a research indicator.

Supply chain collaboration (SCC) is the ability of all supply chain members (suppliers, distributors, service providers to customers) to optimize processes and provide savings in operations (Zhou et al., 2022). So in this case, all supply chain members contribute together to build a solid collaboration chain and strengthen the resilience of all companies involved in it (Badraoui et al., 2022). In previous research conducted in the Marmara region, Turkey, it was found that supply chain collaboration can affect supply chain performance moderated by supply chain uncertainty (SCU) (Ince et al., 2020). There have been several studies examining the impact of uncertainty on supply chain processes that reduce supply chain performance in manufacturing companies (Sutduean et al., 2019). This study uses uncertainty antecedents with the criteria of manufacturing uncertainty, customer demand, and supplier performance (Hotrawaisaya et al., 2020).

With the deepening of globalization in terms of the economy, competition between companies has turned into competition between supply chains (Zhu et al., 2022). In previous studies, it can be shown that supply chain resilience can indirectly affect the financial ability of the company by improving the company's operational

capabilities (Gu et al., 2017). From previous studies, researchers want to know whether supply chain resilience can directly affect supply chain performance (SCP). Firm performance (FP) can be seen from various business functions such as marketing, sales and production performance. The combination of all these business functions is the overall performance of the company.

From the previous studies above, the authors want to see the effect of supply chain resilience (SCR) on supply chain performance (SCP), the effect of supply chain collaboration (SCC) on supply chain performance (SCP), the effect of SCC on SCR, the moderating effect of supply chain uncertainty (SCU) in the relationship between SCR and SCP, the moderating effect of SCU in the relationship between SCC and SCP, and the effect of SCP on manufacturing company performance (FP). From the research hypothesis above, the following conceptual framework is made:

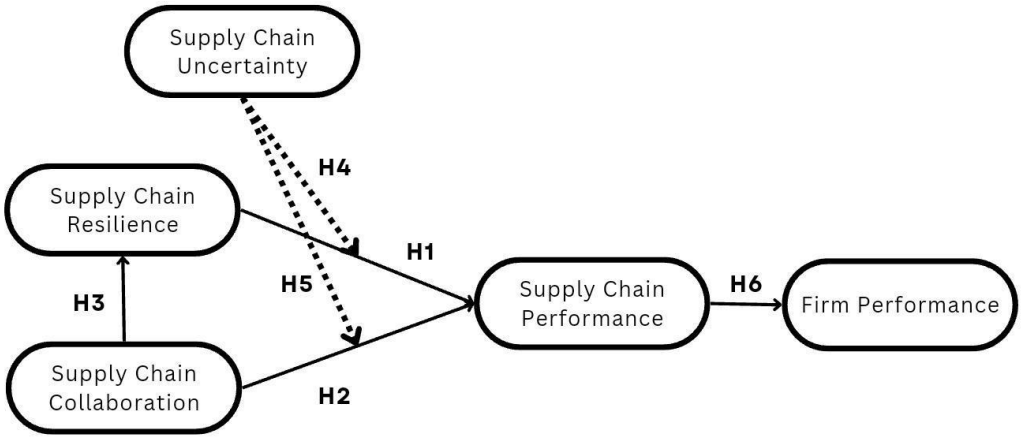

Fig. 1 Conceptual Framework

2. LITERATURE REVIEWS

Supply Chain Resilience

Maintaining and enhancing a company's competitive advantage requires the resilience of its supply chain. A resilience index is used to evaluate the ability of a supply chain to operate under demand uncertainty (Cardoso et al., 2015). In their study Ruiz et al. (2018) examined the relationship between lean supply chain and supply chain resilience on supply chain capabilities. It is found that lean supply chains are more influential than supply chain resilience. But for developing countries, supply chain resilience is very important because it is more easily affected by uncertainty and supply chain resilience (Lopes et al., 2022). In the research of Alshahrani et al. (2022) used antecedents of supply chain resilience with the criteria of agility, robustness, and flexibility. Agility affects the speed of the supply chain to return to normal conditions when there is a disruption (Cardoso et al., 2021). In the conditions after a pandemic, agility can see how quickly the company's supply chain returns to normal to carry out the production process. Robustness is the company's ability to be proactive in anticipating changes before they occur (Wieland et al., 2012). Anticipating supply chain changes due to global geopolitical conditions, facing disasters, and disruption of economic stability requires robustness from a company. Meanwhile, flexibility is the reactive ability of companies to build and balance supply and demand (Siagian et al., 2021). Flexibility is the company's ability to sort and select possible supply chain options to deal with changing supply and market conditions. Flexibility and agility will go hand in hand. The redundancy generated by these three factors is what forms supply chain resilience.

Supply Chain Collaboration

Supply chain collaboration is the ability of suppliers, distributors, service providers to customers to optimize processes and provide savings in operations (Zhou et al., 2022). So in this case, all members of the supply chain contribute together to build a solid collaboration chain and strengthen the resilience of all companies involved in it (Badraoui et al., 2022). In this case, it is in accordance with several things in this study to see the effect of collaboration on supply chain resilience and supply chain performance amid uncertainty. The results of the research of Qasim, R.M., & Hassan, Masood (2022) state that the results of supply chain collaboration are an effective method to improve supply chain performance. In this study, it can also be seen whether there is a relationship between supply chain collaboration and supply chain resilience to improve supply chain performance and the performance of manufacturing companies.

Supply Chain Uncertainty

There have been several studies examining the impact of uncertainty on supply chain processes that reduce supply chain performance within companies in the manufacturing sector (Sutduean et al., 2019). This uncertainty is also related to the risks that can occur in a supply chain. The distinction between supply chain uncertainty and supply chain risk has become so thin that the importance of distinguishing between the two is no longer present in business practice (Zheng et al., 2015). In this study, uncertainty antecedents will be used with a model from Hotrawaisaya, Chattrarat, & Jermsittiparsert, Kittisak, 2020, namely manufacturing uncertainty, customer demand, and supplier performance. Real Options Theory states that the focus on uncertainty risk in business functions must be shown by management in making decisions in making choices of plans and strategies and considering these plans and strategies to be applied or not for conditions that may arise in the future (Choi et al., 2017). The authors expect company management to build supply chain resilience and collaboration to reduce supply chain uncertainty that can affect the supply chain performance of the company.

Supply Chain Performance

With the deepening of globalization in economics, the competition between companies has turned into competition between supply chains (Zhu, Xinqiu; Wu, Yenchun Jim, 2022). Many companies build strategies to increase profits by cutting costs, which in turn may weaken supply chains and increase supply chain risks. Previous studies have shown that supply chain resilience can indirectly affect a company's financial capability by improving the company's operational capabilities (Gu, M.; Huo, B., 2017).

Firm Performance

With the deepening of globalization in economics, the competition between companies has turned into competition between supply chains (Zhu, Xinqiu; Wu, Yenchun Jim, 2022). Many companies build strategies to increase profits by cutting costs, which in turn may weaken supply chains and increase supply chain risks. Previous studies have shown that supply chain resilience can indirectly affect a company's financial capability by improving the company's operational capabilities (Gu, M.; Huo, B., 2017).

3. HYPOTHESIS DEVELOPMENT

Supply Chain Resilience and Supply Chain Performance

Supply chain resilience is defined by Hohenstein et al. (2015) as the ability to prepare for unexpected events/risks, respond and recover quickly from potential disruptions to return to the initial situation or evolve to a new desired condition. Supply chain readiness is evidenced by the presence of safety stock, excess capacity, and supplier variations (Han et al., 2020). Based on the research of Alshahrani, M.A., & Salam, M.A. (2022) robustness and agility are correlated with company performance, so the influence on supply chain resilience has robustness and agility factors as antecedents. Supply chain resilience also has an indirect impact on supply chain performance through a sustainable supply chain (Zhu et al., 2022). The effect of supply chain resilience on supply chain capability is hypothesized:

H1: Supply chain resilience has an influence on supply chain performance.

Supply Chain Collaboration, Resilience and Supply Chain Performance

Supply chain collaboration as the name implies relates to collaboration between supply chain members such as suppliers, distributors, service providers and customers in order to optimize processes and provide assurance of continuity of operations (Zhou et al., 2022). Empirically, supply chain collaboration is a critical factor for improving supply chain performance (Ince et al., 2020). Collaboration facilitates supply chain members to improve supply chain performance through information exchange, common goals, collaborative communication, and the formation of common knowledge. The effect of supply chain collaboration on supply chain resilience and supply chain capabilities is hypothesized:

H2: Supply chain collaboration has an influence on supply chain performance.
H3: Supply chain collaboration has an influence on supply chain resilience.

Supply Chain Collaboration, Resilience and Supply Chain Uncertainty

Uncertainty is the difficulty of determining the probability of future events or accurately determining the consequences of decisions (Wong et al., 2011). The existence of uncertainty makes decision makers to eliminate weak links in the supply chain to increase competitive advantage (Ince et al., 2020). The study also found that supply chain uncertainty moderates the relationship between collaboration and supply chain performance. The moderating effect between supply chain uncertainty with supply chain resilience and supply chain collaboration is formulated with the following hypothesis:

H4: Supply chain uncertainty moderates supply chain resilience on supply chain performance.
H5: Supply chain uncertainty moderates supply chain collaboration on supply chain performance.

Supply Chain Performance and Firm Performance

Companies are formed with various business functions such as procurement, production, marketing, and sales. Production, marketing and sales are important business functions for modern companies in the technology sector (Matthyssens et al., 2006). Supply chain performance has a positive impact on company performance according to research made by Lia et al. (2006), Mentzer et al. (2001), and Ince et al. (2020). This study has a population and sample of manufacturing companies, therefore the influence between supply chain performance and company performance is made with the following hypothesis formulation:

H6: Supply chain performance has an influence on company performance.

4. METHODS AND SAMPLES

The research design used in this study is hypothesis testing with cross-sectional data and purposive sampling. The research population is manufacturing companies in Jakarta, Bogor, Depok, Tangerang and Bekasi (Jabodetabek), with a sample of 289 manufacturing company's owner and/or employees. The data were obtained by distributing online questionnaires, while hypothesis testing was carried out using the Partial Least Square- Structural Equation Modeling (PLS-SEM) method using SPSS 22 and PLS 23.

5. RESULTS AND DISCUSSIONS

Data processing is carried out with PLS-SEM repeatedly to fulfill the validity and reliability values. Variable indicators with a loading factor value can be said to be valid if they have a correlation value above 0.7, but for early stage research from developing a measurement scale, a loading factor of 0.5 to 0.6 is considered sufficient (Chin, 1998 in Ghozali, 2014). Indicators that have a loading factor below 0.5 can be declared invalid and the indicator is removed from the model. The following are the modeling results of the conceptual framework used as follows:

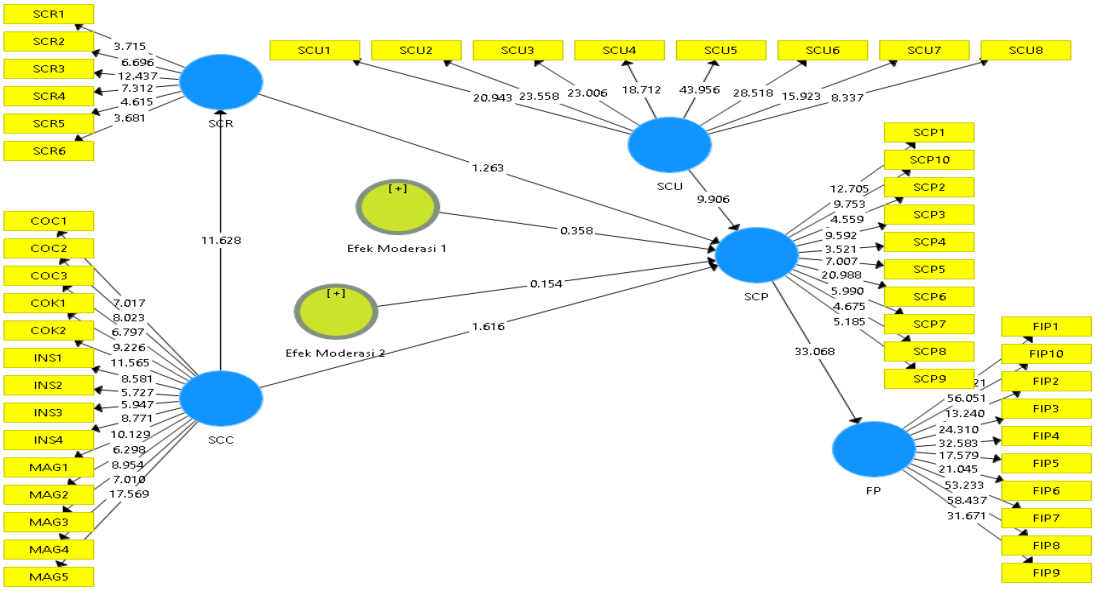

Fig. 2 PLS-SEM Diagram

Hypothesis testing is done by comparing the p-value with a confidence level of 5% (alpha = 0.05). According to Hair Jr et al. (2018) the requirements for hypothesis testing are a p-value below or equal to 0.05, the hypothesis is supported, while a p-value above 0.05, the hypothesis is not supported.

Hypothesis	Sample (O)	P-Value	Decision
H1: Supply chain resilience has an influence on supply chain performance	0.113	0.207	Rejected
H2: Supply chain collaboration has an influence on supply chain performance	0.126	0.107	Rejected
H3: Supply chain collaboration has an influence on supply chain resilience	0.530	0.000	Accepted
H4: Supply chain uncertainty moderates supply chain resilience on supply chain performance	-0.024	0.720	Rejected
H5: Supply chain uncertainty moderates supply chain collaboration on supply chain performance	-0.006	0.877	Rejected
H6 : Supply chain performance has an influence on company performance	0.743	0.000	Accepted

Table 1. Hypothesis Testing

Supply Chain Resilience and Supply Chain Performance

This study is conducted empirically to see the effect of SCC on SCR on SCP and FP moderated by SCU. Hypotheses were developed after the initial framework reflected in Figure 1 was created. Our results show that SCR has no direct influence on SCP, which is related to the results of a previous study that showed that SCR has an indirect influence on SCP while SCR has no direct influence on SCP (Zhu et al., 2022). In the study of Zhu et al. (2022), it shows that SCR does not have a direct effect on SCP but is indirect and mediated by sustainable supply chains including social, economic and environmental aspects. The antecedents of flexibility used cannot show the effect of SCR on SCP or the addition of moderating variables is needed to produce a relationship between SCR and SCP. Supply chain response speed and supply chain management robustness are needed to strengthen the relationship between SCR and SCP (Alshahrani et al, 2022).

Supply Chain Collaboration, Resilience and Supply Chain Performance

This study shows that SCC has no influence on SCP, contrary to the results of previous studies which show that SCC has an influence on SCP (Ince et al., 2020). Collaboration and supply chain performance suggest that customers and suppliers must build mutually beneficial situations to generate positive relationships (Um et al., 2018). Previous research also used incentive antecedents to generate proactivity from supply chain collaboration (Cao and Zhang, 2011). Decision concurrency, incentive formation, resource sharing, and cooperation in processing markets and information are needed to strengthen the relationship between SCC and SCP.

Supply Chain Collaboration, Resilience and Supply Chain Uncertainty

We can empirically show that SCC has an influence on SCR, which is consistent with previous studies. Supply chain risk reduction through collaboration can affect supply chain performance (Zhu et al., 2022). This study does not show that there is a moderating effect of SCU from SCR on SCP. And there is no moderating effect of SCU from SCC on SCP. This is contrary to previous studies that successfully showed the moderating effect of SCU through aspects of supply uncertainty, operation uncertainty, and customer uncertainty (Ince et al., 2020). Other aspects such as environmental uncertainty, and system uncertainty used by Pishvaee and Torabi (2010) can be added in future studies to complement the uncertainty aspects.

Supply Chain Performance and Firm Performance

Empirically, it can be shown that SCP has an influence on FP, in accordance with research conducted by Ince et al. (2020) and Lia et al. (2006). Organizations are already aware of the relationship between supply chain performance and organizational performance and continuously apply supply chain management within their organization (Ince et al., 2020). Company performance related to supply chain performance management brings value to customers, quality, service, and speed (Ghicajanu, 2014). Through improvements in delivery time, inventory turnover, stock levels, and production defect ratio, supply chain performance can be improved to increase sales, profit margins, market share, and operating income of an enterprise.

6. CONCLUSION AND FURTHER RESEARCH

From the results of hypothesis testing, it can be shown that supply chain resilience has no influence on supply chain performance, supply chain collaboration has no influence on supply chain performance, supply chain collaboration has a positive influence on supply chain resilience, supply chain uncertainty does not moderate the relationship between supply chain resilience and collaboration on supply chain performance, supply chain performance has a positive influence on company performance.

This research has some limitations, just like other cross-sectional studies, this research is limited to the contribution and evidence of positive causality. Future research can use longitudinal data to better investigate the relationship between variables. The next limitation is related to the limited sample in the Jabodetabek area with limited characteristics. Readers should be cautious about generalizing the results to other contexts. Future research is also expected to examine a wider area and even examine other industrial sectors as a comparison or examine other industrial sectors that are narrower and focused.

In the previous study, it was explained that SCP greatly affects FP, so management must make strategic decisions to improve SCP which will improve company performance through delivery time, improving stock levels, reducing production defects, and increasing inventory turnover cycles. Management and all supply chain members must also collaborate with each other through information exchange, common goals, and open, close, and regular communication to improve the resilience of the supply chain.

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