

Uncertain Supply Chain Management

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Supply chain ambidexterity, business performance and mediating role of lean and agile supply chain strategies

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ABSTRACT

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Ambidexterity is a company's capability to manage operations and strategy simultaneously and effectively, facilitating innovation and adaptation to market changes. Companies must be able to maintain operational efficiency and stability while also innovating and adapting to market dynamics. Ambidexterity enables companies to manage operations and strategy effectively and efficiently while at the same time, facilitating innovation and adaptation to market changes. This leads to an increase in company performance, such as increased revenue, increased market, and increased operating efficiency. It is also necessary that there are several mediating variables, such as effective supply chain collaboration, supply chain management, and innovation capability, which influence the relationship between supply chain ambidexterity and firm performance. This study aims to determine the extent to which ambidexterity can influence supply chain performance and how the role of lean and agile supply chains mediates the relationship between these variables. The research method used in this study is a quantitative approach. The number of samples analyzed in this study was 225. The results of the study concluded that ambidexterity helps companies to overcome pressure to optimize short- and long-term performance, maintain agility and flexibility in adapting to changes in the business environment. Studies on ambidexterity and supply chain performance have shown that ambidexterity can help directly optimize supply chain performance but can also amplify the positive impact of practices such as lean supply chain and agile supply chain. The implications obtained from the findings are that companies are expected to improve operational efficiency and effectiveness and have the ability to adapt to environmental changes and market demands.

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1. Introduction

The manufacturing industry is considered to play an important role in spurring investment and export value so that it becomes a mainstay sector for accelerating national economic growth. The manufacturing industry provides high quality products and contributes greatly to increasing national income through increased exports. Investments in the manufacturing industry can also enhance economic development, employ large numbers of people, and increase national production capacity. Ambidexterity supply chain has a positive influence on export performance. Ambidexterity enables companies to manage operations and strategies effectively and efficiently at the same time, facilitating innovation and adaptation to market changes (Aslam et al., 2020). This makes companies more flexible and ready to face changes, thereby increasing export performance and enhancing global competitiveness. Ambidexterity is a company's capability to simultaneously and effectively manage operations and strategy, facilitating innovation and adaptation to market changes. In this case, companies must be able to maintain operational efficiency and stability while also innovating and adapting to market dynamics (Raisch & Birkinshaw,

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2008). To implement ambidexterity, a company must have a culture that encourages innovation and adaptation and has systems and processes that support both of these. Companies must also have adequate resources and capabilities to manage operations and strategy simultaneously. Ambidexterity is very important because it allows companies to adapt to changes in the market and business environment, as well as facilitates innovation and improvement of company performance (O'Reilly III & Tushman, 2008). It helps companies to maintain and improve their position in the market, expand market and increase revenue. Ambidexterity enables companies to manage operations and strategies effectively and efficiently at the same time, facilitating innovation and adaptation to market changes (O'Reilly III & Tushman, 2008). This leads to an increase in company performance, such as increased revenue, increased market, and increased operating efficiency. Empirical studies also show that companies that can maintain a balance between stability and innovation in their operations and strategies are more able to survive and improve their performance in a competitive business environment. Therefore, ambidexterity is a company's capability to manage the trade-off between innovation and routine operations effectively and efficiently. This is very important for the company's performance because it allows the company to cope with changes in the business environment and strengthen its position in the industry. Applying ambidexterity properly can help companies achieve optimal performance by maintaining a balance between innovation and consistency (Tushman & O'Reilly III, 1996).

Indonesia as a large archipelagic country creates big challenges for manufacturing companies. The large number of domestic distributors and retailers can complicate the product distribution process and strengthen market competition (Magni & Razdan, 2015). Manufacturing companies must consider how to effectively manage their supply and distribution chain to ensure that products are available in a timely and cost-efficient manner. In addition, Indonesia's vast geography and hilly topography also make transportation of products and raw materials difficult and expensive. Therefore, manufacturing companies must ensure that the available transportation and logistics infrastructure is sufficient to support the production and product distribution processes. To overcome these challenges, manufacturing companies must consider effective strategies for managing supply and distribution chains (Sengupta et al., 2006). This strategy can involve increasing collaboration with distributors and retailers, increasing efficiency in production and logistics processes, and ensuring that transportation and logistics infrastructure is adequate to support business processes. Previous studies have reported that uncertainty in supply chains contributes to higher supply chain risks (Sreedevi & Saranga, 2017), and this study aims to show that a high level of uncertainty in the Indonesian supply chain context results in increased complexity in the relationship between chain ambidexterity supply and supply chain performance due to the high degree of uncertainty.

2. Literature Review and Hypothesis

Supply chain ambidexterity showed a negative correlation with firm performance, unless it is mediated by effective supply chain collaboration (Partanen et al., 2020). The results of this study indicate that effective collaboration between actors in the supply chain can help strengthen company performance and overcome some of the challenges that can be found in implementing ambidexterity in the supply chain. The results of this study add new information about the importance of effective collaboration in implementing ambidexterity and indicate that other factors, such as collaboration, can affect company performance and must be considered in the process of implementing ambidexterity (Tuan, 2016). Therefore, companies must pay attention to effective collaboration in implementing ambidexterity in their supply chain to achieve optimal results. The study conducted by Venkatraman et al. (2007) found that there is no correlation between ambidexterity and firm performance. The results of this study show that the concept of organizational ambidexterity does not always have a positive influence on company performance and that other factors, such as strategy, management capabilities, and the business environment, also have a significant influence on company performance. The results of this study indicate that although organizational ambidexterity can help companies to manage exploitation and exploration simultaneously, other factors must also be considered in the process of implementing ambidexterity (Tushman & O'Reilly III, 1996). Therefore, companies must carry out proper evaluation and analysis to determine what factors affect company performance and how ambidexterity can be applied effectively to achieve the desired results. Research conducted by Kristal et al. (2010) reported that supply chain ambidexterity has no direct correlation with firm performance. Therefore, there needs to be a mediating variable to understand the effect of supply chain ambidexterity on company performance. The study by the researchers identified several mediating variables, such as effective supply chain collaboration, supply chain management, and innovation capability, that affect the relationship between supply chain ambidexterity and firm performance. The results of this study indicate that although supply chain ambidexterity can help companies manage operations and strategies effectively and efficiently at the same time, other mediating variables must also be considered in the process of implementing ambidexterity. Therefore, companies must understand how mediating variables affect company performance and how supply chain ambidexterity can be applied effectively to achieve the desired results.

2.1 Relationship between Supply Chain Ambidexterity (SCA) and Supply Chain Performance (SCP)

Supply chain ambidexterity (SCA) is the ability of a supply chain to manage effectively and efficiently the trade-off between a focus on efficiency and a focus on innovation. This enables the supply chain to compete effectively in a dynamic business environment and maintain a balance between efficiency and innovation in its operations. Supply chain ambidexterity can help companies achieve flexibility and responsiveness to market changes and improve performance and performance. Supply chain ambidexterity (SCA) focuses on how companies can manage the trade-off between focusing on efficiency and focusing on innovation in their operations (Shukor et al., 2021). SCA emphasizes that to achieve optimal performance, companies must

maintain a balance between efficiency and innovation in their operations and consider the key factors that affect supply chain performance. The ability to adapt and maintain a balance between efficiency and innovation allows the company to cope with changes in the business environment and strengthen its position in the industry. This can improve product and service quality, speed delivery times, and lower costs. SCA also enables companies to better address emerging market challenges and strengthen relationships with customers and partners. All of this will help improve SCP and help companies achieve optimal performance. Therefore, the first hypothesis proposed in this study is as follows:

Hypothesis 1: *Supply Chain Ambidexterity (SCA) has a positive and significant effect on Supply Chain Performance (SCP)*

2.2 *The relationship between Lean Supply Chain (LSC) and Supply Chain Performance (SCP)*

Lean Supply Chain (LSC) is an approach to business management aimed at maximizing customer value while minimizing waste. It is based on the principle of Lean Manufacturing as a system developed to eliminate waste and increase efficiency in the production process. LSC focuses on streamlining all activities in the supply chain, including procurement, production, delivery, and customer service, to reduce costs, increase speed, and improve customer satisfaction (Carvalho et al., 2010). The main goal of LSC is to create a flexible, responsive, and efficient supply chain that can quickly adapt to changing customer demands. Lean principles aim to reduce waste and increase efficiency in all aspects of the supply chain, including inventory management, procurement, production, and logistics. By applying these principles, organizations can improve the flow of goods, reduce waiting times, improve responsiveness to customer requests, and improve overall efficiency and effectiveness. All of these factors can lead to improved supply chain performance and higher customer satisfaction. From this description, the second hypothesis in this study is as follows:

Hypothesis 2: *Lean Supply Chain (LSC) has a positive and significant effect on Supply Chain Performance (SCP)*

2.3 *The relationship between Agile Supply Chain (ASC) and Supply Chain Performance (SCP)*

Agile Supply Chain (ASC) is a management approach that emphasizes flexibility and responsiveness in the supply chain (Alzoubi & Yamanandra, 2020). It is designed to adapt quickly to changing customer demands, market conditions and supply chain disruptions. An agile supply chain is characterized by short lead times, close cooperation between suppliers, manufacturers and customers, and the use of technology and data to monitor and respond to changes in real time. By being agile, organizations can respond quickly to market changes, reduce waste, and increase customer satisfaction, which ultimately leads to improved supply chain performance. ASC principles, such as flexibility, collaboration and responsiveness, enable organizations to adapt quickly to changing market and customer demands, reducing waste and increasing efficiency. This can lead to increased customer satisfaction, increased responsiveness, and more efficient and effective supply chain processes. All of these factors can contribute to an overall improvement in Supply Chain Performance (SCP). With this, the third hypothesis obtained in this study is as follows:

Hypothesis 3: *Agile Supply Chain (ASC) has a positive and significant effect on Supply Chain Performance (SCP)*

2.4 *Lean Supply Chain (LSC) and Agile Supply Chain (ASC) mediate the relationship between Supply Chain Ambidexterity (SCA) and Supply Chain Performance (SCP)*

SCA refers to the supply chain's ability to balance the exploitation of existing resources and capabilities with the exploration of new opportunities. On the other hand, Lean Supply Chain (LSC) focuses on increasing efficiency, reducing waste and increasing responsiveness. By applying the principles of Lean Supply Chain (LSC), organizations can achieve better coordination between exploitation and exploration activities, leading to better SCA. This enhanced SCA can then lead to improved supply chain performance, as organizations are better able to balance the need for efficiency with the need for innovation (Oliveira-Dias et al., 2022). In this sense, LSC can act as a mediator between SCA and SCP, helping organizations achieve a better balance between efficiency and innovation, which ultimately leads to improved supply chain performance. The Agile Supply Chain (ASC) can also play a mediating role in the relationship between Supply Chain Ambidexterity (SCA) and Supply Chain Performance (SCP). ASC emphasizes flexibility, responsiveness, and collaboration, which can help organizations balance exploiting existing resources and capabilities with exploring new opportunities. By being agile, organizations can respond quickly to changing market and customer demands, enabling them to balance efficiency with innovation (Altay et al., 2018). In this way, ASC can help organizations achieve better Supply Chain Ambidexterity (SCA), as they are able to respond to market changes more quickly and effectively. Improved SCA can then lead to improved supply chain performance, as organizations are better able to balance the need for efficiency with the need for innovation. ASC can act as a mediator between SCA and SCP, helping organizations achieve a better balance between efficiency and innovation, ultimately leading to improved supply chain performance. Therefore, the fourth and fifth hypotheses proposed in this study are as follows:

Hypothesis 4: *Lean Supply Chain (LSC) mediates the relationship between Supply Chain Ambidexterity (SCA) and Supply Chain Performance (SCP)*

Hypothesis 5: *Agile Supply Chain (ASC) mediates the relationship between Supply Chain Ambidexterity (SCA) and Supply Chain Performance (SCP)*

Supply Chain Ambidexterity (SCA) with exploration and exploitation capabilities can help increase the SCP of manufacturing companies (Kristal et al., 2010). In addition, the use of Lean Supply Chain (LSC) and Agile Supply Chain (ASC) is proposed in this study to increase inter-island SCP. These variables are considered because of their impact on supply chain business performance (Altay et al., 2018; Tarafdar & Qrunfleh, 2017). The proposed construct framework for this study is depicted in Fig. 1.

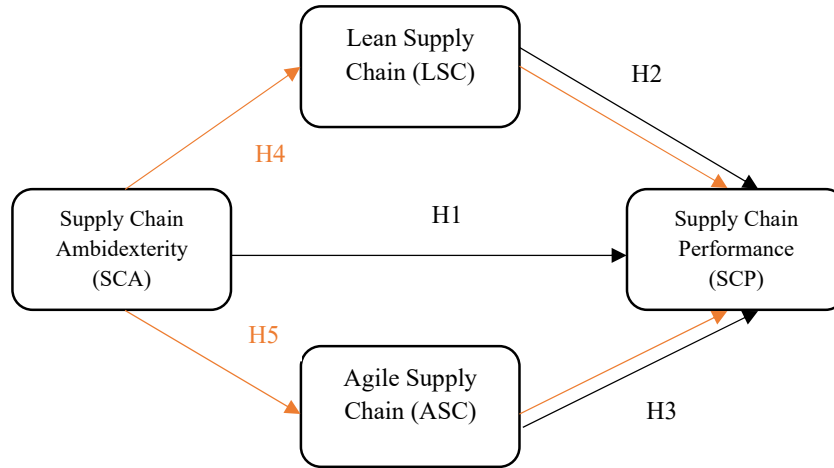


Fig. 1. Conceptual Framework

3. Research Method

To examine the model, this current research used a quantitative approach. The sample selection technique used was simple random sampling. Data collection was carried out through questionnaires which were distributed to medium-scale manufacturing companies in Greater Jakarta with an online survey tool. In the data collection process, it was confirmed that all respondents represented the company. The number of questionnaires distributed to respondents was 250, but only 230 were returned by respondents. Then there were 5 incomplete questionnaires, so that the final sample that could be analyzed in this study was 225. The data in this study were analyzed using AMOS 24. This model can analyze the direct and indirect effects of the variables in the SCP.

4. Result and Discussion

This study suspects that Supply Chain Ambidexterity (SCA) will have a significant and positive relationship with Supply Chain Performance (SCP) and investigates the moderating role of Lean Supply Chain (LSC) and Agile Supply Chain (ASC) in strengthening the positive relationship between Supply Chain Ambidexterity (SCA) with Supply Chain Performance (SCP). The standard path coefficient for the model is presented in Fig. 2.

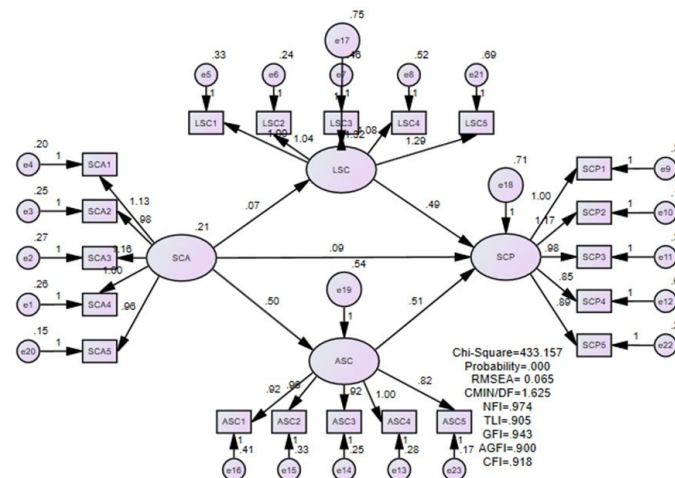


Fig. 2. Empirical Research Model Path Diagram

From the results of the analysis test in Fig. 2, it showed that the goodness of fit indicates the fit test of the model used is acceptable because the chi-square value obtained is 433,157 with a probability value of 0.000, these results indicate that the structural equation model is quite good. Then RMSEA obtained a value of 0.065, this value is < the cut-off value of 0.08. CMIN/DF obtained a value of 1.625 < the cut-off value of 2.00. NFI gets a value of 0.974, this value is greater than the cut-off value of 0.95. TLI gets a value of 0.905, this value is close to the cut-off value of 0.95. GFI gets a value of 0.943, greater than the cut-off value of 0.90. AGFI got a score of 0.900, sufficient for the cut-off value of 0.90. CFI gets a value of 0.918, this value is close to the cut-off value of 0.95. In more detail, the results of the data analysis are provided in the form of Table 1.

Table 1
Results of feasibility mode

Goodness-of-fit index	Cut of Value	Estimation	Information
Chi-Square	34.62	433.157	Fit
Prob.	≥ 0.05	0.000	Fit
RMSEA	≤ 0.08	0.065	Fit
CMIN/DF	≤ 2.00	1.625	Fit
NFI	≥ 0.95	0.974	Fit
TLI	≥ 0.95	0.905	Marginal
GFI	≥ 0.90	0.943	Fit
AGFI	≥ 0.90	0.900	Fit
CFI	≥ 0.95	0.918	Marginal

The contribution of SCA, LSC and ASC to SCP in medium scale manufacturing companies in various industrial areas in Indonesia must be analyzed from a practical perspective. Validity was tested through outer model analysis, where according to Hair et al. (2019), the loading factor score must be above the standard value of 0.50. Then the results of the reliability test show that the measurement is reliable with the C.R. not less than 0.70 and the AVE value must be above 0.50 (Malhotra & Dash, 2010). The results of the validity and reliability tests are presented in Table 2.

Table 2
The Result of Measurement Model

Construct	Item	Std. Loading Factor	C.R.	AVE
Supply Chain Ambidexterity	SCA1	0.751	0.833990684	0.5019518
	SCA2	0.663		
	SCA3	0.712		
	SCA4	0.662		
	SCA5	0.749		
Lean Supply Chain	LSC1	0.833	0.919766141	0.6966232
	LSC2	0.879		
	LSC3	0.861		
	LSC4	0.793		
	LSC5	0.804		
Agile Supply Chain	ASC1	0.741	0.900561425	0.6447150
	ASC2	0.789		
	ASC3	0.820		
	ASC4	0.823		
	ASC5	0.838		
Supply Chain Performance	SCP1	0.865	0.938393835	0.75393820
	SCP2	0.954		
	SCP3	0.875		
	SCP4	0.750		
	SCP5	0.885		

Table 2 shows the results of the validity and reliability measurement models. This step is to re-assess the reliability of each indicator by examining loading steps on the corresponding latent constructs. The Std loading factor value in Table 2 showed the value of all variables above 0.50 indicating an adequate relationship between the indicator and the construct, meaning that the indicator is valid. Then the value of C.R. all variables are > 0.70 and the AVE value is >0.50, this showed that all the variables are reliable.

4.1 Direct Influence

This study examines the empirical model proposed in several hypotheses by testing the structural equation model. Table 3 is the result of testing the direct relationship hypothesis. Direct relationship is the effect that is measured directly between the independent variable and the dependent variable. The analysis was carried out based on the p-value, if the p-value is less than 0.05 then the relationship between variables is significant.

Table 3
Direct Influence Coefficients

			Estimate	S.E.	C.R.	P-Value
Supply Chain Performance	←	Supply Chain Ambidexterity	0.503	0.137	3.661	***
Supply Chain Performance	←	Lean Supply Chain	0.490	0.087	5.614	***
Supply Chain Performance	←	Agile Supply Chain	0.511	0.103	4.949	***

Based on the results of hypothesis testing in Table 3, it showed that there is a unidirectional relationship. The testing of the first hypothesis (H1) showed a direct relationship between Supply Chain Ambidexterity and Supply Chain Performance with its significance effect with a p-value <0.05 with an estimated parameter value of 0.503, a standard error (SE) value of 0.137 and a critical ratio (C.R.) value of 3.661. These results indicate that the hypothesis is accepted, meaning that Supply Chain Ambidexterity has a positive and significant effect on Supply Chain Performance. This finding is consistent with and in line with previous findings by Aslam et al. (2020) and Wamba et al. (2022) who argue that there is a significant positive relationship between Supply Chain Ambidexterity and Supply Chain Performance. The results of testing the second hypothesis (H2) show that the effect of Lean Supply Chain on Supply Chain Performance is significant with a P-value <0.05 with an estimated parameter value of 0.490, a standard error value (SE) of 0.087, and a critical ratio value (C.R.) of 5.614. These results indicate that Lean Supply Chain has a positive and significant effect on Supply Chain Performance. This is in line with Tortorella et al. (2017) and Qrunfleh & Tarafdar (2014), Adnani et al. (2023) Jamaludin et al. (2022) stating that Lean Supply Chain Influences Supply Chain Performance. In testing the third hypothesis (H3), empirical results show that Agile Supply Chain and Supply Chain Performance have a significant positive effect, where the p-value obtained is <0.05, the estimated parameter value is 0.511, the standard error value (SE) is 0.103 and critical ratio value (C.R.) 4,949. These results indicate that Agile Supply Chain has a positive and significant effect on Supply Chain Performance. These results are in line with the research of Jermisittiparsert et al. (2019) and Tarafdar & Qrunfleh (2017) stating that Agile Supply Chain has a positive impact on Supply Chain Performance.

4.2 Indirect Influence

While the indirect relationship is measured through mediating variables. The analysis is carried out based on one and two tailed probabilities, if the one and two tailed probabilities are less than 0.05 then the relationship between the variables and the mediating factor can be said to be significant. Based on Figure 3 and Figure 4, the results of testing the indirect relationship are presented, the fourth hypothesis (H4) and the fifth hypothesis (H5).

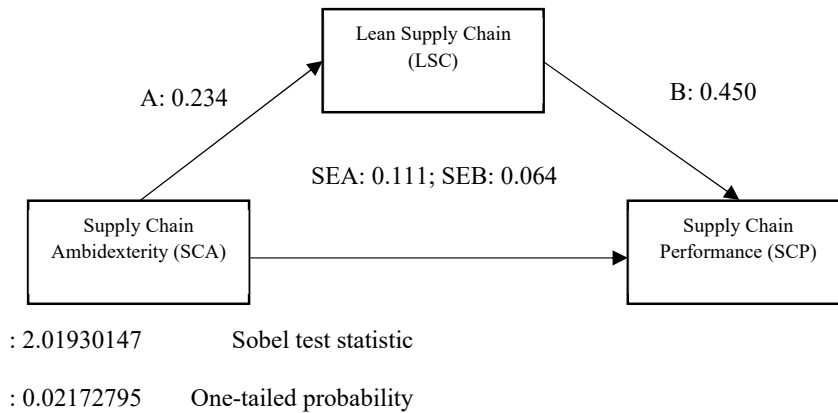


Fig. 3. LSC Mediation Test between SCA and SCP

The results showed that the effect of Supply Chain Ambidexterity (SCA) on Supply Chain Performance (SCP) through Lean Supply Chain (LSC) mediation obtained a Sobel test statistic of 2.01930147 with one-tailed probability of 0.02172795 and two-tailed probability of 0.04345590. These results indicate that the value of one-tailed probability and two-tailed probability is <0.05, therefore it can be concluded that Supply Chain Ambidexterity (SCA) has a significant effect on Supply Chain Performance (SCP) through Lean Supply Chain (LSC) mediation. With these results it is said that the fourth hypothesis can be accepted. This finding is in line with previous research conducted by Alamsjah and Asrol (2022) stating that Supply Chain Performance can be influenced by Supply Chain Ambidexterity using Lean Supply Chain mediation. The results of the mediation test on the fifth hypothesis can be seen in Fig. 4.

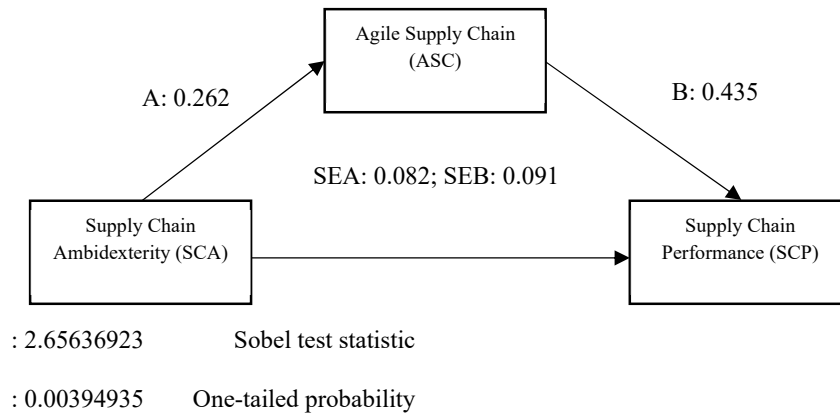


Fig. 4. ASC Mediation Test between SCA and SCP

The results show that the influence of Supply Chain Ambidexterity (SCA) on Supply Chain Performance (SCP) through Agile Supply Chain (ASC) mediation obtained a Sobel test statistic of 2.65636923 with one-tailed probability of 0.00394935 and two-tailed probability of 0.00789871. These results also indicate that the value of one-tailed probability and two-tailed probability is < 0.05 . Therefore, it can be concluded that Supply Chain Ambidexterity (SCA) has a significant effect on Supply Chain Performance (SCP) through Agile Supply Chain (ASC) mediation. With these results it is said that the fifth hypothesis can be accepted. This finding is in line with the research of Alkurdi & Vázquez-Bustelo (2022) stating that Supply Chain Performance can be influenced by Supply Chain Ambidexterity using Agile Supply Chain mediation. The findings of the two hypotheses conclude that Lean Supply Chain and Agile Supply Chain can be the right mediation for manufacturing companies in Indonesia in obtaining a positive influence between Supply Chain Ambidexterity on Supply Chain Performance.

5. Conclusion

Ambidexterity in this case is the ability to optimize supply chain performance using agility and agility in overcoming various existing constraints and obstacles. Ambidexterity emphasizes the ability to adapt to changes in the business environment and have the flexibility to implement different strategies according to changing situations. Ambidexterity theory views that ambidexterity can have a positive effect on company performance and is an important factor in determining long-term performance. Theoretical and empirical research has proven a strong relationship between ambidexterity and firm performance, such as profitability, efficiency, and competitive advantage. Ambidexterity helps companies to overcome pressure to optimize short- and long-term performance, maintain agility and flexibility in adapting to changing business environments. Studies on ambidexterity and supply chain performance have shown that ambidexterity can help directly optimize supply chain performance but can also amplify the positive impact of practices such as Lean Supply Chain and Agile Supply Chain. By utilizing these two variables, companies can improve operational efficiency and effectiveness, and can adapt to environmental changes and market demands. Therefore, ambidexterity can be a key factor for improving supply chain performance and achieving competitive advantage. Companies that can create harmony between ambidexterity, Lean Supply Chain, and Agile Supply Chain can achieve sustainable supply chain performance. This is because the company has the ability to optimize operational efficiency and effectiveness and has the flexibility to adapt to environmental changes and market demands. Thus, companies can ensure that their supply chain continues to run well and meet customer needs in a sustainable manner. The limitation in this study is that the research was conducted at the company level with only one respondent from each participating company. In future research, it is expected to include several respondents from each organization, because the entire supply chain is represented by various job functions within a company.

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