

MARKETING | RESEARCH ARTICLE

The Effect of Absorptive Capacity on Supply Chain Innovation Performance Through Supply Chain Agility in Manufacturing Companies in Bogor, Indonesia

Sabrina Ayu Dewanti¹, Wahyuningsih Santosa²

^{1,2}Department of Management, Faculty of Economics and Business, Universitas Trisakti, Jakarta, Indonesia.

Email: sabriinaayu44@gmail.com¹, wahyuningsih@trisakti.ac.id²

ARTICLE HISTORY

Received: January 06, 2025

Revised: March 20, 2025

Accepted: April 02, 2025

DOI

<https://doi.org/10.52970/grmapb.v5i2.983>

ABSTRACT

This study examines the impact of absorptive capacity on supply chain innovation performance through supply chain agility in a manufacturing company in Bogor. Employing a quantitative approach, data were collected from 216 respondents via questionnaires and analyzed using Structural Equation Modeling (SEM) with AMOS. The results indicate that absorptive capacity positively influences supply chain agility (p-value = 0.000) but does not directly affect supply chain innovation performance (p-value = 0.318). Furthermore, supply chain agility also does not significantly affect innovation performance (p-value = 0.292). The study concludes that enhancing absorptive capacity can improve supply chain agility but does not necessarily translate into improved innovation performance. To address this, the company is advised to strengthen interdepartmental communication and optimize knowledge utilization in decision-making to enhance agility and innovation within the supply chain.

Keywords: Absorptive Capacity, Supply Chain Agility, Innovation Performance, Supply Chain.

JEL Code: M11, O32, L14.

I. Introduction

In today's dynamic and fiercely competitive global landscape, manufacturing companies are under relentless pressure to innovate and adapt to rapidly changing market demands and technological advancements (Park & Park, 2015). This necessitates critically examining the factors that drive innovation performance within the supply chain, enabling firms to survive and thrive in this challenging environment (Davis et al., 2015). A key factor in achieving a sustainable competitive advantage, particularly amidst unprecedented market instability and complex customer requirements, is agile manufacturing, emphasizing responsive adaptability to counteract competitive pressures on organizational performance (Gunasekaran et al., 2018). To navigate the intricate web of supply chain dynamics and achieve superior innovation outcomes, companies must cultivate a robust absorptive capacity, which refers to the ability to recognize the value of

new external information, assimilate it, and apply it to create new knowledge and capabilities (Nagati & Rebolledo, 2013). Absorptive capacity acts as a catalyst, enabling firms to effectively leverage external knowledge and integrate it with their internal resources, fostering innovation and enhancing overall supply chain performance.

The capacity of a company to absorb knowledge plays a crucial role in innovation, linking internal knowledge access with external information (Opoku et al., 2024). Absorptive capacity facilitates the acquisition of new knowledge and promotes its dissemination and application throughout the organization, creating a virtuous cycle of continuous learning and improvement. This is especially critical in manufacturing, where integrating new technologies, processes, and materials is essential for maintaining a competitive edge. Furthermore, supply chain agility, which is the ability to rapidly and efficiently respond to changes in the supply chain, plays a pivotal role in translating absorptive capacity into tangible innovation outcomes. An agile supply chain allows manufacturers to adapt their operations quickly, reconfigure their resources, and develop innovative solutions to meet evolving customer needs (FAUR & Bungău, 2019). Supply chain agility has evolved as a crucial element for firms to integrate supply chains more effectively and establish strong relationships with customers and suppliers (Du et al., 2021).

Agility is not merely about speed; it also encompasses flexibility, responsiveness, and resilience, enabling firms to navigate disruptions, capitalize on opportunities, and maintain a competitive advantage in the face of uncertainty (Shekarian et al., 2019). An agile supply chain allows manufacturers to respond purposefully and within an appropriate timeframe to customer requests or changes in the marketplace (Moosivand et al., 2019). The convergence of absorptive capacity and supply chain agility creates a powerful synergy that drives innovation performance in manufacturing companies (Liu et al., 2022). Understanding the interplay between absorptive capacity, supply chain agility, and innovation performance is critical for manufacturing companies seeking to enhance their competitive advantage and achieve sustainable growth. By developing a deeper understanding of these dynamics, manufacturing companies can strategically invest in developing their absorptive capacity and building agile supply chains, unlocking their complete innovation and value-creation potential.

Examining the interrelationships of variables influencing supply chain agility can be derived using interpretive structural modeling to categorize variables based on their driving power and dependence (Agarwal et al., 2006). Moreover, supply chain agility emphasizes the ability to sense changes, rapidly respond to changes, quickly reduce product development cycle time or total lead time, rapidly increase the level of product customization, rapidly increase the level of customer service, rapidly improve delivery reliability, and rapidly improve responsiveness to changing market needs (Barve et al., 2008; Shekarian et al., 2019). Despite the growing recognition of the importance of absorptive capacity and supply chain agility, there remains a need for a more comprehensive understanding of their impact on innovation performance, particularly within the context of manufacturing companies. This paper seeks to address this gap by investigating absorptive capacity's direct and indirect effects on supply chain innovation performance, focusing on the mediating role of supply chain agility.

This study aims to provide valuable insights for academics and practitioners, offering a framework for understanding how manufacturing companies can leverage absorptive capacity and supply chain agility to drive innovation and achieve sustainable competitive advantage. This research explores the extent to which manufacturers can stay close to the end-user and whether agile supply chains contribute value to those manufacturers adopting a 'close distance' supply chain (Gyarmathy et al., 2020). Ultimately, the goal is to empower manufacturing companies to develop more effective strategies for innovation and to optimize their supply chain operations to meet the challenges of the 21st century.

The innovative application of advanced robotic technology is part of DHL Supply Chain's strategic investment to strengthen its supply chain in Southeast Asia. Despite the weak market conditions following the pandemic, DHL Supply Chain CEO Oscar de Bok emphasized the company's commitment to investing to stay ahead of the curve. "One of the key elements of the future supply chain is the agility to respond quickly to change," he stated. Operations management plays a crucial role in enhancing supply chain efficiency and

effectiveness. As an integral component of operations, Supply Chain Management (SCM) involves systematically coordinating resources to deliver value to consumers (Griffin & Ebert, 2015). Effective operations management ensures that every stage of the production process runs smoothly, optimizing resource utilization to produce high-quality goods or services that meet market demands. The fundamental functions of operations management include planning, organizing, monitoring, and evaluation. Each function is essential for ensuring that human, material, or technological resources are utilized efficiently.

The planning function encompasses all activities related to determining the type, characteristics, and attributes of goods or services before they are marketed. Managers establish company objectives, policies, and regulations in this phase to guide operations. Effective planning ensures the optimal use of resources to achieve organizational goals (Heizer et al., 2020). Organizing within operations management involves defining the workforce, expertise, and responsibilities necessary to execute tasks efficiently. It also includes structuring the organization by establishing transparent relationships among individuals within the company. A well-defined organizational structure facilitates seamless information flow, ensures employees understand their roles and responsibilities, minimizes conflicts, and enhances coordination (Griffin & Ebert, 2015). Review and analysis are essential functions in operations management to evaluate operations and production activities. These processes provide leaders with critical information for decision-making, helping determine whether an activity should be continued, refined, or modified. The insights gained from these reviews serve as valuable feedback for planning and supervisory functions, enabling the company to enhance operational efficiency and effectiveness continuously (Heizer et al., 2020).

The supervisory function in operations management involves directing and ensuring that all activities align with the established plan. This includes verifying whether goods or services meet the predetermined standards. If discrepancies arise, corrective actions must be taken. Effective feedback in the monitoring process is crucial for identifying the root causes of issues and implementing necessary adjustments to maintain product or service quality (Griffin & Ebert, 2015). According to Heizer et al. (2020), operations management encompasses activities that generate value by transforming inputs into outputs in goods and services. A key aspect of operations management is supply chain management, which involves coordinating and overseeing the movement of goods, information, and financial resources from suppliers to end consumers. Efficient supply chain management enhances operational effectiveness, creating value for companies and customers. Company X may face increasing pressure to innovate its supply chain to remain competitive in a rapidly evolving business environment. Innovation is a crucial aspect of operations management, contributing to efficiency, effectiveness, and added value. Heizer et al. (2020) suggest that supply chain innovation significantly influences operational decisions, particularly in production planning and inventory management. Through innovation, operations managers can develop more efficient production strategies, optimize resource utilization, and reduce inventory costs. Furthermore, supply chain innovation enhances a company's responsiveness to market demand fluctuations, improves on-time delivery, and ultimately strengthens customer satisfaction and competitiveness in the global market.

II. Literature Review and Hypothesis Development

The performance of supply chain innovation is shaped by several key factors, with absorptive capacity being one of the most critical. Absorptive capacity refers to a company's ability to acquire, comprehend, and apply new knowledge, making it a fundamental driver of innovation performance in the supply chain. Cohen and Levinthal (1990) define absorptive capacity as an organization's ability to recognize, acquire, and adapt external information, integrating it with internal knowledge for commercial use. This process involves four interconnected stages: acquisition, assimilation, transformation, and exploitation of new knowledge. In this context, absorptive capacity enhances commercial performance and fosters continuous organizational innovation. Zahra and George (2002) further emphasize that firms with high absorptive capacity tend to achieve superior innovation performance. They identify three primary dimensions of absorptive capacity: the ability to access new knowledge, assimilate and internalize it, and apply it in business operations.

Organizations can strengthen knowledge acquisition through information sharing and cross-functional task force teams. These teams, composed of members from various divisions, collaborate to solve specific challenges, enriching the organization's knowledge processing and fostering interdisciplinary learning.

Absorptive capacity can be broken down into three dimensions: internal absorption, transformation, and execution. Internal absorption refers to an organization's ability to understand and integrate new knowledge; transformation absorption involves converting that knowledge into applicable innovations, and execution absorption focuses on implementing new knowledge in business processes to generate tangible benefits. Several factors influence the absorptive capacity process, including knowledge availability, technological adaptability, and resource management (Cohen & Levinthal, 1990; Zahra & George, 2002). Prior research highlights the critical role of absorptive capacity in supply chain management. For example, Cohen et al. (2017) found that firms with high absorptive capacity are more successful in adopting supply chain innovations. Similarly, Grant (2019) suggests that companies capable of identifying, assimilating, and applying new knowledge are more likely to achieve superior innovation performance. These findings underscore the importance of absorptive capacity as a strategic asset for companies aiming to enhance supply chain innovation and maintain a competitive edge. In an increasingly complex and dynamic business environment, supply chain agility is just as crucial as innovation. Supply chain agility refers to a company's ability to quickly and effectively adapt to market and business environment changes. Several studies, including Ivanov (2018), highlight that supply chain agility enhances a company's ability to innovate within its supply chain. This agility encompasses several key aspects, including flexibility, responsiveness, adaptability, collaboration, and technological integration.

- Flexibility allows supply chains to adjust production, distribution, and supply requirements based on market fluctuations.
- Responsiveness refers to the ability to react swiftly and effectively to changes in market conditions.
- Adaptability enables the supply chain to manage shifts in demand, fluctuations in raw material prices, and the adoption of new technologies.
- Collaboration involves working closely with suppliers, manufacturers, and customers to navigate changes and maintain competitiveness.
- Technological integration facilitates more efficient supply chain management, allowing companies to adjust their operations in response to market shifts and ensuring sustained efficiency and competitiveness (Heizer et al., 2020).

The challenges associated with this research topic encompass various aspects. Specifically, manufacturing companies in Bogor may struggle to develop and maintain high absorptive capacity. These challenges include identifying relevant external knowledge sources, assessing their applicability to company operations, and effectively integrating them into supply chain management (SCM) practices. Meanwhile, supply chain agility may also be hindered by sudden demand fluctuations, disruptions, or unexpected regulatory changes. On a broader scale, these challenges reflect the global business landscape, where companies must continuously adapt to rapid market changes and integrate innovation into their supply chains to meet rising customer expectations. Businesses that successfully navigate these dynamics often gain a more decisive competitive advantage. By examining the relationship between absorptive capacity, supply chain agility, and supply chain innovation performance, this study aims to provide valuable insights for manufacturing companies in Bogor and other firms within the same industry. The findings are expected to help companies optimize their strategies to achieve higher innovation performance in their supply chains, ultimately improving operational efficiency and strengthening competitiveness in an increasingly complex and rapidly evolving market.

Building on the discussion above, this research examines "The Effect of Absorptive Capacity on Supply Chain Innovation Performance Through Supply Chain Agility in Manufacturing Companies in Bogor."

This study is inspired by research conducted by Safinaz et al. (2023), which investigates the role of absorptive capacity, digital capabilities, agility, and resilience in supply chain innovation performance. Their study explores the relationships among these factors and their impact on supply chain innovation.

Safinaz et al. (2023) indicate that absorptive capacity positively influences supply chain agility, with supply chain agility as a partial mediator between absorptive capacity and supply chain innovation performance. This suggests that companies with strong absorptive capacity can enhance their supply chain innovation performance more effectively and efficiently. Therefore, absorptive capacity can be considered a key predictor of supply chain innovation performance, mediated by supply chain agility. Supply chain agility is crucial in enhancing business performance in supply chain innovation. Agility enables companies to respond swiftly to market disruptions and maintain competitiveness. In an uncertain business environment, managers must improve productivity, performance, and competitive advantage by strengthening supply chain capabilities and resilience. Implementing supply chain agility allows companies to develop essential capabilities for managing continuous environmental changes, ultimately providing a significant strategic advantage.

This research underscores the importance of supply chain agility in improving business performance. Based on the findings of Safinaz et al. (2023), absorptive capacity directly impacts supply chain innovation performance, while supply chain agility further amplifies this effect. This study will adopt the research model proposed by Safinaz et al. (2023) and apply it to a manufacturing HEI in Bogor. By analyzing the effect of absorptive capacity on supply chain innovation performance through supply chain agility, this research aims to develop a conceptual framework that will serve as the foundation for further investigation, as outlined in Figure 1.

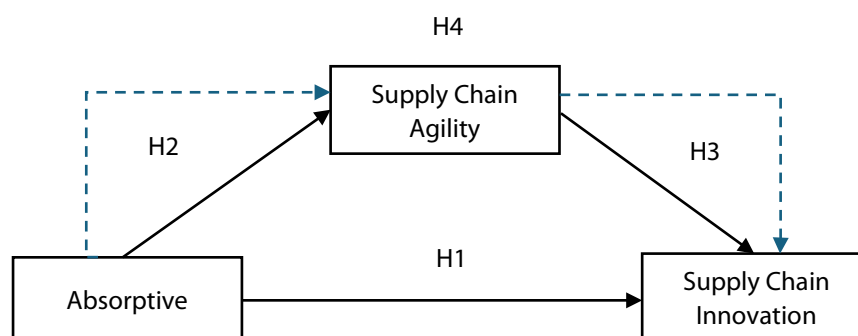


Figure1. Conceptual Framework

2.1. Absorptive Capacity Positively Influences Supply Chain Innovation Performance

Absorptive capacity plays a crucial role in innovation, enabling companies to operate more efficiently and effectively. This hypothesis suggests a correlation between absorptive capacity and supply chain innovation performance (Safinaz et al., 2023). A higher level of absorptive capacity allows companies to develop more advanced and effective innovations within their supply chains. By enhancing absorptive capacity, companies can foster supply chain agility, improving overall supply chain performance and strengthening competitiveness. This indicates that absorptive capacity supports innovation and contributes to a more responsive and adaptable supply chain. Therefore, it can be concluded that absorptive capacity positively impacts supply chain innovation performance.

2.2. Absorptive Capacity Positively Influences Supply Chain Agility

To remain competitive, firms must enhance their ability to absorb external knowledge, particularly from digital and virtual environments, and integrate it with internal expertise. This capability, known as absorptive capacity, enables companies to effectively acquire and utilize external knowledge (Coccia, 2008).

In today's dynamic business landscape, characterized by rapid technological advancements and evolving consumer expectations, absorptive capacity is critical in helping organizations adapt. By leveraging new knowledge, companies can optimize internal processes, enhance operational efficiency, and improve supply chain agility.

2.3. Supply Chain Agility Positively Influences Supply Chain Innovation Performance

According to dynamic capability theory, key outcomes of absorptive capacity—such as creativity, adaptability, and performance—are essential for sustaining innovation. Innovation in supply chains relies on a company's ability to develop new products, services, and processes. Supply chain agility is critical in this process, as it enhances procurement, manufacturing, and delivery, improving overall supply chain performance. Agility enables organizations to respond effectively to market uncertainties, shifting consumer demands, and technological advancements. However, achieving agility requires strategic efforts from decision-makers to optimize processes and resource allocation. Green et al. emphasize a strong relationship between supply chain agility and operational performance, highlighting how environmental uncertainty influences organizational success. Their research further underscores the impact of supply chain agility on overall supply chain innovation performance, reinforcing its importance as a competitive advantage.

2.4. The Influence of Absorptive Capacity on Supply Chain Innovation Performance Through Supply Chain Agility

Absorptive capacity, supply chain innovation performance, and supply chain agility are closely interconnected concepts in supply chain management. Absorptive capacity refers to an organization's ability to recognize, acquire, and integrate new knowledge into its operations. Supply chain innovation performance reflects how effectively a supply chain develops and implements innovations within its business processes. Meanwhile, supply chain agility describes the supply chain's ability to adapt to disruptions and environmental changes. Supply chain agility is an important mediating factor between absorptive capacity and supply chain innovation performance. Absorptive capacity enhances supply chain agility, strengthening supply chain innovation performance. Organizations seeking to improve supply chain innovation performance can increase their absorptive capacity. This can be achieved by investing in research and development, forming strategic alliances, managing knowledge effectively, increasing awareness of potential disruptions, developing strategies to mitigate risks, and managing change in response to disruptions.

III. Research Method

3.1. Research Design

This study is based on the research conducted by Safinaz et al. (2023), titled "Role of Absorptive Capacity, Digital Capability, Agility, and Resilience in Supply Chain Innovation Performance." It employs a quantitative approach, where data is collected numerically and structured through standardized questions (Sekaran et al., 2018). The research instruments underwent a back-translation process to minimize potential misunderstandings due to cultural differences. The survey was conducted online in English and Arabic to ensure clarity and ease of understanding. A seven-point Likert scale was used to measure the variables, ranging from 1 (strongly disagree) to 7 (strongly agree). The key variables in this study include:

- 1) Absorptive capacity (independent variable), measured through dimensions such as knowledge access and dissemination and knowledge acquisition and utilization. Indicators include effective idea communication and the rapid flow of information between departments.
- 2) Supply chain agility (mediating variable), assessed based on environmental monitoring, knowledge access and dissemination, knowledge utilization in decision-making, and adaptability to changes in the business environment.

- 3) Supply chain innovation performance (dependent variable), measured using indicators such as sustainable innovation performance, supply chain efficiency, and supply chain quality.

A seven-point Likert scale ensures precise measurement of respondents' opinions, perceptions, and attitudes regarding specific statements (Sekaran & Bougie, 2013). This study aims to analyze the effect of absorptive capacity on supply chain innovation performance through supply chain agility in manufacturing companies in Bogor, adopting the research model proposed by Safinaz et al. (2023). This study utilizes primary data from respondents to address the research problem and objectives. The respondents are employees from manufacturing companies in Bogor engaged in processing industries. The sampling methods applied include convenience and snowball sampling, which were chosen due to their efficiency in reaching and communicating with participants (Safinaz et al., 2023). The selected respondents include executives, directors, senior managers, general managers, and other managerial-level employees.

A quantitative approach was employed to examine the relationships between the study constructs. The data obtained from the survey were analyzed numerically using statistical methods. The survey instrument was developed based on existing literature and tested for validity and reliability, using a seven-point Likert scale to measure the research variables. The collected data were then used to test the proposed hypotheses. A deductive methodology was also applied, where theoretical concepts were derived from existing literature, following a mono-quantitative approach (Hair et al., 2019). The sample size was determined based on the number of indicators in the questionnaire. With 27 indicators, the sample size was calculated by multiplying this number by 8, resulting in 216 respondents as the maximum limit. Data was collected through a questionnaire survey, distributed directly to manufacturing companies in Bogor and via the online link <https://forms.gle/B9kDtFiMby7JC8zZ8> through email. The distribution period spanned from May 13, 2024, to May 26, 2024. The questionnaire was a field research instrument to gather primary data for further analysis (Sugiyono, 2017). Additionally, expert interviews and practitioner surveys in supply chain innovation and digital technology were conducted to provide deeper insights into the impact of digital capabilities on supply chain innovation performance through digital innovation. Ensuring the validity and reliability of the primary data collected was a key focus throughout the data collection process.

3.2. Research Analysis Method

The data analysis method in this study is designed to process raw data into structured results that are easier to interpret and understand (Sugiyono, 2017). The methods used include Structural Equation Modeling (SEM) and Analysis of Moment Structures (AMOS). SEM consists of two main steps: (1) testing the validity and reliability of the instrument using Confirmatory Factor Analysis (CFA) and (2) examining the relationship model between variables through path analysis. According to Hair et al. (2019), SEM is employed to analyze and test hypotheses by comparing the p-value with a confidence level of 5% (0.05). If $p \leq 0.05$, the hypothesis is not rejected, indicating a statistically significant relationship. Conversely, if $p \geq 0.05$, the hypothesis is rejected.

Validity testing measures the accuracy of each questionnaire item to ensure it effectively represents the research concept (Hair et al., 2019). This test uses the factor loading value in Exploratory Factor Analysis (EFA), which is determined based on the sample size. Reliability testing evaluates the consistency and accuracy of respondents' answers. Cronbach's Alpha Coefficient is the reliability measure, where a value closer to 1 indicates higher reliability. A Cronbach's Alpha value of 0.60 or higher is considered acceptable. The Goodness of Fit (GoF) test assesses how well the model fits the collected data. Various criteria are used to evaluate model fit, including Chi-Square (χ^2), Goodness-of-Fit Index (GFI), and Root Mean Square Error of Approximation (RMSEA). The more criteria are met, the better the model fit, enhancing the study's reliability and validity (Hair et al., 2019).

IV. Result and Discussion

4.1. Respondent Characteristics

This study utilizes primary data collected through questionnaires distributed to employees of manufacturing companies in Bogor. The collected data includes various respondent characteristics, such as gender, age, length of service, education, and position. Based on gender distribution, out of 168 respondents, 102 (60.7%) were male, while 66 (39.3%) were female. These results indicate that the survey reached more male respondents than females. The age distribution of respondents shows that the majority fall within the 20–30 and 31–40 age groups, with 66 respondents (39.3%) and 63 respondents (37.5%), respectively. In contrast, the number of respondents under 20 and over 50 was significantly lower, with only three respondents (1.8%) in the former category and 15 respondents (8.9%) in the latter. This data suggests that most employees are within the productive age range of 20–40 years.

Regarding length of service, the highest proportion of respondents had worked for 6–10 years, totaling 67 respondents (39.9%), followed by those with more than 15 years of service, accounting for 52 respondents (31%). The categories of 11–15 years and 1–5 years had lower frequencies, with 30 respondents (17.9%) and 16 respondents (9.5%), respectively. Meanwhile, the category with the least represented was employees with less than one year of service, with only three respondents (1.8%). This data highlights that most employees have significant work experience within the company. Regarding educational background, most respondents held a Bachelor's degree (S1), with 83 respondents (49.4%). This was followed by respondents with a Master's degree (S2), totaling 26 individuals (15.5%). Meanwhile, those with a high school diploma and an associate degree (Diploma) were fewer, comprising 38 respondents (22.6%) and 17 respondents (10.1%), respectively. Other educational levels had the lowest representation, with only four respondents (2.4%).

Regarding job positions, most respondents were employees or staff, accounting for 70 individuals (41.7%), followed by supervisors with 54 respondents (32.1%). The number of respondents in managerial and executive positions was lower, with 33 individuals (19.6%) and 11 individuals (6.5%), respectively. These findings indicate that most respondents are involved in operational and supervisory roles, enabling them to provide valuable insights into daily operations and managerial processes within the company. Overall, the majority of respondents in this study are male (60.7%), within the productive age range of 20–40 years (76.8%), have work experience of 6–10 years (39.9%), hold a Bachelor's degree (49.4%), and serve as employees or staff (41.7%). This profile reflects an educated, experienced, and productive workforce within manufacturing companies in Bogor.

4.2. Descriptive Statistics

Based on the descriptive statistics for the Absorptive Capacity variable, the mean value is 3.8024, indicating that respondents generally agree that absorptive capacity in their company is relatively strong. The standard deviation of 0.68935 suggests a moderate variation in responses. This finding implies that ideas, concepts, and information are effectively communicated across departments, ensuring a smooth flow of information between business units. Additionally, employees can effectively compile and utilize accumulated customer knowledge, supported by strong management commitment to implementing marketing strategies based on customer insights. The mean value of the Supply Chain Innovation Performance variable is 4.2639, showing that respondents generally agree that their company's supply chain innovation performance is optimal. The standard deviation of 0.59079 indicates relatively low response variation, suggesting a consistent perception among respondents. This reflects the company's active pursuit of continuous innovation in core processes, adopting new technologies to support supply chain operations, and implementing Just-in-Time systems. The respondents' responses also show the company's ability to optimize just-in-time supply chain performance and ensure efficient inventory turnover.

Lastly, the mean value of the Supply Chain Agility variable is 3.9418, indicating that respondents generally perceive their company as having strong supply chain agility. The standard deviation of 0.51214 suggests a relatively low variation in responses. Respondents agree that their company can swiftly detect changes, identify opportunities, and recognize threats in the business environment. Furthermore, the company can efficiently process information from suppliers and customers while taking decisive actions to address changes, opportunities, and risks. The ability to adjust supply chain operations and scale short-term capacity in response to customer needs also received strong approval from respondents.

4.3. Instrument Test and Goodness of Fit

The validity test conducted in this study indicates that all question indicators for each variable exhibit high factor loadings, demonstrating strong validity. The factor loading values exceeding 0.4 confirm the validity of the latent variable "Absorptive Capacity." This suggests that the items within this variable consistently measure the same concept—namely, the company's ability to utilize absorptive capacity or information absorption capability to support business processes. The strong validity of this instrument ensures that it accurately captures the essence of the concept being measured. Similarly, the high factor loading values for the "Supply Chain Innovation Performance" variable confirm its validity. This implies that the items effectively measure the same concept—the company's capability to innovate within its supply chain processes. The success of these measurement items in assessing supply chain innovation performance indicates that the company has an effective system for implementing sustainable and efficient innovation. Ensuring the validity of this measurement is crucial, as it guarantees that the instrument accurately reflects the company's innovation performance.

Likewise, for the "Supply Chain Agility" variable, the high factor loading values indicate strong validity. This confirms that the items within this variable measure the same underlying concept—the company's ability to enhance supply chain agility to support business operations. This agility encompasses the company's capacity to swiftly detect environmental changes, identify opportunities and threats, and adjust supply chain operations accordingly. Overall, the validity test results demonstrate that this research instrument possesses high validity and can be reliably used to measure the studied concepts. In addition to the validity test, the reliability test yielded positive results. Based on the reliability analysis, the Cronbach's Alpha values for the three studied variables are as follows: Absorptive Capacity (0.946), Supply Chain Innovation Performance (0.900), and Supply Chain Agility (0.911). Since all variables have Cronbach's Alpha values greater than 0.60, they are considered highly reliable. These findings indicate that the research instrument is valid and consistent in measuring the intended concepts.

Furthermore, all research variable indicators demonstrate strong reliability, making them suitable for further analysis. These results reinforce the credibility of the data obtained in this study and provide a robust foundation for concluding the subsequent data analysis. The Goodness of Fit test results can be observed in Table 1 below.

Table 1. Goodness of Fit Test Results

Measurement Type	Measurement	Value	Recommended acceptance limit	Conclusion
Absolute fit measures	P-Value	0.000	≥ 0.05	Poor fit
	ECVI	6.940	Closer to Saturated value than independent	Good fit
	RMSEA	0.109	≤ 0.1	Good fit
Incremental fit Measures	IF	0.694	≥ 0.90	Goodness of fit
	NFI	0.601	≥ 0.90	Poor fit
	TLI	0.662	≥ 0.90	Poor fit
	CFI	0.689	≥ 0.90	Poor fit
	RFI	0.566	≥ 0.90	Poor fit

Measurement Type	Measurement	Value	Recommended acceptance limit	Conclusion
Parsimonious fit measures	CMIN/DF	3.000	Lower limit 1, upper limit 5	Goodness of fit
	AIC	1158.930	Closer to the Saturate value than the independent	Poor fit

Source: Results of data processing IBM AMOS version 24 (2024)

Table 1 shows that among the various approaches used to assess the goodness-of-fit index, two models meet the criteria: AGFI with a value of $0.661 \leq \text{GFI}$ and CMIN/DF with a value of 2.655. These findings suggest that the model used in this study is appropriate and suitable for further testing.

4.4. Hypothesis Testing and Discussion

The effect of Absorptive Capacity on Supply Chain Innovation Performance, mediated by Supply Chain Agility, in manufacturing companies in Bogor was analyzed using the direct and indirect models, as illustrated in Figure 2 and Figure 3 below.

Table 2. Hypothesis Test Results

Hypothesis	Estimate	P-Value	Decision
Absorptive Capacity has a positive influence on Supply Chain Innovation Performance.	-0.074	0,318	H1 is not supported
Absorptive Capacity has a positive influence on Supply Chain Agility.	0.658	0.000	H2 supported
Supply Chain Agility has a positive influence	0.104	0.292	H3 is not supported.

The analysis of the effect of Absorptive Capacity on Supply Chain Innovation Performance indicates that the first hypothesis is not supported. This hypothesis initially proposed that Absorptive Capacity positively influences Supply Chain Innovation Performance. However, with a P-value of 0.318 (greater than 0.05), the hypothesis is rejected. This finding suggests that, in the context of this study, Absorptive Capacity does not directly impact Supply Chain Innovation Performance. The second hypothesis examines the effect of Absorptive Capacity on Supply Chain Agility, and the results support this hypothesis. With a P-value of 0.000 (less than 0.05) and an optimistic estimate of 0.658, it can be concluded that Absorptive Capacity significantly affects Supply Chain Agility. This finding implies that a company's ability to absorb and utilize information effectively enhances its supply chain agility, enabling it to respond more quickly and efficiently to market changes. However, the third hypothesis test results indicate that Supply Chain Agility does not significantly affect Supply Chain Innovation Performance. With a P-value of 0.292 (greater than 0.05) and an optimistic estimate of 0.104, this hypothesis is rejected. This suggests that, while companies may possess supply chain agility, it does not directly contribute to improved supply chain innovation performance in the context of this study.

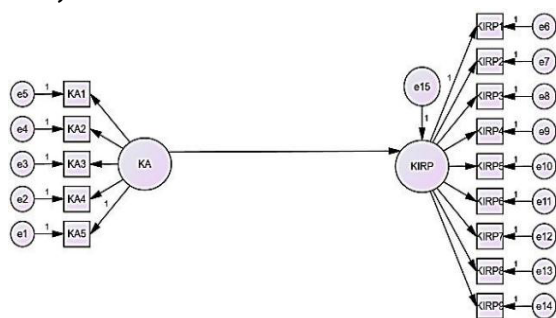


Figure 2. Direct Path Analysis Graph

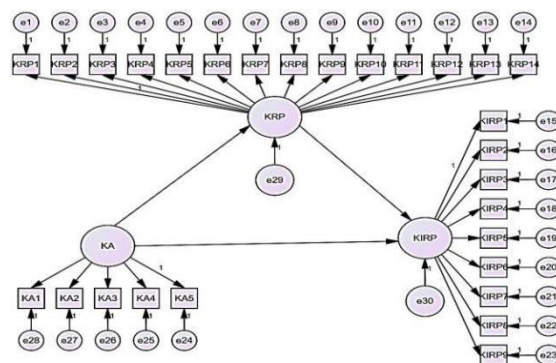


Figure 3. Indirect Path Analysis Graph

The fourth hypothesis was not supported, which examined whether Absorptive Capacity positively influences Supply Chain Innovation Performance through Supply Chain Agility. The analysis indicates that the proposed mediation model does not show a significant effect. In the first model, the direct effect of Absorptive Capacity on Supply Chain Innovation Performance was not significant (P -value = 0.461). In the second model, the mediation conditions were not met, as indicated by the following results:

- 1) P -value = 0.000 for the effect of Absorptive Capacity on Supply Chain Agility (significant).
- 2) P -value = 0.292 for the effect of Supply Chain Agility on Supply Chain Innovation Performance (insignificant).
- 3) P -value = 0.318 for the effect of Absorptive Capacity on Supply Chain Innovation Performance (not significant).

Based on these findings, it can be concluded that Absorptive Capacity does not positively affect Supply Chain Innovation Performance through Supply Chain Agility in this study.

V. Conclusion

This study examines the effect of Absorptive Capacity on Supply Chain Innovation Performance, considering the mediating role of Supply Chain Agility. The results of hypothesis testing indicate that Absorptive Capacity does not have a significant direct effect on Supply Chain Innovation Performance but does have a positive effect on Supply Chain Agility. However, Supply Chain Agility does not significantly influence Supply Chain Innovation Performance. Furthermore, the mediation hypothesis was not supported, suggesting that Absorptive Capacity does not positively affect Supply Chain Innovation Performance through Supply Chain Agility in this study. The findings highlight the importance of a company's adaptability to changes in the business environment. A company's ability to respond quickly to changes enhances its readiness to mitigate threats and seize opportunities. Adequate access to information from suppliers and customers is crucial in decision-making, enabling companies to adjust supply chain operations as needed. Focusing on short-term capacity adjustments suggests that companies must remain flexible in resource management to achieve their strategic goals. Despite its contributions, this study has several limitations. The data collection method may introduce sample bias, and the relatively small sample size could affect the validity and reliability of the findings. Moreover, this study is limited to manufacturing companies in Bogor, which may restrict the generalizability of the results. Other factors, such as work experience, job satisfaction, or motivation, were not included in the analysis, potentially limiting the understanding of the relationship between Absorptive Capacity and Supply Chain Innovation Performance. A more comprehensive analytical approach could provide deeper insights into the phenomenon under investigation. Based on the study's findings, future research should consider such as

Expanding the sample coverage by including companies from different regions to obtain a more representative understanding of the relationship between Absorptive Capacity and Supply Chain Innovation Performance. Enhancing data collection methods, including refining questionnaire validation and ensuring robust variable measurement. Conducting more in-depth analysis using advanced statistical models or incorporating relevant control variables to strengthen the research framework. Emphasizing practical implications, ensuring that research findings contribute to developing effective business strategies in the manufacturing industry, and conducting follow-up studies, including in-depth interviews with industry practitioners, to understand better how Absorptive Capacity impacts Supply Chain Innovation Performance in real-world business settings. By addressing these areas, future research can provide more comprehensive insights and contribute to advancing supply chain management practices in the manufacturing sector.

References

- Agarwal, A., Shankar, R., & Tiwari, M. (2006). Modeling agility of supply chain. *Industrial Marketing Management* (Vol. 36, Issue 4, p. 443). Elsevier BV. <https://doi.org/10.1016/j.indmarman.2005.12.004>
- Barve, A., Kanda, A., & Shankar, R. (2008). The role of human factors in agile supply chains. *European J of Industrial Engineering* (Vol. 3, Issue 1, p. 2). Inderscience Publishers. <https://doi.org/10.1504/ejie.2009.021582>
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation.
- Davis, J., Edgar, T. F., Graybill, R., Korambath, P., Schott, B., Swink, D., Wang, J., & Wetzel, J. (2015). Smart Manufacturing [Review of Smart Manufacturing]. *Annual Review of Chemical and Biomolecular Engineering*, 6(1), 141. *Annual Reviews*. <https://doi.org/10.1146/annurev-chembioeng-061114-123255>
- Du, Y., Hu, X., & Vakil, K. (2021). Systematic literature review on the supply chain agility for manufacturer and consumer. *International Journal of Consumer Studies* (Vol. 45, Issue 4, p. 581). Wiley. <https://doi.org/10.1111/ijcs.12645>
- FAUR, M., & Bungău, C. (2019). Outsourcing Towards Greater Agility Through Investigating Decoupling Points in Leagile Supply Chains. *MATEC Web of Conferences* (Vol. 290, p. 7006). EDP Sciences. <https://doi.org/10.1051/mateconf/201929007006>
- Griffin, R. W., & Ebert, R. J. (2015). *Business Essentials* (10th ed.). Pearson.
- Gunasekaran, A., Yusuf, Y., Adeleye, E. O., Παπαδόπουλος, Θ., Kovvuri, D., & Geyi, D. G. (2018). Agile manufacturing: an evolutionary review of practices. *International Journal of Production Research* (Vol. 57, p. 5154). Taylor & Francis. <https://doi.org/10.1080/00207543.2018.1530478>
- Gyarmathy, A., Peszynski, K., & Young, L. (2020). Theoretical Framework for a Local, Agile Supply Chain to Create Innovative Product Closer to End-user: Onshore-Offshore Debate. *Operations and Supply Chain Management An International Journal* (p. 108). <https://doi.org/10.31387/oscm0410256>
- Hair, J. F., et al. (2019). *Multivariate Data Analysis*. Cengage Learning.
- Heizer, J., Render, B., & Munson, C. (2020). *OPERATIONS Sustainability and Supply Chain Management* (13th ed.).
- Lambert, D. M., & Cooper, M. C. (2014). *Supply Chain Management: Processes, Partnerships, Performance* (4th ed.). Pearson.
- Liu, D., Yu, X., Huang, M., Yang, S., Isa, S. M., & Hu, M. (2022). The Effects of Green Intellectual Capital on Green Innovation: A Green Supply Chain Integration Perspective. *Frontiers in Psychology* (Vol. 13). Frontiers Media. <https://doi.org/10.3389/fpsyg.2022.830716>
- Moosivand, A., Ghatari, A. R., & Rasekh, H. R. (2019). Supply Chain Challenges in Pharmaceutical Manufacturing Companies: Using Qualitative System Dynamics Methodology. *PubMed*, 18(2), 1103. <https://doi.org/10.22037/ijpr.2019.2389>
- Nagati, H., & Rebolledo, C. (2013). Fostering Innovation through Customer Relationships. *Supply Chain Forum an International Journal*, 14(3), 16. <https://doi.org/10.1080/16258312.2013.11517318>
- Opoku, E., Okafor, M., Williams, M., Aribigbola, A., & Olaleye, A. (2024). Enhancing small and medium-sized businesses through digitalization. *World Journal of Advanced Research and Reviews*, 23(2), 222. <https://doi.org/10.30574/wjarr.2024.23.2.2313>
- Park, E. M., & Park, S. T. (2015). The Effectiveness of Absorptive Capacity Formation Mechanism on Innovation Performance by Industry. In *Indian Journal of Science and Technology* (Vol. 8, Issue 21). Indian Society for Education and Environment. <https://doi.org/10.17485/ijst/2015/v8i21/83351>
- Safinaz, et al. (2023). Role of Absorptive Capacity, Digital Capability, Agility, and Resilience in Supply Chain Innovation Performance.
- Sekaran, U., & Bougie, R. (2013). *Research Methods for Business: A Skill-Building Approach*
- Shekarian, M., Nooraie, S. V., & Parast, M. M. (2019). Examining the impact of flexibility and agility on mitigating supply chain disruptions. *International Journal of Production Economics* (Vol. 220, p. 107438). Elsevier BV. <https://doi.org/10.1016/j.ijpe.2019.07.011>
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta Supply Chain Management Institute.
- Zahra, S. A., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27(2), 185-203.