Studi Akuntansi, Keuangan, dan Manajemen (SAKMAN)
ISSN 2798-0251, Vol 5, No 4, 2026, 35-48 https://doi.org/10.35912/sakman.v5i4.5702

The Influence of Supply Chain Performance on Batam Retail Businesses Mediated by Supply Chain Flexibility

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Article History:
Received on 13 September 2025
1st Revision on 19 September 2025
2nd Revision on 28 September 2025
3rd Revision on 05 Oktober 2025
Accepted on 10 Oktober 2025

Abstract

Purpose: This study analyzes the influence of supply chain performance on retail business performance in Batam City, with supply chain flexibility as a mediator. Strong supply chain performance is expected to enhance retail businesses' ability to respond to market dynamics and consumer needs.

Methodology/approach: A quantitative approach was used by distributing surveys and questionnaires to retail business actors in Batam, Indonesia. The collected data were statistically analyzed to examine the relationship between supply chain performance, supply chain flexibility, and retail business performance.

Results/findings: The findings show that supply chain performance positively and significantly affects supply chain flexibility, which subsequently improves retail business performance. This confirms that supply chain flexibility plays an essential role in strengthening competitiveness and supporting sustainability.

Conclusions: This study concludes that supply chain flexibility effectively mediates the relationship between supply chain performance and overall retail business success. Efficient supply chain management enables businesses to respond quickly to market changes and enhance their operational efficiency.

Limitations: This study is limited to retail businesses in Batam City; therefore, the results may not fully represent other regions or sectors. Future research should broaden the scope or use longitudinal data.

Contributions: This study provides empirical evidence of the importance of flexibility in supply chain management and serves as a reference for retail managers to optimize strategies for sustainable growth.

Keywords: *Batam, Supply Chain Flexibility, Supply Chain Performance, Retail Business*

How to Cite: Rany, H., Zai, I. (2026). The Influence of Supply Chain Performance on Batam Retail Businesses Mediated by Supply Chain Flexibility. *Studi Akuntansi, Keuangan, dan Manajemen*, 5(4), 35-48.

1. Introduction

Retail is a crucial sector in the economy, as it serves as the primary link between producers and consumers. In Indonesia, the development of modern retail, such as supermarkets and independent stores, has brought significant changes in how people fulfill their daily needs (Alexandra, Wijaya, Al Akbar, & Efendi, 2024). In Batam City, the retail business not only plays a role in providing consumer goods but also contributes to regional economic growth. According to data from the Central Statistics Agency (BPS), the Wholesale and Retail Trade sector, excluding Motor Vehicles and Motorcycles, contributed 10.92 percent to Batam City's Gross Regional Domestic Product (PDRB) in 2024.

This condition makes Batam a potential and continuously growing market in the modern retail and trade sectors. With the population increasing to over 1.3 million people in 2023 and growing purchasing power, the retail sector in Batam has rapidly grown. This makes Batam a potential and continuously

developing market in the modern retail and trade sectors. However, previous studies have mostly focused on the impact of digital technology on supply chain performance, innovation management to enhance competitive advantage, or product design and supply chain management at the micro-enterprise level. Other studies have emphasized the roles of collaboration and information technology in driving innovation. Although important, these studies have not specifically examined how supply chain performance affects retail business performance, particularly in strategically significant trade areas such as Batam City, nor have they explored the role of supply chain flexibility as a mediator.

Therefore, there remains a research gap that needs to be filled, especially in the context of Batam retail, which continues to grow and faces rapidly changing market dynamics. Supply chain performance plays a critical role in the success of retail businesses. An efficient supply chain ensures that the goods consumers need are available on time, with maintained quality, and at competitive prices (da Gama, Hernández-Gómez, Escobeto-Portillo, & Noriega, 2022). Poor supply chain performance, on the other hand, can lead to various problems, such as distribution delays, high logistics costs, and missed market opportunities (Duong et al., 2023). Therefore, research on how supply chain performance affects retail businesses in Batam City is highly relevant and requires further investigation. Supply chain flexibility is also a key factor, as retailers must quickly adapt to changes in consumer demand, price fluctuations, and external disruptions, such as supply shortages and government regulations (Sari, 2023).

Globally, many companies have adopted internationally integrated supply chain models, known as the concept of global to local supply chains (Dymyt, Wincewicz-Bosy, & Skubisz, 2024). This model emphasizes a company's ability to leverage a global supply network while remaining responsive to local market requirements. Although this practice is common among large manufacturing companies, its application in the retail sector remains relatively rare. Retail in large cities, including Batam, typically relies more on domestic supply chains, even though integration with global supply chains can increase efficiency, broaden product variety, and strengthen competitiveness (Melissa & Zai, 2025). This raises a fundamental question about how retail businesses in Batam can improve their supply chain flexibility to survive and grow amid increasingly fierce competition.

In practice, Batam's retail sector faces several obstacles that hinder its performance. First, high logistics costs between regions are due to limited transportation infrastructure and distribution networks. Second, there is a dependence on certain supplies from outside the region, making retail highly vulnerable to supply chain disruptions. Third, changing consumer shopping trends, which are increasingly moving toward digitalization and e-commerce, require conventional retailers to adjust their business strategies quickly and effectively (Melissa & Zai, 2025). Fourth, government policies related to imports, taxes, and local trade regulations can affect the smooth distribution of goods. These issues indicate that the improvement of the retail sector's performance cannot be separated from the supply chain's ability to respond to market changes and to pressure.

However, to date, studies that specifically examine how supply chain performance and supply chain flexibility contribute to retail business performance in Batam are limited. Therefore, this research is important to fill this gap and provide an empirical understanding of the key factors that determine the competitiveness and sustainability of retail businesses in strategic areas such as Batam. The novelty of this research lies in its focus on the role of supply chain performance and flexibility, specifically in the context of retail businesses in Batam. Most previous research has focused on supply chains in the manufacturing sector or other industries, not retail. For example, the impact of the Triple-A supply chain on supply chain performance in the textile industry in Ethiopia, not in retail. Forozandeh (2021) also highlighted the challenges of supply chain management in research and development projects using Fuzzy DEMATEL and TOPSIS approaches; thus, the retail context was not the main focus.

Hsu, Chen, and Feng (2024) examined product quality and customer satisfaction in the automotive parts industry, while Torabi, Maalmir, and Ahmadi (2025) researched the challenges of knowledge management implementation in knowledge-based supply chain companies. Additionally, Zerine, Biswas, Doha, Meghla, and Polas (2025) emphasized the role of predictive analytics in achieving supply chain sustainability, but did not focus on the retail sector or supply chain flexibility variables. Thus,

previous studies have not specifically addressed the relationship between supply chain performance, supply chain flexibility, and retail business success, especially in cities with strategic economic characteristics such as Batam (Laulita, 2020). The framework of this study adopts an approach that connects supply chain performance with retail business success through the mediating variable of supply chain flexibility. This approach is expected to fill the academic gap by providing a new perspective on how supply chain flexibility strengthens this relationship. The contributions of this study are expected to encompass several important aspects. First, the theoretical contribution, which enriches the literature on supply chain management in the retail sector, particularly in Indonesia, where studies on the relationship between supply chain performance and supply chain flexibility are still limited.

This study also expands the understanding of the role of flexibility as a mediating variable in improving retail business performance. Second, the practical contribution involves providing operational strategy recommendations for retail managers in Batam to enhance supply chain effectiveness, enabling businesses to adapt more quickly to market changes, supply disruptions and consumer demands. Third, the methodological contribution is the use of a quantitative approach with a mediation model, which can serve as a reference for future researchers who wish to study the relationship between similar variables in different sectors and regions in the future. Fourth, the policy contribution provides data-driven insights for local governments and stakeholders in formulating supportive policies, such as improving distribution infrastructure, enhancing trade regulations, and strengthening the local retail ecosystem. Thus, this research offers academic benefits and contributes tangible value to retail business practitioners and policymakers in addressing the economic dynamics in Batam City.

2. Literature Review and Hypothesis Development

2.1 Resource-Based View (RBV)

The Resource-Based View (RBV) is a theory that explains that a company's competitive advantage stems from its mastery of unique, valuable, difficult-to-imitate, and non-substitutable internal resources (VRIN: Valuable, Rare, Inimitable, Non-substitutable) (Barney, 1991). According to recent research, RBV emphasizes the importance of managing internal capabilities, such as supply chain integration, supplier relationships, information technology usage, and strategic collaborations, to achieve a sustainable competitive advantage (Wahyono & Kusdi, 2021). In this study, supply chain flexibility is considered one of the key capabilities arising from supply chain strategy, network design, information technology utilization, and strategic partnerships. Therefore, RBV serves as the theoretical framework to explain how supply chain resources and capabilities can enhance flexibility, which ultimately has a positive impact on retail business performance.

2.2 Definition of Research Variables

2.2.1 Supply Chain Strategy

A supply chain strategy is a long-term decision framework that governs how a company designs and manages the flow of materials, information, and resources from suppliers to customers. According to Chopra and Meindl (2019), in Supply Chain Management: Strategy, Planning, and Operation, supply chain strategy involves making decisions about procurement, production, storage, distribution, and coordination across facilities to align with the company's objectives, such as cost efficiency or market responsiveness. With the right strategy, companies can create process integration, reduce uncertainty, and enhance their competitive advantage in the dynamics of the global market.

2.2.2 Supply Chain Network Design

Supply chain network design is the process of determining the physical structure of the supply chain, including the locations and roles of facilities, such as factories, warehouses, and distribution centers, as well as the logistics flow between these facilities. Christopher (2016) explains that network design directly affects total supply chain costs, lead time, distribution flexibility, and a company's ability to respond to market demand. This process involves analyzing facility placement, capacity, and transportation integration to ensure that the network built supports operational efficiency and provides fast service to customers.

2.2.3 Information Technology

Information technology in the supply chain serves as a system that enables data integration, real-time communication, and coordination of activities between supply chain entities, such as suppliers, manufacturers, distributors, and customers Pearson (2008). IT systems such as ERP, RFID, WMS, and transaction processing systems allow companies to gain complete visibility into inventory, production, and distribution. The application of IT improves information accuracy, speeds up decision-making, and reduces uncertainty, allowing the supply chain to operate more efficiently, responsively, and adaptively to changes in the market.

2.2.4 Strategic Partnerships

Strategic partnerships in the supply chain refer to long-term collaborative relationships between companies and key partners, such as suppliers and customers, aimed at achieving common goals. According to Mentzer, Min, and Zacharia (2000), strategic partnerships involve activities such as information sharing, risk sharing, decision-making coordination, and process integration, which enhance the overall supply chain efficiency and effectiveness. Such partnerships help companies improve supply reliability, accelerate innovation, reduce coordination costs, and strengthen their competitiveness in a dynamic business environment.

2.2.5 Supply Chain Flexibility

Supply chain flexibility is the ability of a supply chain to adapt to uncertainty and changes in the business environment, including demand variation, fluctuations in production volumes, delivery schedule changes, and product modifications. Slack (1987) explained that flexibility is the ability of an operational system to respond quickly and efficiently to changes without compromising performance. In the context of the supply chain, flexibility includes production, logistics, supplier, and distribution flexibility, which allows companies to anticipate market dynamics and maintain their competitive edge.

2.2.6 Supply Chain Performance

Supply chain performance refers to the extent to which supply chain activities can meet organizational objectives, as measured by indicators such as cost efficiency, on-time delivery, service quality, process reliability, and customer satisfaction. Measuring supply chain performance should include aspects of cost, responsiveness, and flexibility to provide a comprehensive view of the supply chain's operational effectiveness. Superior supply chain performance helps companies enhance their competitive capabilities, accelerate demand fulfilment, and increase customer value.

2.3 Relationship Between Variables

2.3.1 The Effect of Supply Chain Strategy on Supply Chain Performance

Supply chain strategy is the key to managing the flow of goods, information, and operational processes across the supply chain. Theoretically, the right strategy will drive better coordination, optimal decision-making, and cost efficiency across the various parts of the supply chain. This concept aligns with the view that a strong supply chain strategy is the foundation for superior supply chain performance. Previous research supports this theory, such as in the study by Hoshimov, Mahdavisharif, and Cagliano (2021) found that supply chain strategy has a positive impact on supply chain performance (Hoshimov et al., 2021). This study shows that every decision made by supply chain members affects the overall performance (Perano et al., 2023). Additionally, the right strategic decisions can improve operational effectiveness and efficiency throughout the supply chain (Türkeș, Stăncioiu, & Marinescu, 2024). With the proper implementation of a supply chain strategy, decision-making becomes more effective, enabling the optimization of overall performance. Therefore, it is essential to align strategy with performance goals to maximize outcomes (Wei, Zhang, & Tamamine, 2024).

H_1: Supply Chain Strategy has a positive effect on Supply Chain Performance

2.3.2 The Effect of Supply Chain Strategy on Supply Chain Flexibility

Conceptually, supply chain flexibility refers to a company's ability to respond to changes in demand, distribution, or market dynamics. This ability cannot stand alone; it must be supported by an adaptive, integrated, and collaborative supply chain strategy. Supply chain flexibility is significantly influenced by the supply chain strategy implemented by a company. Research indicates that the right strategy will

improve an organization's adaptability to market changes. A flexible strategy helps companies respond quickly to demand fluctuations, market dynamics, and supply chain disruptions, thereby enhancing the company's resilience (Türkeş et al., 2024). Additionally, collaboration among supply chain members, managed through a well-designed strategy, strengthens a company's flexibility in responding to opportunities or crises (Perano et al., 2023). Hoshimov et al. (2021) and Türkeş et al. (2024) found that supply chain strategies positively affect supply chain flexibility. Therefore, an adaptive supply chain strategy supports higher flexibility.

H_2: Supply Chain Strategy has a positive effect on Supply Chain Flexibility

2.3.3 The Effect of Supply Chain Network Design on Supply Chain Flexibility

Theoretically, supply chain network design determines how the flow of goods, information, and distribution activities is structured. An efficient design enables companies to respond quickly and effectively to changes, thereby improving their flexibility. A well-designed supply chain network can enhance a company's flexibility in responding to change. Research shows that an efficient network structure, including facility placement, distribution flow, and partner relationships, supports smooth supply chain processes and allows companies to adapt more quickly to market changes (Fu, Abdul Rahman, Jiang, Abbas, & Comite, 2022). Additionally, a collaborative network design helps minimize knowledge risks and optimizes information exchange among partners (Perano et al., 2023).Fu et al. (2022); Gong, Xu, Zhao, and Schoenherr (2024); Perano et al. (2023) show that supply chain network design positively affects supply chain flexibility. With the right design, companies can create collaborations that enhance overall supply chain flexibility (Zhu & Wu, 2022).

H_3: Supply Chain Network Design has a positive effect on Supply Chain Flexibility

2.3.4 The Effect of Information Technology on Supply Chain Flexibility

Theoretically, information technology supports supply chain flexibility by enhancing data visibility, communication speed, and decision-making based on real-time data. Integrated systems allow companies to respond quickly to changes in demand and disruptions. The utilization of information technology in the supply chain is crucial for enhancing flexibility. Efficient information systems enable companies to respond swiftly to demand changes and market dynamics (Ruzo-Sanmartín, Abousamra, Otero-Neira, & Svensson, 2024). Information technology supports companies in analyzing data more accurately, thereby enabling fast and adaptive decision-making (Gong et al., 2024). Additionally, the application of information technology facilitates communication and collaboration among supply chain members, making coordination smoother and enhancing flexibility (Jamal, Ikhval, Nisa, Qulbi, & Arifin, 2024). Jasrotia, Rai, Rai, and Giri (2024) and Gong et al. (2024) found that information technology positively affects supply chain flexibility. Therefore, investing in information technology is a strategic step to improve the overall supply chain flexibility.

H_4: Information Technology has a positive effect on Supply Chain Flexibility

2.3.5 The Effect of Strategic Partnerships on Supply Chain Flexibility

Conceptually, strategic partnerships expand a company's ability to access resources, information and innovation. Such partnerships enhance flexibility because long-term relationships allow companies to adjust their production, distribution, and strategies more quickly and in a coordinated manner. Strategic partnerships are crucial for building supply chain flexibility. Long-term collaborations with suppliers and distributors can strengthen efficiency, innovation, and the company's ability to respond to market changes (Yang, Zheng, Xie, & Tian, 2022). Research shows that information-sharing collaborations and shared risks through strategic partnerships can enhance supply chain flexibility. Gopal, Rana, Krishna, and Ramkumar (2024); (Zhu & Wu, 2022); Wei et al. (2024) state that strategic partnerships positively affect supply chain flexibility. With strategic partnerships, companies are better prepared to face uncertainties and seize emerging opportunities.

H_5: Strategic Partnerships have a positive effect on Supply Chain Flexibility

2.3.6 The Effect of Supply Chain Flexibility as a Mediator on Supply Chain Performance

Theoretically, supply chain flexibility enhances a company's ability to respond to market changes, demand shifts, and operational risks. With high flexibility, companies can improve cost efficiency, timeliness, and customer service, all of which are key components of the supply chain performance.

According to studies by Tsai and Lasminar (2021); (Jafari, Ghaderi, Eslami, & Malik, 2022; Khanuja & Jain, 2022) supply chain flexibility as a mediator positively impacts supply chain performance. Companies with flexible supply chains can quickly adjust their operational strategies according to market needs, thus improving cost efficiency, timeliness, and customer satisfaction (Khanuja & Jain, 2022). Research also emphasizes that flexibility is an important mediator that strengthens the relationship between supply chain integration and improved performance. Therefore, supply chain flexibility is a crucial capability that supports competitive advantages.

H_6: Supply Chain Flexibility has a positive mediating effect on Supply Chain Performance

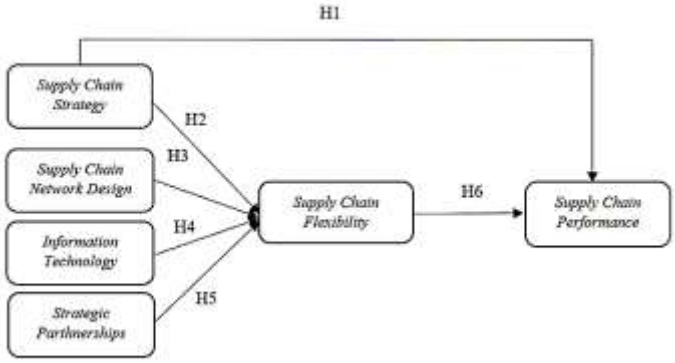

Figure 1. Research framework

3. Research Methodology

This study employed a quantitative research method aimed at examining the relationships between variables through statistical analysis. The sampling technique used was non-probability sampling with a purposive sampling approach, which involved selecting respondents based on specific criteria set by the researcher to align with the study's objectives. These criteria include retail business operators acting as owners, managers, or retail managers, as used in previous research by (Setiawan & Sari, 2021). In determining the sample size, this study follows the guidelines of Hair Jr, Hair Jr, Hult, Ringle, and Sarstedt (2021), which state that the minimum sample size should be ten times the number of formative indicators for each construct. With a total of 18 questions, the minimum required sample size was 180 respondents. The data collection process was conducted by distributing an online questionnaire using Google Forms, and the researcher successfully obtained 300 respondents, fulfilling the minimum requirement for the data analysis.

The research instrument consisted of a questionnaire constructed using a five-point Likert scale, with the following response categories: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. This scale quantitatively measures the respondents' perceptions of each indicator. The data collection method through questionnaires refers to Sugiyono (2019), who stated that a questionnaire is a technique used by giving a set of questions to respondents to obtain relevant data systematically. After the data were collected, they were processed and analyzed using the SmartPLS application, which was used to test the validity and reliability of the constructs through a Partial Least Squares (PLS) approach, in accordance with the procedures outlined by Melissa and Zai (2025).

4. Results and Discussion

4.1 Results

This study was analyzed based on the criteria and information provided by respondents, such as gender, age, job position, business age, and business turnover. The questionnaire was distributed via Google Forms to gather information from respondents. According to the data presented, most respondents were male (54.7%) and in the age range of 17 to 27 years (41.3%), indicating that the sample predominantly consisted of young individuals, particularly from Generation Z. In terms of job position, most respondents were staff (23.7%), followed by business owners (20.3%), stock keepers/warehouse staff (16.0%), cashiers (15.0%), employees (14.7%), and managers (10.3%). Regarding the age of retail businesses, most had been established for 6 to 10 years (42.7%), and most had a monthly turnover of

less than 500 million (52.0%), with the rest falling between 500 million and 1 billion (43.0%), and only a few businesses reported turnovers greater than 2 billion (4.7%). Overall, the respondents in this study were primarily young people aged 17-27, with staff and employees as the dominant positions. The businesses represented were generally in the 6-10 year range, with relatively low to moderate monthly turnovers, reflecting the characteristics of retail business operators in Batam at a developing stage.

Table 1. Outer model

Contruct	Item	Convergen Validity (Outer Loading)	VIF	Discriminant Validity (AVE)	Composite Realibility	Cronbach Alpha	R - Square
Information Technology	IT1	0.879	2.077				
	IT2	0.880	2.221	0.779	0.914	0.858	
	IT3	0.889	2.187				
Strategic Partnerships	SP1	0.871	1.835				
	SP2	0.862	1.988	0.748	0.899	0.832	
	SP3	0.861	1.942				
Supply Chain Flexibility	SCF1	0.879	2.097				
	SCF2	0.884	2.246	0.784	0.916	0.862	0.580
	SCF3	0.893	2.273				
Supply Chain Network Design	SCND1	0.875	1.976				
	SCND2	0.871	2.035	0.754	0.902	0.837	
	SCND3	0.859	1.876				
Supply Chain Performance	SCP1	0.810	1.394				
	SCP2	0.842	1.888	0.693	0.871	0.779	0,456
	SCP3	0.845	1.852				
Supply Chain Strategy	SCS1	0.889	2.288				
	SCS2	0.899	2.316	0.784	0.916	0.862	
	SCS3	0.868	2.047				

The table above presents the Variance Inflation Factor (VIF) values for several indicators included in various constructs, such as Information Technology (IT), Strategic Partnerships (SP), Supply Chain Flexibility (SCF), Supply Chain Network Design (SCND), Supply Chain Performance (SCP), and Supply Chain Strategy (SCS). The VIF values in this study were used to evaluate the potential multicollinearity between independent variables in a structural model, such as in Partial Least Squares Structural Equation Modeling (PLS-SEM). The Variance Inflation Factor (VIF) is a measure used to test collinearity in a model, where a VIF value higher than 5.00 indicates potential collinearity issues, as high VIF values can cause difficulties in interpreting path coefficients. Conversely, VIF values less than 5.00 suggest that there are no collinearity issues (Hair Jr et al., 2021).

Based on Table 1 (Outer Model), the VIF values are below 5.00, indicating that the model is free from Common Method Variance, confirming that the data used in this study are valid and free from Common Method Variance. The data presented in Table 1 show the Outer Loadings results from the measurement model in the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis. Outer Loadings measure how strongly an indicator reflects the construct it represents. The higher the loading value, the better the indicator reflects the construct itself. According to Hair Jr et al. (2021), the ideal outer loading value is ≥ 0.60, as it indicates that the indicator explains more than 50% of the construct's variance. Based on the results in the table, most indicators have outer loading values above 0.60, which means that these indicators have good convergent validity.

For example, the Information Technology construct (TI1 to TI3) shows loadings between 0.879 and 0.889, meaning that each indicator strongly reflects the application of information technology that helps

improve the response speed to demand in retail businesses. Similarly, the constructs of Strategic Partnerships, Supply Chain Flexibility, Supply Chain Network Design, Supply Chain Performance, and Supply Chain Strategy all have high and valid loading values. Convergent validity can also be confirmed through the Average Variance Extracted (AVE), which should be greater than 0.50 (Fornell & Larcker, 1981). These outer loading values served as the basis for calculating the AVE for each construct. Overall, this model demonstrated good convergent validity based on the majority of high outer loading values that met the standards. Therefore, the results in Table 1 indicate that these indicators can be trusted to accurately measure the respective constructs.

Based on the reliability and validity testing of the constructs using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, it can be concluded that all constructs in this model meet the recommended criteria. Reliability testing assesses the reliability level between several measurement variables, where the aim of reliability and validity testing is to ensure whether the questionnaire distributed for primary data collection can be trusted and to determine the validity of each indicator. According to Hair Jr et al. (2021), a variable is considered reliable if it has a Cronbach's Alpha and composite reliability value between 0.60 and greater than 0.70. The results of the Cronbach's Alpha and composite reliability tests in Table 1 show values above 0.60–0.70, indicating that the constructs are reliable.

The R-squared value is used to illustrate the amount of variation between endogenous variables that can explain other endogenous or exogenous variables. The R-squared value is qualitatively divided into three categories: low impact if R^2 is 0.25, moderate impact if R^2 is 0.50, and high impact if R^2 is 0.75 (Hair Jr et al., 2021). Based on the data processed by the researcher, the R-Square value for Supply Chain Flexibility is 0.580 (moderate), meaning that the variables Supply Chain Strategy, Information Technology, Supply Chain Network Design, and Strategic Partnerships contribute 58.0% to explaining the Supply Chain Flexibility variable. The R-Square value for Supply Chain Performance is 0.456 (moderate).

Table 2. HTMT (Heterotrait-Monotrait Ratio)

	Information Technology	**Strategic Partnerships**	**Supply Chain Flexibility**	**Supply Chain Network Design**	**Supply Chain Performance**	**Supply Chain Strategy**
Information Technology						
Strategic Partnerships	0.767					
Supply Chain Flexibility	0.743	0.795				
Supply Chain Network Design	0.670	0.792	0.721			
Supply Chain Performance	0.685	0.803	0.704	0.687		
Supply Chain Strategy	0.678	0.749	0.733	0.638	0.766	

The data above show the results of the Heterotrait-Monotrait Ratio of Correlation (HTMT) test, which is used to measure discriminant validity in the PLS-SEM measurement model. Discriminant validity is crucial to ensure that the constructs in the model truly measure distinct concepts. According to Hair Jr

et al. (2021), an HTMT value of less than 0.9 is considered very good, indicating that discriminant validity has been achieved. The results in Table 2 show that the constructs in the model have good discriminant validity, meaning that each construct can differentiate itself from the others (Hair Jr et al., 2021).

Table 3 displays the output of the direct effects between the variables. This analysis is important for understanding the dynamics being studied, so the information obtained can contribute to the development of previous theories and be applied by other researchers. Based on the results shown in Table 3, the relationships are considered significant if the T-statistic value is greater than 1.96 and the P-value is less than 0.05 (Hair Jr et al., 2021). The results in Table 3 indicate that most of the relationships between the variables in this study are significantly positive.

Table 3. Inner model

Path Relationship X - Y	T Statistic	P Values	Conclusion	Remarks
Supply Chain Strategy -> Supply Chain Performance	5.572	0.000	Positive Significant	H_1 Accepted
Supply Chain Strategy -> Supply Chain Flexibility	3.530	0.000	Positive Significant	H_2 Accepted
Supply Chain Network Design -> Supply Chain Flexibility	2.692	0.007	Positive Significant	H_3 Accepted
Information Technology -> Supply Chain Flexibility	3.493	0.001	Positive Significant	H_4 Accepted
Strategic Partnerships -> Supply Chain Flexibility	3.105	0.002	Positive Significant	H_5 Accepted
Supply Chain Flexibility ->Supply Chain Performance	3.714	0.000	Positive Significant	H_6 Accepted

4.2 Discussion

4.2.1 The Effect of Supply Chain Strategy on Supply Chain Performance (H_1)

Based on the path coefficient analysis between Supply Chain Strategy and Supply Chain Performance, the T-statistic value is 5.572, and the p-value is 0.000. This finding confirms that supply chain strategy is a fundamental element that determines the performance of retail supply chains. Theoretically, a supply chain strategy reflects the direction, priorities, and operational policies used by organizations to manage the flow of goods, information, and relationships between partners. According to Hoshimov et al. (2021), well-designed strategies affect coordination quality, operational priority setting, and the supply chain's ability to respond to market demands.

Perano et al. (2023) further explain that every strategic decision within the supply chain, including supplier management, distribution mode selection, and inventory management, directly impacts supply chain performance. Additionally, the right strategy can improve operational efficiency and effectiveness throughout the supply chain (Türkeş et al., 2024). The findings of this study also support the theory that aligning strategy with performance goals enhances a company's ability to operate optimally (Wei et al., 2024). In the context of retail businesses in Batam, a structured and adaptive supply chain strategy has been proven to improve timeliness, cost efficiency, and service quality, ultimately enhancing the overall supply chain performance.

4.2.2 The Effect of Supply Chain Strategy on Supply Chain Flexibility (H_2)

The T-statistic value of 3.530 and the p-value of 0.000 indicate that Supply Chain Strategy has a significant positive effect on Supply Chain Flexibility. Theoretically, supply chain flexibility reflects an organization's ability to adapt to changes in demand, market fluctuations, and potential operational disruptions. A good supply chain strategy aims to build adaptive capabilities through planning, managing the flow of goods, and collaborating with partners. Chandak and Rout (2021) explained that a responsive strategy enables companies to quickly anticipate external environmental changes.

Additionally, a collaborative strategy strengthens the relationships between supply chain members, enhancing flexibility in responding to opportunities and threats (Perano et al., 2023). The adaptability theory in supply chains emphasizes that without a clear strategy, organizations cannot create agile and responsive supply chain systems. This finding reinforces the idea that retail businesses with a clear supply chain strategy tend to be more flexible in adjusting their inventory planning, distribution patterns, and customer service.

4.2.3 The Effect of Supply Chain Network Design on Supply Chain Flexibility (H_3)

The analysis shows a significant effect of SCNDesign on SCFlex with a t-statistic value of 2.692 and a p-value of 0.007. Conceptually, supply chain network design involves the physical structure and workflow, including the location of facilities, distribution routes, and relationship patterns between business partners. Fu et al. (2022) explained that an efficient network design enhances organizational flexibility by providing alternative pathways, streamlining logistics flows, and improving the capacity to adapt to demand changes. Zhu and Wu (2022) emphasize that the right network design can enhance an organization's response to supply chain disruptions, such as supply delays or changes in customer demand. With a flexible network structure, retail businesses in Batam can quickly reorganize distribution processes, reroute supplies to other partners, and improve logistics flow. This finding aligns with supply chain agility theory, which highlights the importance of network structure as the foundation for flexibility.

4.2.4 Pengaruh Information Technology terhadap Supply Chain Flexibility (H_4)

Based on the path coefficient analysis between Information Technology and Supply Chain Flexibility, the T-statistic value is 3.493, and the p-value is 0.001. This analysis supports H_4 and shows that IT has a significant positive effect on Supply Chain Flexibility. The utilization of information technology in the supply chain plays a crucial role in enhancing flexibility in retail business. This study aligns with previous research indicating that information technology supports retail businesses in analyzing data quickly and adaptively (Gopal et al., 2024). Additionally, according to Gopal et al. (2024), the use of information technology enables companies to analyze demand in real time, predict market changes, and make quicker and more accurate decisions. Jamal et al. (2024) state that information technology facilitates collaboration and information exchange among partners, thus improving coordination capabilities. In the context of retail businesses, IT helps speed up inventory data processing, reduces errors in shipments, and enhances the ability to adjust operational plans to market dynamics. Therefore, this study strengthens the concept that information technology serves as a catalyst for creating a responsive supply chain..

4.2.5 The Effect of Supply Chain Flexibility as a Mediator on Supply Chain Performance (H_5)

Based on the analysis, Strategic Partnerships have a significant positive effect on Supply Chain Flexibility with a T-statistic value of 3.105 and a p-value of 0.002. Theoretically, strategic partnerships enable organizations to share resources, information, and risks, thereby enhancing supply chain flexibility. Yang et al. (2022) explained that long-term partnerships increase efficiency, innovation, and a company's ability to adapt. Zhu and Wu (2022); Gopal et al. (2024); Wei et al. (2024) also emphasize that trust-based collaborations strengthen coordination between partners, thus increasing a company's ability to face market uncertainties. This finding proves that retail businesses that build strong strategic partnerships are better able to adjust supply, improve distribution, and manage risks when demand changes.

4.2.6 The Effect of Supply Chain Flexibility as a Mediator on Supply Chain Performance (H_6)

The analysis shows that Supply Chain Flexibility serves as a significant mediator in the relationship between strategic variables and Supply Chain Performance, with a T-statistic value of 3.714 and a p-value of 0.000. Theoretically, supply chain flexibility is an adaptive ability that allows companies to quickly adjust their operations, thereby improving supply chain performance. Siagian, Tarigan, and Jie (2021) emphasized that flexibility strengthens the relationship between supply chain integration and company performance. Retail businesses with high flexibility can reduce operational costs, speed up distribution processes, reduce uncertainty, and improve customer satisfaction. This proves that

flexibility is a strategic capability that mediates and strengthens the influence of strategy, technology, network design, and partnerships on supply chain performance in Batam, Indonesia.

Table 4. Standardized Root Mean Square Residual (SRMR)

	Sample Mean (M)
Saturated Model	0,036
Estimated Model	0,040

The results of this analysis indicate that the research model has an adequate fit based on the Standardized Root Mean Square Residual (SRMR) value. The saturated model produced an SRMR value of 0.036, whereas the estimated model produced a value of 0.040. According to Hu and Bentler (1999), an SRMR value smaller than 0.01 indicates a good model fit, while values below 0.10 are acceptable. Therefore, the results of the saturated model in Table 4 show a good fit, and the estimated model also shows a good fit. This suggests that the proposed model in this study can be considered to have a reasonably good fit with the collected empirical data.

Table 5. GoF Index

Average AVE	**Average R-Square Adjusted**	**GoF**
0,757	0,578	0,661

To evaluate the overall model fit, this study used the Goodness of Fit (GoF) index, as recommended by Prasetiyo (2025) that GoF is an index that describes the global model fit, considering both the measurement and structural models. The results of this study show that the average AVE of all constructs is 0.757, while the average adjusted R-squared value is 0.578. According to Sarstedt, Ringle, and Hair (2021), the GoF value can be categorized as follows: 0.10 is considered weak, 0.25 is considered moderate, and 0.36 is considered strong. Based on the analysis in Table 5, the GoF value was 0.661, indicating that the model used in this study had a strong GoF. This study shows that the model used is sufficiently good to explain the phenomena being studied and successfully depicts the relationships between variables with satisfactory accuracy. These results support the validity of the analysis, demonstrating the influence of supply chain performance on retail businesses, as mediated by supply chain flexibility in Batam City.

5. Conclusions

5.1 Conclusion

This study aims to analyze the impact of supply chain performance on retail businesses, mediated by supply chain flexibility, in Batam City. Based on the analysis using the PLS-SEM method, all the hypotheses proposed in this study were significantly accepted. The results of this study show that supply chain strategy, supply chain network design, information technology, and strategic partnerships positively impact supply chain flexibility, which in turn positively affects retail business performance. Supply chain flexibility has proven to be a strong mediating variable that reinforces the relationship between internal supply chain factors and overall retail business performance. This indicates that the ability of retail businesses in Batam to adapt to market changes, consumer demand, and supply dynamics is key to maintaining competitiveness in a dynamic environment.

These findings align with research emphasizing the importance of adaptation and collaboration in supply chain management. Therefore, this study enriches the literature on supply chain management in the retail sector, particularly in a local context such as Batam, by asserting that flexibility is a strategic factor that cannot be overlooked in improving business performance. The findings also prove that flexible supply chain practices in Batam enhance the competitiveness and sustainability of retail businesses. Retail businesses can leverage information technology, strengthen strategic partnerships, and establish efficient distribution networks, making them more resilient to market challenges.

5.2 Research Limitations

While this study provides valuable insights, it has some limitations that should be acknowledged. The research was conducted within a specific region (Batam City) and focused on retail businesses, which may limit the generalizability of the findings to other sectors and regions. Additionally, the study utilized a quantitative approach, and a more comprehensive understanding of the factors influencing supply chain flexibility could be gained by incorporating qualitative methods in future studies. Future studies should explore other sectors and expand the scope to include various industries and regions, allowing for broader generalizations.

5.3 Suggestions and Directions for Future Research

Based on the findings of this study, retail business operators in Batam are advised to strengthen supply chain flexibility through strategic partnerships with suppliers and distributors, leverage information technology to enhance coordination and decision-making, and design efficient distribution networks to respond quickly to changes in the market. Future research is recommended to expand the scope to other sectors and integrate a qualitative approach to provide a more in-depth understanding of the factors affecting supply chain flexibility. Furthermore, future studies could explore the impact of other variables, such as organizational culture, leadership, and external market factors, on supply chain flexibility and performance.

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