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Original research article

The effect of supply chain management and strategy on organizational performance through competitive advantage

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ABSTRACT

Rapid economic growth has intensified business competition across all industrial sectors. Companies must continuously innovate and optimize their operations to achieve a competitive advantage. Intense inter-company competition drives high market demand for products, often resulting in difficulties meeting marketing demands and suboptimal production planning. This study aims to examine how supply chain management and supply chain strategy influence company performance through competitive advantage, using PLS-SEM. The findings indicate that supply chain strategy positively affects company performance through competitive advantage, whereas supply chain management does not. Based on the hypothesis testing results, recommendations include improving effective demand management by responding quickly to demand changes, adapting to market shifts, and evaluating supply chain systems and processes. To achieve sustainable competitive advantage, companies should focus on key aspects of supply chain strategy implementation, such as increasing speed and accuracy in meeting customer demand, ensuring consistent product and service quality, and continuously evaluating and refining strategies to maintain relevance and effectiveness.

1. Introduction

Rapid economic development has intensified business competition across all industrial sectors. Companies must continuously innovate and optimize their operations to achieve a competitive advantage. One critical focus is supply chain management (SCM), which involves managing the flow of goods and production activities from raw materials to product delivery. Effective SCM enhances operational efficiency, thereby improving company performance. Additionally, a supply chain strategy is vital for managing resources from start to finish and must align with company goals to secure a competitive advantage [1].

A company producing various seasonings, established in 1970, initially manufactured Monosodium Glutamate (MSG) before launching products like Masako, Sajiku, and Mayumi. Masako, a widely recognized

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product, offers chicken, beef, and mushroom flavors in packaging sizes of 9, 100, 130, and 250 grams. Observations and interviews reveal that intense competition in the seasoning industry, particularly for Masako, creates challenges in managing demand uncertainty, leading to suboptimal production planning. Consequently, the company misses opportunities to outperform competitors. This study aims to examine the influence of supply chain management and supply chain strategy on company performance through competitive advantage. Leading brands with outstanding performance in the Indonesian market receive the Top Brand Award, which reflects high consumer interest and brand popularity.

Masako's market share fluctuates annually, failing to surpass Royco in top rankings. Consumer perception of brand image significantly influences purchasing decisions. To evaluate factors affecting competitive advantage and company performance, this study employs Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM, a structural equation approach, maximizes the explained variance of endogenous variables through iterative methods [2]. Compared to covariance-based SEM, PLS-SEM offers advantages, such as fewer assumptions, suitability for small samples, and applicability to various data scales [3]. The method involves two stages: measurement model evaluation and structural model evaluation, including inner model testing. Previous research by Yoga et al. identified a negative correlation between operational performance and supply chain processes, noting that improved connectivity significantly enhances operational performance [4]. However, their study relied on descriptive analysis and multiple regression, lacking structural or outer model testing, which limits its depth.

A supply chain is a network of entities—suppliers, manufacturers, distributors, retailers, and logistics firms—collaborating to produce and deliver products to end users [5]. Supply chain management (SCM) oversees the entire cycle, from raw materials to payments and information flow across suppliers, manufacturers, and consumers [6]. Effective SCM maximizes customer value and competitive advantage through strategies and software [7]. SCM indicators include information exchange [8], long-term relationships [9], and process integration [10]. Supply chain strategy outlines plans to manage the flow of goods and services from inception to delivery [11]. A well-executed strategy reduces costs, enhances efficiency, improves performance, and boosts customer satisfaction, fostering competitive advantage. It requires aligning business goals, customer needs, and partner capabilities. Strategy indicators include flexibility in meeting requests [12], process capability (speed, accuracy, quality) [13], and risk management. Competitive advantage encompasses an organization's resources and competitive strengths, emphasizing superior expertise, competence, and innovation [14]. Indicators include price, quality, and innovation [15]. Company performance reflects the achievement of goals, vision, and mission through strategic operations [16], measured by inventory turnover [17] and order management (from receipt to delivery) [18].

Existing studies on supply chain management and competitive advantage often focus on operational efficiency or isolated supply chain components, neglecting the integrated impact of supply chain management and strategy on company performance through competitive advantage in the seasoning industry. Additionally, few studies employ PLS-SEM to model these relationships comprehensively, particularly in addressing demand uncertainty and brand image challenges. This study bridges the gap by using PLS-SEM to analyze the combined effects of supply chain management and strategy on company performance via competitive advantage in the seasoning industry. It provides a comprehensive model with structural and measurement evaluations, offering deeper insights than prior descriptive approaches. The findings will help companies identify critical performance drivers, prioritize impactful strategies, and address weaker areas. Practically, the study offers actionable recommendations for managing demand uncertainty and enhancing brand image, enabling firms to formulate effective strategies to thrive in the competitive seasoning market. Academically, it contributes to the literature by applying PLS-SEM to a nuanced industry context, enriching supply chain strategy frameworks.

2. Material and method

2.1. Research hypothesis

This study proposes several hypotheses (see Fig 1) to test the relationships among supply chain management, supply chain strategy, competitive advantage, and company performance. Specifically, it hypothesizes that effective supply chain management positively influences competitive advantage by enhancing operational efficiency and information exchange. Additionally, it posits that a well-aligned supply chain strategy positively affects competitive advantage through improved flexibility and process capability. These hypotheses will be tested using the PLS-SEM model to determine the significance and strength of these relationships.

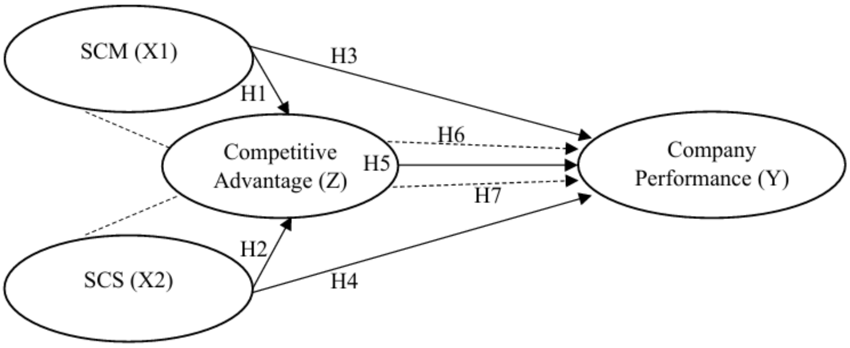

Fig 1. Structural model

Table 1
Research hypothesis

Hypothesis	Effect description
H1	supply chain management has a positive effect on competitive advantage
H2	supply chain strategy has a positive effect on competitive advantage
H3	supply chain management has a positive effect on company performance
H4	supply chain strategy has a positive effect on company performance
H5	competitive advantage has a positive effect on company performance
H6	supply chain management has a positive effect on company performance through competitive advantage
H7	supply chain strategy has a positive effect on company performance through competitive advantage

2.2. Research methodology

This study employs a quantitative research approach using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method to examine the effect of relationships among Supply Chain Management (SCM) and Supply Chain Strategy (SCS) variables on company performance, mediated by competitive advantage. PLS-SEM is a technique in Structural Equation Modeling that uses an iterative approach to maximize the explained variance of each endogenous variable. Compared to covariance-based SEM methods, PLS-SEM offers several advantages: it can be applied to all data scales, requires fewer assumptions, and does not necessitate a large sample size.

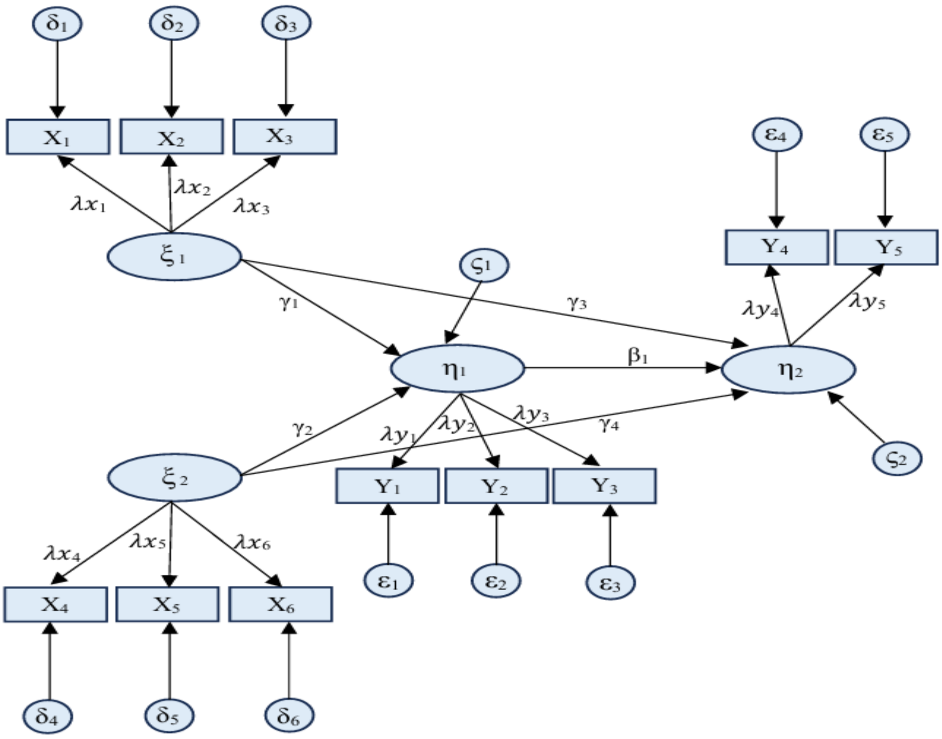

Fig 2. Path diagram

In this study, the measurement model was tested for validity and reliability. The validity test includes convergent validity and discriminant validity. Convergent validity was assessed using loading factors (valid if the outer loading value is greater than 0.7) and the Average Variance Extracted (AVE) value (valid if AVE is greater than 0.5). Discriminant validity was evaluated using the Fornell-Larcker Criterion (valid if the square root of a variable's AVE exceeds its correlations with other variables) and cross-loading (valid if the cross-loading value is greater than 0.7). Reliability was tested using Composite Reliability (reliable if the value is greater than 0.6) and Cronbach's Alpha (reliable if the value is greater than 0.7).

The study population consisted of 44 employees from the IC and PPC departments. Using the Slovin formula, a minimum sample size of 40 respondents was determined. SmartPLS software was used to analyze descriptive data and test the validity and reliability of the measurement model (outer model). The questionnaire was based on a Likert scale, and the structural model (inner model) was used to assess relationships among variables. Google Forms was utilized to collect data on the indicators of each variable, which were defined in the conceptual model. The Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree). The results of the path diagram construct are presented in Fig 2. The mathematical equation system is expressed in Eq. (1) and Eq. (2).

$$\eta 1 = \gamma 1 \xi 1 + \gamma 2 \xi 2 + \varsigma 1 \quad (1)$$

$$\eta 2 = \beta 1 \eta 1 + \gamma 1 \xi 1 + \gamma 2 \xi 2 + \gamma 3 \xi 1 + \gamma 4 \xi 2 + \varsigma 2 \quad (2)$$

where $\xi 1$, $\xi 2$ denote latent variables, $\eta 1$, $\eta 2$ denote endogenous latent variables, $\lambda x1$ to $\lambda x6$ denote loading factor of latent variables, $\lambda y1$ to $\lambda y5$ denote loading factor of endogenous latent variables, $\beta 1$ denotes the coefficient of influence of endogenous variables on endogenous, $\varsigma 1$ and $\varsigma 2$ denote error model, $\gamma 1$ to $\gamma 4$ denote the coefficient of influence of exogenous variables on endogenous, $\delta 1$ to $\delta 3$ denote error for SCM indicators, $\delta 4$ to $\delta 6$ denote error for SCS indicators, $\varepsilon 1$ and $\varepsilon 3$ denote error for CA indicators, and $\varepsilon 4$ and $\varepsilon 5$ denote error for CP indicators.

3. Results and discussion

3.1. Respondent information

Based on the Slovin formula, the minimum sample size for this study was 40 respondents. The sample consisted of 90% men and 10% women. The age distribution was as follows: 25–35 years (12.5%), 36–46 years (45%), and 45–57 years (42.5%). Respondents were from the Inventory Control department (60%) and the Production Planning and Control department (40%). Respondent characteristics by role were as follows: department manager (5%), section manager (10%), foreman (22.5%), and staff (62.5%).

Table 2
Loading factor

	X1	X2	Y	Z
X11	0.891			
X12	0.786			
X13	0.773			
X21		0.904		
X22		0.815		
X23		0.853		
Y1			0.936	
Y2			0.896	
Z1				0.728
Z2				0.849
Z3				0.842

Table 3
Average Variance Extracted (AVE)

No	Variable	Average Variance Extracted (AVE)
1	X1	0.670
2	X2	0.736
3	Y	0.839
4	Z	0.654

Table 4
Fornell larcker criterion

	X1	X2	Y	Z
X1	0.818			
X2	0.592	0.916		
Y	0.458	0.458	0.818	
Z	0.584	0.582	0.592	0.808

Table 5
Cross loading

	X1	X2	Y	Z
X11	0.891	0.512	0.408	0.312
X12	0.786	0.502	0.350	0.298
X13	0.773	0.437	0.364	0.276
X21	0.578	0.904	0.675	0.617
X22	0.441	0.815	0.387	0.355
X23	0.473	0.853	0.338	0.468
Y1	0.454	0.583	0.936	0449
Y2	0.377	0.474	0.896	0.282
Z1	0.197	0.466	0.306	0.728
Z2	0.352	0.518	0.206	0.849
Z3	0.323	0.437	0.459	0.842

Table 6
Composite reliability and Cronbach's alpha

	Composite reliability	Cronbach's alpha
X1	0.858	0.751
X2	0.893	0.828
Y	0.912	0.810
Z	0.894	0.732

3.2. Evaluation of outer model

The loading factor for all variables must be greater than 0.7 to ensure that all indicators of the variable construct are valid and exhibit good convergent validity. Table 2 presents the loading factor values. As shown in Table 2, all indicators have values above 0.7, indicating that all variable indicators are valid and have good convergent validity. Additionally, convergent validity was assessed using the Average Variance Extracted (AVE), with a threshold of > 0.5 for validity. Table 3 displays the AVE values. According to Table 3, all AVE values are above 0.5, confirming that all variables are valid at the AVE stage.

The Fornell-Larcker criterion is used to ensure discriminant validity, requiring the R^2 value for each latent variable to be higher than the R^2 values with all other latent variables. Table 4 presents the Fornell-Larcker criterion results. Based on Table 4, the Fornell-Larcker criterion value for each latent variable exceeds the R^2 values of all other latent variables. Additionally, discriminant validity is assessed using cross-loading. If an indicator's cross-loading value with other latent variables is higher than with its own latent variable, it should be reconsidered. Table 5 shows the cross-loading results. The validity test indicates that all cross-loading values are valid, as each manifest (measure) in the construct has a cross-loading value greater than those with other variables, with a value > 0.7. This confirms that each manifest in each construct is an appropriate measurement tool for its respective construct.

After testing validity in two stages, a composite reliability test is conducted. The composite reliability test measures internal consistency, with a value greater than 0.6 indicating reliability. If the value is less than 0.6, the test is considered unreliable. Table 6 presents composite reliability results. Based on Table 6, all variables have values above 0.6, indicating appropriate internal consistency and reliability. Next, Cronbach's alpha reliability testing is performed. This test reflects the reliability of all indicators in the model, with a minimum acceptable value of 0.7. Table 6 shows Cronbach's alpha results. According to Table 6, all variables exceed the 0.7 threshold: the SCM variable has a value of 0.751, SCS has a value of 0.828, company performance has a value of 0.810, and competitive advantage has a value of 0.732. These values confirm that all variables are reliable.

Table 7
R-Square

	R-Square
Y	0.365
Z	0.342

Table 8
Path coefficient direct effect

	Y	Z
X1	0.172	0.024
X2	0.423	0.570
Y		
Z	0.099	

Table 9
Path coefficient indirect effect

Path	Specific Indirect Effect
X1 → Z → Y	0.002
X2 → Z → Y	0.057

Table 10
T-statistic of direct and indirect effect

Path	Effect	T-Statistic
X1 → Y	Direct	0.808
X1 → Z	Direct	0.139
X2 → Y	Direct	2.211
X2 → Z	Direct	4.099
Z → Y	Direct	0.647
X1→Z→Y	Indirect	0.067
X2→Z→Y	Indirect	0.614

3.3. Evaluation of inner model

The inner model test is conducted to predict causal relationships between variables and test hypotheses. First, a structural model evaluation is performed. This evaluation examines the R-squared value, which indicates how much of the variability in endogenous variables is explained by exogenous variables. The R-squared value pertains to variables Y and Z, showing the extent to which variable X affects Y and Z. The R-squared results are presented in Table 7. Based on Table 7, the R-squared value for variable Y is 0.365, meaning that 36.5% of the variability in the Company Performance variable is explained by the model, with the remainder influenced by other factors. Similarly, the R-squared value for variable Z is 0.342, indicating that 34.2% of the variability in the Competitive Advantage variable is explained by the model, with the rest attributed to other factors.

The path coefficient indicates the direction and strength of the relationship between variables. A path coefficient value below 0, approaching -1, suggests a negative effect of variable X on Z or Z on Y. Conversely, a path coefficient value above 0, approaching 1, indicates a positive effect of variable X on Z or Z on Y. The path coefficients are presented in Table 8. This analysis determines the direction of the relationships between variables X1 and X2 with variables Y and Z. The results of the path coefficient calculations for direct effects are shown Table 8. Based on Table 8, all variables exhibit a positive relationship between the dependent and intervening variables. The path coefficient values enable the model's relationships to be expressed in a structural equation.

Additionally, this analysis evaluates the direction of the relationships between variables X1 and X2 with variable Y through variable Z, which serves as an intervening variable. The results of the path coefficient calculations for indirect effects are presented in Table 9. Based on Table 9, variable Z positively mediates the relationship between independent and dependent variables. The path coefficient values allow the relationships between variables to be expressed in a structural equation. The T-statistic test (bootstrapping) is conducted to evaluate hypothesis testing. The bootstrapping results yield a T-statistic value used to determine the significance of relationships between variables. A T-statistic value above 2.022 (at a 0.05 significance level, two-tailed) indicates a significant effect. This analysis supports decision-making for hypothesis testing among variables.

Table 11
Predictive relevance

	Q^2 (=1-SSE/SSO)
Y	0.205
Z	0.181

Table 12
Model fit

	Saturated model	Estimated model
NFI	0.613	0.613

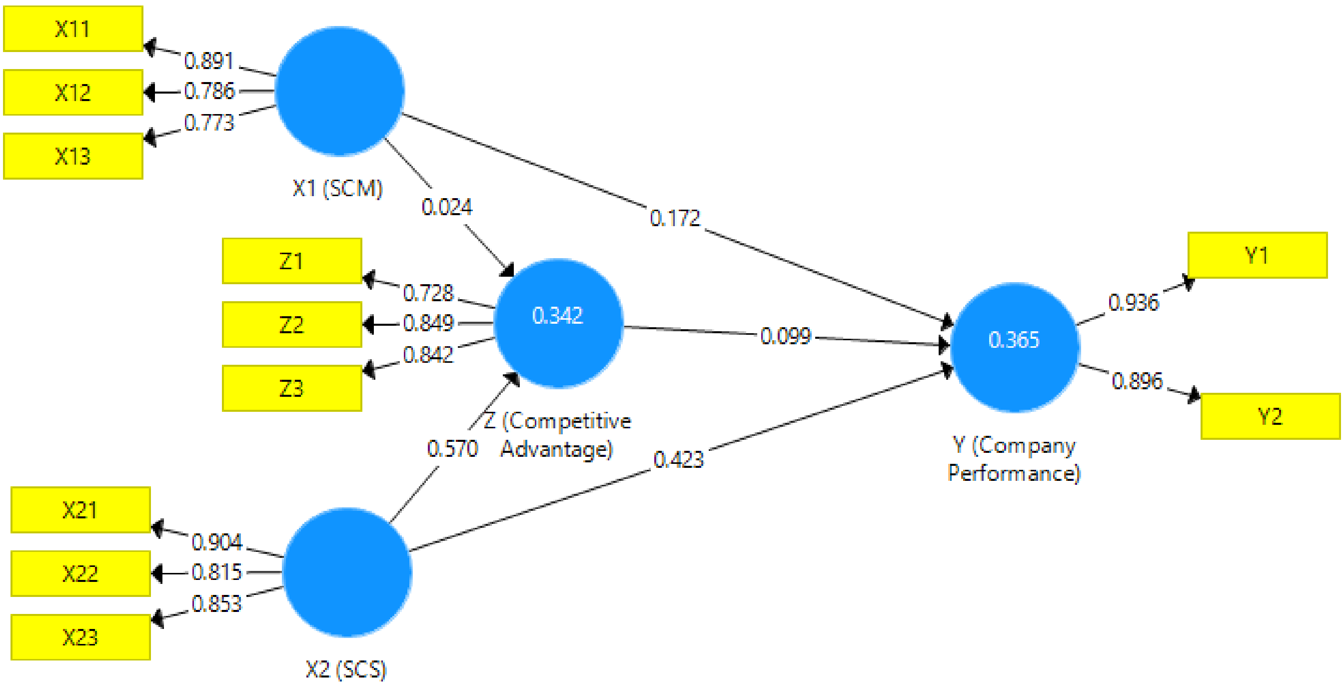

Fig 3. Final framework

The T-statistic calculations for direct effects are presented in Table 10. Based on Table 10, the SCM variable yields a T-statistic of 0.808, indicating no significant effect on Company Performance, and 0.139, indicating no significant effect on Competitive Advantage. Similarly, the Competitive Advantage variable yields a T-statistic of 0.647, showing no significant effect on Company Performance. In contrast, the SCS variable produces a T-statistic above 2.022, indicating a significant effect. This analysis also examines hypothesis testing through the intervening variable, Z. The T-statistic calculations for indirect effects are shown in Table 10. Based on Table 10, variable Z mediates the relationship between X1 and Y with a T-statistic of 0.067, indicating no significant mediation effect. Likewise, variable Z mediates the relationship between X2 and Y with a T-statistic of 0.614, also indicating no significant mediation effect.

The Predictive Relevance (Q^2) value validates the model's predictive accuracy. A Q^2 value greater than 0 indicates that the model has predictive relevance, demonstrating good prediction accuracy. The Q^2 analysis is obtained through the blindfolding process in SmartPLS software, with results shown in Table 11. The Q^2 test results for each variable are greater than 0, confirming that the model has predictive relevance and achieves good prediction accuracy.

The Normed Fit Index (NFI) measures model fit by comparing the proposed model to a baseline model. A higher NFI value indicates a better fit with the data. Based on Table 12, the NFI value for both the saturated and estimated models is 0.613, indicating that the model is a good fit, explaining 61.3% of the data. The final framework is presented Fig 3. Based on Fig 3, there is no difference between the initial and final frameworks, as all indicators met the convergent validity test criteria. No indicators had a value below 0.7, confirming that all indicators are valid.

Table 13
Hypothesis results and discussion

No	Hypothesis	Result
1	H1	SCM has no significant positive effect on competitive advantage, so H0 is accepted.
2	H2	SCS has a significant positive effect on competitive advantage, so H2 is accepted.
3	H3	SCM has no significant positive effect on company performance, so H0 is accepted.
4	H4	SCS has a significant positive effect on company performance, so H4 is accepted.
5	H5	Competitive Advantage has no significant positive effect on company performance, so H0 is accepted.
6	H6	SCM has no significant positive effect on company performance through competitive advantage, so H0 is accepted.
7	H7	SCS has no significant positive effect on company performance through competitive advantage, so H0 is accepted.

3.4. Hypothesis testing

This study employs Structural Equation Modeling (SEM) with a Partial Least Squares (PLS) approach, using SmartPLS software. Bootstrapping evaluation generates T-statistic values to support hypothesis testing decisions. If the calculated T-statistics exceed the T-table value, the hypothesis is supported. The bootstrapping results from the PLS analysis are presented in Table 13. Based on the bootstrapping results, hypotheses H2 and H4 are supported. H2 confirms that SCS has a significant positive effect on competitive advantage, and H4 confirms that SCS has a significant positive effect on company performance. However, hypotheses H1, H3, H5, H6, and H7 are not supported, as their null hypotheses (H0) are accepted. These findings contrast with Angel et al. [19], who found that SCM significantly affects company performance and competitive advantage.

3.5. Recommendations

Based on the evaluation of path coefficients and T-statistics (bootstrapping), which influence each variable, the following solutions are proposed:

a. An effective Supply Chain Strategy can positively impact company performance. To enhance company performance through supply chain strategy, companies should focus on managing demand flexibility effectively by responding quickly to demand shifts, ensuring readiness to adapt, evaluating supply chain systems or processes to achieve the desired speed, accuracy, and flexibility, and taking proactive measures to identify, assess, and mitigate potential risks that could disrupt supply chain performance.
b. To achieve a sustainable competitive advantage, companies should prioritize key aspects of Supply Chain Strategy implementation, including increasing speed and accuracy in meeting customer demand, ensuring consistent product and service quality, and continuously evaluating and improving strategies to maintain relevance and effectiveness.

4. Conclusions

This study concludes, based on hypothesis testing using Partial Least Squares (PLS), that Supply Chain Strategy (SCS) positively influences Company Performance and Competitive Advantage, whereas Supply Chain Management (SCM) does not positively influence Company Performance through Competitive Advantage. Based on the hypothesis testing results, it is recommended that companies enhance Company Performance through Supply Chain Strategy implementation by effectively managing demand flexibility with rapid responses to demand shifts and readiness to adapt, evaluating supply chain systems or processes to achieve the desired speed, accuracy, and flexibility, and taking proactive measures to identify, assess, and mitigate potential risks that could disrupt supply chain performance. To achieve sustainable competitive advantage, companies should focus on increasing speed and accuracy in meeting customer demand, ensuring consistent product and service quality, and continuously evaluating and improving strategies to remain relevant and effective.

This study contributes to the supply chain strategy literature by proposing a new framework that connects various elements of SCM and SCS, introducing a model that describes complex interactions within the supply chain. Further research is recommended to explore additional variables not examined in this study to broaden the understanding of these dynamics.

Declaration statement

Artha Fitri Wulandari: Conceptualization, Methodology, Writing-Original Draft. **Dira Ernawati**: Collecting data, Writing-Review & Editing.

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Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article or its supplementary materials.

AI Usage Statement

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