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Optimizing operational performance through logistics and supply chain system effectiveness: evidence from Indonesian automotive manufacturing firms

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ABSTRACT

Logistics and supply chain systems are critical determinants of operational efficiency in inventory-intensive industries such as automotive manufacturing. Although prior studies have examined the relationship between supply chain management and firm performance, much of the evidence relies on perceptual measures or single-dimensional outcomes, leaving limited finance-based empirical validation in emerging markets. This study addresses this gap by examining how logistics and supply chain system effectiveness influences multidimensional operational performance in the Indonesian automotive sector. The study contributes to the literature by providing finance-based evidence of capability-driven performance and by integrating the Resource-Based View with Contingency Theory within an emerging-market regulatory context. A quantitative explanatory design is employed using pooled firm-year data from automotive manufacturing firms listed on the Indonesian Stock Exchange over the period 2022–2024. Logistics effectiveness is operationalized using objective financial efficiency ratios derived from audited statements. Multiple regression analysis with moderation testing is conducted using SPSS. The findings indicate that logistics and supply chain system effectiveness significantly improve inventory turnover and time-based inventory efficiency, demonstrating strong support for capability-driven performance effects. However, the relationship between logistics effectiveness and operating cost efficiency is not statistically significant, suggesting that cost structures are influenced by broader structural factors. Firm size positively moderates the relationship between logistics effectiveness and inventory-based performance, confirming that organizational scale conditions capability effectiveness. Robustness tests confirm the stability of these results across alternative model specifications.

1. Introduction

Logistics and supply chain systems constitute the operational core of automotive manufacturing firms, where multi-tier supplier networks, high inventory dependency, and capital-intensive production structures create strong interdependencies across upstream and downstream actors [1]. In such environments, inefficiencies in logistics execution, manifested in low inventory turnover, prolonged holding periods, or uncontrolled operating expenses, directly disrupt production continuity

and erode competitive advantage [2], [3]. Empirical studies confirm that supply chain complexity and inventory management practices significantly influence firm-level financial outcomes, including asset turnover and profitability [1], [3].

From a theoretical perspective, the Resource-Based View (RBV) argues that organizational capabilities embedded in logistics systems represent strategic resources that are valuable, rare, inimitable, and non-substitutable [4], [5]. Logistics information systems, coordination routines, and inventory optimization capabilities function as inside-out resources that enhance operational efficiency and generate competitive advantage [6], [7]. Within RBV logic, operational performance improvements are not merely outcomes of operational activities but manifestations of firm-specific capability configurations. Complementing RBV, Supply Chain Management (SCM) theory emphasizes that performance optimization emerges from effective synchronization of material flows, cost structures, and working capital cycles across the supply chain [2], [8]. Financial-based indicators, such as inventory turnover, days inventory outstanding, and operating expense ratios, provide objective measures of how logistics capability translates into operational efficiency [3], [9].

However, despite extensive research on supply chain performance, the literature exhibits several critical limitations that remain insufficiently addressed. First, prior studies predominantly rely on perceptual survey-based measures of supply chain capability and performance, which are susceptible to common method bias and subjective inflation [10], [11]. Although some studies have begun to utilize objective financial indicators derived from audited statements [3], [12], the systematic operationalization of logistics and supply chain system effectiveness as a composite capability construct based on financial efficiency ratios remains limited [9].

Second, existing research tends to examine inventory management or financial performance in isolation, without modelling logistics system effectiveness as an integrated capability that simultaneously explains multiple operational performance dimensions. As a result, prior studies have not adequately compared the relative explanatory power of logistics capability across different performance indicators, such as inventory turnover, time-based efficiency, and operating cost efficiency, leaving unclear whether capability effects are uniform or dimension-specific. Third, the majority of empirical studies implicitly assume homogeneous performance effects across firms. While some studies incorporate contextual variables such as demand uncertainty or organizational growth [13], [14], firm size as a structural contingency variable has not been systematically examined within finance-based logistics–performance models. This limit understanding of whether and how organizational scale conditions the effectiveness of logistics capability. Therefore, a clear research gap exists in the lack of finance-based, multidimensional, and contingency-oriented empirical models that examine logistics and supply chain system effectiveness using objective data.

In the Indonesian automotive manufacturing sector, an industry characterized by high logistics dependency and strategic national importance, these gaps are particularly salient. Empirical studies integrating logistics system effectiveness, financial-based operational performance, and firm size contingency effects remain scarce [15]. To address these gaps, this study makes three primary contributions. First, it operationalizes logistics and supply chain system effectiveness using objective financial efficiency indicators derived from audited financial statements, thereby providing more robust and unbiased empirical evidence compared to perceptual approaches. Second, it advances the literature by modelling logistics effectiveness as a multidimensional capability and empirically comparing its explanatory power across distinct operational performance dimensions, including inventory turnover, time-based inventory efficiency, and operating cost efficiency. Third, it integrates the Resource-Based View and Contingency Theory by incorporating firm size as a moderating variable, thereby demonstrating that the capability–performance relationship is contingent upon organizational scale within an emerging market context such as Indonesia.

By integrating RBV and Contingency Theory within a finance-based empirical framework, this study advances a more analytically rigorous understanding of when and how logistics capability translates into operational optimization. According to the Resource-Based View, firm-specific logistics capabilities enhance operational performance by improving resource utilization efficiency and reducing process inefficiencies [4], [6].

In inventory-intensive industries such as automotive manufacturing, effective logistics systems improve material flow synchronization, reduce idle inventory, and accelerate asset turnover. Inventory turnover reflects how efficiently firms convert inventory into sales, while days inventory outstanding captures time-based holding efficiency. Operating expense efficiency reflects cost discipline in logistics-related operations. If logistics effectiveness represents a strategic operational capability, it should positively influence these performance dimensions.

H1: Logistics and supply chain system effectiveness positively affects inventory turnover.
H2: Logistics and supply chain system effectiveness improves time-based inventory efficiency.
H3: Logistics and supply chain system effectiveness improves operating cost efficiency.

Contingency Theory suggests that the impact of organizational capabilities depends on contextual factors [14]. Firm size represents a structural contingency that influences resource availability, infrastructure investment, and bargaining power [14], [16], [17]. Larger firms may leverage logistics systems more effectively due to economies of scale and advanced coordination mechanisms. Conversely, smaller firms may experience diminishing returns due to resource constraints [17]. Therefore, the strength and direction of the relationship between logistics effectiveness and operational performance may vary across firm size.

H4a: Firm size moderates the relationship between logistics effectiveness and inventory turnover.
H4b: Firm size moderates the relationship between logistics effectiveness and time-based inventory efficiency.
H4c: Firm size moderates the relationship between logistics effectiveness and operating cost efficiency.

Based on the theoretical arguments derived from the Resource-Based View and Contingency Theory, this study proposes a conceptual framework linking logistics and supply chain system effectiveness to multidimensional operational performance. Firm size is incorporated as a moderating variable to capture contextual heterogeneity. The proposed research model is illustrated in Fig. 1.

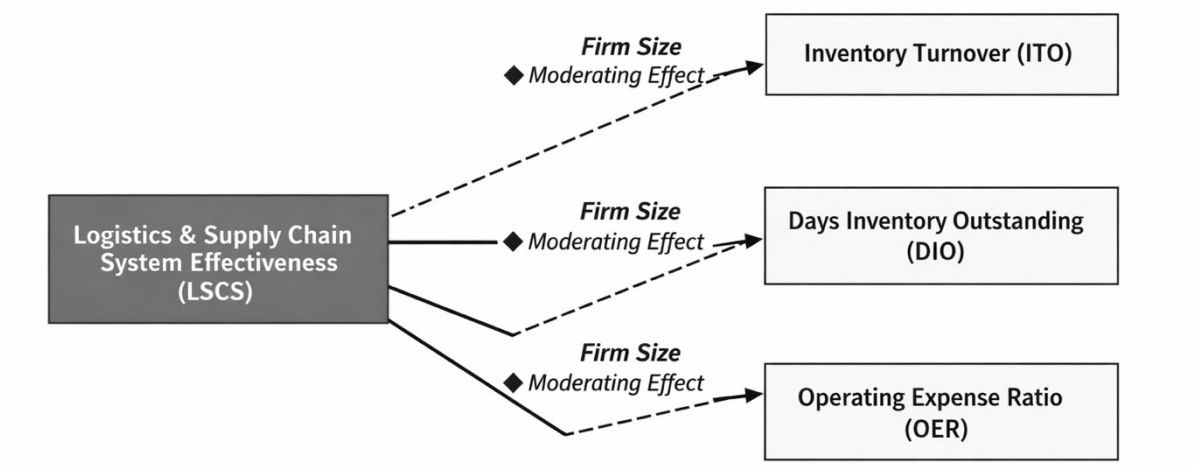

Fig. 1. Conceptual Model

2. Method

This study adopts a quantitative explanatory research design to examine the relationship between logistics and supply chain system effectiveness and operational performance, as well as the moderating role of firm size. The analysis is based on pooled firm-year observations of automotive manufacturing companies listed on the Indonesian Stock Exchange (IDX) over the period 2022–2024. Financial data are obtained from audited annual reports to ensure measurement reliability, objectivity, and consistency across firms.

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A purposive sampling technique is employed to ensure data completeness and comparability. Firms are included in the sample if they meet three criteria: (i) they operate within the automotive manufacturing or automotive component sector, (ii) they are continuously listed on the IDX during the observation period, and (iii) they publish complete audited financial statements for each year from 2022 to 2024. Based on these criteria, the final dataset consists of 24 firm-year observations. Although the sample size is relatively limited, the use of audited financial data enhances data reliability and reduces measurement bias. To provide a clear overview of the research procedure, Fig. 2 illustrates the methodological flow of this study, including data collection, variable construction, regression analysis, and robustness testing.

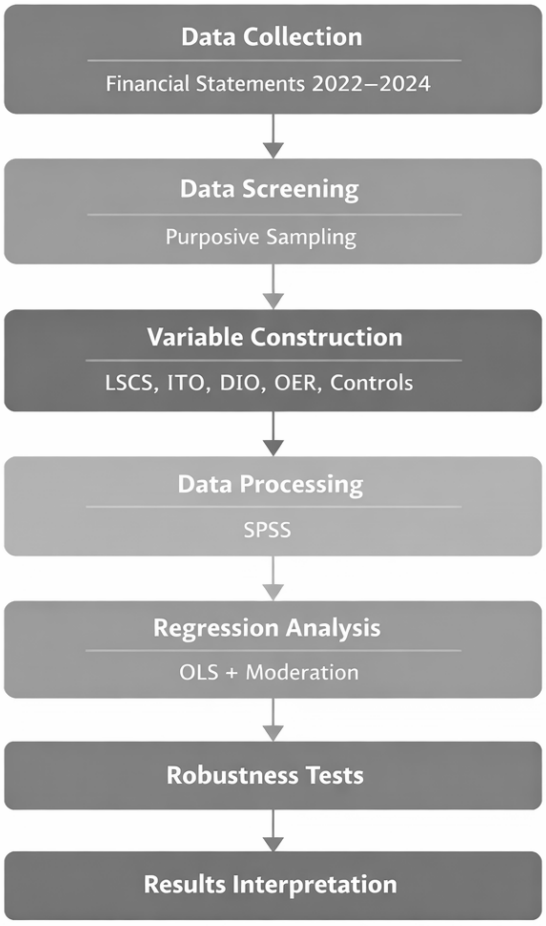

Fig. 2. Research Methodology Flowchart

2.1. Research Design

A quantitative explanatory research design is employed, utilizing pooled firm-year observations. The sample consists of automotive manufacturing companies listed on the Indonesian Stock Exchange during the period 2022–2024. Financial data are obtained from audited annual reports to ensure objectivity and reliability of measurement. A purposive sampling procedure is adopted to ensure data completeness and comparability across firms and years. Firms are included if they operate primarily in automotive manufacturing or component production and publish complete audited financial statements throughout the observation period. The final dataset comprises 24 firm-year observations. Given the study's objective of examining cross-sectional relationships between logistics effectiveness and operational performance, a pooled regression approach is deemed appropriate.

2.2. Variable Measurement

Logistics and supply chain system effectiveness is conceptualized as the firm's capability to manage inventory flows and operating costs in a coordinated and efficient manner. This construct is operationalized using objective financial ratios derived from audited financial statements. To avoid tautological estimation, when one efficiency indicator is specified as the dependent variable, the logistics effectiveness index is constructed from the remaining indicators. Operational performance is measured through three distinct dimensions: inventory turnover, time-based inventory efficiency, and operating cost efficiency. Each dimension is examined separately in order to assess the relative explanatory strength of logistics effectiveness across different operational outcomes. Firm size is measured as the natural logarithm of total assets. Logarithmic transformation reduces scale heterogeneity and improves distributional properties. Leverage and revenue growth are included as control variables to account for differences in financial structure and expansion dynamics that may influence operational efficiency. The operational definitions of the variables are presented in Table 1.

Table 1. Operational Definition of Variables

Variable	Conceptual Definition	Measurement	Key References
Logistics and Supply Chain System Effectiveness (LSCS)	A firm-specific operational capability reflecting the efficiency of inventory flow management and cost control within the supply chain system, consistent with RBV logic	Composite index derived from financial efficiency ratios (constructed from inventory-based indicators)	[3], [6], [12]
Inventory Turnover (ITO)	The efficiency with which a firm converts inventory into sales, indicating asset utilization performance	Cost of Goods Sold divided by Average Inventory	[1], [3],[12]
Days Inventory Outstanding (Reversed)	Time-based inventory efficiency reflecting the speed of inventory conversion; reversed to ensure directional consistency	Negative transformation of Days Inventory Outstanding	[2], [14], [15]
Operating Expense Ratio (Reversed)	Operational cost efficiency reflecting the proportion of operating costs relative to revenue; reversed to align higher values with higher efficiency	Negative transformation of Operating Expense Ratio (Operating Expenses / Revenue)	[3], [12]
Firm Size	Organisational scale representing structural resource availability and bargaining power	Natural logarithm of total assets	[15], [17]
Leverage	Financial structure reflecting the degree of debt financing and potential financial constraint	Total debt divided by total assets	[3], [12]
Revenue Growth	Expansion dynamics representing changes in operational scale and demand conditions	Annual percentage change in revenue	[11], [15]

2.3. Data Analysis Technique

Data analysis is conducted using the Statistical Package for the Social Sciences (SPSS). The analytical procedure begins with descriptive statistics to examine the central tendency and dispersion of the variables. Pearson correlation analysis is subsequently performed to assess preliminary relationships and identify potential multicollinearity concerns. Hypotheses are tested using multiple linear regression analysis. The baseline model evaluates the direct effect of logistics and supply chain system effectiveness on each operational performance indicator while controlling for leverage and revenue growth. To examine the moderating role of firm size, an interaction term between logistics effectiveness and firm size is incorporated into the regression Equation (1).

The empirical specification is expressed as:

$$Y = \beta_0 + \beta_1 LSCS + \beta_2 FirmSize + \beta_3 (LSCS \times FirmSize) + \beta_4 Controls + \varepsilon \quad (1)$$

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where Y represents each operational performance dimension analyzed separately. Classical regression assumptions are evaluated to ensure model validity. Normality of residuals is examined through graphical inspection and statistical testing. Multicollinearity is assessed using the Variance Inflation Factor (VIF). Heteroskedasticity is evaluated through residual diagnostics, and autocorrelation is examined using the Durbin–Watson statistic.

2.4. Robustness Tests

To enhance the credibility and stability of the empirical findings, several robustness checks are conducted. First, mean-centering is applied to the variables involved in the interaction term prior to estimating the moderation model. This procedure reduces multicollinearity between the main effects and the interaction term and allows more stable estimation of the moderating coefficient. Second, the regression models are re-estimated using heteroskedasticity-consistent standard errors to account for potential non-constant error variance. This adjustment ensures that statistical inference remains valid even if heteroskedasticity is present. Third, alternative model specifications are estimated by excluding control variables. This approach tests whether the main effects and moderation effects remain statistically significant in the absence of leverage and revenue growth controls. Fourth, sensitivity analysis is conducted by estimating the models separately for each operational performance indicator to assess whether logistics effectiveness exerts consistent or differentiated effects across performance dimensions. The consistency of coefficient signs, statistical significance, and explanatory power across these alternative specifications is used to evaluate the robustness of the main findings.

3. Results and Discussion

3.1. Descriptive Statistics and Correlation Analysis

Table 2 presents the descriptive statistics of the variables included in the analysis. Inventory turnover exhibits moderate dispersion across firms, indicating variation in inventory conversion efficiency within the automotive manufacturing sector. The reversed days inventory outstanding variable also demonstrates substantial variation, suggesting heterogeneity in time-based inventory management practices. In contrast, the reversed operating expense ratio shows relatively lower dispersion, implying that cost efficiency may be more structurally constrained across firms.

Table 2. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Inventory Turnover (ITO)	24	5.103	3.786	2.410	18.310
Days Inventory Outstanding (Reversed)	24	-91.968	35.390	-151.500	-19.940
Operating Expense Ratio (Reversed)	24	-0.099	0.019	-0.142	-0.076
Firm Size (ln Assets)	24	29.120	1.447	26.400	31.020
Leverage	24	0.407	0.141	0.170	0.610
Revenue Growth	24	0.017	0.045	-0.168	0.062

Firm size displays expected variation consistent with differences in organizational scale, while leverage and revenue growth reflect heterogeneous financial structures and growth trajectories among firms. Pearson correlation analysis indicates that logistics and supply chain system effectiveness is positively associated with inventory turnover and time-based inventory efficiency, consistent with the proposed hypotheses. Variance Inflation Factor (VIF) values remain below conventional thresholds, indicating no severe multicollinearity concerns.

3.2. Regression Results

Table 3 reports the regression results for the three operational performance dimensions. For inventory turnover, logistics and supply chain system effectiveness demonstrates a positive and

statistically significant coefficient. The model exhibits strong explanatory power, with a high adjusted R^2 value, indicating that logistics capability accounts for a substantial proportion of variation in inventory turnover. This finding supports the argument derived from the Resource-Based View that firm-specific logistics capabilities enhance asset utilization efficiency.

Similarly, the effect of logistics effectiveness on time-based inventory efficiency (reversed DIO) is statistically significant and economically meaningful. The explanatory power of the model is particularly strong in this dimension, suggesting that logistics capability is most directly manifested in inventory flow optimization. The magnitude and significance of the coefficient imply that firms with more effective logistics systems achieve faster inventory conversion cycles.

In contrast, the effect of logistics effectiveness on operating cost efficiency (reversed OER) is not statistically significant. Although the overall regression model remains significant, the coefficient associated with logistics effectiveness does not reach conventional significance levels. This indicates that while logistics capability strongly influences inventory-related performance, its impact on cost efficiency is less direct and potentially mediated by other structural or strategic factors.

Table 3. Regression Results for Inventory Turnover (ITO)

Variable	B	Std. Error	t-value	p-value
Constant	136.896	18.387	7.445	<0.001
LSCS Index	3.883	0.469	8.271	<0.001
Firm Size	-3.989	0.616	-6.470	<0.001
LSCS × Firm Size	-0.125	0.016	-7.852	<0.001
Leverage	-14.228	2.735	-5.202	<0.001
Revenue Growth	2.594	5.925	0.438	0.667

Model Summary:
$R^2 = 0.927$
Adjusted $R^2 = 0.907$
$F = 46.00$ ($p < 0.001$)
Durbin–Watson = within acceptable range

3.3. Moderation Analysis

The moderating role of firm size is examined through the inclusion of an interaction term between logistics effectiveness and firm size. The interaction coefficient is statistically significant in the models where inventory turnover and time-based inventory efficiency serve as dependent variables. This suggests that the strength of the relationship between logistics capability and inventory performance varies according to organizational scale. For inventory turnover, the interaction term indicates that the positive effect of logistics effectiveness is conditional upon firm size. Larger firms appear to leverage logistics systems more effectively, potentially due to economies of scale, bargaining power advantages, and more advanced coordination infrastructure in Table 4.

Table 4. Regression Results for Days Inventory Outstanding (Reversed)

Variable	B	Std. Error	t-value	p-value
Constant	1140.936	89.029	12.815	<0.001
LSCS Index	-459.754	39.138	-11.747	<0.001
Firm Size	-45.086	3.184	-14.160	<0.001
LSCS × Firm Size	16.757	1.390	12.058	<0.001
Leverage	69.681	11.979	5.817	<0.001
Revenue Growth	-31.015	32.367	-0.958	0.351

Model Summary:
$R^2 = 0.976$
Adjusted $R^2 = 0.969$
$F = 144.40$ ($p < 0.001$)

A similar moderating pattern is observed in the time-based inventory efficiency model. The amplification effect of firm size supports the logic of Contingency Theory, which posits that the effectiveness of organizational capabilities depends on structural alignment and contextual factors.

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However, the interaction term is not statistically significant in the operating cost efficiency model. This suggests that firm size does not meaningfully alter the relationship between logistics effectiveness and cost efficiency. Cost structures may be influenced by fixed overhead components, contractual obligations, or pricing strategies that are less directly responsive to logistics system optimization.

3.4. Robustness Tests

Several robustness checks were conducted to ensure the stability of the findings. First, mean-centering was applied to the variables involved in the interaction term. The significance and direction of the main and interaction effects remained consistent, indicating that multicollinearity did not distort the moderation results. Second, the regression models were re-estimated using heteroskedasticity-consistent standard errors. The key coefficients retained their statistical significance and directional consistency, confirming that the results are not driven by heteroskedastic variance in the error terms. Third, alternative model specifications excluding control variables were estimated. The core relationships between logistics effectiveness and inventory-based performance remained statistically significant, suggesting that the primary findings are not sensitive to model specification. Collectively, these robustness checks demonstrate that the results are stable across alternative estimation approaches in Table 5.

Table 5. Regression Results for Operating Expense Ratio (Reversed)

Variable	B	Std. Error	t-value	p-value
Constant	-0.210	0.178	-1.178	0.254
LSCS Index	-0.006	0.005	-1.250	0.227
Firm Size	0.004	0.006	0.719	0.481
LSCS × Firm Size	0.0002	0.000	1.339	0.197
Leverage	0.002	0.030	0.076	0.940
Revenue Growth	0.122	0.067	1.826	0.085

Model Summary:
$R^2 = 0.624$
Adjusted $R^2 = 0.520$
$F = 5.97$ ($p = 0.002$)

3.5. Discussion

The findings of this study demonstrate that logistics and supply chain system effectiveness functions as a strategic operational capability that primarily enhances inventory-based performance rather than cost efficiency, and that its impact is contingent upon firm size within the Indonesian automotive manufacturing context. This conclusion refines and integrates insights from the Resource-Based View (RBV) and Contingency Theory while situating the results within an emerging-market regulatory environment. The findings are consistent with prior studies indicating that supply chain effectiveness plays a central role in improving operational and financial performance in the automotive sector [3], [4], [11].

From a Resource-Based View perspective, the significant positive effects on inventory turnover and time-based inventory efficiency confirm that logistics systems constitute valuable and performance-enhancing capabilities [18], [19]. RBV posits that firm-specific resources generate competitive advantage when they improve the efficiency with which assets are deployed. In this study, logistics effectiveness increases asset velocity by accelerating material flows and reducing idle inventory, thereby enhancing working capital efficiency. This mechanism is consistent with empirical evidence linking shorter cash conversion cycles and improved inventory turnover to stronger financial outcomes [2], [7], [19]. Furthermore, recent studies highlight that effective inventory management and supply chain integration significantly improve operational efficiency and financial performance [12], [13], [17].

The findings also align with research demonstrating that supply chain complexity and coordination mechanisms influence inventory performance outcomes [1], [20]. Similarly, Pan et al. [6] show that management accounting practices enhance inventory efficiency through improved

decision-making and process alignment. The present findings extend this literature by demonstrating that the explanatory strength of logistics capability is particularly pronounced in time-based inventory optimization, suggesting that capability-driven performance gains operate primarily through flow synchronization rather than accounting-based profitability adjustments. The relatively high R^2 values observed, particularly in the time-based inventory model, are theoretically expected due to the use of structurally interrelated financial ratios that capture closely aligned operational efficiency dimensions. This strengthens the internal consistency of the model rather than indicating model overfitting.

The absence of a significant effect on operating cost efficiency further clarifies the boundary conditions of logistics capability. While RBV suggests that capabilities enhance performance, it does not imply uniform impact across all dimensions [18], [19]. Operating cost structures are influenced by fixed overheads, regulatory compliance costs, labour agreements, and capital intensity, factors that may not be directly responsive to logistics improvements. This finding is consistent with prior evidence showing that improvements in operational efficiency do not always translate into cost reductions due to structural constraints in supply chain systems [4], [21], [22]. In automotive supply chains, efficiency improvements are often associated with service level and responsiveness trade-offs rather than immediate cost minimization [1], [23], [24]. Thus, the study refines RBV by demonstrating that capability effects are domain-specific and operationally mediated.

In addition to aligning with prior empirical findings, the methodological approach adopted in this study provides a distinct contribution compared to previous research. While many studies in supply chain management employ perceptual survey-based methods or structural equation modelling to capture logistics capability [10], [11], the present study adopts a finance-based regression approach using objective financial ratios derived from audited statements. This approach reduces common method bias and enhances measurement reliability. Moreover, unlike studies that utilize advanced panel techniques such as fixed effects or system GMM to address dynamic relationships [25], this study employs pooled ordinary least squares (OLS) regression to focus on cross-sectional variation in operational efficiency. Compared to data envelopment analysis (DEA) approaches used in efficiency studies [22], the regression-based approach allows for direct hypothesis testing and examination of moderating effects. Therefore, the present study complements prior methodologies by providing a more transparent and interpretable framework for analyzing the capability–performance relationship.

The moderation results provide strong support for Contingency Theory by showing that firm size conditions the strength of the logistics–performance relationship in inventory dimensions. Contingency Theory suggests that organizational performance depends on the alignment between internal capabilities and contextual factors [26], [27]. Larger firms possess economies of scale, stronger bargaining power, and more advanced supply chain integration capabilities, which enhance their ability to leverage logistics systems effectively [28], [29]. These findings are consistent with Zhu and Liu [14], who show that firm size moderates the relationship between inventory flexibility and performance, as well as with studies highlighting the role of supply chain integration and coordination in improving operational outcomes [30], [31]. However, firm size does not moderate cost efficiency, suggesting that cost structures are less sensitive to scale advantages and more influenced by structural and regulatory constraints.

The Indonesian institutional context further explains the magnitude and pattern of these results. The automotive sector operates under government policies promoting local content requirements (TKDN), industrial down streaming, and electric vehicle development. These policies increase supply chain complexity and require firms to coordinate multi-tier supplier networks [1], [32]. Additionally, Indonesia's geographical fragmentation and infrastructure disparities create logistical challenges that amplify the importance of supply chain coordination and integration [33], [34]. Empirical evidence from Indonesian automotive firms shows that supply chain management practices and inter-organizational collaboration significantly influence operational efficiency [1], [35]. Compared with developed economies, where supply chains are more integrated and infrastructure is more advanced, logistics capability in Indonesia plays a more critical role in mitigating structural inefficiencies.

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Taken together, these findings contribute theoretically by integrating RBV and Contingency Theory within a finance-based empirical framework. The study advances RBV by demonstrating that logistics capability enhances operational performance primarily through inventory optimization mechanisms rather than universal cost efficiency. It strengthens Contingency Theory by empirically showing that organizational scale conditions capability effectiveness. Furthermore, by incorporating institutional and infrastructural characteristics of Indonesia, the study contributes contextual evidence to the logistics and supply chain management literature.

From a managerial standpoint, the results imply that investments in logistics systems are most likely to yield measurable gains through accelerated inventory turnover and reduced holding periods rather than immediate cost reduction. Firms operating within Indonesia's automotive ecosystem should priorities supply chain integration, digital coordination systems, and working capital optimization strategies aligned with regulatory requirements. Larger firms may leverage scale advantages to maximize logistics capability benefits, whereas smaller firms may require collaborative supply chain strategies to achieve comparable efficiency improvements.

4. Conclusion

This study examined the extent to which logistics and supply chain system effectiveness enhances operational performance in Indonesian automotive manufacturing firms and whether this relationship is contingent upon firm size within a regulated emerging-market environment. By integrating the Resource-Based View and Contingency Theory and employing objective financial indicators derived from audited statements, the study provides structured empirical evidence on the domain-specific and context-dependent nature of logistics capability. The findings demonstrate that logistics and supply chain system effectiveness significantly improve inventory turnover and time-based inventory efficiency, but does not exert a statistically significant influence on operating cost efficiency. These results indicate that logistics capability enhances performance primarily through inventory flow optimization rather than structural cost compression. Moreover, firm size significantly moderates the relationship between logistics effectiveness and inventory-based performance, confirming that the value of organizational capabilities depends on structural alignment and scale-related advantages. However, firm size does not moderate cost efficiency, suggesting that cost architecture is shaped by broader structural and regulatory constraints.

The novelty of this study lies in three areas. First, it operationalizes logistics effectiveness using finance-based efficiency indicators rather than perceptual measures, thereby addressing methodological limitations in prior research. Second, it demonstrates that capability-driven performance effects are dimension-specific, offering a refined explanation of how logistics systems influence operational outcomes. Third, it incorporates institutional and regulatory context into the capability–performance framework, showing that the Indonesian industrial environment amplifies the strategic relevance of logistics capability. Beyond theoretical advancement, the findings carry policy implications. In Indonesia, government policies promoting local content requirements (TKDN), industrial down streaming, and electric vehicle development increase supply chain coordination complexity. The evidence suggests that regulatory initiatives aimed at strengthening domestic manufacturing should be accompanied by investments in logistics infrastructure, digital supply chain integration, and inter-island transportation efficiency. Public policy that enhances port connectivity, digital customs procedures, and industrial logistics corridors may further strengthen the operational gains derived from firm-level logistics capability.

From an academic perspective, the study encourages a shift from broad performance generalizations towards dimension-specific capability analysis. Future research should continue integrating finance-based indicators with organizational and institutional variables to deepen understanding of operational capability mechanisms. The findings also support further theoretical integration between RBV and Contingency Theory in operations and supply chain research. Several limitations should be acknowledged. The sample is restricted to a relatively small number of listed automotive manufacturing firms over a three-year period, which may limit generalizability and reduce statistical power. The operationalization of logistics effectiveness relies on financial ratios

and may not fully capture qualitative aspects of logistics capability such as digital maturity or supplier collaboration depth. Additionally, the pooled regression approach does not account for potential endogeneity or dynamic adjustment effects.

Future research may address these limitations by expanding the sample across multiple industries or emerging economies, extending the observation period, and employing panel econometric techniques such as fixed effects or system GMM to mitigate endogeneity concerns. Further studies may also incorporate additional contextual variables, including regulatory intensity, digital infrastructure readiness, or supply chain resilience measures, to better capture the institutional dimensions of logistics capability. In conclusion, this study demonstrates that logistics and supply chain system effectiveness constitute a strategically significant operational capability in the Indonesian automotive sector. Its performance impact is primarily manifested through inventory optimization and is contingent upon organizational scale and institutional context. By clarifying the mechanisms, boundary conditions, and policy implications of logistics capability, the study contributes to a more contextually grounded and theoretically integrated understanding of operational performance in emerging markets.

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