

Exploring the Role of Logistics in Enhancing Supply Chain Management Value

¹Daniel Opoku-Akyea | ²Robert Tay | ³Lord Emmanuel Yamoah

¹*ORCID: <https://orcid.org/0000-0009-0674-4063>

²*ORCID: <https://orcid.org/0009-0002-6680-7379>

³*ORCID: <https://orcid.org/0009-0001-8684-3038>

¹Lecturer, Ghana Communication Technology University

²Deputy Director (Head) Procurement & Stores. (DVLA, Ghana)

³Lecturer, Takoradi Technical University,

*Correspondence: Lord Emmanuel Yamoah, email: lord.yamoah@ttu.edu.gh

Abstract

This study investigates the critical role logistics plays in enhancing the overall value of supply chain management (SCM), with a focus on key logistics functions such as transportation, warehousing, order processing, and information flow. In the face of increasing global competition and evolving customer expectations, organisations are under pressure to deliver supply chain value in terms of cost efficiency, responsiveness, customer satisfaction, and sustainability. A mixed-methods approach was employed, involving the administration of structured questionnaires to 115 logistics and supply chain professionals, as well as semi-structured interviews with key industry stakeholders. Quantitative data were analysed using descriptive statistics, Pearson correlation, and regression analysis, while qualitative insights were examined through thematic content analysis.

Findings revealed that logistics performance has a strong and statistically significant positive correlation with SCM value ($r = 0.742$, $p < 0.01$). Transportation emerged as the most influential logistics function, followed by warehousing and order processing. While logistics contributes notably to cost efficiency and customer satisfaction, its impact on sustainability and innovation remains limited. Qualitative data highlighted key challenges, including poor infrastructure, limited technological adoption, and skill gaps in logistics operations. The study concludes that logistics is not only an operational necessity but also a strategic enabler of value in modern supply chains. It recommends targeted investments in logistics technology, infrastructure, and workforce development, alongside policy reforms to strengthen logistics ecosystems.

Keywords: Logistics, Supply Chain Management, Transportation, SCM Value, Warehousing, Logistics Performance, Reverse Logistics

Citation: Opoku-Akyea, D., Tay, R., & Yamoah, L. E. (2025), "Exploring the Role of Logistics in Enhancing Supply Chain Management Value", African Journal of Procurement, Logistics & Supply Chain Management Society 2025, 8(4): pp.15-24, DOI: <https://dx.doi.org/10.4314/ajplscm.v8i4.2>

Submitted: 25 February, 2024 | Accepted: 10 March, 2025 | Published: 28 May, 2025

1.0 INTRODUCTION

In today's globalised and highly competitive business environment, effective supply chain management (SCM) has become a critical tool for achieving operational efficiency, enhancing customer service, and gaining a competitive advantage (Christopher, 2016). Among the integral components of SCM is logistics, which plays a pivotal role in coordinating and moving goods,

services, and information across the supply chain. Logistics refers to the processes involved in planning, implementing, and controlling the efficient and cost-effective flow and storage of goods and materials from the point of origin to the point of consumption (Ballou, 2007). It encompasses various functions, including transportation, warehousing, inventory management, order processing, and distribution, all of which are vital for ensuring that products reach consumers in a timely and cost-effective manner (Rushton, Croucher, & Baker, 2017).

The value generated by supply chains is increasingly being measured not only by cost savings but also by the ability to meet customer expectations, reduce lead times, and adapt to market changes. Logistics significantly contributes to these outcomes by integrating and streamlining supply chain operations (Mentzer et al., 2001). Moreover, advancements in information technology, globalisation, and the rise of e-commerce have heightened the strategic importance of logistics in creating supply chain value (Langley et al., 2009).

Despite this, logistics systems are often under-optimised, especially in developing economies where infrastructural deficiencies, poor coordination, and limited use of technology can limit performance (Rodrigue, Comtois, & Slack, 2016). Therefore, a deeper exploration into how logistics can be effectively leveraged to enhance supply chain value is both necessary and timely.

The growing complexities of global commerce, consumer expectations, and technological innovations have transformed the landscape of supply chain management (SCM). Within this transformation, logistics has emerged as a vital function that can either propel or hinder supply chain performance. Logistics, which encompasses transportation, warehousing, inventory control, and distribution, is now recognised as more than a tactical necessity; it is a strategic driver of value in modern supply chains (Christopher, 2016; Rushton, Croucher, & Baker, 2017). When effectively managed, logistics contributes to improved efficiency, reduced costs, and enhanced customer satisfaction. However, in many organisations, logistics continues to be underutilised or poorly integrated within broader supply chain strategies, leading to systemic inefficiencies.

Several scholars have highlighted the positive contributions of logistics to supply chain value. For example, Mentzer et al. (2001) argue that logistics integration fosters supply chain visibility, responsiveness, and customer alignment, which are critical for value creation. Similarly, Ballou (2007) emphasises the role of logistics in mitigating operational bottlenecks and facilitating lean supply chains. These authors advocate for a strategic view of logistics as a core component of competitive advantage.

On the other hand, some researchers have critiqued the practical challenges and limitations of logistics in enhancing supply chain value, especially in developing regions. For instance, Rodrigue, Comtois, and Slack (2016) highlight infrastructural deficits, regulatory inefficiencies, and limited technological adoption as significant barriers to progress. They argue that, despite their theoretical potential, the real-world implementation of advanced logistics systems is hindered by socioeconomic and policy-related constraints. Grant, Trautrim, and Wong (2017) similarly caution that over-reliance on logistics technology without aligning with local capabilities can result in cost overruns and operational inefficiencies.

Neutral scholars such as Langley et al. (2009) take a more balanced stance. They acknowledge both the opportunities and constraints of logistics in SCM, noting that its effectiveness is contingent mainly upon context, industry type, geographic scope, infrastructure, and the maturity of supply chain systems. Their work emphasises that while logistics can be a value enabler, it is not a one-size-fits-all solution; instead, it must be tailored to the specific needs of the supply chain.

Despite this diversity of perspectives, a significant knowledge gap persists. Much of the existing literature tends to focus on developed economies or large multinational corporations, where logistics systems are well-developed and technologically advanced (Christopher & Peck, 2004). There is a lack of context-specific research examining how logistics contribute to supply

chain value in small- to medium-sized enterprises (SMEs) or in emerging economies, where infrastructure, policy frameworks, and resource availability differ markedly.

Additionally, while several studies emphasise cost-efficiency and speed as logistics outcomes, fewer have holistically examined how logistics contributes to broader dimensions of supply chain value, such as sustainability, agility, resilience, and innovation. The integration between logistics functions and digital technologies (e.g., AI, IoT, blockchain) also remains underexplored in many industry settings. Furthermore, there is limited empirical work evaluating the performance metrics used to measure logistics' contribution to supply chain value, leading to inconsistencies in strategic decision-making (Grant et al., 2017).

Therefore, this study aims to fill these gaps by exploring logistics from both operational and strategic value driver perspectives within the context of supply chain management. It aims to evaluate the enablers and barriers to logistics optimisation, considering diverse perspectives and contextual realities. This will provide a more nuanced understanding of how logistics contributes to supply chain value in both favourable and constrained environments.

2.0 LITERATURE REVIEW

This chapter presents a structured review of relevant literature to provide a foundation for the study. It examines existing concepts, theories, and empirical findings related to logistics and its impact on supply chain management (SCM) value. The chapter is organised into four key sections: conceptual literature review, theoretical review, empirical review, and the conceptual framework.

2.1 Conceptual Literature Review

2.1.1 Logistics in Supply Chain Management

Logistics is a vital component of supply chain management that involves planning, executing, and controlling the movement and storage of goods, services, and related information from the point of origin to the point of consumption (Ballou, 2007). Within the supply chain, logistics supports various functions, including procurement, inventory management, warehousing, transportation, and distribution. Efficient logistics systems enable organisations to achieve lower operational costs, timely delivery, and customer satisfaction (Rushton, Croucher, & Baker, 2017).

2.1.2 Supply Chain Value

Supply chain value refers to the benefits derived from the efficient coordination and integration of all supply chain activities, including procurement, production, logistics, and customer service. Value can be measured through various outcomes such as cost reduction, responsiveness, flexibility, customer satisfaction, and sustainability (Christopher, 2016). Logistics contributes to this value by ensuring efficient material flow, reducing lead times, and supporting strategic decisions such as network optimisation and outsourcing.

2.1.3 Logistics as a Value Enabler

Logistics has evolved from a cost-focused operational activity to a strategic function that can provide firms with a competitive advantage. Mentzer et al. (2001) argue that logistics enhances value through integration, visibility, and improved information flow across the supply chain. In the context of globalisation and digitalisation, logistics is also playing a crucial role in enabling firms to respond to dynamic market demands (Langley et al., 2009).

2.2 Theoretical Review

To understand the strategic role of logistics in enhancing supply chain value, several theories are applicable:

2.2.1 Resource-Based View (RBV)

The RBV (Barney, 1991) posits that firms achieve sustainable competitive advantage by possessing valuable, rare, inimitable, and non-substitutable (VRIN) resources. Logistics capabilities, including efficient distribution systems, real-time tracking, and skilled personnel, are considered strategic resources that can create significant value.

2.2.2 Porter's Value Chain Theory

Porter (1985) highlights logistics as a primary activity in the value chain. Inbound and outbound logistics activities directly contribute to creating value through efficient resource movement and timely product delivery.

2.2.3 Transaction Cost Economics (TCE)

TCE (Williamson, 1981) argues that firms aim to minimise transaction costs when coordinating activities. Effective logistics systems reduce transaction costs by enhancing coordination, mitigating uncertainty, and improving operational efficiency.

2.2.4 Systems Theory

Systems theory views the supply chain as a dynamic system where logistics acts as a subsystem that connects and synchronises other parts of the value chain. A breakdown in logistics disrupts the entire system, emphasising its integral role in value creation (Bertalanffy, 1968).

2.3 Empirical Review

Numerous empirical studies have investigated the relationship between logistics performance and supply chain value:

2.3.1 Positive Empirical Evidence

Green et al. (2008) found that improvements in logistics capabilities (such as transportation, warehousing, and IT) have a direct positive impact on overall firm performance. Agyabeng-Mensah et al. (2019) showed that logistics integration and IT adoption enhance supply chain responsiveness and customer satisfaction. Al-Balwy (2020), in a case study of Almarai Company (Saudi Arabia), confirmed that efficient logistics operations significantly contributed to the overall effectiveness of the supply chain.

2.3.2 Negative or Critical Views

Rodrigue et al. (2016) argued that in many developing countries, poor infrastructure, inadequate investment, and policy constraints hinder the positive impact of logistics on supply chains. Grant et al. (2017) cautioned that misaligned logistics strategies and insufficient technological adoption can increase costs rather than create value, particularly in volatile markets.

2.3.3 Neutral Perspectives

Langley et al. (2009) observed that the impact of logistics on supply chain value is context-dependent. They emphasise that logistics benefits vary based on industry, geography, and organisational maturity.

2.3.4 Recent Trends and Gaps

Chinomona (2021) examined green logistics and found limited implementation in African contexts, highlighting a gap in integrating sustainability within logistics. Chen et al. (2023) emphasised the role of digital technologies in logistics transformation but noted that empirical studies on implementation challenges remain limited, especially in emerging markets.

3.0 METHODOLOGY

This chapter outlines the research design, methodology, and procedures that will be employed in conducting the study. It describes the population, sampling techniques, data collection instruments, methods of data analysis, and ethical considerations. The purpose is to ensure that the research is systematic, reliable, and valid in investigating the role of logistics in enhancing the value of supply chain management (SCM).

3.1 Research Design

This study adopts a descriptive and exploratory research design. A descriptive approach is used to systematically capture and describe the logistics functions and their relationship with SCM value. At the same time, an exploratory dimension is employed to uncover the underlying challenges and contextual factors that affect logistics efficiency. The research will use a mixed-methods approach, combining both quantitative (e.g., structured questionnaires) and qualitative (e.g., interviews) techniques. This allows for a more comprehensive understanding of the phenomenon under investigation.

3.2 Population of the Study

The target population consists of supply chain and logistics professionals working in medium to large-scale manufacturing and distribution companies. The study also considers relevant staff from logistics service providers (LSPs) and government regulatory agencies involved in transportation and trade.

The study will use stratified random sampling to ensure fair representation from manufacturing companies, logistics service providers, and government agencies. Within each stratum, simple random sampling will be used to select respondents. For qualitative interviews, purposive sampling will be employed to select experienced logistics and supply chain management (SCM) managers.

3.3. Data Collection Methods

Administered to logistics and SCM professionals to gather data on logistics functions, performance indicators, and perceived value. Conducted with key stakeholders to obtain in-depth insights into logistics strategies, challenges, and contextual factors. The primary research instrument is a structured questionnaire divided into four sections: Demographics, Logistics functions (transportation, warehousing, order processing, etc.), Indicators of SCM value (cost, responsiveness, customer satisfaction, etc.) and Barriers and enablers (technology, infrastructure, regulation) Responses will be measured using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Interview questions will be open-ended and designed to explore participants' experiences and perspectives on logistics and SCM value.

3.4 Validity and Reliability

Content validity will be ensured by aligning questionnaire items with constructs drawn from the literature and having experts review the instrument. A pilot study will be conducted using 10% of the sample. Cronbach's Alpha will be used to assess internal consistency, with a threshold of 0.7 or higher indicating acceptable reliability.

4.0 DATA ANALYSIS

This chapter presents, analyses, and interprets the findings of the study on the role of logistics in enhancing supply chain management (SCM) value. The chapter is structured to present descriptive and inferential statistical analyses from questionnaire responses, along with thematic insights derived from interviews. The results are aligned with the study's objectives and research questions.

4.1 Response Rate

Out of 133 questionnaires distributed, 120 were returned, of which 115 were found valid for analysis, representing an 86.5% response rate. This high response rate ensures the reliability and generalizability of the findings.

4.2 Demographic Characteristics of Respondents

The demographic profile indicates a well-educated and experienced respondent base, which is suitable for concluding logistics and SCM issues.

Variable	Category	Frequency	Percentage (%)
Gender	Male	75	65.2
	Female	40	34.8
Age	18–25	20	17.4
	26–35	45	39.1
	36–45	30	26.1
	46 and above	20	17.4
Education Level	Diploma	25	21.7
	Bachelor's Degree	60	52.2
	Master's/PhD	30	26.1
Work Experience (Years)	Less than 5	30	26.1
	5–10	50	43.5
	Above 10	35	30.4

A majority of respondents (65.2%) are male, indicating a gender imbalance, although females are also significantly represented. The largest age group (39.1%) is 26–35 years, indicating a relatively young and active workforce in logistics and SCM. Most respondents (52.2%) hold a Bachelor's degree, reflecting a well-educated sample. The highest proportion (43.5%) has 5–10 years of work experience, suggesting they possess practical knowledge of logistics operations.

4.3 Descriptive Analysis of Key Logistics Functions

Respondents were asked to rate key logistics functions on a 5-point Likert scale. The mean scores indicate their perceived importance and performance.

Logistics Function	Mean Score	Interpretation
Transportation Efficiency	4.35	Very High
Warehousing & Inventory Mgmt	4.10	High
Order Processing	3.85	Moderate to High
Information Flow	4.05	High
Reverse Logistics	3.65	Moderate

Transportation and information flow are the most valued logistics components contributing to SCM value. Reverse logistics, though recognised, lags, possibly due to low implementation. Transportation Efficiency (4.35) is considered the most critical logistics function, reinforcing its importance in supply chain reliability and speed. Information Flow (4.05) and Warehousing (4.10) are also highly valued, underscoring their crucial role in enhancing product visibility and effective inventory control. Order Processing (3.85) is effective but shows room for improvement. Reverse Logistics (3.65) is rated lowest, suggesting it is either underdeveloped or not prioritised in current logistics strategies.

4.4 Perceived Impact of Logistics on SCM Value

Respondents rated logistics' impact on several supply chain value metrics:

SCM Value Indicator	Mean Score	Interpretation
Cost Efficiency	4.25	High
Customer Satisfaction	4.15	High
Flexibility/Responsiveness	3.90	Moderate to High
Sustainability	3.50	Moderate
Innovation	3.75	Moderate

Logistics strongly contributes to cost efficiency and customer satisfaction, but its role in sustainability and innovation is underleveraged. Logistics plays a significant role in contributing to cost efficiency and customer satisfaction, which are key indicators of operational performance. Flexibility and responsiveness (3.90) are pretty strong, indicating logistics supports agile supply chain responses. Sustainability (3.50) and Innovation (3.75) are moderate, revealing underutilisation of logistics in these strategic areas, possibly due to a lack of investment or awareness.

4.4.1 Correlation Analysis

A Pearson correlation analysis was conducted to examine the relationship between logistics performance and SCM value:

Variables	Correlation Coefficient (r)	Significance (p-value)
Logistics Performance & SCM Value	0.742	p < 0.01

A strong and statistically significant positive correlation exists between logistics performance and SCM value. As logistics efficiency improves, so does the overall value of the supply chain.

4.4.2 Regression Analysis

A linear regression was conducted to predict SCM value based on logistics functions. $R^2 = 0.612$ – Logistics functions explain 61.2% of the variance in SCM value. $F(4, 110) = 28.43$, $p < 0.001$ – Model is statistically significant.

Variable	B (Unstandardized Coeff.)	t-Value	Significance (p)
Transportation	0.430	5.12	0.000
Warehousing	0.285	3.84	0.001
Order Processing	0.198	2.50	0.014
Reverse Logistics	0.155	2.01	0.046

All central logistics functions significantly and positively predict SCM value, with transportation having the highest impact.

Semi-structured interviews were conducted with 10 logistics and supply chain managers. Key themes emerged: Respondents emphasised that the use of ERP systems, GPS tracking, and warehouse automation significantly improves logistics visibility and decision-making.

Theme 2: Barriers to Logistics Optimisation

Frequent issues include poor infrastructure, fluctuating fuel prices, and regulatory delays (e.g., customs).

Theme 3: Skill Gaps and Training Needs

Many noted a shortage of skilled professionals capable of handling digital tools and supply chain analytics.

5.0 CONCLUSION

This chapter provides a summary of the research findings, draws conclusions based on the study's objectives, and offers recommendations for practitioners and policymakers. It also presents suggestions for further research to address emerging gaps uncovered during the study.

5.1 Summary of Findings

The study aimed to explore the role of logistics in enhancing the value of supply chain management (SCM), focusing on the effectiveness of logistics functions and their contribution to supply chain outcomes. Data were collected from 115 respondents, including logistics professionals, supply chain managers, and policymakers.

Logistics as a Value Driver: Transportation, warehousing, inventory control, and order fulfilment were identified as the primary logistics functions that contribute to SCM value. Transportation ranked highest in importance and performance, underscoring its crucial role in reducing delivery times and operational costs.

Impact on SCM Value Dimensions: The study found that logistics makes a substantial contribution to cost efficiency and customer satisfaction, while having a moderate effect on flexibility, innovation, and sustainability. This suggests that while logistics enhances operational performance, its strategic potential in driving innovation and green practices remains underutilised.

Statistical Evidence: The Pearson correlation analysis revealed a strong positive relationship ($r = 0.742$, $p < 0.01$) between logistics performance and SCM value. Regression analysis further confirmed that all central logistics functions significantly predict SCM value, with transportation having the most significant impact ($\beta = 0.430$, $p < 0.001$).

Qualitative Insights: Interviews revealed that infrastructure challenges, technological limitations, and skill gaps hinder the optimisation of logistics. Managers emphasised the need for real-time information systems, improved transportation networks, and investment in workforce development.

5.2 Conclusion

The study concludes that logistics plays a pivotal role in enhancing the value of supply chain management, particularly through improved transportation, warehousing, and information flow. Efficient logistics operations directly enhance cost performance, responsiveness, and customer satisfaction—key competitive factors in today's supply chains. However, areas such as reverse logistics, environmental sustainability, and technology adoption remain inadequately addressed. The study reinforces the need to treat logistics not just as an operational function, but as a strategic tool for delivering long-term value in the supply chain.

5.3 Recommendations

Based on the findings, the following recommendations are made: Organisations should adopt fleet management systems and route optimisation technologies to reduce transit times and costs. Automation, inventory tracking, and demand forecasting tools should be integrated to improve inventory accuracy and fulfilment speed. Establish structured systems for product returns, recycling, and waste management to improve sustainability performance. Provide

continuous training for logistics and supply chain staff in digital tools, analytics, and sustainable practices.

Governments should invest in roads, ports, and railways to support efficient logistics across regions, thereby enhancing regional connectivity. Simplify customs procedures and reduce bureaucratic bottlenecks to enhance cross-border logistics performance. Provide tax incentives or funding for firms that adopt logistics technologies, especially small and medium-sized enterprises (SMEs) in developing regions.

5.4 contributions to Knowledge

This study contributes to existing literature by:

- Providing empirical evidence from a developing context, addressing the research gap identified in prior studies (Rodrigue et al., 2016).
- Highlighting the strategic importance of transportation and warehousing in enhancing SCM value.
- Revealing the disconnect between logistics operations and sustainability practices, calling for integrative approaches in future logistics planning.

5.5 Suggestions for Further Research

Future studies could explore:

- Sector-specific logistics challenges in industries like agriculture, pharmaceuticals, or e-commerce.
- The role of emerging technologies (e.g., blockchain, AI) in transforming logistics and SCM value.
- Comparative studies between developed and developing economies on logistics infrastructure and efficiency.
- Longitudinal studies to track the evolving role of reverse logistics and sustainability integration.

References

Ackah, D., Dadzie. B., E., Yornu, K. I., (2025), "The Role of Corporate Governance in Strengthening Competitive Advantage through Strategic Project Procurement", Dama Academic Scholarly & Scientific Research Society 2025, 10(01): pp.58-81, DOI: <https://dx.doi.org/10.4314/dasjr.v10i1.3>

Ackah, D., Ofori., I., (2025), "The Influence of Green Logistics and Food Distribution Strategy on Post-Harvest Loss Reduction", African Journal of Procurement, Logistics & Supply Chain Management Society 2025, 7(9): pp.01-17, DOI: <https://dx.doi.org/10.4314/ajplscm.v8i1.1>

Al-Balwy, M. A. (2020). The role of logistics in achieving supply chain performance: A case study of Almarai company in Saudi Arabia. *International Journal of Supply Chain Management*, 9(4), 287–295.

Ackah, D., Addo, K. S., K., Yornu, K. I., (2025), "Analysing the Connection Between Motivation, Compensation, and Employee Job Satisfaction", Dama Academic Scholarly & Scientific Research Society 2025, 10(01): pp.01-31, DOI: <https://dx.doi.org/10.4314/dasjr.v10i1.1>

Ackah, D., Addo, K. S., K., Yornu, K. I., (2025), "Analyzing the Impact of Green Procurement on Inexpensive Advantage and Business Performance", Dama Academic Scholarly & Scientific Research Society 2025, 10(01): pp.32-57, DOI: <https://dx.doi.org/10.4314/dasjr.v10i1.2>

Ackah, D., Ofori, I., Amponsah., R., (2025), "Resource Capabilities as a Moderator: Impact of Procurement Practices on Project Performance and Competitive Advantage", *Project Management Scientific Journal*, 2024, 8(9): pp.158-188. DOI: <https://dx.doi.org/10.4314/pmsj.v8i1.6>

Agyabeng-Mensah, Y., Ahenkorah, E., & Afum, E. (2019). Examining the relationship between green supply chain management and performance of manufacturing SMEs: The moderating role of firm age and size. *Journal of Manufacturing Technology Management*, 30(3), 560–580. <https://doi.org/10.1108/JMTM-11-2017-0249>

Ballou, R. H. (2007). *Business logistics/supply chain management: Planning, organising, and controlling the supply chain* (5th ed.). Pearson Education.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>

Bertalanffy, L. V. (1968). *General system theory: Foundations, development, applications*. George Braziller.

Chen, Y., Lin, Y., & Wang, H. (2023). Digital supply chains: A review and implications for future research. *Journal of Business Logistics*, 44(1), 15–37. <https://doi.org/10.1111/jbl.12310>

Chinomona, R. (2021). The mediating role of logistics performance on the relationship between logistics resources and firm performance in Sub-Saharan Africa. *Journal of Contemporary Management*, 18(1), 45–61.

Christopher, M. (2016). *Logistics & supply chain management* (5th ed.). Pearson Education.

Grant, D. B., Trautrim, A., & Wong, C. Y. (2017). *Sustainable logistics and supply chain management: Principles and practices for sustainable operations and management*. Kogan Page.

Green, K. W., McGaughey, R. E., & Whitten, D. (2008). The impact of logistics performance on organisational performance in a supply chain context. *Supply Chain Management: An International Journal*, 13(4), 317–327. <https://doi.org/10.1108/13598540810882206>

Langley, C. J., Coyle, J. J., Gibson, B. J., Novack, R. A., & Bardi, E. J. (2009). *Managing supply chains: A logistics approach* (8th ed.). South-Western Cengage Learning.

Mentzer, J. T., Min, S., & Bobbitt, L. M. (2001). Toward a unified theory of logistics. *International Journal of Physical Distribution & Logistics Management*, 31(1), 15–31. <https://doi.org/10.1108/09600030110381900>

Rodrigue, J.-P., Comtois, C., & Slack, B. (2016). *The geography of transport systems* (4th ed.). Routledge. <https://doi.org/10.4324/9781315618159>

Williamson, O. E. (1981). The Economics of Organisation: The Transaction Cost Approach. *American Journal of Sociology*, 87(3), 548–577. <https://doi.org/10.1086/227496>

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.