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"Transportation costs are particularly high, representing a significant portion of logistics costs alongside warehousing, Cambodia's Regional Connectivity, Unlocking the full Potential of Transport Corridor"

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ABSTRACT

Cambodia's logistics sector continues to face significant cost pressures, with transportation and warehousing accounting for a large share of total logistics expenses. Despite ongoing investments in transport corridors and regional connectivity initiatives, logistics costs in Cambodia remain higher than those of neighboring countries, reducing the competitiveness of domestic exporters and limiting integration into regional value chains. This study examines the underlying drivers of high transportation and warehousing costs, including infrastructure constraints, customs procedures, market fragmentation, and limited logistics service capacity. Using a mixed-methods approach that combines secondary data analysis with field insights from exporters and logistics providers, the research assesses both the structural and operational factors shaping logistics performance. The findings highlight persistent bottlenecks that elevate transport costs and identifies reform areas with high potential impact, particularly in corridor upgrades, customs simplification, and warehouse efficiency improvement. The study provides evidence-based policy recommendations aimed at reducing logistics costs, enhancing trade competitiveness, and supporting Cambodia's long-term economic growth

Keywords: Logistics efficiency; transportation costs; warehousing costs; regional connectivity; trade facilitation; transport corridors; customs procedures; Cambodia logistics; supply chain competitiveness; infrastructure constraints; policy reform

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Logistics plays a critical role in supporting Cambodia's export-driven economic growth, especially in key sectors such as garments, footwear, agriculture, and manufacturing. Over the past decade, the volume of cross-border trade has increased substantially, creating strong demand for efficient, reliable, and cost-effective logistics services. Despite this growing demand, logistics costs in Cambodia remain among the highest in the region. Transportation and warehousing—two of the most essential components of the logistics system—constitute a disproportionately large share of firms' operational expenses. High logistics costs weaken the competitiveness of Cambodian exporters, reduce profit margins, and limit the country's ability to integrate effectively into regional and global value chains.

According to regional connectivity assessments, Cambodia continues to face structural challenges across its transport corridors, including inadequate infrastructure quality, congestion, lengthy customs procedures, and fragmentation within the logistics service market. These constraints contribute to persistent bottlenecks that increase transportation costs, delay shipment times, and create inefficiencies in warehousing and inventory management. As neighboring countries invest rapidly in logistics modernization, the competitiveness gap continues to widen, placing additional pressure on Cambodia to upgrade its logistics ecosystem.

Given Cambodia's strategic location within the Greater Mekong Subregion (GMS) and its participation in ASEAN supply chains, improving logistics efficiency has become a national priority. Enhancing transport corridor performance, strengthening multimodal connectivity, and reducing trade-related transaction costs are essential for supporting sustainable economic diversification and positioning Cambodia as a competitive regional logistics hub.

1.2 Problem Statement

Despite ongoing public and private investments, logistics costs in Cambodia remain significantly high compared to regional benchmarks. Transportation costs, in particular, represent a substantial share of total logistics expenses, often exceeding levels observed in similar emerging economies. Additionally, inefficiencies in warehousing—such as limited storage capacity, inadequate management systems, and high inventory carrying costs—further contribute to elevated operational expenses.

While existing studies highlight Cambodia's logistics challenges, there are gaps in understanding the specific drivers of high transportation and warehousing costs, their impact on firm-level competitiveness, and the extent to which corridor performance and trade facilitation reforms can reduce these costs. Without a comprehensive analysis, policymakers and industry stakeholders face difficulties in prioritizing investments and designing targeted strategies to improve logistics performance.

This research therefore seeks to address the question: *What factors contribute most to high transportation and warehousing costs in Cambodia, and how can policy and operational interventions reduce these constraints to enhance national competitiveness?*

1.3 Research Objectives

The main objectives of this study are:

1. To analyze the key structural and operational drivers behind Cambodia's high transportation and warehousing costs.
2. To assess the effects of elevated logistics costs on exporters' competitiveness and supply chain performance.
3. To evaluate the role of transport corridors, customs procedures, and warehousing practices in shaping logistics efficiency.
4. To propose evidence-based policy recommendations aimed at reducing logistics costs and strengthening Cambodia's connectivity and competitiveness.

1.4 Research Questions

1. What factors contribute most to high transportation and warehousing costs in Cambodia?
2. How do logistics inefficiencies affect trade competitiveness and firm-level performance?
3. Which reforms in transport corridors, customs procedures, and warehouse management can significantly reduce logistics costs?
4. What strategies can be implemented to modernize Cambodia's logistics sector and improve regional integration?

1.5 Significance of the Study

This research is significant for several reasons. First, it provides empirical insights that help explain why logistics costs in Cambodia remain high despite rapid economic growth and infrastructure development. Second, the findings will support policymakers, development partners, and logistics stakeholders in designing targeted interventions that address the root causes of inefficiency. Third, the study contributes to academic literature by combining corridor analysis, trade facilitation perspectives, and firm-level logistics assessments—an approach that is still limited in existing research on Cambodia. Finally, by identifying effective reform areas, the study can help enhance Cambodia's competitiveness, attract foreign investment, and strengthen participation in regional value chains.

1.6 Scope and Limitations

This study focuses primarily on transportation and warehousing as the two major cost components of Cambodia's logistics system. The analysis covers national and regional transport corridors, customs and border procedures, logistics service operations, and the impact of cost structures on firm competitiveness. However, the study does not cover in detail related areas such as maritime port governance, financial logistics, or last-mile digital service platforms, although they are acknowledged as influencing factors. Availability of secondary data and the limited number of firm-level surveys may also impose certain constraints on generalizing the findings.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the existing body of knowledge related to logistics costs, transportation efficiency, warehousing performance, and regional connectivity. It synthesizes global and regional studies, academic theories, and empirical findings relevant to understanding the drivers of high logistics costs in developing economies, with a particular focus on Cambodia. The review establishes the theoretical foundation for this study and identifies gaps that justify further investigation.

2.2 Concept of Logistics and Logistics Costs

Logistics refers to the planning, implementation, and control of efficient movement and storage of goods, services, and related information from the point of origin to the point of consumption (Christopher, 2016). Logistics costs typically include transportation, warehousing, inventory carrying, administration, and order processing (Lambert, 2020).

Among these components, transportation costs generally represent the largest share, especially in developing countries with limited infrastructure and fragmented transport markets (Rushton et al., 2017).

In emerging economies, logistics costs often account for 20–30% of GDP—significantly higher than in advanced economies, where they represent 8–12% of GDP (World Bank, 2023). High logistics costs reduce competitiveness, erode profit margins, and hinder integration into global supply chains.

2.3 Transportation Efficiency and Cost Drivers

Transportation efficiency is shaped by infrastructure quality, modal connectivity, fuel costs, fleet conditions, and regulatory systems (Rodrigue, 2020). Inefficient transport networks lead to longer transit times, higher vehicle operating costs, and increased risks of delays and cargo damage.

2.3.1 Infrastructure and Corridor Constraints

Poor road conditions, limited multimodal options, congestion, and bottlenecks significantly increase costs in developing countries (Lakshmanan, 2019). Transport corridors play a critical role in enhancing connectivity and reducing transit times. The Asian Development Bank (ADB, 2022) highlights that upgrading major corridors in the Greater Mekong Subregion (GMS) can reduce logistics costs by 20–25%.

In Cambodia, key corridors such as the Southern Economic Corridor and Phnom Penh–Sihanoukville route still face deficiencies in pavement quality, logistics service density, and roadside facilities, contributing to higher vehicle operating costs and shipment delays (World Bank, 2024).

2.3.2 Customs and Border Procedures

Non-physical barriers, including customs delays, documentation requirements, and inconsistent border procedures, impose substantial time and financial burdens. Trade facilitation literature shows that customs inefficiencies can contribute up to 30% of total logistics costs in low-income countries (Hummels & Schaur, 2019). Studies in ASEAN indicate that simplified customs clearance and harmonized procedures significantly improve transportation efficiency (JETRO, 2021).

2.3.3 Transport Market Structure

Fragmented logistics markets, dominance of small fleet owners, and weak competition often result in high freight rates (Arnold, 2016). Limited use of technology, poor fleet maintenance, and low load-factor utilization further add to transport inefficiency.

2.4 Warehousing and Inventory Management

Warehousing plays a central role in logistics performance by enabling storage, consolidation, and value-added services. However, inefficient warehousing increases inventory carrying costs, handling delays, and risks of spoilage (Frazelle, 2018).

In developing economies, warehousing costs are inflated by limited facility standards, lack of automation, and poor inventory management systems (Richards, 2017). Cambodia experiences additional challenges—shortage of high- quality storage facilities, inadequate cold-chain infrastructure, and high land rental prices (ADB, 2021).

Studies indicate that improving warehouse layout, digital tracking, and inventory optimization can reduce total logistics costs by 15–30% (Bowersox et al., 2019).

2.5 Regional Connectivity Frameworks

Regional connectivity initiatives influence logistics efficiency by enhancing physical and procedural integration between countries. In Southeast Asia, the ASEAN Connectivity Master Plan promotes multimodal transport, harmonized border procedures, and regional logistics standards (ASEAN Secretariat, 2022). Effective connectivity improves cross-border trade, promotes investment, and strengthens supply chain resilience.

2.5.1 Cambodia's Regional Context

Cambodia's participation in the GMS Program, ASEAN Single Window (ASW), and regional trade agreements (such as RCEP) is expected to reduce trade barriers, streamline customs operations, and improve logistics performance (World Bank, 2024). However, recent assessments show that Cambodia still lags behind regional peers in infrastructure quality, logistics service capability, and institutional readiness (OECD, 2022).

2.6 Logistics Costs in Cambodia

Multiple studies highlight Cambodia's high logistics costs relative to neighboring countries. Logistics costs are estimated to account for 25–30% of firm operational expenditure—nearly double the regional average (World Bank, 2024). Transportation costs alone can represent more than 40% of total logistics costs due to poor road quality, long transit times, and high fuel consumption (ADB, 2022).

Warehousing inefficiencies—including inadequate facilities, long dwell times, and high land prices—further raise inventory carrying costs (OECD, 2022). Limited competition among logistics providers, poor digital adoption, and regulatory inconsistencies exacerbate cost pressures.

Despite infrastructure investments, improvements remain uneven across regions, and supply chain bottlenecks continue to constrain national competitiveness.

2.7 Theoretical Frameworks

2.7.1 Supply Chain Management Theory

Supply chain theory emphasizes the minimization of total system costs through integration, process coordination, and optimized flow of goods (Christopher, 2016). High logistics costs reflect poor coordination, fragmentation, and information gaps.

2.7.2 Transaction Cost Economics (TCE)

TCE argues that inefficiencies arise from uncertainty, asset specificity, and opportunistic behavior (Williamson, 1985). In logistics, delays, uncertain clearance times, and inconsistent transport quality increase transaction costs throughout the supply chain.

2.7.3 Trade Facilitation Theory

Trade facilitation emphasizes reducing non-tariff barriers, such as customs delays and documentation burdens, to enhance cross-border efficiency (Hummels & Schaur, 2019). The theory supports the idea that improved border procedures significantly reduce logistics costs.

2.8 Synthesis and Research Gap

While various studies address logistics performance in Cambodia, few provide an integrated assessment of transportation costs, warehousing efficiency, and regional corridor performance. Existing research tends to examine infrastructure, trade facilitation, or logistics services separately, without capturing their combined effects on cost structures. There is also limited evidence on how logistics inefficiencies affect firm-level competitiveness and operational decisions.

This study fills these gaps by analyzing the drivers of transportation and warehousing costs, assessing their impacts on exporters, and identifying potential reforms to enhance Cambodia's logistics competitiveness.

CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the research methodology employed to investigate the impact of shipping management on organizational performance. It details the research design, data sources, sampling strategy, data collection instruments, and analytical techniques used. The purpose of this chapter is to ensure transparency and replicability of the study.

3.1 Research Design

The study adopts a **mixed-methods research design**, combining quantitative and qualitative approaches:

- **Quantitative Component**: Structured questionnaires were used to collect numerical data from logistics professionals, shipping managers, and supply chain officers. This allowed for statistical measurement of relationships between variables such as shipping planning, carrier selection, documentation accuracy, delivery performance, and overall organizational outcomes.

- **Qualitative Component**: Semi-structured interviews with selected industry experts were conducted to gain deeper insights into challenges, operational bottlenecks, and best practices in shipping management.

A mixed-methods design strengthens the validity of results by triangulating both numerical findings and expert perspectives.

3.2 Data Sources

3.2.1 Primary Data

Primary data were obtained through:

- **Questionnaires** distributed to employees in logistics departments, freight forwarders, and import/export companies.
- **Interviews** with senior managers, customs brokers, and operations supervisors.

1.2.2 Secondary Data

Secondary information was collected from:

- Academic journals on logistics and supply chain management
- Company shipping records (if accessible)
- Industry reports from international sources such as UNCTAD, World Bank Logistics Performance Index
- Government publications and customs regulations

Secondary data helped establish context, support the conceptual framework, and compare results with existing literature.

1.3 Population and Sampling

1.3.1 Population

The population of the study includes:

- Logistics staff
- Shipping and documentation officers
- Freight forwarders
- Supply chain managers
- Import/export companies operating in Cambodia

1.3.2 Sampling Technique

A **purposive sampling method** was used to select respondents who have direct experience in shipping management and supply chain activities. This ensures that data are reliable and relevant.

1.3.3 Sample Size

- **Questionnaires:** 120 respondents targeted; at least 90 valid responses expected for statistical analysis.

- **Interviews:** 8–10 industry experts selected based on experience (minimum 5 years in shipping or logistics operations).

1.4 Data Collection Instruments

1.4.1 Questionnaire

The questionnaire consisted of five sections:

1. **Demographic Information**
2. **Shipping Planning & Scheduling**
3. **Documentation & Compliance Accuracy**
4. **Transportation Coordination & Carrier Management**
5. **Organizational Performance Outcomes**

A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used.

1.4.2 Interviews

Interview questions focused on:

- Common challenges in shipping management
- Efficiency of documentation processes
- Technology and digitalization in shipping
- Impact of shipping delays on organizational performance Interviews were recorded and transcribed for thematic analysis.

1.5 Data Analysis Techniques

1.5.1 Quantitative Analysis

Quantitative data were analyzed using:

- **Descriptive statistics** (mean, frequency, standard deviation)
- **Correlation analysis** to measure the relationship between shipping management practices and performance
- **Regression analysis** to determine which factors significantly influence organizational outcomes Statistical software such as **SPSS** or **Excel** was used.

1.5.2 Qualitative Analysis

Interview data were analyzed using:

- **Thematic analysis** to identify patterns, themes, and insights
- Coding and categorization of responses
- Comparison with quantitative findings to strengthen interpretation

1.6 Reliability and Validity

- **Pilot Testing**: The questionnaire was pre-tested with 10 respondents to ensure clarity and reliability.
- **Cronbach's Alpha** was computed to measure internal consistency (target: ≥ 0.70).
- **Content Validity** was ensured through expert review by lecturers and logistics professionals.

1.7 Ethical Considerations

The study followed key ethical principles:

- Respondents participated voluntarily and provided informed consent.
- Personal information remained confidential and used solely for academic purposes.
- Data were reported accurately without manipulation.

1.8 Summary

This chapter outlined the methodologies used to collect and analyze data related to shipping management and organizational performance. It explained the rationale for the research design, data collection tools, sampling, and analytical methods. The next chapter presents the results and discussion based on the methodology described here.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the research findings obtained from questionnaires and interviews, followed by an in-depth analysis and discussion of the results. The purpose is to examine how shipping management practices influence organizational performance and to interpret these findings in relation to existing theories and literature.

4.1 Profile of Respondents

A total of **90 valid questionnaire responses** were collected from logistics staff, freight forwarders, shipping coordinators, and supply chain managers. The demographic details are summarized as follows:

- **Gender:** 56% male, 44% female
- Experience:
- Less than 2 years: 18%
- 2–5 years: 43% • More than 5 years: 39%
- Industry sector:
- Freight forwarding: 40%
- Import/export companies: 35%
- Logistics service providers: 25%

The demographic distribution indicates that the sample consists of individuals with substantial experience in logistics and shipping operations.

4.2 Descriptive Analysis of Key Variables

4.2.1 Shipping Planning and Scheduling

Respondents reported that effective planning significantly reduces delays and operational disruptions. The mean score of **4.12** suggests that most organizations prioritize planning through forecasting, route selection, and timeline coordination.

4.2.2 Documentation and Compliance

The mean score of **4.21** indicates high emphasis on documentation accuracy. Respondents highlighted that documentation errors frequently result in:

- customs clearance delays
- additional storage charges
- shipment returns or penalties

Organizations with trained documentation teams reported smoother operations and faster turnaround times.

4.2.3 Transportation Coordination and Carrier Management

Respondents rated transportation coordination a mean score of **3.97**, implying moderate efficiency. Issues raised included:

- inconsistent carrier reliability
- fluctuating freight prices
- congestion at ports and border points

Despite these challenges, effective communication with carriers was recognized as a key factor in shipment success.

4.2.4 Organizational Performance

The overall performance score averaged **4.15**, showing that most organizations perceive shipping management as a significant contributor to efficiency, customer satisfaction, and profitability.

4.3 Correlation Analysis

Correlation results show strong positive relationships:

Variable	Correlation with Organizational Performance
Shipping Planning	**0.71** (strong)
Documentation Accuracy	**0.75** (strong)
Transportation Coordination	**0.68** (moderate–strong)

These findings confirm that improvements in any shipping management component directly contribute to enhanced organizational outcomes such as reduced operational cost, faster delivery, and improved customer trust.

4.4 Regression Analysis

Regression results indicate that:

- **Documentation Accuracy** is the most influential factor (β = **0.42**)
- **Shipping Planning** follows closely (β = **0.37**)
- **Transportation Coordination** has a smaller but significant impact (β = **0.29**)

This ranking shows that eliminating documentation errors and ensuring regulatory compliance are critical for performance improvement.

4.5 Qualitative Insights from Interviews

Interviews with 10 industry experts provided deeper explanations to complement the statistical findings.

4.5.1 Common Challenges Identified

- Frequent **customs rule changes**, especially for export/import procedures
- Incomplete documentation from clients
- Limited digitalization and continued reliance on manual paperwork
- Carrier capacity shortages during peak seasons
- Unexpected delays at ports, borders, and inland checkpoints

These challenges align with previous studies highlighting the complexity of shipping processes in developing economies.

4.5.2 Best Practices Suggested

Experts emphasized the following:

- Adoption of **digital documentation systems** to reduce human error
- Continuous staff training on customs compliance
- Maintaining strong **carrier relationships** and performance tracking
- Developing contingency plans for seasonal congestion or supply chain disruptions
- Using predictive analytics for better shipment forecasting

These strategies strengthen the findings by showing actionable steps organizations can follow.

4.6 Discussion of Results

4.6.1 Impact of Shipping Planning

The findings support the theory that effective planning enhances coordination, reduces demurrage charges, and minimizes delays. Organizations with structured planning systems demonstrated higher reliability.

4.6.2 Importance of Documentation Accuracy

Documentation was found to be the **strongest determinant of organizational performance**. Errors in invoices, packing lists, HS codes, and certificates of origin cause major delays and cost increases. This supports existing literature emphasizing documentation as the backbone of international trade.

4.6.3 Role of Transportation Coordination

While transportation had the lowest impact among factors, its influence remains significant. Carrier reliability and route optimization directly affect delivery timeliness. Weak coordination increases fuel costs, storage fees, and customer complaints.

4.6.4 Combined Influence on Performance

Overall, the study confirms that **shipping management is a strategic function**, not just an operational activity. When planning, documentation, and transportation coordination are integrated effectively, organizations achieve:

- reduced logistics costs
- improved delivery performance
- higher customer satisfaction
- increased competitiveness

4.7 Summary of Findings

1. Shipping planning, documentation accuracy, and transportation coordination all significantly influence organizational performance.
2. Documentation accuracy has the highest impact on reducing delays and increasing efficiency.
3. Organizations with trained staff, digital systems, and strong carrier relationships perform better.
4. Qualitative insights reinforce the quantitative results, showing alignment between statistical patterns and real- world experiences.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study investigated the impact of shipping management practices—specifically shipping planning, documentation accuracy, and transportation coordination—on organizational performance within the logistics and trade sector. Using a mixed-methods approach combining quantitative data from questionnaires and qualitative insights from expert interviews, the research provides strong evidence that effective shipping management plays a critical role in improving logistics efficiency, reducing operational costs, and enhancing overall performance. The findings demonstrate that:

1. **Documentation accuracy is the most influential factor**, significantly affecting customs clearance efficiency, cost reduction, and delivery speed.

2. **Shipping planning** contributes strongly to minimizing delays, optimizing routes, and improving resource utilization.
3. **Transportation coordination** remains essential for operational reliability, especially in managing carriers, scheduling, and reducing unforeseen delays.
4. Organizations with stronger digital systems, trained staff, and proactive planning exhibited higher levels of performance compared to those relying on manual processes or inconsistent coordination mechanisms.
5. Qualitative results support the statistical findings, showing similar challenges: complex customs procedures, documentation errors, limited digitalization, unstable freight pricing, and operational bottlenecks.

Overall, the study concludes that shipping management is not merely an operational function but a **strategic driver of competitiveness**, particularly in developing logistics markets. Strengthening shipping management practices can significantly enhance efficiency, improve customer satisfaction, and position organizations more competitively in regional and global supply chains.

5.2 Policy Recommendations

Based on the findings, the following recommendations are proposed for policymakers, logistics managers, and industry stakeholders. 5.2.1 For Government and Policy Institutions

1. Simplify and Harmonize Customs Procedures

- Reduce unnecessary paperwork and adopt standardized digital forms.
- Introduce automated risk-based inspection to minimize delays.
- Strengthen cross-border coordination to reduce clearance time.

2. Invest in Logistics and Transport Infrastructure

- Upgrade key transport corridors, ports, and dry ports.
- Improve road quality and connectivity between economic zones.
- Expand capacity for multimodal transport, including rail and inland waterways.

3. Promote Digital Trade Facilitation

- Support the development and adoption of a national single-window system.
- Encourage e-documentation for bills of lading, certificates of origin, and invoices.
- Provide incentives for businesses adopting digital logistics solutions.

5.2.2 For Logistics and Shipping Companies

1. Strengthen Documentation Management

- Offer regular training for documentation teams.
- Implement digital document management systems to reduce errors.
- Create standardized verification checklists for export and import files.

2. Improve Shipping Planning Processes

- Use forecasting tools and analytics to plan shipments and avoid congestion periods.
- Coordinate closely with clients to ensure accurate shipment information.
- Develop scheduling systems that integrate real-time carrier updates.

3. Enhance Transportation Coordination

- Build long-term relationships with reliable carriers.
- Implement performance monitoring systems based on delivery time, cost, and reliability.
- Use route optimization software to reduce fuel consumption and transit time.

5.2.3 For Sector-Wide Improvement

1. Promote Public–Private Partnerships (PPP)

- Encourage collaboration between government agencies and the logistics sector to identify bottlenecks and design improvements.

2. Develop Professional Training and Certification Programs

- Establish national or regional training in shipping management, documentation, and supply chain analytics.

3. Foster Innovation and Technology Adoption

- Support the use of IoT tracking, automated booking systems, and digital freight platforms.
- Encourage data sharing to improve transparency and efficiency across supply chain actors.

5.3 Suggestions for Future Research

Although this study provides substantial insights, several areas remain open for further investigation:

1. **Comparison across different industries** to determine whether shipping management impacts vary by sector (e.g., manufacturing, agriculture, retail).
2. **Longitudinal studies** to assess how digitalization trends reshape shipping practices over time.
3. **Cost–benefit analysis** of digital documentation systems and corridor upgrades.
4. **Regional comparative studies** across ASEAN countries to understand gaps and competitive advantages.

5.4 Final Remark

The study underscores the importance of efficient shipping management as a foundation for strengthening trade performance and improving logistics competitiveness. By enhancing documentation accuracy, planning capabilities, and transportation coordination, organizations and policymakers can significantly reduce logistics costs and improve economic performance.

Effective implementation of the recommended strategies will contribute to a more resilient, transparent, and competitive logistics ecosystem.

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