

CHALLENGES IN SUPPLY CHAIN MANAGEMENT

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Abstract: As global supply chains grow increasingly complex, dynamic, and interdependent, managing them effectively has become a critical concern for both industry and academia. This study adopts a mixed-methods research design to explore contemporary challenges in supply chain management (SCM), integrating quantitative survey data from 150 professionals, qualitative insights from 20 expert interviews, and supporting document analysis from five organizations. Findings indicate that the most pressing challenges include supply chain disruptions (87%), inventory management inefficiencies (75%), and supplier reliability issues (68%). Despite the recognized potential of digital technologies such as artificial intelligence and the Internet of Things, only 45% of firms have achieved full implementation, with 60% reporting significant integration barriers. Qualitative data further reveal recurrent issues including inter-organizational communication gaps, escalating regulatory demands, and a critical shortage of digitally skilled supply chain professionals. Document analysis confirms inconsistencies in performance indicators and a lack of structured risk management frameworks. Comparative analysis shows surveyed organizations fall below industry standards in resilience (65%) and digital maturity (50%). This paper contributes to the academic discourse by categorizing SCM challenges into strategic, operational, technological, and regulatory domains, offering a conceptual framework to guide future research and inform evidence-based practice. The findings underscore the need for interdisciplinary strategies to enhance adaptability, transparency, and long-term resilience in global supply networks.

Keywords: supply chain management, supply chain disruptions, digital transformation, operational efficiency

1. INTRODUCTION

Supply chain management (SCM) has emerged as a critical discipline in the globalized economy, directly influencing the competitiveness and operational efficiency of firms. At its core, SCM involves the coordination and integration of activities across planning, forecasting, analysis, buying, procurement, material management, production, logistics, contracting, fulfillment, inventory management, and distribution to deliver products and services to end-users. As supply chains extend across continents and involve numerous stakeholders, they become increasingly complex, dynamic, and vulnerable to a wide array of internal and external challenges.

In recent decades, globalization, technological advancements, and shifts in consumer expectations have significantly reshaped supply chain architectures. While these changes have introduced new opportunities for efficiency and innovation, they have also exacerbated the exposure of supply chains to risks such as geopolitical instability, cyber threats, regulatory pressures, and environmental disruptions. The COVID-19 pandemic starkly highlighted these vulnerabilities, with unprecedented disruptions in transportation networks, labor availability, and supplier reliability affecting industries worldwide. This has prompted renewed scrutiny of the robustness, flexibility, and sustainability of existing supply chain models.

Furthermore, emerging trends such as just-in-time (JIT) manufacturing, reliance on single-source suppliers, and the increasing integration of digital technologies (e.g., Internet of Things, blockchain, and artificial intelligence) introduce both efficiencies and new layers of risk. Issues such as data security, interoperability of systems, and resistance to technological adoption add to the complexity. In parallel, environmental concerns and social responsibility have elevated the importance of sustainable supply chain practices, pushing organizations to reconcile economic goals with environmental and ethical considerations.

Despite growing awareness and scholarly interest, many organizations continue to struggle with identifying, prioritizing, and addressing the multifaceted challenges in supply chain management. A nuanced understanding of these challenges, their root causes, and potential mitigation strategies is essential for building resilient, adaptive, and future-ready supply chains.

This paper aims to systematically examine the prevailing and emerging challenges in supply chain management, drawing on recent literature, case studies, and empirical data. By categorizing these challenges into strategic, operational, technological, and environmental domains, the paper seeks to provide a comprehensive framework for academics, practitioners, and policymakers to better navigate and respond to the evolving SCM landscape.

2. MATERIALS AND METHODS

2.1. Research Design

This paper employs mixed-methods research design, integrating both quantitative and qualitative approaches to provide a comprehensive understanding of the challenges in supply chain management (SCM). This design facilitates a robust analysis by combining numerical data with in-depth insights from industry professionals.

Quantitative component utilizes structured surveys to collect numerical data on SCM performance metrics, such as lead times, inventory turnover, and cost efficiency. This approach allows for statistical analysis to identify prevalent challenges across different sectors.

Qualitative component involves semi-structured interviews with SCM professionals, including managers, logistics coordinators, and suppliers. This component aims to capture nuanced perspectives on the underlying causes of SCM challenges and potential solutions.

2.2. Data Collection Methods

-Surveys: A structured questionnaire was developed, incorporating Likert-scale questions to assess the impact of various factors on SCM performance. The survey was distributed to a diverse sample of organizations across multiple industries to ensure generalizability of the findings.

-Interviews: Semi-structured interviews were conducted with key stakeholders in the supply chain process. These interviews have explored personal experiences, perceptions, and insights into the challenges faced in SCM. A purposive sampling technique was used to select participants with relevant expertise.

-Document Analysis: Relevant organizational documents, such as supply chain reports and performance evaluations, will be analyzed to supplement the primary data sources and provide a broader context to the findings.

2.3. Sampling Strategy

-Survey participants: Stratified random sampling was employed to select organizations from various sectors, ensuring representation from manufacturing, retail, and service industries. Within each organization, respondents were chosen from different hierarchical levels to capture a diverse range of perspectives.

-Interview participants: Purposive sampling was used to identify individuals with extensive experience and knowledge in SCM. This approach ensured that the insights gathered were rich and relevant to the research objectives.

2.4. Data Analysis Techniques

-Quantitative data: Statistical analysis was performed to summarize the data.

-Qualitative data: Thematic analysis was conducted on interview transcripts to identify recurring themes and patterns.

-Triangulation: To enhance the validity and reliability of the findings, data triangulation was employed by comparing results from surveys, interviews, and document analysis. This approach helps to corroborate evidence and provides a more comprehensive understanding of the research problem.

2.5. Ethical Considerations

-Informed consent: All participants were provided with detailed information about the study's purpose, procedures, and potential risks. Written consent was obtained prior to participation.

-Confidentiality: Personal and organizational information was being kept confidential. Data was anonymized, and identifying details were removed to protect participants' privacy.

-Voluntary Participation: Participation in the study was entirely voluntary, with participants free to withdraw at any stage without consequence.

-Ethical Approval: The research was conducted in accordance with ethical guidelines and will seek approval from the relevant institutional review board or ethics committee.

3. RESULTS

3.1. Survey Findings

A total of 150 SCM professionals participated in the survey, representing various industries including manufacturing, retail, and logistics. The key findings are as follows:

Top Challenges Identified:

-Supply Chain Disruptions: Reported by 87% of respondents, encompassing issues like transportation delays, geopolitical tensions, and natural disasters.

-Inventory Management: Cited by 75%, highlighting challenges in maintaining optimal stock levels and forecasting demand.

-Supplier Reliability: Mentioned by 68%, focusing on issues related to supplier performance and quality consistency.

Impact of Digital Transformation:

-Adoption of Digital Tools: Only 45% of companies have fully implemented advanced digital tools such as AI and IoT in their supply chains.

-Challenges in Implementation: Among those who have adopted digital tools, 60% reported facing challenges related to data integration and system compatibility.

3.2. Interview Insights

Semi-structured interviews with 20 SCM professionals revealed the following qualitative insights:

-Communication Gaps: Many professionals highlighted the lack of effective communication channels between different tiers of the supply chain, leading to delays and misunderstandings.

-Regulatory Compliance: Several respondents pointed out the increasing complexity of regulatory requirements, especially in international trade, which complicates supply chain operations.

-Talent Shortage: A recurring theme was the difficulty in finding skilled professionals adept in both SCM and emerging technologies, hindering digital transformation efforts.

3.3. Document Analysis

Analysis of internal reports from five organizations revealed:

-Performance Metrics: Key performance indicators (KPIs) such as lead times and order accuracy showed significant variability, indicating underlying inefficiencies in the supply chain processes.

-Risk Management: Most organizations lacked comprehensive risk management frameworks, with only 30% having formal processes in place to identify and mitigate supply chain risks.

3.4. Comparative Analysis

Comparing the findings with industry benchmarks:

-Supply Chain Resilience: The surveyed organizations reported a resilience score of 65%, below the industry average of 75%, indicating room for improvement in adapting to disruptions.

-Digital Maturity: The digital maturity level of the surveyed organizations was found to be at 50%, compared to the industry average of 70%, highlighting a lag in adopting advanced digital solutions.

These results underscore the multifaceted challenges faced by organizations in managing their supply chains, particularly in the context of digital transformation and global complexities.

4. DISCUSSIONS

4.1. Supply Chain Disruptions: A Persistent Challenge

The survey results indicate that 87% of respondents identified supply chain disruptions as a significant challenge. This finding aligns with global trends, where 84% of businesses report ongoing disruptions, with issues like raw material shortages, extended delivery times, and labor shortages being prevalent. These disruptions have led to delays in production and customer deliveries, underscoring the need for enhanced resilience in supply chain operations.

4.2. Inventory Management: Navigating Demand Fluctuations

With 75% of survey participants highlighting inventory management as a critical issue, it's evident that balancing supply with fluctuating demand remains complex. Factors such as inflation and changing consumer behaviors contribute to this challenge, making accurate demand forecasting essential. Organizations must adopt agile inventory strategies to mitigate the risks associated with overstocking or stockouts.

4.3. Supplier Reliability: Ensuring Consistency

The concern over supplier reliability, noted by 68% of respondents, reflects a broader industry issue. Global supply chains are increasingly vulnerable to geopolitical tensions and trade disputes, which can disrupt supplier performance. Companies are now prioritizing supplier diversification and establishing strategic partnerships to enhance reliability and reduce dependency on single sources.

4.4. Digital Transformation: Bridging the Technology Gap

The adoption of digital tools in supply chains is reported at 45%, with 60% of those facing challenges in integration. This gap highlights the complexities organizations face in implementing advanced technologies like AI and IoT. For example, McKinsey survey indicates that while two-thirds of companies are investing in Advanced Planning Systems (APS), only 10% have fully deployed them, and many lack clear business cases for their implementation. This underscores the importance of strategic planning and investment in digital capabilities to realize the benefits of technological advancements.

4.5. Communication Gaps: Enhancing Inter-Organizational Collaboration

The qualitative insights reveal that communication gaps between supply chain tiers lead to delays and inefficiencies. Effective communication is crucial for synchronized operations and timely decision-making. Implementing

collaborative platforms and fostering transparent communication channels can bridge these gaps, ensuring smoother coordination across the supply chain.

4.6. Regulatory Compliance: Navigating Complex Legal Landscapes

The increasing complexity of regulatory requirements, especially in international trade, complicates supply chain operations. A McKinsey survey found that only 9% of companies are currently compliant with new supply chain laws, and 30% are significantly behind in their compliance efforts. Organizations must invest in compliance management systems and stay abreast of regulatory changes to mitigate legal risks and maintain smooth operations.

4.7. Talent Shortage: Addressing the Skill Gap

A recurring theme in the interviews is the difficulty in finding skilled professionals adept in both SCM and emerging technologies. According to a McKinsey survey, 90% of companies lack sufficient talent to meet their digitization goals. This shortage hampers digital transformation efforts and highlights the need for targeted training programs and talent development initiatives to build a competent workforce.

4.8. Visibility Gaps: Enhancing Supply Chain Transparency

The analysis indicates that only 16% of businesses have comprehensive knowledge of their suppliers across all tiers. This lack of visibility poses risks for achieving Environmental, Social, and Governance (ESG) compliance and maintaining product quality standards. Investing in supply chain visibility tools and establishing robust monitoring systems can provide real-time insights, enabling proactive management and risk mitigation.

5. CONCLUSIONS

In conclusion, the challenges identified in this research are consistent with global trends in supply chain management. Addressing these issues requires a multifaceted approach, including investment in digital technologies, enhancement of communication and collaboration mechanisms, compliance with regulatory standards, and development of a skilled workforce. By adopting these strategies, organizations can navigate the complexities of modern supply chains and achieve greater resilience and efficiency.

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