

## The Impact of Post-Pandemic Supply Chain Disruptions on Construction Cost Management (2022)

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### ABSTRACT

The COVID-19 pandemic caused unprecedented disruptions in global supply chains, profoundly affecting construction cost management. Delays, material shortages, and price volatility challenged project budgeting and scheduling (Ivanov, 2022; Doloi et al., 2022). This study examines post-pandemic supply chain disruptions and their impact on construction cost management using a mixed-method approach. Data were collected from 200 construction projects across Africa and Europe between January and December 2022. Key metrics included material cost fluctuations, project delays, and budget variance. Statistical analysis revealed that 58% of projects experienced material shortages, 47% reported significant cost overruns, and average project delays increased by 18%. Regression analysis indicated that supply chain disruption intensity significantly predicted cost variance ( $R^2 = 0.61$ ,  $p < .01$ ). The study concludes that post-pandemic supply chain instability remains a major factor affecting construction budgeting, and recommends proactive supply chain risk management, strategic procurement planning, and cost contingency frameworks.

**Keywords:** Construction Cost Management, Supply Chain Disruption, Post-Pandemic, Project Budgeting, Material Shortages, Risk Management

## Introduction

The COVID-19 pandemic exposed vulnerabilities in global supply chains, including transportation bottlenecks, labor shortages, and material scarcity (Ivanov, 2022). The construction industry, heavily dependent on timely procurement of materials and equipment, faced severe budgetary pressures and scheduling delays. Post-pandemic, supply chain disruptions persist due to fluctuating demand, inflation, and geopolitical uncertainties (Doloi et al., 2022).

Effective construction cost management requires accurate budgeting, cost control, and contingency planning. However, post-pandemic disruptions have introduced variability in material prices, extended lead times, and increased project risk exposure. Understanding the impact of these disruptions is crucial for sustainable project delivery and financial management.

This study investigates how post-pandemic supply chain disruptions affect construction cost management, with particular focus on material availability, cost overruns, and schedule adherence.

## Statement of the Problem

In an ideal construction environment:

- Materials and equipment are procured on schedule at stable prices.
- Project budgets align with actual expenditures.
- Risk management mitigates delays and cost escalations.

Post-pandemic disruptions have undermined these conditions. Material shortages, delayed shipments, and price volatility have increased budget deviations and project delays. Without systematic analysis, construction managers may lack actionable strategies to mitigate cost and schedule risks.

## Objectives of the Study

- i. To evaluate the extent of post-pandemic supply chain disruptions in the construction industry.
- ii. To assess the impact of these disruptions on project cost management and budgeting.
- iii. To recommend strategies for mitigating supply chain-related cost risks.

## Research Questions

- i. What is the prevalence of supply chain disruptions in post-pandemic construction projects?
- ii. How do supply chain disruptions affect project cost management and budgeting?
- iii. What strategies can reduce the impact of supply chain disruptions on construction costs?

## Statement of Hypotheses

- i.  $H_{01}$ : Post-pandemic supply chain disruptions have no significant impact on construction project cost variance.
- ii.  $H_{02}$ : Material shortages do not significantly contribute to project delays and budget overruns.
- iii.  $H_{03}$ : Implementation of risk management strategies does not significantly mitigate the financial impact of supply chain disruptions.

## Literature Review

### Conceptual Review

#### Concept of Supply Chain Disruption

Supply chain disruptions refer to unexpected interruptions in the flow of materials, labor, and equipment that affect production and project execution. In the construction industry, disruptions can be caused by pandemics, natural disasters, labor strikes, or logistics failures (Ivanov, 2022).

DeRose, 2025

### Concept of Construction Cost Management

Construction cost management involves planning, estimating, budgeting, and controlling costs to complete a project within the approved budget. Effective cost management requires forecasting material requirements, labor costs, and contingency planning for risk events (Doloi et al., 2022).

### Theoretical Review

This study is underpinned by the Supply Chain Risk Management Theory (Christopher & Peck, 2004), which emphasizes:

- Risk identification and assessment
- Risk mitigation through strategic planning
- Resilience and flexibility in supply chain design

Applying this theory, construction projects must integrate risk assessment and contingency planning to manage post-pandemic disruptions.

### Empirical Review

Ivanov (2022) analyzed supply chain disruptions across global industries and identified construction as highly vulnerable due to dependency on multiple suppliers. Doloi et al. (2022) found that post-pandemic material price volatility and delivery delays significantly contributed to cost overruns in building projects. These studies suggest the importance of proactive supply chain and cost risk management to maintain project financial stability.

## 3. Methodology

The study employed a mixed-method approach with both quantitative and qualitative elements.

### Dataset

- 200 construction projects across Africa and Europe
- Project types: Residential (40%), Commercial (35%), Infrastructure (25%)
- Data collection period: January–December 2022

### Data Collection

- Project financial records for budget variance analysis
- Supplier reports for material availability and lead times
- Interviews with project managers on risk management practices

### Data Analysis

- Descriptive statistics for frequency and percentage of disruptions
- Regression analysis to examine relationship between disruption intensity and cost variance
- ANOVA to test differences across project types

### Data Presentation and Analysis

**Table 1: Supply Chain Disruptions in Construction Projects**

Disruption Type	Frequency	Percentage
Material shortages	116	58%
Delivery delays	101	50.5%
Price volatility	94	47%
Labor unavailability	62	31%

Source: Construction Project Dataset, 2022

Material shortages and delivery delays were the most common disruptions, affecting over half of surveyed projects.

**Table 2: Impact on Project Cost Management**

Project Outcome	Frequency	Percentage
Budget overrun	94	47%
Schedule delay	88	44%
Cost contingency utilized	62	31%

Source: Project Financial Records, 2022

Nearly half of the projects experienced significant cost overruns and schedule delays due to supply chain disruptions.

### Regression Analysis: Supply Chain Disruption vs. Cost Variance

- $R^2 = 0.61$ ,  $p < .01$
- Supply chain disruption intensity significantly predicts project cost variance

This confirms that stronger disruptions correspond to higher budget deviations.

### Hypothesis Testing

- $H_{01}$  rejected: Supply chain disruptions significantly impact construction cost variance
- $H_{02}$  rejected: Material shortages contribute significantly to delays and cost overruns
- $H_{03}$  partially rejected: Projects with formal risk management strategies experienced reduced cost impact, but mitigation was not complete

### Summary of Findings, Conclusion and Recommendations

#### Summary of Findings

- Material shortages and delivery delays were the most prevalent post-pandemic supply chain disruptions.
- Nearly half of the projects experienced cost overruns and schedule delays.
- Supply chain disruption intensity significantly predicts cost variance.

## Conclusion

Post-pandemic supply chain disruptions remain a critical challenge in construction cost management. Budget deviations, material shortages, and schedule delays highlight the need for resilient procurement and risk planning strategies.

## Recommendations

- i. Implement proactive supply chain risk assessment and contingency planning.
- ii. Maintain strategic supplier relationships and diversify sourcing to reduce dependency risks.
- iii. Allocate appropriate budget contingencies to absorb cost volatility.
- iv. Monitor global and local supply chain trends to anticipate potential disruptions.

## References (APA 7th Edition)

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