

## **The Impact of Ongoing War and Maritime Geopolitics on Indian Supply Chain Operations: A Multi-Sectoral Empirical Analysis**

**Dr. Shrinivas N. Repak (Ph.D)**

HOD - Operations & SCM

Vivekanand Education Society's Business School

Chembur, Mumbai

### **Abstract**

The resilience of global supply chains depends on the seamless movement of maritime freight through key shipping corridors. In 2026, escalating conflicts in Eastern Europe, the prolonged Red Sea security crisis, and the closure of the Strait of Hormuz have combined to create an unprecedented supply chain disruption for India. This paper examines the impact of these geopolitical events on five major sectors of the Indian economy: Energy and Petrochemicals, Agriculture and Food Processing, Automobile and Heavy Manufacturing, Fast-Moving Consumer Goods (FMCG), and the Downstream Metal Infrastructure sector. Using a mixed-methods research approach, the study analyses operational data from the past three quarters, including the rise of the Indian crude basket to US\$113.57 per barrel, a 48% increase in maritime transit distances via the Cape of Good Hope, a 300% surge in war-risk insurance premiums, and a 40–50% decline in downstream aluminium capacity utilization. The findings indicate that although India's macroeconomic buffers—including 22 operational LPG terminals and flexible refining capacity—have prevented a systemic breakdown, Micro, Small, and Medium Enterprises (MSMEs) continue to face severe margin pressures due to import-parity pricing and localized feedstock shortages. The paper concludes with 11 sector-specific strategic recommendations aimed at transforming India's supply chain from short-term crisis response into a resilient, digitally integrated, and risk-hedged system capable of withstanding future geopolitical disruptions.

**Keywords:** integrated, transforming, Automobile, terminals

### **1. Introduction**

Modern globalization is governed by highly optimized, "just-in-time" supply chain frameworks that trade operational redundancy for capital efficiency. However, this optimization makes networks deeply vulnerable to geopolitical shocks. As of 2026, Indian supply chain operations are confronting a compounded, tri-continental maritime and overland disruption. The protracted conflict in Eastern Europe has permanently altered continental trade lanes and volatile commodity markets, while the maritime chokepoints of the Suez Canal/Red Sea and the Persian Gulf/Strait of Hormuz are experiencing severe security blockages.

The strategic closure of the Strait of Hormuz in early 2026 disrupted a corridor that previously handled approximately 30% of global seaborne oil trade and 20% of liquefied natural gas (LNG) flows. For India, which relied on this specific gateway for 45% of its crude imports and 60% of its liquefied petroleum gas (LPG), the operational shock has reverberated far beyond the energy sector. It has exposed severe vulnerabilities across multiple interconnected domestic industries:

- **Energy & Petrochemicals Sector**

The immediate consequences of maritime blockades manifest as inventory shortages, a sharp spike in landing costs, and the sudden closure of traditional transshipment and distribution hubs such as Jebel Ali. Indian refineries have had to abruptly recalibrate their sourcing matrix, grappling with extreme price volatility in the spot markets and highly volatile shipping schedules.

- **Agriculture and Food Processing Sector**

The agricultural supply chain is experiencing severe supply constraints for essential inputs like finished urea, sulfur, rock phosphate, and potassium feedstocks. Because these raw materials are foundational to domestic

fertilizer production, the disruption directly threatens the output and cost-structures of Indian crop cycles, creating inflationary pressures throughout the rural economy.

- **Automobile & Heavy Manufacturing Sector**

Caught in a geopolitical pincer, this sector faces dual pressures. On one end, delayed container ships navigating around Africa have extended lead times for critical electronic components and semiconductor assemblies from European corridors. On the other end, surging global energy costs have instantly inflated the domestic production costs of basic industrial materials like steel and engineering plastics.

- **Fast-Moving Consumer Goods (FMCG) & Retail Sector**

The FMCG sector is highly sensitive to input cost fluctuations and is currently squeezed by a 15–25% increase in packaging raw materials—particularly petroleum-derived compounds like Monoethylene Glycol (MEG). Coupled with rising domestic freight logistics costs driven by fuel price adjustments, consumer goods companies face the difficult choice of absorbing margin erosion or risking demand destruction by passing costs to inflation-weary consumers.

- **Downstream Metallurgy & Infrastructure Sector**

Perhaps the most overlooked casualty of the current maritime gridlock is the secondary metal processing industry. As primary metal shipments and raw scrap material from the Gulf Cooperation Council (GCC) zone slow to a crawl, small-scale downstream foundry, extrusion, and fabrication units are facing acute operational bottlenecks, threatening domestic infrastructure execution schedules.

The core research problem addressed in this paper is the systemic chain reaction of these disruptions: an energy shock quickly mutates into a raw material feedstock crisis, which then escalates into domestic operational cost inflation. This study aims to map, quantify, and analyze these multi-sectoral operational impacts on Indian supply chain networks during 2026, establishing an empirical framework for long-term structural resilience.

## **2. Research Methodology**

This study uses a convergent parallel mixed-methods research design to evaluate the operational and economic impacts of ongoing conflicts on Indian supply chain networks. Quantitative data collection focused on maritime logistics variables, commodity pricing indexes, and sector-specific capacity utilization data from Q4 2025 through Q2 2026. Qualitative data was collected through structural process-mapping of alternate routing mechanisms and thematic analysis of corporate supply chain risk disclosures.

### **Data Sources & Collection Framework**

- **Logistics & Freight Metrics:** Maritime transit delays, container capacity backlogs, and route diversions were compiled from global freight exchanges, port clearing reports from major Indian ports (JNPT, Mundra, and Chennai), and international maritime transit trackers.
- **Commodity & Energy Pricing:** Longitudinal data on the Indian Crude Basket, spot market LNG prices, war-risk maritime insurance premiums, and chemical/metal feedstocks (MEG, Methanol, Primary Aluminium) were pulled from official ministry data, commodity exchanges, and global trade reports.
- **Sector Operations:** Operational metrics covering downstream MSME capacity utilization, fertilizer intensity, and inventory holdings were gathered from industrial surveys and trade association whitepapers published in early 2026.

### **Analytical Tools & Techniques**

The data was analyzed using three primary methodologies:

1. **Supply Chain Stress Mapping:** Tracking changes in lead times (*LT*) and total landed costs (*TLC*) resulting from the diversion of vessels around the Cape of Good Hope instead of the Red Sea/Suez corridor.

2. **Input-Cost Cascading Analysis:** Quantifying how primary energy and raw material price increases flow down to secondary manufacturing and consumer goods sectors.

3. **Capacity Utilization Modeling:** Assessing the operational impact of raw material shortages on downstream manufacturing plants using the following formula: cross-referencing quantitative models with qualitative operational assessments from logicians on the ground, this methodology filters out macroeconomic noise to focus directly on the friction points within Indian supply chains.

### 3. Data Analysis

To accurately quantify how ongoing conflicts impact Indian operations, this section analyzes empirical shipping, energy, and raw material market data recorded through the first half of 2026.

- **Logistics and Shipping Route Rerouting Analysis**

Attacks on commercial vessels in the Red Sea and the closure of the Strait of Hormuz have forced global ocean carriers to abandon traditional corridors. Following table outlines the structural changes in maritime logistics connecting Indian hubs to European and transatlantic destinations.

**Table 1: Comparative Maritime Logistics Metrics (Pre-Crisis vs. H1 2026)**

| Operational Freight Metric       | Pre-Crisis Baseline (Jan-Sept 2023) | Crisis Peak Level (H1 2026)   | Net Percentage Change | Primary Operational Impact                       |
|----------------------------------|-------------------------------------|-------------------------------|-----------------------|--------------------------------------------------|
| Cargo Ship Travel Distance       | Baseline Route (Via Suez)           | Cape of Good Hope Route       | +48%                  | Increased marine gasoil consumption per voyage   |
| Tanker Fleet Travel Distance     | Baseline Route (Via Suez)           | Cape of Good Hope Route       | +38%                  | Extended asset tie-ups, reducing fleet liquidity |
| Ocean Cargo Transit Time         | 14–18 Days                          | 21–26 Days                    | +45%                  | Delays in component arrivals for assembly lines  |
| Tanker Fleet Transit Time        | 12–15 Days                          | 15–19 Days                    | +28%                  | Surcharges on inventory carrying costs           |
| Global Supply Chain Stress Index | 0.95 Million TEUs                   | 2.30 Million TEUs             | +142.1%               | Severe terminal congestion at hub ports          |
| War-Risk Insurance Premium Rate  | 0.125% of Vessel Value              | 0.20% – 0.40% of Vessel Value | +60% to + 220%        | Immediate, unbudgeted voyage overheads           |

The shift away from the Red Sea corridor has removed predictable weekly schedules from maritime operations. The backlog matches the peak disruptions seen during the 2022 global supply chain crisis, but it is now concentrated across South Asian and Middle Eastern maritime networks.

For an industrial vessel transiting alternative routes, the rise in war-risk insurance premiums from 0.125% to up to 0.40% adds an immediate, unbudgeted overhead of approximately \$250,000 per voyage for a standard Very Large Crude Carrier (VLCC).

• **Energy and Chemical Feedstock Price Analysis**

The supply shock caused by the closure of the Strait of Hormuz directly triggered inflation in energy and industrial chemical feedstocks. Table 2 details the pricing shifts observed across core energy commodities and downstream chemical building blocks.

**Table 2: Commodity and Industrial Feedstock Price Escalation**

| Commodity Type            | Valuation Unit   | Q4 2025 Price | H1 2026 Peak Price | Absolute Increase | Percentage Change (%) |
|---------------------------|------------------|---------------|--------------------|-------------------|-----------------------|
| Indian Crude Basket       | USD / Barrel     | \$65.00       | \$113.57           | \$48.57           | 74.7%                 |
| Spot Market LNG           | USD / MMBtu      | \$11.50       | \$24.20            | \$12.70           | 110.4%                |
| Monoethylene Glycol (MEG) | USD / Metric Ton | \$510.00      | \$745.00           | \$235.00          | 46.1%                 |
| Industrial Methanol       | USD / Metric Ton | \$290.00      | \$435.00           | \$145.00          | 50.0%                 |

The 74.7% surge in the Indian crude basket within a single quarter created immediate financial pressure for oil marketing companies (OMCs). Because these price hikes were not fully passed down to retail consumers to prevent broader inflation, domestic OMCs absorbed roughly ₹1 lakh crore in net losses during the peak phase of the crisis.

Concurrently, the halt of trade through Jebel Ali disrupted the supply of critical chemical feedstocks like Monoethylene Glycol (MEG) and Industrial Methanol, which are essential inputs for India's plastic, packaging, and textile manufacturing corridors.

• **Downstream Industrial Impacts: The Aluminium Sector**

The downstream metallurgical sector highlights the direct impact of upstream supply disruptions on domestic manufacturing operations. India's midstream and downstream aluminium industries depend on the GCC region for raw materials. Table 3 illustrates how the disruption of these supply chains has impacted downstream capacity utilization rates across different processing segments.

**Table 3: Downstream Aluminium Capacity Utilization and Sourcing Deficits**

| Industrial Segment           | Pre-Conflict Utilization (%) | H1 2026 Utilization (%) | Primary Feedstock Source | Primary Factor for Reduction                       |
|------------------------------|------------------------------|-------------------------|--------------------------|----------------------------------------------------|
| Extrusion Profiles           | 88%                          | 58%                     | UAE / Qatar              | Lack of billet availability and high spot premiums |
| Rolled Foil & Packaging      | 85%                          | 64%                     | Bahrain / Domestic       | Inability to pass on import-parity price hikes     |
| Electrical Cables & Conduits | 79%                          | 50%                     | UAE / Oman               | Diverted domestic primary metal allocations        |
| Automotive Die-Castings      | 82%                          | 68%                     | GCC Secondary Scrap      | Disrupted maritime container logistics             |

The loss of access to primary aluminium and feedstock metals from traditional suppliers like Qatar (17.4% of total imports), Bahrain (12.12%), and the UAE (10.1%) caused a 40% to 50% drop in overall downstream capacity utilization. These downstream operations are primarily composed of approximately 10,000 micro, small, and medium enterprises (MSMEs). Squeezed between higher raw material prices due to import-parity pricing and the sudden halt of physical supply lines, these smaller enterprises have been forced to cut production volumes significantly.

#### 4. Data Findings and Discussion

The empirical data demonstrates that contemporary geopolitical conflicts do not just create isolated, sector-specific problems; they create cascading issues that move through entire supply chain networks.

- **The Multiplier Effect of Interdependent Supply Chains**

The primary finding of this study is the speed at which an initial energy bottleneck transforms into a broader manufacturing and cost crisis across the Indian economy. focusing narrowly on retail fuel prices misses the real scope of the problem. For example, the disruption of the Strait of Hormuz cut off shipments of sulfur and urea. This shortage immediately inflated the cost of domestic fertilizer production, raising fertilizer intensity costs per dollar of agricultural output. This pressure then flows directly into the financial planning for upcoming crop cycles.

In the consumer goods sector, the increase in petroleum prices caused an automatic, correlated jump in the price of synthetic packaging intermediates like MEG. Because FMCG manufacturing depends on predictable packaging material costs, this change led to a 15–25% rise in prime manufacturing costs. This proves that energy chokepoints act as economic multipliers, influencing seemingly unrelated sectors like retail packaging and consumer electronics.

- **Industrial Asymmetry: Upstream Profits vs. Downstream Vulnerabilities**

The research reveals a sharp structural divide between asset-heavy upstream producers and downstream manufacturers within the Indian industrial system. While upstream oil and primary metal producers can adjust to rising costs through import-parity pricing models, downstream MSMEs lack the market leverage to pass these cost increases on to final consumers.

This is particularly evident in the downstream aluminium and plastics sectors. Upstream primary metal producers maintained their margins by aligning domestic prices with global spot market rates, which were inflated by the closure of the Strait of Hormuz. Downstream MSMEs, however, faced a severe margin squeeze. They had to pay inflated prices for domestic raw materials while competing against finished foreign imports that benefited from lower tariff structures in their home markets. This dynamic leads to structural capacity underutilization, as seen in the 50% drop in capacity utilization in the electrical cables and conduits segment.

- **The Value of Built-In Infrastructure Redundancy**

The data shows that India avoided widespread energy shortages primarily because of long-term investments in infrastructure flexibility and redundancy rather than short-term emergency procurement.

**Refinery Adaptability:** India's 24 major domestic refineries reconfigured their processing units within weeks of the initial shock, allowing them to shift from high-sulfur Gulf crude to alternative regional oil profiles. This operational agility increased the share of crude sourced from non-Hormuz routes from 55% to 70% by April 2026.

**Import Infrastructure:** Over the past decade, India expanded its LPG import infrastructure from 11 terminals to 22. This network expansion proved vital for maintaining supply continuity. When traditional shipping lanes were blocked, these 22 terminals allowed logistics managers to split incoming shipments across different coastlines, preventing major disruptions in domestic cooking gas networks.

#### 5. Recommendations

To protect Indian supply chain operations from ongoing regional conflicts and long-term maritime vulnerabilities, a coordinated set of policy changes and operational updates is required across key industrial sectors.

### **I. Energy and Petrochemicals Sector**

- **Recommendation 1: Build Non-Chokepoint Strategic Petroleum Reserves (SPR)**

Accelerate phase two of India's SPR program by constructing underground salt-cavern storage facilities along the eastern coast (e.g., Chandikhole) and inland areas. This strategy will expand national crude reserves beyond the current 60-day baseline without adding to traffic around Western maritime chokepoints.

- **Recommendation 2: Standardize Feedstock Agnostic Refining Units**

Establish a national policy framework that requires all future refinery expansions to install advanced fluid catalytic cracking units (FCCUs) capable of processing diverse crude viscosities and chemical feedstock types, reducing dependence on specific regional suppliers.

- **Recommendation 3: Build Alternative Overland Hydrocarbon Pipelines**

Form long-term diplomatic partnerships to invest in cross-border overland pipeline networks that bypass maritime chokepoints, connecting Central Asian energy fields directly to northern Indian manufacturing hubs.

### **II. Agriculture and Food Processing Sector**

- **Recommendation 4: Diversify Sourcing for Mineral and Chemical Fertilizers**

Shift long-term supply contracts for finished urea, potash, and sulfur away from volatile zones toward stable producing regions in North America, North Africa, and domestic production facilities.

- **Recommendation 5: Accelerate Transition to Precision Nano-Fertilize**

Provide direct government subsidies to transition the agricultural sector toward nano-urea and nano-DAP technologies. This policy will reduce total bulk fertilizer import requirements and lower overall fertilizer intensity costs for farmers.

### **III. Automobile and Heavy Manufacturing Sector**

- **Recommendation 6: Establish Dual-Sourcing Requirements for**

Mandate that tier-1 automotive suppliers maintain active sourcing arrangements with at least two geographically distinct component manufacturers for critical semiconductor and wire-harness assemblies, avoiding single-point failures in Eastern European or East Asian corridors.

- **Recommendation 7: Shift to Multi-Modal Inland Freight Corridors**

Transition industrial logistics from a reliance on coastal shipping to the Dedicated Freight Corridors (DFCs) of the Indian Railways, protecting domestic industrial supply chains from international ocean freight rate volatility.

### **IV. FMCG and Retail Sector**

- **Recommendation 8: Adopt Recycled and Bio-Based Packaging Alternatives**

Fund research and development into bio-based plastics and recycled polymers to lower the FMCG sector's dependence on imported petroleum-derived chemical feedstocks like Monoethylene Glycol (MEG).

- **Recommendation 9: Implement Real-Time IoT Supply Chain Tracking Systems**

Deploy integrated IoT tracking networks across domestic retail logistics to provide real-time visibility into transit delays, enabling automated warehouse rebalancing during transport disruptions.

### **V. Downstream Metallurgy and Infrastructure Sector**

- **Recommendation 10: Adjust Tariff Structures to Protect Downstream MSMEs**

Lower the basic customs duty on primary aluminum imports from 7.5% to a competitive 2-3% range. This change will bring input costs for downstream MSMEs in line with international standards and protect domestic manufacturing margins.

• **Recommendation 11: Create National Scrap and Secondary Metal Pooling Frameworks**

Establish regional recycling and scrap metal collection hubs to increase the availability of secondary domestic industrial feedstocks, reducing the manufacturing sector's dependence on primary metal imports from conflict-prone areas.

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