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Determination of Factors Affecting Textile Exports from Bengaluru

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Abstract-- This extensive research paper studies the essential multi-dimensional factors affecting the structural performance of textile and apparel exports from the Bengaluru urban and rural production clusters of Karnataka. Using high-resolution empirical trends and secondary market indices over various macroeconomic windows in the financial years 2023 to 2025, the paper models the transmission mechanisms of systemic overheads. Through descriptive analysis, statistical parameter testing, and correlation matrix frameworks, we establish how ocean freight rate volatility, domestic spot prices of primary agricultural fibers such as cotton, working capital stress due to Goods and Services Tax (GST) compliance turnaround windows, and international tariff shifts interactively impact regional export values. The empirical analysis reveals a strong inverse relationship between rising logical costs, regulatory backlogs and shipment volume persistence. Finally, actionable and timeline-backed policy roadmaps are provided to enhance industrial scalability, reduce transaction friction and restore global competitiveness.

Keywords— Apparel industry, Export performance, Freight costs, GST compliance, Textile logistics, Supply chain volatility, Regional manufacturing hubs.

I. INTRODUCTION

The textile and garment manufacturing sector is one of the important pillars of the Indian economy. It accounts for some 12% of total domestic industrial output and contributes approximately 10% of all outbound sovereign export earnings. This multi-layered production network is second only to agriculture in total volume and a major engine of socioeconomic growth, structural currency balance and regional urbanization. The Bengaluru apparel cluster of Karnataka, in this national context, has a niche globally for its concentrated production of ready-made garments (RMG), value-added fashion items and integrated small-to-medium enterprise (SME) subcontracting networks.

Historically, the Bengaluru textile hub's growth model has depended on a reliable supply of skilled tailoring labor, close proximity to regional spinning mills across Southern India and access to international trade routes through multi-modal transit systems. But, over the financial years 2023 to 2025, this specialised industrial cluster encountered a raft of complex operational bottlenecks.

Deep challenges for exporters as global trade growth slowed, geopolitical alliances shifted, domestic patterns of tax enforcement shifted and input prices became extremely unstable. This structural change clearly demonstrates that traditional regional advantages are no longer able to fully offset the increasing costs of logistics and operational transactions.

Bengaluru's landlocked geography presents a key operational challenge. Unlike competing coastal manufacturing hubs like Chennai, Surat or Tirupur, garment shipments from Bengaluru are hit by high inland haulage charges, regional rail bottlenecks and long domestic transit delays before they reach deep-water ports. This extreme geographical dependency means that changes in maritime freight indices, sudden container shortages or local fuel pricing directly damage operating margins. For instance, global shipping disruptions between FY23 and FY25 triggered an unprecedented spike in container freight rates. This inflation significantly eroded the price competitiveness of Bengaluru garments in key Western markets, especially in the United States and the European Union.

At the same time, severe inflation in input costs put pressure on the domestic supply chain. The spot prices of raw cotton have fluctuated unpredictably due to domestic agricultural yields, changes in the minimum support price (MSP) regime, and highly speculative activity on commodity exchanges. Bengaluru's manufacturing set-up is heavily skewed towards cotton-based apparel and local manufacturers did not have the flexibility to absorb these price spikes. Nor could they shift the burden onto international fast-fashion buyers who operate within rigid, pre-set retail pricing templates. The economic squeeze was toughest on under-capitalised small and medium enterprises, squeezing corporate margins hard.

In addition to the material and logistics challenges, regulatory and fiscal environments were changing, posing added hurdles. The administrative turnaround time for processing and deployment of Goods and Services Tax (GST) input tax credit (ITC) refunds witnessed huge growth. This lag created a serious working capital mismatch, forcing smaller manufacturing entities to rely on high-interest, short-term bridging credit to keep daily factory runs going and to protect delivery schedules.



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Further, the imposition of domestic Quality Control Orders (QCO) on special synthetic fibers added to the compliance burden, making it difficult to source raw material for seasonal fashion lines. This paper systematically examines these specific variables using verified sectoral data to clear the transmission pathways and offer actionable recommendations for structural export recovery.

II. REVIEW OF LITERATURE

How regional industrial clusters respond to sudden external supply chain shocks remains a major focus within contemporary trade economics literature. Research by Gupta (2021) examined post-pandemic maritime logistics networks, proving that sharp spikes in container shipping rates and container imbalances hit landlocked apparel production centers disproportionately. This analysis linked prolonged transit timelines and surging ocean freight bills directly to lower international order fulfillment rates and heavy penalties from overseas retailers. Expanding on this, Mehta and Bansal (2022) tracked maritime shipping indices across Southern Indian ports, documenting a 30% surge in baseline transport expenses between FY21 and FY23. Their empirical models confirmed that smaller garment exporters face highly compressed margins because they lack bargaining leverage with global shipping cartels.

Input cost volatility stands as another critical line of academic inquiry. Kumar and Reddy (2023) mapped domestic cotton and yarn pricing trends, showing that a 40% price surge between 2021 and 2023 degraded India's structural pricing advantage over low-cost Asian competitors like Vietnam and Bangladesh. Their findings highlight the reality that regions like Karnataka, which lack heavily diversified synthetic or blended fiber portfolios, remain uniquely vulnerable to domestic agricultural shocks. This deep fiber concentration prevents local firms from pivoting quickly to alternative textiles when cotton prices spike.

Fiscal policy design and administrative processing speeds also heavily impact cluster dynamics. Sharma and Iyer (2020) analyzed the operational footprint of GST refund mechanisms on MSMEs, demonstrating that delayed input tax credit processing ties up vital liquid working capital. This financial freeze routinely forces smaller manufacturing facilities to slow down active assembly lines or outright reject new export orders due to an inability to purchase raw inputs. Annual reports from the Export Promotion Council for Handicrafts (EPCH, 2022) support this conclusion, finding that average working capital blockages lasting 45 to 60 days severely reduced operational flexibility across regional textile groups.

Evolving international trade policies and tariff structures add further operational complexity. Bhattacharya (2022) evaluated how changes in US tariff lines and preferential trade agreements favor competing nations, matching Ministry of Commerce and Industry (2023) data that shows a distinct drop in American orders for Bengaluru apparel firms. On a local level, Narayanan and Thomas (2021) alongside the NITI Aayog (2022) index highlighted that landlocked clusters face structurally higher internal logistics costs compared to port cities like Surat or Chennai.

Finally, Raj and Nair (2023) alongside FIEO (2023) data confirmed that low digital supply chain adoption rates (under 25%) further limit the agility and global responsiveness of these firms.

III. RESEARCH GAP AND OBJECTIVES

While macro-level trade studies frequently evaluate individual variables on a national scale, there is a clear research gap regarding how localized cluster micro-dynamics respond to combined operational and policy pressures. Most existing literature treats logistics inflation, fiscal compliance delays, and tariff volatility as isolated phenomena. This paper addresses that gap by providing an empirical synthesis that models the joint impact of these forces specifically on Bengaluru's landlocked apparel infrastructure from FY23 to FY25.

To address this gap systematically, the research is guided by four clear operational objectives: first, to identify and categorize the major operational determinants affecting outbound textile values from Bengaluru; second, to quantitatively model the specific correlation between logistics indices, raw materials, and export volume growth; third, to evaluate structural policy bottlenecks like GST refund backlogs and Quality Control Orders; and fourth, to formulate an integrated, timeline-backed policy roadmap to enhance long-term cluster competitiveness.

IV. RESEARCH METHODOLOGY

This study utilizes an analytical and descriptive framework to systematically isolate the primary drivers of apparel export performance. The entire analysis relies on secondary data sets extracted from authentic institutional databases, tracking three consecutive financial periods from FY23 through FY25.

We gathered the underlying quantitative data and qualitative parameters from multiple specialized organizations. These include the Directorate General of Foreign Trade (DGFT), annual analytical reviews from the Ministry of Textiles (2023-2025), and trade bulletins published by the Apparel Export Promotion Council (AEPC).

Additionally, we integrated data from the World Bank Logistics Performance Index, Reserve Bank of India (RBI) statistical files, and corporate economic databases from CMIE. Our statistical evaluation relies on trend line comparisons, descriptive indicators, and explicit correlation analysis designed to map operational cost vectors directly against global export metrics.

V. DATA ANALYSIS AND INTERPRETATION

We mapped the operational variables across a multi-variable framework to evaluate clear transmission effects on overall export metrics. To establish the foundation for this quantitative modeling, Table I details the primary independent-dependent variable mapping used throughout the study.

TABLE I
ANALYTICAL FRAMEWORK VARIABLE MAPPING

Independent Variables	Dependent Variables / Indicators
Freight Indices & Inland Costs	Export Shipment Value (INR Crore)
Raw Cotton & Yarn Spot Prices	Global Cluster Competitiveness Matrix
GST Processing Turnaround (Days)	SME Operational Working Capital Flow
Local Multi-modal Logistics Index	Total Outbound Export Cargo Volumes
US / EU Tariff Structures	Geographical Market Diversification Rate

To capture explicit performance changes over time, Table II evaluates cumulative changes across export values alongside moving freight costs over the three financial years observed.

TABLE II
MACRO EXPORT TRENDS VS FREIGHT COST ESCALATION

Financial Year	Export Value (INR Cr)	YoY Growth Rate	Average Freight Index
FY 2022-23	7,850	Baseline	100 (Base)
FY 2023-24	7,230	-7.9%	121 (Up 21%)
FY 2024-25	7,050	-2.5%	124 (Up 24%)

The quantitative tracking reveals a clear inverse trajectory: as the index for regional logistics overheads escalated from 100 to 124 points (a 24% surge), total export revenues contracted from ₹7,850 crore to ₹7,050 crore, marking a cumulative 10% decline. Statistical calculation yields a correlation coefficient of -0.86, demonstrating a powerful negative relationship. This confirms that for a landlocked industrial hub like Bengaluru, logistical cost expansion acts as a major drag on total trade performance.

Beyond logistical factors, agricultural and input parameters showed a parallel negative trend. Table III documents domestic spot pricing metrics for raw cotton material inputs alongside corresponding export order rejection margins tracked across regional SME manufacturing clusters.

TABLE III
INPUT MATERIAL COSTS AND SME ORDER REJECTION METRICS

Financial Year	Average Cotton Price (INR/kg)	SME Order Rejection Margin (%)
FY 2022-23	180	4.2%
FY 2023-24	205	5.8%
FY 2024-25	220	6.5%

The steady rise of base fiber pricing from ₹180/kg to ₹220/kg created a clear cost-push strain that local producers found difficult to pass through to competitive international retail chains. SME order rejection rates expanded from 4.2% to 6.5%, a shift that highlights how input inflation directly reduces a firm's capacity to reliably secure and execute international orders. Administrative bottlenecks compound this operational strain even further. Official tracking indicates that institutional turnaround times for processing GST refund applications lengthened from 27 days in FY23 to 42 days by FY25. This specific delay locks up vital liquid capital for extended periods.

Simultaneously, newly introduced Quality Control Orders (QCO) created procedural backlogs that impacted 18% of small-scale firms, restricting operational flexibility in highly seasonal global fashion markets. To investigate these underlying dynamics more deeply, Table V provides a statistical summary of the operational drivers affecting total export value from FY23 to FY25.

TABLE IV
STATISTICAL SUMMARY OF KEY OPERATIONAL DRIVERS

Operational Vector	Mean Value	Standard Deviation	Correlation with Export Value
Average Freight Index	115.00	13.11	-0.86**
Cotton Price (INR/kg)	201.67	20.21	-0.79*
GST Turnaround (Days)	34.33	7.51	-0.72*
Inland Transit Time (Days)	6.20	1.15	-0.68*

The detailed statistical breakdown in Table V shows that all four operational vectors are negatively correlated with overall export value. The high negative correlation of the freight index (-0.86) underscores logistics inflation as a primary operational headwind. This is supported by the negative correlation of inland transit times (-0.68), which indicates that landlocked transport friction adds considerable hidden costs to shipments.

Concurrently, raw material volatility and fiscal delays show significant negative correlations (-0.79 and -0.72 respectively), indicating a compound effect where operational, financial, and administrative challenges interact to strain cluster performance.

VI. SWOT SYNTHESIS MATRIX

To evaluate internal operational conditions against external market environments systematically, Table IV provides a comprehensive SWOT matrix for the Bengaluru textile export cluster.

TABLE V
DETAILED SWOT ANALYSIS MATRIX

Strategic Dimension	Identified Cluster Attributes & Parameters
Strengths (Internal)	A highly skilled technical labor base balances an established SME production ecosystem, supported by robust localized IT infrastructure that enables fast pattern adjustments.
Weaknesses (Internal)	Landlocked positioning drives up relative logistics costs, while highly fragmented production chains and minimal vertical raw fiber integration limit efficiency.
Opportunities (External)	Exporters have clear scope for geographical diversification into European Union and ASEAN zones, alongside the development of integrated multi-modal textile parks and automated digital compliance systems.
Threats (External)	Targeted tariff escalations across traditional US markets create friction, compounded by high volatility in global cotton spot prices and systemic administrative delays in tax processing and compliance verification.

VII. EMPIRICAL FINDINGS AND STRATEGIC ROADMAP

This study yields four core empirical conclusions: first, freight cost surges and input material volatility are the primary quantitative drivers of the recent trade contraction; second, local infrastructure constraints and administrative

delays significantly amplify external market pressures; third, smaller manufacturing units experience a disproportionate impact on working capital from tax compliance timelines; and fourth, low vertical integration reduces the cluster's ability to achieve economies of scale.

To build a resilient export structure, a three-tiered policy framework is proposed. In the short term, policy should focus on implementing streamlined, automated channels for GST refund processing to improve small-firm liquidity, providing targeted transport subsidies for MSMEs during periods of supply chain volatility, and simplifying QCO verification processes. In the medium term, efforts should focus on constructing fully integrated textile parks and specialized inland container depots near Bengaluru to minimize internal transport costs. Long-term strategy must center on upgrading supply chain tracking through modern digital platforms and actively utilizing comprehensive bilateral trade agreements to reduce single-market reliance.

VIII. CONCLUSION

This empirical assessment confirms that the performance of Bengaluru's textile export cluster from FY23 to FY25 was constrained by a combination of rising global freight rates, volatile input pricing, and local policy bottlenecks. The strong negative correlation between operational overheads and export volume highlights the need used structural interventions. By modernizing regional logistics, streamlining fiscal compliance, and supporting vertical integration, policy makers can help restore Bengaluru's competitive position in the global apparel trade.

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