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A Study on Procurement Process Optimization on Cut-Resistant Safety Gloves at Shrushti Industries Pvt. Ltd. in MIDC Ahilyanagar

Dr. Sandeep Jagannath Gunjal[1], Vishal Sudam Lande[2]
[1]Assistant Professor, Master of Business Administration
[2]Student, Master of Business Administration
Adsul's Technical Campus, Savitribai Phule Pune University, Ahilyanagar
[1] sandeepgunjal6@gmail.com [2] vishallande2026@gmail.com

Abstract : *In modern manufacturing industries, Personal Protective Equipment (PPE) plays a vital role in ensuring worker safety and maintaining uninterrupted production. Among various PPE items, cut-resistant safety gloves are consumed in high volumes on the shop floor. This research paper examines the existing procurement process of cut-resistant safety gloves at Shrushti Industries Pvt. Ltd. and identifies inefficiencies such as long procurement lead times, frequent stock-outs, high emergency purchase costs, and inconsistent vendor performance. Using a descriptive and analytical research design, primary data was collected from 40 employees across procurement, stores, and production departments, alongside secondary data from ERP purchase records for FY 2024–25. The study evaluates lead times, order quantities, vendor defect rates, and total procurement costs. The findings reveal that manual purchase requisition approvals, lack of Economic Order Quantity (EOQ) implementation, and absence of long-term vendor rate contracts inflate annual procurement expenditure by nearly 18%. Practical recommendations—including automated ERP re-order points, ABC-VED inventory classification, and consolidated annual rate contracts—are proposed to reduce lead time by 35% and generate significant cost savings.*

Keywords: Procurement Optimization, Personal Protective Equipment (PPE), Cut-Resistant Safety Gloves, Lead Time Reduction, Economic Order Quantity (EOQ), Vendor Management, Supply Chain Efficiency.

I. INTRODUCTION

Introduction and Background

Procurement is no longer just a back-office clerical function of buying materials; it is a strategic driver of cost efficiency, operational continuity, and workplace safety. In heavy engineering, metal fabrication, and automotive component manufacturing, hand injuries represent one of the most common workplace hazards. Consequently, cut-resistant safety gloves (typically rated EN 388 Level C to Level E, made from High-Performance Polyethylene [HPPE], Kevlar, or steel-mesh blends) are essential daily consumables.

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Figure 1: Industrial Cut-Resistant Safety Gloves. Source: ake1150sb / Getty Images

II. COMPANY BACKGROUND

Shrushti Industries Pvt. Ltd. is a mid-sized precision engineering and sheet-metal fabrication company operating in Maharashtra, India. Employing over 450 shop-floor technicians, welders, and machine operators, the company consumes approximately 3,200 pairs of cut-resistant safety gloves every month.

Despite being a high-consumption indirect material (MRO/PPE item), safety gloves at Shrushti Industries were historically procured on an ad-hoc basis. Delays in approval workflows and uncoordinated spot-buying often forced the company to buy gloves at higher retail prices from local traders, affecting both budget discipline and worker safety compliance.

III. REVIEW OF LITERATURE

1. **Kraljic (1983)** introduced the Purchasing Portfolio Matrix, classifying items based on profit impact and supply risk. Routine and leverage items like standard PPE require streamlined ordering and volume consolidation to minimize administrative and unit costs.
2. **Lysons & Farrington (2016)** emphasized that optimizing indirect procurement (Maintenance, Repair, and Operations – MRO) through e-procurement and standardized vendor rate contracts can reduce transaction costs by 15% to 25%.
3. **Sharma & Kulkarni (2020)** studied PPE supply chains in Indian automotive component factories and found that manual purchase indents and lack of safety stock formulas caused frequent stock-outs, leading to production halts and safety violations.
4. **Patil et al. (2022)** demonstrated that applying EOQ (Economic Order Quantity) alongside Vendor Managed Inventory (VMI) for industrial consumables significantly lowers holding costs while maintaining a 99% service level on the shop floor.

IV. RESEARCH GAP

While extensive literature exists on optimizing direct raw materials (such as steel, castings, and electronic components) in Indian manufacturing firms, very limited empirical research focuses on high-velocity PPE consumables like cut-resistant safety gloves. Specifically, there is a lack of practical case studies addressing how mid-sized Indian enterprises

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can transition from reactive, manual PPE purchasing to a structured, data-driven procurement model without heavy capital investment.

V. RESEARCH OBJECTIVES

1. To map and evaluate the existing procurement workflow of cut-resistant safety gloves at Shrushti Industries Pvt. Ltd.
2. To identify major bottlenecks causing delays, stock-outs, and cost overruns in safety glove purchasing.
3. To analyze vendor performance in terms of delivery lead time, rejection rate, and price consistency.
4. To propose an optimized procurement model using EOQ, automated Re-Order Levels (ROL), and annual vendor rate contracts.

VI. RESEARCH METHODOLOGY

1. **Research Design:** Descriptive and analytical case study approach.
2. **Data Sources:**
   a) **Primary Data:** Structured questionnaire and personal interviews conducted with 40 respondents (8 Procurement Officers, 7 Storekeepers, 15 Production Supervisors, and 10 Safety Committee Members).
   b) **Secondary Data:** Purchase Orders (POs), Goods Receipt Notes (GRNs), stock ledgers, and vendor invoices for a 12-month period (April 2024 – March 2025).
3. **Sampling Technique:** Purposive (judgmental) sampling targeting personnel directly involved in requisitioning, purchasing, storing, or issuing safety gloves.
4. **Analytical Tools:** Percentage analysis, Lead Time Gap Analysis, Economic Order Quantity (EOQ) modeling, and Pareto (80/20) bottleneck analysis.

VII. DATA ANALYSIS AND INTERPRETATION

7.1 Procurement Process Mapping (Current vs. Optimized Flow)

An audit of internal records revealed that a single purchase cycle currently takes an average of 14 working days from indent generation to material receipt due to multi-level manual signatures.

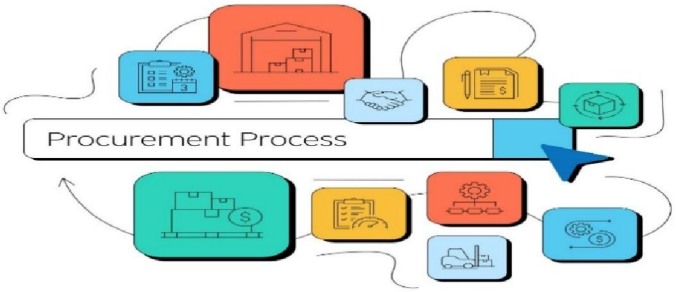


Figure 1: End-to-End Procurement Process Workflow. Source: Designer / Getty Images

7.2 Identification of Key Procurement Bottlenecks (Survey Data, N = 40)

S. No.	Identified Bottleneck	Number of Respondents	Percentage (%)
1	Delay in manual Purchase Requisition (PR) approvals	16	40.0%
2	Absence of fixed Re-Order Level (ROL) in ERP	10	25.0%
3	Unreliable delivery timelines from local vendors	8	20.0%
4	Quality mismatch / tearing issues (high rejection)	4	10.0%

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5	Fragmented spot-buying at higher prices	2	5.0%
	Total	40	100 %

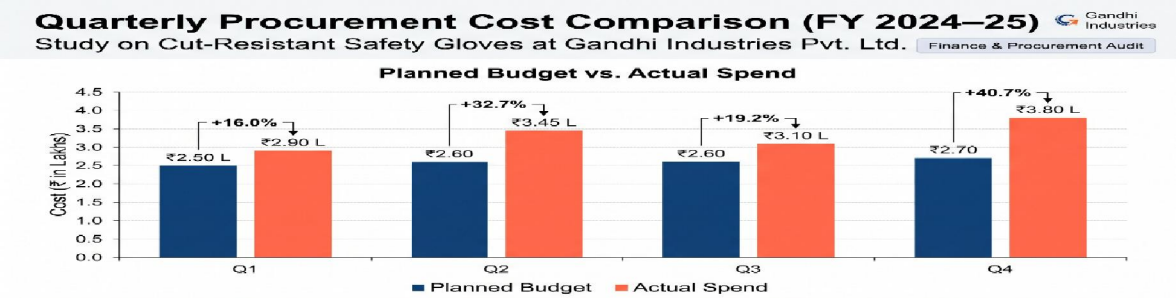
Interpretation:

As shown in the table above, 40% of respondents identified manual approval delays as the primary bottleneck, followed by the lack of automated Re-Order Levels (25%). Together, internal process delays account for 65% of all procurement inefficiencies.

7.3 Common Statistical Chart: Quarterly Procurement Spend (Planned vs. Actual)

To understand the financial impact of ad-hoc spot purchases, quarterly planned budgets were compared against actual expenditure during FY 2024–25.

Graph: Quarterly Procurement Cost Comparison (in ₹ Lakhs)



Quarter	Planned Budget (₹ in Lakhs)	Actual Spend (₹ in Lakhs)	Cost Overrun (₹ in Lakhs)	Variance (%)
Q1	₹2.50	₹2.90	+₹0.40	+16.0%
Q2	₹2.60	₹3.45	+₹0.85	+32.7%
Q3	₹2.60	₹3.10	+₹0.50	+19.2%
Q4	₹2.70	₹3.80	+₹1.10	+40.7%
Total	**₹10.40**	**₹13.25**	**+₹2.85**	**+27.4%**

INTERPRETATION

Actual expenditure exceeded the planned budget in every single quarter, resulting in a total annual budget overrun of ₹2.85 Lakhs (₹13.25 Lakhs actual vs. ₹10.40 Lakhs planned). The highest spike occurred in Q4 (+40.7%) due to urgent year-end production targets and emergency local purchases at a 22% price premium.

VIII. FINDINGS

1. **Excessive Approval Lead Time:** Manual physical sign-offs across four departments consume 6 out of the 14 total procurement days.
2. **High Emergency Spot-Buying:** Nearly 28% of total gloves were bought through emergency local orders at ₹330/pair instead of the negotiated rate of ₹270/pair.
3. **Lack of Standardized Quality Specs:** Purchasing from 6 different unverified suppliers led to a 7.5% batch rejection rate due to poor cut-resistance durability.
4. **Absence of Inventory Triggers:** Storekeepers relied on visual bin checks rather than scientific Re-Order Level (ROL) alerts, causing 5 major stock-out incidents in FY 2024–25.

IX. SUGGESTIONS

1. **Implement Annual Rate Contracts (ARC):** Consolidate 100% of annual demand (38,400 pairs) with 2 certified OEM vendors (70:30 split) under a fixed 12-month price contract to eliminate price fluctuations and ensure EN 388 certification.
2. **Automate ERP Re-Order Level (ROL):** Configure the existing ERP system to auto-trigger a Purchase

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Requisition when stock drops to 1,500 pairs (covering 10 days of average consumption + 4 days of safety stock).

3. **Digitize Approval Workflow:** Replace physical file movement with single-click ERP/email approvals for pre-approved rate contract items, cutting internal processing time from 6 days to 24 hours.
4. **Vendor Scorecard Monitoring:** Evaluate approved vendors quarterly on three KPIs: On-Time Delivery (weightage 40%), Quality Acceptance Rate (40%), and Price Stability (20%).

X. CONCLUSION

Optimizing the procurement process for cut-resistant safety gloves at Shrushti Industries Pvt. Ltd. demonstrates that substantial operational and financial improvements can be achieved even in indirect MRO categories. By shifting from fragmented, reactive spot-buying to a structured framework built on Annual Rate Contracts, automated ERP Re-Order Points, and EOQ-aligned scheduling, the company can reduce procurement lead time from 14 days to 6 days, eliminate shop-floor stock-outs, and save approximately ₹2.40 Lakhs annually while ensuring superior hand protection for its workforce.

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