

Assessing the Efficiency of Procurement Processes in Manufacturing Companies at Nagpur-MH

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Abstract:

The complete process by which businesses obtain goods and services to satisfy their demands is referred to as the procurement process in manufacturing companies. This procedure guarantees that businesses can obtain the required resources effectively and economically is essential to business operations. The complexity of the needs, the platforms being used, the procurement method, and the responsiveness of providers are the variables that affect how long the procurement process takes. For decades, practitioners, scholars, and researchers have paid close attention to procurement performance because of poor performance caused by a lack of respect for proper processes and procedures. The subject of this study is the effectiveness of procurement procedures in manufacturing firms in Nagpur, Maharashtra, an area known for its quick industrial development and strategic significance in India's supply chain network. The synchronization of owners' strategic vision, managers' operational oversight, and employees' process execution are crucial for evaluating procurement efficiency in Nagpur's manufacturing companies. Their combined efforts promote a simplified procurement process that improves supply chain resilience and cost-effectiveness in the corporate sector. Understanding that preserving competitive advantage depends on procurement efficiency, the study examines important procurement performance indicators, pinpoints common problems, and assesses risk management tactics in this industry. Tata-AiRbus Project was migrated to Vadodara, Gujarat due to political instability in Maharashtra. Similarly, Bulk Drug Park and Medical Device Park migrated to Orissa due to delayed approvals and inadequate follow-up by Maharashtra's administration. The results show that a variety of factors, such as supplier delays, pricing volatility, and logistical challenges exacerbated by current global supply chain disruptions, affect the effectiveness of procurement. The study aims to provide a more robust procurement strategy that is in line with the changing needs of Maharashtra's manufacturing industry.

Keywords:- Procurement Efficiency, Manufacturing companies, Nagpur-Maharashtra, Supply Chain, Risk Management, Procurement Challenges, Global Supply Chain, geopolitical tensions.

Aim:-

To evaluate and optimize the procurement processes of manufacturing companies in Nagpur, Maharashtra, to enhance operational efficiency, mitigate risks, and ensure resilience in the face of global supply chain challenges and evolving geopolitical tensions.

Objectives:-

1. To analyze current procurement practices and metrics used in Nagpur-based manufacturing companies.

2. To identify the main challenges in the procurement process and how they impact operational efficiency.
3. To evaluate the impact of global supply chain risks and geopolitical factors, and tensions on procurement efficiency.

Introduction:-

Improving the operational and financial success of manufacturing companies, especially in Nagpur, Maharashtra's industrial hubs depends heavily on the effectiveness of procurement procedures. Nagpur, which is well situated in central India, has become a major force in the country's industrial sector, housing 6000-7000 industries from machinery and electronics to textiles, constructions, and chemicals. For major manufacturing firms, efficient procurement procedures are crucial since they have a direct impact on production schedules, cost control, and product quality [1]. When evaluating procurement efficiency in Nagpur's manufacturing sector, managers make sure that procurement activities are in line with business objectives, owners concentrate on the financial and strategic advantages, and staff manage daily procurement chores that promote cost-effectiveness and process reliability.

Several of factors, such as changing geopolitical conditions, increased regulatory requirements, and fluctuating raw material prices, have drastically altered the dynamics of global supply chains in the last 4-5 years. These difficulties have highlighted the necessity for Nagpur's manufacturers to evaluate and improve their procurement procedures to guarantee strong supplier relationships, inventory management, and effective logistics. The geopolitical tensions of 2024 have added another level of complexity, necessitating the use of risk management strategies that can help ensure the availability of essential resources and reduce the likelihood of supply chain disruptions [2].

Procurement is a strategic tool that promotes resilience and profitability rather than just being a supporting role. Procurement affects everything from production continuity to final product price and market competitiveness by guaranteeing the timely and economical acquisition of materials and resources. Effective procurement results in improved inventory control, shorter lead times, and more flexibility in meeting market demands for Nagpur's manufacturing companies. Given Nagpur's location within Maharashtra, a state that makes a large contribution to India's industrial output and GDP, the focus on the city's manufacturing sector is especially important. The city is a desirable location for manufacturing investments due to its accessibility to important markets and skilled labor pool. Nonetheless, issues including shifting commodity pricing, hiccups in logistics, and reliance on outside vendors draw attention to the procurement process's weaknesses [3]. Recent geopolitical tensions, such as disputes over international trade, have made these difficulties worse by upsetting supply chains and increasing the dangers of relying on foreign suppliers for essential resources.

Additionally, businesses must implement flexible and responsive procurement procedures due to the complexity of global supply chains. Therefore, assessing procurement efficiency in Nagpur's manufacturing sector necessitates careful analysis of both qualitative and

quantitative criteria, including supplier relationships and disruptive adaptability, as well as quantitative indicators like cost savings and delivery timelines [4]. By examining these factors, the study seeks to suggest tactics that can help Nagpur's manufacturing firms increase supply chain sustainability overall, save costs, and develop resilience.

Efficacy of Supply Chain:-

We concentrate on assessing a supply chain's performance, detecting inefficiencies, and implementing improvements to determine its effectiveness, particularly with regard to procurement in Nagpur's manufacturing companies. Maximizing cost, quality, and delivery entails examining workflows, supplier relationships, and technology adoption.

Key Parameters:

1. **Procurement Cycle Time:** Calculates how long it takes to place an order and have it delivered.
2. **Supplier Reliability:** Assesses the regularity and caliber of supplier output.
3. **Cost Efficiency:** Monitors procurement expenses about benchmarks and budgets.
4. **Inventory turnover:** It measures the effectiveness of the stocking and use of materials.
5. **On-Time Delivery:** Guarantees that manufacturing schedules are followed.
6. **Technology Utilisation:** Evaluates how well automation and ERP solutions are integrated.
7. **Risk management:** Evaluate the capacity to successfully manage supply chain interruptions.
8. **Sustainability:** Considers environmental impact and ethical sources.

Businesses may develop a strong evaluation framework for improving supply chain efficiency by combining these factors.

Impact of Risk Factors on Efficacy of a Supply Chain:-

Risk factors have a major effect on a supply chain's effectiveness by interfering with its seamless operation and influencing timeliness, quality, and cost. Important effects include:

1. **Operational Delays:** Production can be stopped by supply chain disruptions like material shortages or transportation problems, which can impact delivery schedules.
2. **Increased Cost:** Budget overruns are caused by changes in raw material prices and ineffective procurement practices.
3. **Quality Compromise:** Relying on dubious sources could lead to inferior materials, which would lower the quality of the final product.
4. **Reputation Damage:** Consistently breaking promises can erode consumer confidence and damage a brand's reputation.
5. **Decreased Competitiveness:** A loss of market position results from ineffective risk management, which limits flexibility.

Important Terms:-

- 1. Procurement Efficiency:** The term "procurement efficiency" describes how well a company controls its purchasing procedures to minimize costs, shorten lead times, preserve quality, and further corporate objectives.
- 2. Manufacturing Companies:** Manufacturing companies create goods by turning components, pieces, or raw materials into completed goods. They use a lot of manufacturing methods, including machining, assembly lines, and chemical processing, to make everything from industrial apparatus and equipment to consumer goods like electronics and apparel.
- 3. Supply Chain:** The entire system used to produce and transport goods or services to final customers is known as the supply chain. It includes several phases, such as procurement of raw materials, production, distribution, logistics, and retail [5].
- 4. Risk Management:** The process of recognizing, evaluating, and ranking risks that might influence a project, operation, or organization is known as risk management.
- 5. Procurement Challenges:** The term "procurement challenges" describes the typical barriers that businesses have while trying to source and acquire goods and services economically and efficiently.
- 6. Global Supply Chain:** An integrated network of manufacturers, suppliers, warehouses, distribution hubs, and retailers operating across several nations to produce and transport goods and services is known as a global supply chain.
- 7. Geopolitical Tensions:** Conflicts or power struggles between countries or areas are referred to as geopolitical tensions [6]. These conflicts are frequently fuelled by conflicting goals like political influence, economic dominance, territory disputes, or ideological disagreements.

Methods:-

A mixed-approach strategy has been used, incorporating qualitative interviews with procurement managers and quantitative research of procurement data.

Data Collection:

Primary Data: To obtain information on procurement procedures, cycle times, cost savings, supplier performance, and risk mitigation, procurement managers participated in semi-structured interviews and formal surveys.

Secondary Data: To obtain further context, procurement records, business performance reports, and trade journals are analyzed.

Sampling: To guarantee a range of viewpoints, we use stratified random sampling to choose procurement departments from 20–22 manufacturing companies in important industries (such as Textile, Automotive, and Construction).

A wide range of manufacturing businesses may be found in Nagpur, Maharashtra, especially in sectors like construction, automotive, and textiles. Here are a few noteworthy examples:

Textile Industry: With businesses like Morarjee Textiles, Umiya Textiles, Decora Textiles, Hindusthan Textiles, Indorama Synthetics, and Raymond UCO Denim, Nagpur is a burgeoning textile powerhouse. These businesses, which concentrate on premium textiles and

environmentally friendly production methods, are located in places like the Butibori Industrial Area and the MIHAN-SEZ (Special Economic Zone).

Automotive Industry: Mahindra, Tata Motors, Nexa, Rohit Automobiles, Maruti Suzuki Arena, Force Motors, Bhagya Automobiles, and CEAT are some of the major companies in the automotive industry. These businesses produce automobiles, tires, and associated parts and make major contributions to the technological advancement and economic growth of the area.

Construction and Associated Industries: Businesses in Nagpur that offer automation, material handling, and manufacturing engineering solutions include Rachana Constructions, HKGN Constructions, Dhuni Constructions, Elite, Electus Technologies, Smark Automation, Siemens, and TAL Manufacturing Solutions. We got all the data related to the research through National Sample Survey of India [7].



Fig:- Block Diagram of Procurement Process in Manufacturing Companies in Nagpur
Computations of Procurement Processes in Manufacturing Companies in Nagpur:-

1. Lead Time:

Lead Time (LT) is generally calculated using the following formula:

$$LT = \text{Order Processing Time (OPT)} + \text{Transit Time (TT)} + \text{Receiving and Inspection Time (RIT)} + \text{Administrative Time (AT)}$$

$$\text{OPT} = 4 \text{ days, TT} = 6 \text{ days, RIT} = 2 \text{ days, AT} = 1 \text{ day}$$

$$\text{Total Lead Time} = 4 + 6 + 2 + 1 = 13 \text{ days.}$$

2. Procurement Cost Analysis:

Cost analysis in procurement involves direct material costs, procurement process costs, and additional costs such as shipping, taxes, and handling fees. It helps in identifying cost-saving opportunities [8].

$$\text{Total Procurement Cost} = \text{Direct Material Cost} + \text{Procurement Process Cost} + \text{Additional Costs}$$

Direct Material Cost per unit = 500 rs
Procurement Process Cost = 100 rs per order
Additional Costs = 50 rs per order.
For an order of 100 units:
Total Cost = $(500 \times 100) + 100 + 50 = 50,150$ rs.

3. Supplier Performance Index (SPI):

One important statistic for assessing supplier effectiveness, quality, and compliance with requirements in procurement procedures is the Supplier Performance Index (SPI). It assists in determining whether a supplier is providing value and fulfilling the requirements necessary for a smooth and successful procurement process.

$$\text{SPI} = \frac{\text{Total Purchases from Supplier} + \text{Non-Compliance Cost}}{\text{Total Purchases from Supplier}}$$

Total Purchases from Supplier: The sum of all purchases made from the supplier over a specific period, expressed in monetary terms.

Non-Compliance Cost: The costs incurred as a result of the supplier's noncompliance with established standards. This covers expenses resulting from missed deliveries, faulty goods, or noncompliance with contractual duties.

Total Purchase value from a supplier = 300,000 rs

Non-Compliance Cost = 30,000 rs.

$$\text{SPI} = \frac{300,000 + 30,000}{300,000} = 1.1$$

4. Order Accuracy Percentage:

Order accuracy measures the percentage of orders that are fulfilled without errors, essential for minimizing returns, delays, and additional costs.

$$\text{Order Accuracy (\%)} = \left(\frac{\text{Number of Accurate Orders}}{\text{Total Orders}} \right)$$

If 92 out of 100 orders were accurate:

$$\text{Order Accuracy (\%)} = \left(\frac{92}{100} \right) \times 100 = 92\%$$

5. Risk Analysis:

Risk analysis identifies and evaluates potential disruptions in procurement due to geopolitical issues, supplier reliability, or economic factors [9].

Risk Score = Likelihood of Risk \times Impact of Risk

Likelihood of Risk: Probability of a particular risk occurring, scored on a scale of 1 to 5, where 5 represents very high and 1 represents very low.

Impact of Risk: Severity of consequences if the risk occurring, scored on a scale of 1 to 5, where 1 represents negligible and 5 represents catastrophic.

If the likelihood of a supply chain disruption due to geopolitical tensions is 5 (high) and its impact on procurement is 6 (severe):

Risk Score = $5 \times 6 = 30$

Table 1: Risk Analysis Matrix

Impact of Risk	1 (Minimal)	2 (Low)	3 (Moderate)	4 (High)	5 (Severe)	6 (Critical)
Likelihood						
1 (Very Low)	1	2	3	4	5	6
2 (Low)	2	4	6	8	10	12
3 (Moderate)	3	6	9	12	15	18
4 (High)	4	8	12	16	20	24
5 (Very High)	5	10	15	20	25	30

Interpretation:

Low Risk (1-9): Monitor but no immediate action required.

Moderate Risk (10-15): Develop Contingency Plans.

High Risk (16-25): Immediate mitigation strategies needed.

Critical Risk (26-30): Top priority, requires urgent action.

Table 2: Parameters

Sr No	Parameters	Values
1	Lead Time	13 days
2	Procurement Cost Analysis	50,150 rs
3	Supplier Performance Index (SPI)	1.1
4	Order Accuracy Percentage	92%
5	Risk Analysis	30

Results and Discussions:-

Local suppliers offered shorter lead times than those outside of Maharashtra, according to the average lead time across different procurement categories (such as raw materials and packaging), which varied significantly based on the suppliers' location. The cost analysis found that supplier non-compliance penalties and higher logistical costs were the main causes of cost overruns. Lower non-compliance costs indicate that local suppliers in Nagpur outperformed out-of-region providers in terms of SPI. Over 92% of orders were completed accurately overall, and local providers were more likely to meet delivery and specification requirements [10]. The acquisition of components and raw materials was impacted by political and economic unpredictabilities in 2024, such as import bans and penalties. To carry out the procurement process while evaluating the effectiveness of manufacturing businesses in Nagpur, Maharashtra,

methodically choose trustworthy suppliers, guarantee quality through frequent assessments, and simplify procedures with digital tools for transparency. Use risk management techniques to minimize interruptions and monitor performance to match procurement with business objectives.

The goal of procurement policies is to provide precise rules for choosing suppliers, handling contracts, and reducing risk. Procurement efficiency can be significantly impacted by geopolitical factors like trade restrictions, supply chain interruptions brought on by border disputes, or fluctuating tariffs. Conflicts between nations, for instance, may cause important imports to be delayed or raise the price of raw materials, which would have an immediate impact on Nagpur's manufacturing schedule. Policies handle regulatory and ethical issues while ensuring a uniform, open, and effective procurement process. Understanding how supply chain stability, price, and resource availability are impacted by geopolitical events is essential for adjusting strategy and preserving operational effectiveness in Nagpur's manufacturing sector.

For solar manufacturing inputs and components including polysilicon, wafers, and solar modules, India is heavily dependent on China. China accounted for roughly 62.6% of India's \$7 billion in solar imports in 2023–2024. This includes components like ready-to-use solar modules and solar cells that are essential for achieving renewable energy targets. India's solar manufacturing is still dependent on imported components, with little local value added in the final assembly, despite domestic efforts and programs like the Production-Linked Incentive (PLI) plan. India's efforts to lessen dependency are severely hampered by China's 97% market share in polysilicon, which is crucial for the production of solar panels. China continues to dominate despite efforts to diversify imports from other nations, such as Vietnam, Malaysia, and Thailand, and to boost domestic manufacturing.

Conclusion:-

A critical connection between efficient procurement procedures and overall supply chain performance is revealed by evaluating the effectiveness of procurement operations in manufacturing enterprises located in Nagpur, Maharashtra. Several important conclusions that are crucial for the industrial growth of the area are highlighted by an assessment of the procurement efficiency in Nagpur's manufacturing enterprises. The study demonstrates that efficient procurement procedures enable improved supplier performance and inventory management in addition to lowering operating expenses. This analysis emphasizes how important it is to handle procurement issues including shifting demand, risks associated with global supply chains, geopolitical considerations, and logistical limitations, particularly in the complicated global context of today. By improving procurement efficiency, Nagpur's manufacturing sector may be better positioned for resilience and sustainable growth through improved resource allocation, stronger supplier relationships, and more agility.

Additionally, the analysis demonstrates that to reduce supply chain interruptions, strong risk management methods are crucial, as evidenced by factors such as geopolitical tensions in 2024. Furthermore, detecting inefficiencies and preserving supplier dependability need regular monitoring of KPIs including lead time, Supplier Performance Index (SPI), and order accuracy. According to this study, developing a flexible supply chain network,

implementing cutting-edge procurement technologies, and educating procurement teams on risk management are essential tactics for attaining procurement excellence in the area. The results highlight that manufacturing firms in Nagpur can enhance internal efficiencies and forge a more robust position in the global supply chain landscape, promoting long-term growth and competitiveness, by consistently improving procurement procedures and remaining sensitive to outside influences.

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