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# MATERIALS MANAGEMENT REVIEW



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## Northern Regional Conference Ajmer Branch



***Dignitaries on the Dias*** - Northern Regional Conference held on 25th October 2025 at Ajmer. Shri Vasudev Devnani Hon. Speaker of Rajasthan Assembly was the Chief Guest.



भारतीय सामग्री प्रबंधन संस्थान  
INDIAN INSTITUTE OF MATERIALS MANAGEMENT



**AHMEDABAD BRANCH**

# **NATCOM 2025**

## **(GOLDEN JUBILEE YEAR)**

**SUSTAINABLE SUPPLY CHAIN :**  
**A PATHWAY TO NET ZERO CARBON FOOTPRINT**

**29 Nov. : 9.00 am to 10.00 pm &  
30 Nov. : 9.00 am to 6.00 pm  
At Pride Plaza Hotel , Bodakdev**

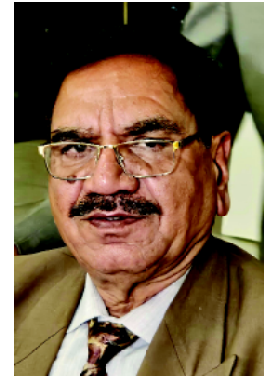


### **WHY IT MATTERS !!!**

From raw material extraction to last-mile delivery, global supply chains face unprecedented complexity. Cross-border operations, evolving regulations, and stakeholder demands for transparency make sustainability both a challenge and a competitive advantage.



## *From the Desk of National President & Editor in Chief*



Greetings from your National President!!!

One of the most potent change-catalysts in the worldwide battle to achieve a net zero carbon footprint is supply chain sustainability. Although governments and businesses have committed to becoming carbon neutral by the middle of the century, the true change will come from rethinking the sourcing, production, delivery, and transportation of commodities. The supply chain is the biggest obstacle and the biggest potential in the quest for net zero, as it frequently accounts for more than 80% of a company's carbon emissions.

Beyond merely cutting emissions, a sustainable supply chain necessitates a structural change towards transparency, cooperation, and circularity. There are chances to reduce the environmental impact at every stage of the chain, from the extraction of raw materials to the management of end-of-life products. From raw material extraction and manufacture to transportation and product disposal, supply chains are responsible for the majority of greenhouse gas emissions - typically reaching 80% of a company's total carbon output. This reality emphasises the critical significance of Sustainable Supply Chain Management (SSCM) as a means to reaching net-zero goals. Businesses must now optimise for carbon, resilience, and responsibility in addition to cost and efficiency.

Understanding the source of emissions, or carbon mapping, is the first step in the transformation. Indirect emissions from suppliers and logistical partners are included in scope 3 emissions, which frequently account for the greatest portion. Real-time carbon tracking is made possible by utilising digital tools like blockchain and AI-driven analytics, which enhances network accountability. Better decision-making is facilitated by this transparency, which also increases consumer trust in ethical brands.

Innovation-based decarbonisation follows. Waste and emissions can be significantly reduced by using circular economy models, such as remanufacturing and product take-back programs, low-carbon materials, and green manufacturing driven by renewable energy. The field of logistics is also ready for innovation. A company's carbon footprint can be considerably reduced by investing in sustainable packaging, electrifying fleets, and optimising route planning.

But creating a sustainable supply chain is a strategic and cultural problem as much as a technical one. Companies need to incorporate sustainability into their partner selection criteria and procurement processes. Training and incentives should be provided to suppliers, especially small and medium-sized businesses, to encourage them to embrace greener practices. Since no business can reach net zero on its own, industry collaboration is crucial.

The role of policymakers is equally crucial. Adoption can be accelerated by supportive frameworks, such as carbon price, green finance, and required sustainability reporting. By selecting companies that are dedicated to openness and low-carbon operations, consumers also have a significant impact.

Ultimately implementing sustainable supply chain management is not only an environmental responsibility but also a business advantage. Organizations that incorporate sustainability into their core operations gain resilience against market changes, increase brand reputation, and satisfy the growing demands of conscientious customers and investors alike. Reaching net zero is a community undertaking. By transforming supply chains into engines of sustainability, industries can move beyond pledges to concrete success – ensuring that economic growth and environmental stewardship advance hand in hand.

In the end, supply chain sustainability is an investment in resilience and reputation rather than a cost to be controlled. Companies that take the lead today will not only align with global climate goals but also secure long-term competitiveness in a world that increasingly values environmental stewardship.

A handwritten signature in black ink, appearing to read 'Lalit Raj Meena'.

**Lalit Raj Meena**  
**National President**  
[mmr@iimm.org](mailto:mmr@iimm.org)



# MATERIALS MANAGEMENT REVIEW

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### Chief Editor & Publisher

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Prof.(Dr.) Goutam Sen Gupta,

Vice Chancellor- Techno India University

### Correspondence :

MATERIALS MANAGEMENT REVIEW

Indian Institute of Materials Management

4598/12 B, 1st Floor, Ansari Road,

Darya Ganj, New Delhi - 110 002.

Phones : 011-43615373

E-mail: mmr@iimm.org

Website : www.iimm.org

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Phones : 011-43615373 Fax: 91-11-43575373

E-mail: mmr@iimm.org

Website : www.iimm.org

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# FUTURE-READY PROCUREMENT: ISO 20400 IN ACTION: DRIVING SUSTAINABLE PROCUREMENT

SN PANIGRAHI,  
GST & INTERNATIONAL BUSINESS & PROJECTS CONSULTANT,  
CORPORATE TRAINER, MENTOR & AUTHOR  
LIFE MEMBER & EX NC, IIMM, LIFE MEMBER ISTD  
MEMBER BOARD OF STUDIES, SCDL ADJUNCT FACULTY L&T IPM.  
snpanigrahi1963@gmail.com

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**Introduction:** Every organization, regardless of its size or industry, exerts an influence on the environment, society, and economy. Procurement, as a pivotal function, presents a unique opportunity for organizations to demonstrate responsible behavior and contribute meaningfully to sustainable development. The rising awareness of sustainability is reshaping how organizations approach procurement, transforming it from a transactional activity to a strategic enabler of corporate social responsibility (CSR) and environmental, social, and governance (ESG) goals or achievement of UN SDGs.

Sustainable procurement is a strategic approach that integrates environmental, social, and economic considerations into purchasing decisions, aiming to achieve long-term value while minimizing negative impacts across the supply chain. It goes beyond cost-efficiency, focusing on responsible sourcing, ethical labor practices, and reducing ecological footprints, ensuring that procurement aligns with broader corporate sustainability goals and stakeholder expectations.

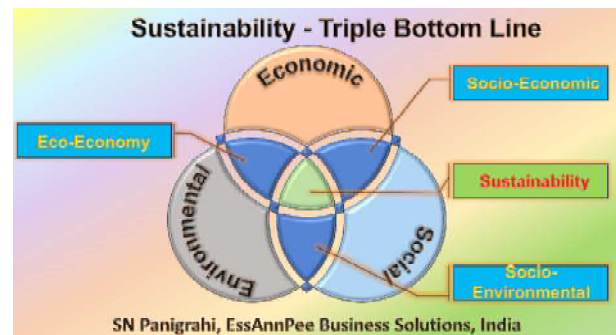
By adopting and seamlessly integrating sustainability considerations into procurement policies, practices, and supply chains, organizations not only mitigate risks and enhance resilience but also contribute to social equity and environmental stewardship, positioning themselves as leaders committed to sustainable development and responsible business conduct.

This article offers an in-depth, clause-by-clause exploration of ISO 20400, highlighting its critical guidelines and practical strategies for sustainable procurement. Organizations looking to adopt sustainable practices can benefit immensely from these insights, helping them manage risk, enhance reputation, and create long-term value.

**Keywords:** ISO 20400, Sustainable Procurement, Corporate Social Responsibility, Environmental, Social, and Governance (ESG), Risk Management, Supply Chain, Life Cycle Assessment.

**Sustainability:** Sustainability, rooted in the **Triple Bottom Line** framework, promotes a holistic approach to economic, social, and environmental priorities, ensuring long-term value for organizations and society. The **Economic** aspect focuses on resilient growth and efficient resource use, while the **Social** dimension emphasizes equity, human rights, and community welfare. The **Environmental** component seeks to protect

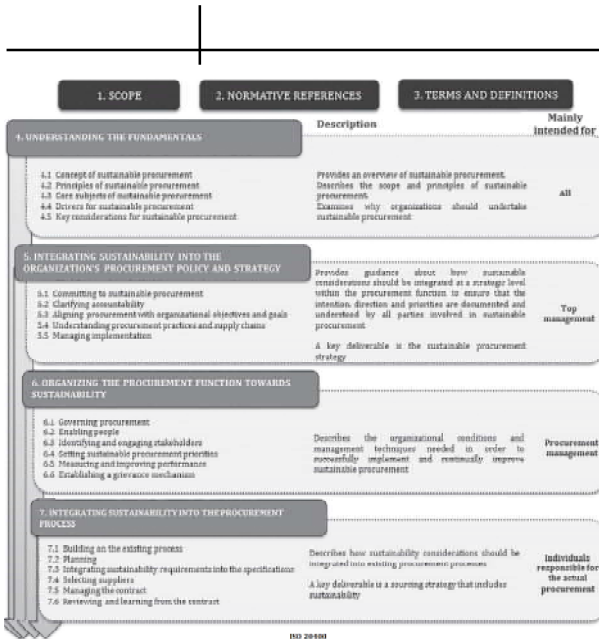
and restore ecosystems. At their intersections, **Socio-Economic** goals support fair economic opportunities, **Socio-Environmental** efforts promote ecological health alongside social well-being, and the **Eco-Economy** balances profitability with environmental stewardship. By fostering equitable opportunities, protecting ecosystems, and aligning financial goals with social and environmental well-being, the Triple Bottom Line empowers organizations to contribute to a **sustainable and resilient future**.



**Understanding ISO 20400 :** ISO 20400 was developed by ISO project committee ISO/PC 277, with contributions from over 50 countries. The first edition of ISO 20400 was published in April 2017.

As the pioneering international standard dedicated to sustainable procurement, ISO 20400 provides a comprehensive framework for integrating sustainability principles into procurement practices. It outlines fundamental principles, elucidates the compelling reasons for organizations to embrace sustainable procurement, and offers actionable strategies for strategic implementation. Moreover, the standard delves into essential management techniques for successful execution.

ISO 20400 provides a strategic framework for sustainable procurement, enabling organizations to balance economic goals with environmental and social responsibilities (Clause 4 – applicable to all). Top management establishes this direction within policy (Clause – 5), procurement leaders implement structured sustainability practices (Clause – 6), and procurement teams operationalize these principles by ensuring each decision aligns with responsible sourcing, resilience, and positive impact across the supply chain (Clause – 7). Together, these roles ensure sustainability is deeply integrated into procurement, shaping organizational reputation and long-term value.



Designed to empower organizations of all sizes and sectors, ISO 20400 encourages informed decision-making and contributes to sustainable development. As a guidance standard, it offers a flexible framework for aligning purchasing practices with sustainability goals, encompassing economic, environmental, and social dimensions. By adopting ISO 20400, organizations can effectively manage risks, enhance their reputation, and contribute to a more sustainable future.

### ISO 20400 Guidance: Principles of Sustainable Procurement (Clause 4)

ISO 20400 sets forth a comprehensive framework for sustainable procurement, positioning it as a strategic imperative aligned with an organization's environmental, social, and economic objectives. These principles guide procurement toward long-term value creation, balancing cost-efficiency with responsible practices that reduce ecological impact, uphold human rights, and foster community well-being. Sustainable procurement under ISO 20400 is not an isolated practice but a core component of organizational strategy that shapes both reputation and resilience.

According to **Clause 4** of **ISO 20400**, Sustainable procurement is procurement that has the most positive environmental, social and economic impacts possible across the entire life cycle and that strives to minimize adverse impacts. Sustainable procurement is a powerful instrument when an organization considers sustainability requirements and its own contribution to sustainable development.

Clause 4 of ISO 20400, provides an overview of sustainable procurement. It describes the principles and core subjects of sustainable procurement and examines why organizations undertake sustainable procurement. Important consideration is given to managing risks (including opportunities), addressing adverse sustainability impacts through due diligence, setting priorities, exercising positive influence and avoiding complicity.

### Principles of Sustainable Procurement:

ISO 20400's principles for sustainable procurement provide a strategic framework that drives accountability, transparency, and ethical practices across the supply chain. These guidelines help organizations integrate sustainability into procurement, ensuring that each decision supports responsible growth and long-term value for society, the economy, and the environment.

As per **Clause 4.2** of **ISO 20400**, the main principles for sustainable procurement are the following:



- 1. Accountability:** Organizations should be accountable for their impacts on society, the economy, and the environment, with a particular focus on procurement. This includes responsibility for both direct impacts and those within the supply chain, adopting a life-cycle perspective on all goods and services.
- 2. Transparency:** Transparency in decisions and activities that affect the environment, society, and the economy is essential. In procurement, this requires clarity in procurement choices and processes and encourages suppliers to do the same, fostering dialogue and trust with stakeholders.
- 3. Ethical Behavior:** Ethical conduct should be central to an organization's operations and promoted across supply chains, upholding integrity, fairness, and compliance with high standards.
- 4. Equitable Opportunity:** Procurement decisions must be free from bias, ensuring that all suppliers, including local and small-to-medium enterprises (SMEs), have an equal and fair chance to compete.
- 5. Stakeholder Respect:** Organizations must recognize and thoughtfully respond to the interests of stakeholders impacted by procurement activities, fostering an inclusive approach.
- 6. Adherence to Law and International Norms:** Organizations must be vigilant regarding compliance within their supply chains, encouraging adherence to legal standards and international norms and actively addressing any violations.
- 7. Human Rights Commitment:** Recognizing and upholding internationally recognized human rights throughout the supply chain is essential.

8. **Encouragement of Innovation:** Organizations should seek innovative solutions that address sustainability goals, promoting practices across the supply chain that lead to sustainable outcomes.
9. **Demand-Focused Procurement:** Reviewing and responding to actual needs, buying only necessary items, and seeking sustainable alternatives help reduce waste and environmental impact.
10. **Sustainability Integration:** Sustainability should be embedded within all procurement practices, ensuring alignment with organizational values and maximization of sustainable outcomes.
11. **Life-Cycle Cost Analysis:** Evaluating costs across the life cycle, including societal, environmental, and economic impacts, is critical to achieving value for money while enhancing sustainability.
12. **Commitment to Continuous Improvement:** Organizations should continually refine their sustainability practices and encourage the same commitment across their supply chain, advancing overall sustainability.

These principles collectively guide organizations toward responsible, resilient procurement strategies that support sustainable development objectives.

#### Core Subjects of Sustainable Procurement:

Clause 4.3 of ISO 20400 outlines core subjects for sustainable procurement, guiding organizations to uphold responsibility across multiple dimensions. **Organizational Governance** ensures transparency and ethical oversight, embedding accountability into procurement decisions. **Human Rights** and **Labour Practices** mandate respect for individual dignity and fair treatment throughout the supply chain. **Environmental stewardship** promotes resource efficiency and minimizes ecological impact, while **Fair Operating Practices** reinforce integrity and anti-corruption measures. **Consumer Issues** prioritize safety, information, and trust in goods and services, and **Community Involvement and Development** encourage positive contributions to local economies, fostering inclusive growth and resilience. Together, these principles shape a holistic approach to procurement that aligns with both ethical standards and sustainable development goals.



#### Integrating Sustainability into Procurement Policy and Strategy (Clause 5: Role of Top Management)

Top management plays a pivotal role in embedding sustainability into the organization's procurement policy and strategy. By prioritizing sustainability at the policy level, executives set the direction for responsible procurement, establishing a vision that aligns with corporate values, stakeholder expectations, and regulatory standards. Leaders are responsible for defining sustainability goals, allocating resources, and ensuring governance structures that hold all levels accountable, turning sustainability from a concept into measurable action.

#### Organizing the Procurement Function Toward Sustainability (Clause -6: Role of Procurement Management)

Procurement management is tasked with operationalizing sustainable principles within the function, translating strategic goals into actionable practices and clear responsibilities. This involves structuring the procurement team to focus on sustainability, fostering cross-functional collaboration, and implementing supplier development programs that promote ethical sourcing and transparency. By creating an organized, goal-oriented procurement structure, management ensures the alignment of day-to-day operations with the organization's broader sustainability mission.

#### Integrating Sustainability into the Procurement Process (Clause – 7: Role of Procurement Individuals)

At the operational level, individual procurement professionals drive sustainability by embedding it into each phase of the procurement process. They assess supplier sustainability credentials, consider life-cycle impacts, and enforce contract terms that support ethical and environmental standards. These professionals are the catalysts of sustainable procurement, ensuring that each transaction reflects the organization's commitment to responsible sourcing, long-term resilience, and positive social impact, in line with ISO 20400 guidelines.

#### Conclusion:

In conclusion, ISO 20400 offers a comprehensive and strategic roadmap for embedding sustainability into procurement, enabling organizations to achieve responsible, resilient growth. By integrating principles of accountability, transparency, and ethical practices across the supply chain, organizations are better positioned to reduce risks, enhance stakeholder trust, and contribute positively to society and the environment. Adopting ISO 20400 standards is more than a compliance measure; it is a commitment to sustainable development, aligning procurement with long-term value creation, and positioning the organization as a leader in responsible business practices.

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# HOW DIGITAL INNOVATION, GREEN PRACTICES, AND RISK RESILIENCE ARE SHAPING A SMARTER ECOSYSTEM AS A DRIVER OF THE FUTURE OF SUPPLY CHAIN SECTOR IN INDIA

AVINASH KUMAR RAUT, KOLKATA  
avinashrautm@gmail.com

**Introduction :** The supply chain sector is a vital part of the Indian economy. It connects manufacturers, transporters, retailers, and digital platforms to meet growing consumer needs. This sector not only drives trade within the country but also helps India take part in global markets. Today, companies want more than just speed and profit. They are also focusing on sustainability and resilience. This has made supply chains the center of major changes. New digital tools like AI, IoT, and blockchain are making supply chains smarter and faster. Green steps like using electric vehicles and tracking carbon help protect the environment. After the Covid 19 crisis, there is also a strong need to make supply chains more resilient. Government programs like PM Gati Shakti, ONDC, and NLP are helping this change. They aim to lower costs and improve digital systems. This study will explore digital change, green practices, resilience, and policy support in supply chain sector of India.

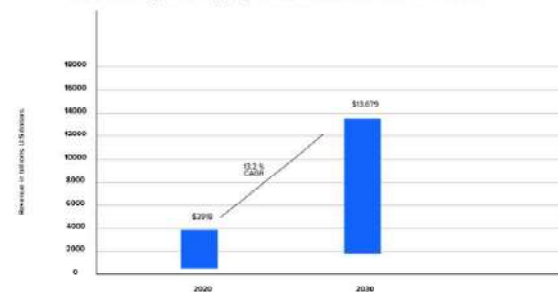
## 2. Digital Transformation in Indian Supply Chains

| Aspect             | Traditional Supply Chain                                                                    | Digital Supply Chain                                                                                            |
|--------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Operation          | Relies on historical data and past transactions for process management.                     | Functions in real-time, using current data to make immediate decisions.                                         |
| Structure          | Follows a linear path from suppliers to consumers with a series of sequential steps.        | Employs a networked model with interconnected systems and multiple points.                                      |
| System Integration | Often operates with separate, standalone systems that have limited interconnectivity.       | Features integrated IT and operational technology systems for smooth data exchange.                             |
| Problem Detection  | Depends on manual efforts to spot issues and forecast potential risks.                      | Uses integrated data to predict problems and take preventive actions proactively.                               |
| Decision-Making    | Decisions are mainly made by humans based on information from various machines and reports. | Driven by automated systems and algorithms, with human oversight for final decisions and strategic adjustments. |

**Table 1: Traditional Supply Chain Vs. Digital Supply Chain**

(Source: Singh, 2025) The Table 1 clarifies the difference between the traditional and digitalized Supply Chain Management (SCM). From there, it can be deduced that the traditional SCM is becoming obsolete due to its limited applicability. Hence, the organizations in this sector are moving towards the digitalization of the process.

**Global Digital Supply Chain Market: 2020- 2030**



**Figure 1: Global Digital Supply Chain Market 2020-20230**

(Source: Singh, 2025) According to Allied Market Research it has been identified that the overall supply chain market is growing over 13% CAGR by which the market value is going to be of around \$3918 million by the end of 2030 (Singh, 2025). This huge market scope is also a driver for the organizations in thriving for making the process of SCM digitalized.

### 2.1. Key Technologies Transforming the Landscape

Digital transformation in Indian supply chains is growing fast considering the rapid growth in global supply chain sector. It is powered by new technologies that improve visibility and speed. Artificial Intelligence and Machine Learning help in demand planning (Singh, 2023). These tools use real-time data like sales, weather, and festivals. Companies like Dabur use AI to reduce stockouts and manage inventory better (Waditwar, 2025).

On the other hand, Internet of Things and RFID improve tracking. In pharma and food sectors, IoT helps maintain cold chain standards. Godrej Appliances uses IoT to cut losses and improve delivery. RFID tags help track items in retail, where stock variety is high (Chaturvedi, Goyal and Dwivedi, 2024). Automation is also helping in warehouses to improve speed and reduce errors. Blockchain is still new but shows promise. NITI Aayog tested it in Andhra Pradesh to trace farm produce. It helped farmers get better prices. In pharma and textiles, it can help fight fake products. Cloud ERP systems like Zoho and SAP help small businesses (Narain, 2022). Startups like Jumbotail use them to link kirana stores to supply chains.

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## 2.2. Case Studies & Examples

Indian corporates and institutions are leveraging digital tools not merely for optimization but for strategic transformation. Reliance Retail has implemented an AI-powered inventory system that connects POS data with central warehouses. This system enables real-time auto-replenishment, enhancing in-store availability while minimizing excess inventory. It is being a critical advantage in the fast-moving consumer goods (FMCG) sector (Sharma, 2023).

Tata Steel, on the other hand, has exemplified digital leadership in core manufacturing. It uses Industrial IoT to implement predictive maintenance across high-capital machinery (Roy, 2025). Through sensor data analytics, the company has been able to anticipate equipment failure, reduce unplanned downtime, and improve energy efficiency. These all are aligned with its broader ESG strategy. Tata's foray into AI-driven process optimization and digital twins marks a shift from reactive to proactive operations management.

## 2.3. Impact and Benefits

The impact of digital transformation in supply chains is visible across multiple dimensions. Real-time visibility provided by IoT and cloud tools is empowering organizations to anticipate disruptions, respond rapidly, and reduce systemic inefficiencies. During COVID-19, companies with digital maturity demonstrated superior agility, pivoting to alternate sourcing, managing workforce shortages, and responding to demand shocks (Mubarik and Khan, 2024). Furthermore, digitalization is enabling leaner working capital models by improving inventory turnover and reducing wastage.

Sustainability has emerged as an unintended but welcome consequence. Tools like AI-driven route optimization and real-time energy monitoring are reducing fuel consumption, emissions, and resource wastage (Vasudevan, 2024). Companies are also beginning to use digital platforms to track Scope 3 emissions across their value chains, marking a departure from siloed environmental compliance toward integrated ESG strategy.

## 3. Sustainability in Supply Chain

### 3.1 Drivers for Green Supply Chains

The regulatory environment, especially the implementation of Extended Producer Responsibility (EPR) standards, is one of the main factors promoting sustainability in Indian supply chains. Post-consumer plastic waste management is the responsibility of manufacturers, importers, and brand owners, according to the Amended Plastic Waste Management Rules (2022). This includes measurable goals for packaging material co-processing, recycling, or reuse. Concurrently, comparable EPR frameworks in the battery and e-waste

industries are pressuring manufacturers to implement tracking technologies, work with approved recyclers, and construct reverse logistics systems in order to guarantee transparent waste handling (Sahu et al. 2022). These rules are becoming more and more like design limitations that influence logistics planning, vendor selection, and product life cycles rather than merely being compliance checkboxes. Supply chain expectations are being redefined by corporate ESG (Environmental, Social, and Governance) commitments in conjunction with regulatory pressure. Prominent companies like Godrej, ITC, and Mahindra & Mahindra have set high ESG targets, such as water stewardship, supply chain decarbonization, and zero waste goals (Gupta and Singh, 2024). Suppliers and logistics partners are now expected to adhere to sustainability KPIs (energy consumption, packaging recyclability, and emissions intensity) as a result of these initiatives. ESG ratings, which connect sustainability with observable business value, are also increasingly being used to win over investors and obtain preferential financing. Consumer awareness is another important factor that is accelerating the green transformation. When making purchases, Indian Gen Z and millennial consumers are starting to place a greater emphasis on sustainability. Consequently, supply chains are being restructured to meet evolving needs. 57% of consumers think about a product's sustainability impact before making a purchase, according to a 2023 Deloitte India survey (Gupta et al. 2024). Consumer awareness is causing procurement policies to change, and companies are spending more on open environmental reporting, traceability, and ethical sourcing in order to boost their brand and gain a competitive advantage.

### 3.2 Green Practices Being Adopted

Thanks to several innovative initiatives, India's transition to green supply chains is beginning to take shape. One prominent example is the increasing use of electric vehicles (EVs) for last-mile delivery. Companies like Amazon India and Flipkart are setting the standard; Amazon has committed to deploying 10,000 EVs by 2025, while Flipkart wants to have a fully electric fleet by 2030. Since they use less fuel and need less maintenance, particular initiatives are not limited to sustainability. Initiatives also result in financial savings over the vehicle's lifetime (Gupta et al. 2022). For example, Startups like Euler Motors and Magenta Mobility are making a big contribution to this shift by offering scalable EV leasing models. They are also expanding the charging infrastructure, especially in Tier 1 and Tier 2 cities. Additionally, it can be identified that the application of reverse logistics and circular economy is able to reduce the environmental impact of materials, along with providing economic value. Tech giants such as Apple and Samsung implemented structured electronics return programs in India that offer incentives for devices that are returned (Chhabra and Kr Singh, 2024). Collecting and recycling more packaging than

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they produce helps Unilever and Nestlé India to make themselves plastic neutral. Similarly, the circular economy model is also gaining popularity in the apparel industry, as companies such as “FabIndia” are investing in sustainable textiles and recycled clothing lines. Green transformation can be accomplished by utilizing software to track carbon footprints. Current technologies are allowing companies to track Scope 1, 2, and 3 emissions across their entire supply chain using digital platforms. This helps them in making data-driven decisions. For example, Infosys is employing internal dashboards that collect emissions data from suppliers, logistics partners, and operational sites. On the other hand, businesses such as TCS and Accenture India are putting life-cycle assessment tools into place to assist clients in manufacturing. In the case of retail sectors, business are using emissions reporting and science-based target alignment to maintain their sustainability quality. Filling the gap between sustainability intentions and quantifiable effects, digital technologies are increasing accountability.

### 3.3 Data & Reports

Empirical evidence that India’s economy needs to maintain sustainability in its operation. This is essential to ensure that the supply chain process is following the global needs. According to the NITI Aayog report, “Decarbonizing Transport in India (2022)”, there are two strategies to lower emissions. The first strategy to encourage emissions is multi-modal transportation. The second strategy is to electrify significant freight corridors so that they produce less carbon and greenhouse gases (Kalkha et al. 2023). According to the World Economic Forum’s Global Logistics Emissions Index (2023), India is ranked 23rd. The rank indicates a lack of coordinated cross-sectoral action in the Indian logistics sector, even though it has sufficient clean mobility infrastructure. Currently, the logistics sector accounts for nearly 14% of India’s carbon emissions. It has also been predicted that this percentage could double by 2040 if nothing is done, according to a 2022 report from TERI (The Energy and Resources Institute). This shows that the Indian logistics sector needs to take faster and coordinated action to improve sustainability. For example, it can improve warehousing, trucking and packaging efficiency.

## 4. Building Supply Chain Resilience

### 4.1. Need for Resilience

Multiple supply chain shocks happening for the past few years have exposed distinct weaknesses existing in India’s industrial and economic structure. Numerous industries shut down as a result of the pandemic’s disruptions to labor availability, manufacturing output, and cross-border travel. Delivery delays took place due to the result of logistics bottleneck situations appearing in port areas (Gupta and Singh, 2021). For example, port congestion and container shortages occurred due to a

shift in the economy during the pandemic. The over-reliance on the Suez Canal was exposed in 2021 as the Suez Canal crisis occurred. The conflict between Russia and Ukraine also had a significant effect on the supply chain process of goods like natural gas, fertilizer, and sunflower oil. This led to shortages and price volatility throughout the Indian economy

The lack of semiconductors was arguably the clearest illustration of India’s structural reliance. Months of delays were experienced by industries such as consumer electronics, smartphones, and automobiles due to the unavailability of critical chip components (Moldabekova et al. 2021). Furthermore, India’s pharmaceutical industry, which prides itself on being the “pharmacy of the world,” faced danger due to its excessive reliance on Chinese Active Pharmaceutical Ingredients (APIs). These intensified disruptions compelled public and private stakeholders to reconsider long-held assumptions about globalization, efficiency, and supply base concentration.

### 4.2. Strategies for Resilience

India is trying to build strategic resilience against a high-risk environment. Indian companies and policymakers are putting more emphasis on proactive resilience-building techniques that prioritize flexibility, redundancy, and visibility. The trend of supplier diversification is one of the most prominent in the Indian economy. Indian companies, engaged in electronics, chemical, and apparel sectors, are reducing their over-reliance on China with greater priority. The business is applying the “China+1” strategy into practice. Business are choosing Bangladesh, Vietnam, Thailand, and Indonesia and alternative suppliers (Wan et al. 2022). There is also support for the Indian economy to engage domestic vendors to increase local capacity. This helps in reducing exposure to geopolitical uncertainties. Although this diversification entails higher transaction costs and new relationship-building activities, it protects against supply shocks. Localization is growing in popularity as companies recognise the benefits of both control and agility. Industries such as food processing, pharmaceuticals, and auto manufacturing are sourcing domestic materials (Deo and Anjankar, 2023). Another example is here, where the business expanded its local sourcing footprint to ensure just-in-time assembly and guard against import volatility. Similarly, the expansion of Indian contract electronics producers (such as Dixon Technologies and Optiemus) is a sign that Indian suppliers are expanding their capability to support growing demand. Technological forecast is another aspect of modern risk management. Business are applying AI risk management tools to simulate the supply chain. Similarly, the Indian government is advancing an integrated, multi-modal logistics ecosystem that links rail, road, waterways, and air cargo infrastructure under the PM Gati Shakti initiative. This is making the transportation process

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flexible.

### 4.3. Critical Observations

#### Resilience vs. Cost-Efficiency:

The main issue with resilience-focused models is the possibility of degradation of cost-efficiency. Higher inventory buffers, multi-location warehousing, and redundant suppliers frequently lead to higher operating costs for business. These measures may be too costly for Indian MSMEs with narrow profit margins and operating in a competitive market. There is also a need for conflict resilience and the ideas of lean management and cost optimization.

#### PLI as a Resilience Enabler:

The Indian government's Production-Linked Incentive (PLI) program has been instrumental in fostering domestic production in key strategic sectors like semiconductors, mobile devices, electric vehicles, and pharmaceuticals. With the help of incentives for capacity building, technological advancements, and local value addition, the PLI program is increasing domestic capabilities (Gupta and Singh, 2024). This also helps in reducing dependency on imports. For example, companies like Vedanta-Foxconn and Tata Electronics are setting up semiconductor fabrication plants that, once operational, could significantly lower the risk involved in India's electronics and automotive supply chains.

#### National Logistics Policy (NLP) 2022:

The NLP, which was introduced in 2022, aims to reduce India's logistics costs from an incredible 13–14% of GDP to 8% (Ministry of Commerce & Industry, 2023). It created the foundation for a unified logistics interface platform, shared digital documentation, and specialized logistics parks in India. The advantages of such infrastructure go beyond efficiency (Wan et al. 2022). They directly promote resilience by ensuring the traceability, transparency, and modularity of transport systems. A resilient supply chain requires a strong national logistics backbone, which the NLP promises to provide in the years to come.

## 5. Integration of Digital Green and Resilient Approaches

### 5.1. Systems Thinking: Synergies

Digital technologies like AI, IoT, and blockchain are increasingly powering supply chains. It is happening not just for efficiency, for advancing sustainability and resilience as well. AI-driven dashboards now track emissions in real time, while blockchain ensures supplier traceability. Hence, it can be stated that it is enabling ethical sourcing and compliance. These tools also help in identify vulnerabilities (Example: unstable Tier-2 suppliers) allowing firms to preempt disruptions through data-driven risk assessments.

Green practices further enhance resilience. The electrification of fleets and adoption of renewable-powered warehouses reduce reliance on volatile fossil fuel markets. Additionally, it is offering both environmental and operational benefits. Digital twins simulate crises and interventions, helping optimize carbon, cost, and continuity in a unified framework.

### 5.2. Example Ecosystems

Several Indian companies have emerged as early adopters of this triadic approach and those are being enumerated below.

One such case is **Marico**, which has digitized its agricultural sourcing networks, particularly for coconut and safflower oil. By incorporating smallholder farmers into mobile-based platforms, Marico ensures traceable sourcing, provides real-time agronomic advice, and tracks soil health parameters. These digital tools help farmers and support Marico in achieving low-emission and regenerative farming goals. This makes the supply chain more eco-friendly and less affected by climate and crop risks (Rahaman, 2023).

**Delhivery** is another good example. It uses AI to plan better delivery routes and reduce fuel use. The company also uses electric vehicles and eco-friendly packaging. This helps reduce traffic delays and fuel problems. Delhivery shows how green logistics and smart technology can work well together and grow at scale (Global Business Line, 2024).

### 5.3. Frameworks to Assess Impact

Companies in the Indian supply chain sector are now using clear frameworks to make sure digital, green, and resilient efforts are real and effective. The Triple Bottom Line or TBL is a common tool. It looks at profit, people, and the planet together (ITC, 2024). This helps companies balance financial goals with social and environmental impact. Indian firms like Tata Power and ITC use TBL in reports and planning to show their broader responsibility. Some businesses also use Supply Chain Maturity Models. These check areas like vendor ethics, emissions, and risk planning. Standards like ISO 20400 and ISO 22301 guide firms toward global best practices (Crask, 2024).

## 6. Challenges and Critique

India has made strong progress in building digital and sustainable supply chains. However, many structural challenges still remain. One major issue is the exclusion of MSMEs. These small businesses make up more than 90% of the supply network. Only 12% of MSMEs are currently fully digitized. Even as 76% plan to invest more in cybersecurity and 72% in cloud technologies highlighting financial and advisory constraints among smaller firms (Economic Times, 2025). Yet, they often lack money, digital skills, and basic tech tools. Large companies are moving fast with AI, IoT, and blockchain.

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But many small firms still use outdated systems. Government programs like Digital MSME exist. Some private platforms also offer support. But old habits and unclear benefits slow down adoption. Cybersecurity is another big problem as supply chains use more cloud systems, APIs, and smart devices, the risk of cyberattacks increases (Kumar and Mallipeddi, 2022). The ransomware attack on Jawaharlal Nehru Port Trust in 2020 showed how serious this threat can be. Many small firms do not have proper firewalls or security plans. This leaves the whole network open to risk. There is also a lack of skilled people. Workers often do not have the right mix of supply chain and tech knowledge. Colleges are adding new courses. But the number of trained professionals is still too low. Going green is also expensive. EVs, solar-powered sites, and eco-friendly packaging all cost a lot. The payback time is long. Small companies face the most difficulty. They do not have easy access to green loans or subsidies. The supply of green materials is also low and often uncertified. This makes ESG reporting hard (Chen et al. 2022).

## 7. Policy & Institutional Support

### 7.1. Key Government Initiatives

The Indian government plays a key role in shaping supply chains that are digital, green, and resilient. To solve old problems and build future-ready systems, it has launched several important programs in recent years.

One of the biggest efforts is PM Gati Shakti. This is a digital platform that aims to connect transport planning across different ministries and states. It helps reduce delays, improve last-mile delivery, and remove coordination issues (Economic Times, 2025). As a result, supply chains become faster, cheaper, and more reliable.

Another major step is the Open Network for Digital Commerce, or ONDC. This platform gives small businesses a chance to join online markets without depending on big e-commerce companies (Economic Times, 2025). It builds a fair, open, and flexible retail supply chain. It also helps small firms become more visible and stronger against market changes.

The government has also introduced Production-Linked Incentive schemes, or PLIs. These focus on sectors like electronics, textiles, and medicines. The aim is to boost local production and reduce imports. These incentives help India grow into a global supply chain hub, especially in high-tech areas (Wandhe, 2024).

The National Logistics Policy, launched in 2022, is another key move. It tries to lower logistics costs and increase speed and transparency (AVR Logistics, 2025). It uses digital tools like ULIP for real-time tracking. This improves both sustainability and risk management.

Finally, the National Green Hydrogen Mission will

change how freight moves in the long term. Hydrogen-powered trucks and trains will help cut pollution in transport. This mission supports both green goals and energy security (Ministry of New & Renewable Energy, 2023).

### 7.2. Institutional Collaborations

Beyond government intervention, **industry bodies and professional institutions** are instrumental in bridging the gap between policy formulation and execution. Organizations like **FICCI** and **CII** have taken on active roles in supply chain reform (KPMG International, 2021). Through ESG advisory panels, climate disclosure tools, and skill development workshops, these bodies are helping companies align with sustainability norms and operational resilience.

At the professional level, the **Indian Institute of Materials Management (IIMM)** stands out as a leading institution for building supply chain capabilities. This institute is conducting certifications, capacity-building programs, and publishing domain-specific research. Additionally, it is raising the professional standards of procurement and logistics functions across both public and private sectors (IIMM, 2025). It also acts as a critical knowledge partner for MSMEs navigating global ESG frameworks and digitization challenges.

In the digital domain, **NASSCOM** is actively shaping the future of tech-integrated supply chains. It is promoting AI/IoT applications in procurement and logistics, supporting digital innovation hubs, and advocating for IT upskilling. It is also laying the foundation for a tech-enabled, disruption-resilient supply network (NASSCOM, 2025).

### 7.3. Future Expectations

India is preparing for a future where digital, green, and resilient supply chains become the norm. One new idea is AI-powered logistics parks. These parks will use smart systems, sensors, and real-time data to manage goods. They will cut costs, save time, and help during disruptions by predicting problems and adjusting routes quickly (Times of India, 2025). Another big step is the National Carbon Credit Exchange. This will let companies earn money by cutting carbon emissions. If a company uses clean energy or green transport, it can sell its savings. This will turn sustainability into a business advantage and make green practices more common (Press Information Bureau, 2025).

## 8. Conclusion & Way Forward

As the Indian Supply Chain is evolving to meet the demands of a dynamic global economy, the integration of digital transformation, sustainability, and resilience is a strategic imperative. These pillars, once pursued in isolation, must now converge into a unified operational framework to ensure long-term competitiveness, regulatory compliance, and stakeholder trust.

Digital technologies (AI, IoT, and blockchain etc) are not merely tools for automation but enablers of visibility, intelligence, and responsiveness across the supply chain. Simultaneously, sustainability must move beyond compliance and embrace circularity, resource optimization, and emissions reduction as core design principles. Resilience, once viewed as a cost-heavy insurance measure, has proven essential in navigating disruptions like the COVID-19 pandemic, geopolitical conflicts, and raw material shortages.

Young professionals have a pivotal role to play in this transformation. As digital natives, they are best positioned to lead innovations in AI-driven logistics, ESG analytics, and sustainable procurement. Policymakers must continue enabling reform through infrastructure development, transparent regulations, and targeted incentives. Likewise, technology providers must create scalable, inclusive tools that support not only large enterprises but also vast network of Indian MSMEs.

Hence, it can be concluded that the most successful supply chains will be those that embed intelligence, sustainability, and resilience at their core. This strategic convergence offers not just operational advantages but also the opportunity to build a more equitable, efficient, and environmentally conscious economic future, transforming India into a global leader in next-generation supply chain systems.

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## Indian Institute of Materials Management

### MISSION

- To promote professional excellence in Materials Management towards National Prosperity through sustainable development.

### OBJECTIVE

- To secure a wider recognition of and promote the importance of efficient materials management in commercial and industrial undertakings.
- To safe guard and elevate the professional status of individuals engaged in materials management faculty.
- To constantly impart advanced professional knowledge and thus improve the skill of the person engaged in the materials management function.
- Propagate and promote among the members strict adherence to IIMM code and ethics.

### CODE OF ETHICS

- To consider first the total interest of one's organisation in all transactions without impairing the dignity and responsibility of one's office :
- To buy without prejudice, seeking to obtain the maximum ultimate value for each rupee of expenditure.
- To subscribe and work for honesty and truth in buying and selling; to denounce all forms and manifestations of commercial bribery and to eschew anti-social practices.
- To accord a prompt and courteous reception so far as conditions will permit, to all who call up on legitimate business mission.
- To respect one's obligations and those of one's organisation consistent with good business practices.



# ETHICAL GOVERNANCE AND INTEGRITY IN PUBLIC SERVICE

**PREM NARAYAN, IRSS PRINCIPAL CHIEF MATERIALS MANAGER  
EAST COAST RAILWAY, LIFE FELLOW IIMM  
premn2011@gmail.com**

## 1.0 Introduction

**E**thical governance and integrity in public service involve applying moral principles like honesty, transparency and accountability to ensure public officials act in public interest, build trust and prevent corruption. The key values include transparency, objectivity and a commitment to a public welfare. This foundation of trust and ethical conduct is vital for effective governance just societies and sustainable development often supported by codes of conduct and Whistleblower protection to uphold these standards. These fundamental concepts are essential for ensuring that public institutions serve the common good in a just, transparent, and accountable manner while maintaining public trust, promoting fairness, and ensuring that resources are used efficiently and effectively.

Good governance relies on public service integrity, which entails ethical standards, transparency, and accountability in public office, directly combating corruption by ensuring public welfare is prioritized over private gain. Corruption erodes public trust, weakens democracy, and hinders development. Strategies to foster integrity and combat corruption include strengthening whistleblower protections, using e-governance and technology, implementing codes of conduct, and establishing performance-based incentives within public institutions.

## 2.0 Corruptions Perception Index

The Corruption Perceptions Index (CPI) is an index that scores and ranks countries by their perceived levels of public sector corruption and generally defines corruption as an abuse of entrusted power for private gain including both petty and grand forms of corruption, as well as capture of the state by elites and private interests. According to the Transparency International, Corruption hampers climate action by misusing funds meant for mitigation and adaptation, with fossil-fuel interests obstructing policies.

The 2024 Corruption Perceptions Index published by Transparency International, places India at 96<sup>th</sup> rank, out of 180 countries, with a score of 38. This assessment is based on a score of 1 to 100, with score of hundred implying as very clean country (i.e. having zero corruption) and score of zero as very corrupt country (i.e. epitome of corruption). No country has scored above 90, nor was any rated below 10. More than 2/3 countries scored below 50, while the average score is 43.

The government of India, in pursuance of its commitment to “zero tolerance against corruption”, has taken several measures to combat corruption, which include systemic improvements and reforms to provide transparent citizen-friendly services and reduce corruption. Further, the disbursement of welfare benefits directly to the citizens under various schemes of the government in a transparent manner through the direct benefit transfer (DBT) mode, implementation of e-tendering in public procurements, introduction of e-governance and simplification of procedures and systems besides the introduction of procurement through the Government e-marketplace (GeM) as measures to check corruption.

The key components of ethical governance and integrity in the context of public service are discussed below:

## 3.0 Ethical Governance

Ethical governance refers to the adherence to moral principles and standards in the functioning of public institutions. It focuses on ensuring that government agencies, officials, and public servants make decisions that are in the best interests of the public, guided by ethics, law, and the common good.

### Key Components:

- **Transparency:** Government actions, decisions, and policies must be clear, open, and easily accessible to the public. This builds trust and allows for accountability.
- **Accountability:** Public officials should be held accountable for their actions and decisions. This includes being answerable to the public, legislative bodies, and oversight bodies.
- **Fairness and Justice:** Decisions must be made impartially, without favoritism, discrimination, or bias. Ethical governance ensures that everyone is treated equally under the law.
- **Rule of Law:** Ethical governance requires that decisions be made in accordance with established laws and regulations, and that public servants comply with legal and ethical standards.
- **Citizen Participation:** A key aspect of ethical governance is the inclusion of citizens in the decision-making process. This includes public consultations, feedback mechanisms, and participatory approaches that empower people to

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have a say in how their government operates.

#### 4.0 Integrity in Public Service

Integrity is the quality of being honest or having strong moral principles. People with integrity are generally known to be trustworthy, honest and kind. Honesty and integrity are defined as qualities that allow an individual to do the right thing as often as much as possible and when they have done a wrong thing, they admit to why they have done.

Integrity refers to the consistency of actions, values, methods, and principles. In the context of public service, it is about maintaining high ethical standards and performing duties with honesty and professionalism. Public servants with integrity ensure that their actions are consistent with the values of public service, such as honesty, accountability, fairness, and responsibility.

##### 4.1 Why live with Integrity?

**1) It's Easier:** Living with integrity is easier than living a deceitful life, which making unethical decisions, it is often easier in the short term, it eventually takes its toll. There is no real happiness to be found in struggling to remember your lies, living in fear of getting caught and not feeling like you truly earned your earned. It's empty and stressful, living with integrity brings wholeness and peace. Your conscience can rest easy and you can look at yourself in the mirror with pride.

**2) It builds Trust:** A man of integrity is a man other can count on. They know he will do what he says he will do. He is promoted at work because he can be trusted with greater responsibility. His wife knows that when he says he is working late, he really is. His friend feel comfortable opening up to him and turning to him at times of crises. When you choose to live with integrity, all your relationships will be healthier, stronger and more satisfying.

**3) It serves as basis for value Judgements:** A commitment to live a life of integrity allows you clarity, when you have to make hard choices. You can't be at war with yourself over which path to choose. Instead, you will experience the confidence that causes with having every aspect of your life knit together in a unity of purpose.

##### 4.2 Key Aspects of Integrity in Public Service:

- **Honesty and Truthfulness:** Public servants must be truthful and transparent in their dealings with the public, colleagues, and other stakeholders.
- **Avoidance of Conflicts of Interest:** Public servants must avoid situations where their personal interests conflict with their professional responsibilities. This includes refraining from accepting bribes or favours that could influence their decisions.
- **Commitment to the Public Good:** Public servants must act in the best interest of society, prioritizing the welfare of citizens over personal gain.

- **Ethical Decision-Making:** Integrity requires public servants to make decisions that align with ethical values, even when it may not be the most convenient or popular choice.
- **Respect for Public Trust:** Public officials are entrusted with power and resources on behalf of the public. They must use these resources responsibly, safeguarding the public's confidence in their actions.

#### 5.0 Challenges to Ethical Governance and Integrity

While ethical governance and integrity are fundamental to effective public service, there are various challenges that public officials face in maintaining these principles:

- **Corruption:** Bribery, nepotism, and other forms of corruption undermine ethical governance. Corruption erodes public trust and leads to inefficient resource allocation.
- **Political Pressure:** Public officials may face pressure from political leaders or powerful interest groups to make decisions that serve narrow agendas, rather than the common good.
- **Lack of Accountability Mechanisms:** In some cases, oversight bodies or legal frameworks may be weak, allowing unethical behaviour to go unchecked.
- **Resource Constraints:** Public servants may face challenges in fulfilling their duties due to limited budgets, time constraints, or insufficient training in ethical decision-making.
- **Cultural Factors:** In some societies, there may be cultural norms or practices that enable or even encourage unethical behaviour in public service.

##### 5.1 Promoting Ethical Governance and Integrity

To promote ethical governance and integrity in public service, governments, organizations, and citizens can take several steps:

###### 5.1.1 Institutional Measures:

- **Clear Codes of Conduct:** Establishing and enforcing clear codes of conduct and ethical standards for public servants helps to set expectations for behaviour.
- **Training and Education:** Regular ethics training for public servants can ensure that they are equipped with the knowledge and skills to make ethical decisions in complex situations.
- **Independent Oversight Bodies:** Independent institutions such as anti-corruption commissions, ombudsman offices, and audit agencies are essential for ensuring accountability and detecting unethical practices.
- **Whistleblower Protection:** Public servants should

be encouraged to report unethical behaviour, with strong legal protections to shield whistleblowers from retaliation.

#### 5.1.2 Public Participation and Transparency:

- Open Data and Access to Information: Governments should provide open access to information, allowing citizens to hold public servants accountable.
- Engagement with Civil Society: Civil society organizations, media, and the public play a key role in ensuring transparency and advocating for ethical standards in governance.

#### 5.1.3 Political Commitment:

- Political Will: Strong political leadership is crucial in setting a tone of integrity and ethical behaviour. Political leaders must model ethical behaviour and be committed to implementing reforms that promote integrity.
- Legal Frameworks: Robust anti-corruption laws, conflict of interest regulations, and ethical guidelines help to create a framework within which public servants can operate with integrity.

#### 5.1.4 The Role of Ethics in Public Administration

Public administration is the implementation arm of government policy, and ethical governance and integrity are vital in ensuring that policies are carried out in a manner that benefits society as a whole. Ethical leadership in public administration helps:

- Ensure efficient use of resources: Ethical leadership reduces waste, fraud, and mismanagement, leading to better allocation of public resources.
- Foster public trust: When citizens believe their government is acting ethically, they are more likely to trust government decisions and participate in the democratic process.
- Support social justice: Ethical governance ensures that vulnerable populations are treated with fairness and justice, reducing inequality.

#### 5.1.5 Examples of Ethical Governance

- India: Right to Information Act (RTI) for transparency, e-governance initiatives like, GeM and CPPP for increasing transparency in government procurement, the MyGov portal to reduce bureaucracy, the Code of Conduct for Ministers, the Centralized Public Grievance Redress and Monitoring System (CPGRAMS) for citizen feedback, the Prevention of Corruption Act to combat corruption, and the establishment of Parliamentary ethics committees. These mechanisms aim to foster accountability, promote integrity, and ensure fair treatment for citizens.

- Singapore: The country has consistently ranked highly for its commitment to transparency and integrity in public service. Through strong legal frameworks, transparency, and a zero-tolerance approach to corruption, Singapore has established a reputation for clean and efficient governance.

- New Zealand: Known for its ethical standards in public administration, New Zealand's public service operates under a clear code of conduct, with strong mechanisms for transparency, accountability, and oversight.

#### 5.1.6 Examples of integrity in public service:

- Resisting Corruption: An official refusing bribes or taking a firm stand against illegal sand mining, even when facing pressure, demonstrates moral courage and integrity.
- Ensuring Fairness: A judge delivering judgments based solely on evidence and law, without regard for a person's status or influence, upholds the principle of justice and equality.
- Upholding Ethical Standards: An official who identifies and reports a conflict of interest, or openly declares any financial obligations that could influence their duties, acts with integrity by prioritizing public interest over personal gain.
- Whistleblowing: Individuals who report corruption or misconduct, despite personal risks, exemplify integrity by exposing unethical practices to uphold public trust and promote accountability.
- Transparency in Decision-Making: Public servants who ensure transparency in their decision-making processes, providing timely and accurate information to the public, build confidence and accountability.
- Impartial Service: An official consistently treating all citizens with fairness and without favouritism, regardless of their background or affiliations, demonstrates integrity and commitment to meritocracy.

#### 6.0 Conclusion

Ethical governance and integrity in public service are essential for fostering good governance, maintaining public trust, and ensuring that government decisions serve the common good. Public institutions must be transparent, accountable, and committed to ethical decision-making, while also providing a framework of oversight and protection for both citizens and public servants. Ensuring these principles are upheld, requires collaboration across all levels of government, civil society, and the public at large.

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# IMPORT PROCEDURE IN BRIEF FOR ENGINEERING INDUSTRY

**BANI PRASAD CHAKRABORTY**  
**SCM-HEAD (TUAMAN ENGINEERING LTD.)**  
**banipr43@gmail.com**

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## 1. WHAT IS IMPORT?

**A**n import is a procedure of procurement of goods across a national border from an external source maintaining the rules related to it as per Government guide lines. Purchaser of goods is called an importer in the receiving country and selling of goods in overseas country is called exporter. Imports can be for goods as well as for services.

## 2. WHEN TO IMPORT?

A country demand for import when domestic quantity/ quality requirement exceeds the domestic quantity/ quality supplied or when the price of the goods or services on the world market is less than the price in the domestic market. Based on the transaction of Import and export, balance of trade of particular country is determined. Balance of Trade is basically the difference between the values of goods and services a country exports and the value of goods country imports. Hence, Balance of Trade is positive when export is more than import and negative when import is more than export value.

**Import and Export is governed by the following act/ procedures:**

- a. Foreign Trade regulation Act 1992.
- b. Foreign Trade Regulation rules 1993 related to different import license, Import Export code application for particular organization etc.
- a. Foreign trade exemption rules applicable in certain cases.
- a. Different notification under this act.

All this you will get from the publication issued by Ministry of commerce/ Director General of Foreign Trade and Customs.

- a. Hand book of Import Export policy. Hand book of Import Export procedure
- b. Customs Tariff in India
- c. Uniform customs and practice for documentary credit (UCP 600) and INCOTERMS issued by ICC.
- d. RBI Exchange Control Manual
- e. Procedure for Customs House Agent for clearing the goods at customs and Port.
- f. Customs Law Manual.

## To start any business of import and Export

- a. We have to apply for Import Export Code no for particular organization to Director General of Foreign Trade, Jonal office in the prescribed format available in DGFT office.
- b. Selection of items required from overseas supplier.
- c. Whether the items are under negative list or under any additional / antidumping duty for the import from the particular country.
- d. Whether there is any duty concessions or benefit for the particular project or not.
- e. Whether there is any benefit under Export Promotion Capital Goods scheme.

For duty benefit under some projects you have to take Project Authority Certificate from the customer for the particular items as per format under Import Export Procedure of DGFT and same is to be endorsed by the concerned Ministry of Center or State as applicable.

After arrival of goods you have to follow the customs tariff book available in India for the duty specifically mentioned against HSN code of each item taking into consideration for notification issued by DGFT/ Customs time to time.

In Import Export Policy there are different chapters like Project Import, EPCG Scheme, Deemed export etc.

Similarly for customs duty in customs tariff book you will get different chapters like Mechanical items under chapter 84, Electrical items under chapter 85, Instrumentation item under chapter 90, steel items under Chapter 72 and 73 etc.

## IMPORT TRADE FINANCE

It is generally regulated by Letter of Credit (as per UCP600) of different types like,

- a. Revocable or irrevocable Letter of Credit.
- b. Unconfirmed or confirmed L/C
- c. Transferable L/C
- d. Revolving Letter of Credit
- e. Back to Back L/C
- f. Sight L/C.
- g. Deferred payment L/C
- h. Documents against acceptance L/C

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**Forward Contract :** Foreign exchange variation plays a major role in case of long lead and high value items. To minimize the loss due to this variation Forward contract is done sometimes while opening L/C with the bank to avoid FEV during shipment. For this Bank charges some premium of course.

## **INCOTERMS**

EXW

### **EX WORKS...(NAMED PLACE)**

Means that the seller fulfills his obligation to deliver when he has handed over the goods, cleared for export into the charge of the carrier named by the buyer at the named place or point

FAS

### **FREE ALONGSIDE SHIP (NAMED PORT OF SHIPMENT)**

Means that the seller fulfills his obligation to deliver when the goods have been placed alongside the vessel on the quay at the named port of shipment

### **FREE ON BOARD**

(NAMED PORT OF SHIPMENT)

Means that the seller fulfills his obligation to deliver when the goods have passed over the ship's rail at the named port of shipment

CFR

### **COST AND FREIGHT**

(NAMED PORT OF DESTINATION)

Means that the seller must pay the costs and freight necessary to bring the goods to the named port of destination but the risks and loss of or damage to the goods as well as any additional costs due to events occurring after the time the goods have been delivered on board the vessel is transferred from the seller to the buyer when the goods pass the ship's rail in the port of shipment

CIF

### **COST INSURANCE AND FREIGHT (NAMED PORT OF DESTINATION)**

Means that the seller has the same obligation as under CFR but with the addition that he has to procure marine insurance against the buyer's risk of loss or damage to the goods during carriage

CPT

### **CARRIAGE PAID TO**

(NAMED PLACE OF DESTINATION)

Means that the seller pays the freight of the carriages of the goods to the named destination. The risk of loss or damage to the good, as well as any additional costs due

to events occurring after the time the goods have been delivered to the carrier to transfer from the seller to the buyer when the goods have been delivered to the carrier.

CIP

### **CARRIAGE AND INSURANCE PAID TO.. (NAMED PLACE OF DESTINATION)**

Means that the seller has the same obligations as under CPT but with the addition that the seller has to procure cargo insurance against the buyer's risk to loss or damage to the goods during the carriage.

DAF

### **DELIVERED AT FRONTIER..(NAMED PLACE)**

Means that the seller fulfills his obligation to deliver When the goods have been made available, cleared for export, at the named point and place at the frontier, but before the customs border of the adjoining country.

DES

### **DELIVERY EX SHIP..**

(NAMED PORT OF DESTINATION)

Means that the seller fulfills his obligation to deliver when the goods have been made available to the buyer on board the ship uncleared for import at the named port of destination. The seller has to bear all the costs and risks involved in bringing the goods to the named port of destination

DEQ

### **DELIVERY EX QUAY ( DUTY PAID).. (NAMED PORT OF DESTINATION)**

Means that the seller fulfills his obligation to deliver when he has made the goods available to the buyer on the quay (wharf) at the named port of destination, cleared for importation. The seller has to bear all risks and costs including duties, taxes and other charges of delivering the goods thereto.

DDU

### **DELIVERY DUTY UNPAID.. (NAMED PORT OF DESTINATION)**

Means that the seller fulfills his obligation to deliver when the goods have been made available at the named place in the country of importation. The seller has to bear the costs and risks involving in bringing the goods thereto, (excluding duties, taxes and other official charges payable upon importation) as well as the costs and risks of carrying out the customs formalities

DDP

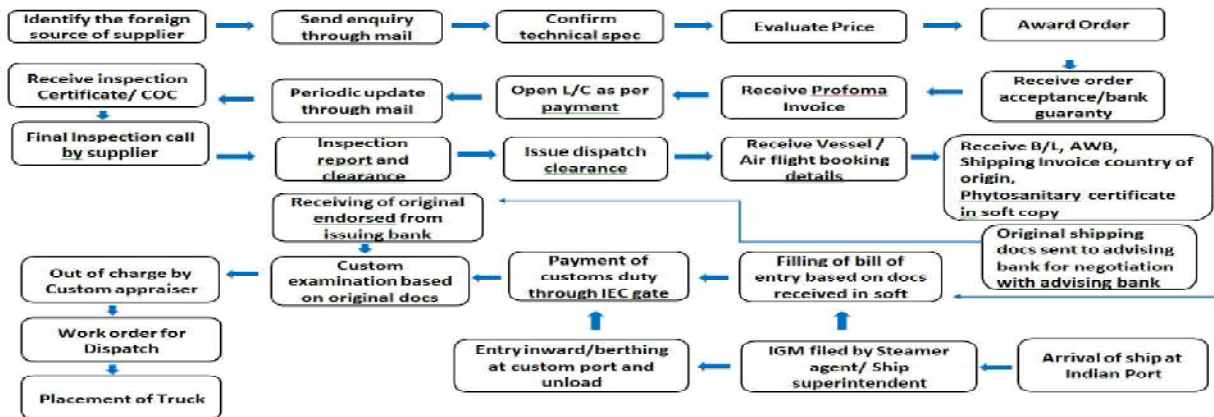
### **DELIVERY DUTY PAID**

(NAMED PLACE OF DESTINATION)

Means that the seller fulfills his obligation to deliver

when the goods have been made available at the named place in the country of importation. The seller has to bear the risks and cost, including duties, taxes and other charges of delivering the goods thereto, cleared for importation.

### FLOW CHART ON IMPORT



### FLOW CHART ON CUSTOM CLEARANCE



### Duty Calculation based on different basic customs Duty.

| Custom Duty Computation under GST Regime |                                       |        |        |        |        |        |                    |        |
|------------------------------------------|---------------------------------------|--------|--------|--------|--------|--------|--------------------|--------|
| IGST - 18%                               |                                       |        |        |        |        |        |                    |        |
|                                          | Basic Customs Duty                    | 15.0%  | 7.5%   | 5%     | 3%     | 0%     | Calculated On / As | 10.0%  |
|                                          | IGST Rate                             | 18.00% | 18.00% | 18.00% | 18.00% | 18.00% |                    | 18.00% |
|                                          | CIF Value                             | 100    | 100    | 100    | 100    | 100    |                    | 100    |
| A.                                       | Assessable Value                      | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | A                  | 100.00 |
| B.                                       | Basic Customs Duty                    | 15.00  | 7.50   | 5.00   | 3.00   | 0.00   | B                  | 15.00  |
| C.                                       | Education Cess on Customs Duty @ 0%   | 0.000  | 0.000  | 0.000  | 0.000  | 0.000  | C                  | 0.000  |
| D.                                       | H E SEC on Customs Duties @ 0%        | 0.000  | 0.000  | 0.000  | 0.000  | 0.000  | D                  | 0.000  |
| E.                                       | Social Welfare surcharge @ 10% on BCD | 1.500  | 0.750  | 0.500  | 0.300  | 0.000  | 10% x B            | 1.000  |
| F.                                       | Sub Total                             | 116.50 | 108.25 | 105.50 | 103.30 | 100.00 | F = A+B+C+D+E      | 111.00 |
| G.                                       | IGST @ 18%                            | 20.970 | 19.485 | 18.990 | 18.594 | 18.000 | G                  | 19.980 |
| H.                                       | Total Custom Duties                   | 37.470 | 27.735 | 24.490 | 21.894 | 18.000 | H = G+E+D+C+B      | 30.980 |
| I.                                       | Creditable Custom Duty                | 20.970 | 19.485 | 18.990 | 18.594 | 18.000 | F                  | 19.980 |
| J.                                       | Non Creditable Custom Duty            | 16.500 | 8.250  | 5.500  | 3.300  | 0.000  | B+C+D+E            | 11.000 |

### DESPATCH DOCUMENTS FOR IMPORT

- Signed Invoice
- Bill of Lading / Airway Bill
- Certificate of country of origin
- Packing List
- Test and Inspection certificate
- Fumigation certificate
- Third party inspection certificate.
- Insurance certificate.

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# “INDUSTRIAL SYSTEM DESIGN AND OPERATIONAL SYNERGY: A THREE-DIMENSIONAL ANALYSIS OF SPATIAL LAYOUT, MATERIAL FLOW, AND INVENTORY DYNAMICS”

DR. BALAGOPAL MK, PRINCIPAL, MUSALIAR COLLEGE OF  
ARTS AND SCIENCE MG UNIVERSITY & MEMBER TRIVANDRUM BRANCH  
balagopalmannumkal@gmail.com

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**Introduction :** Industrial efficiency depends on the synchronized coordination of multiple interconnected components — the layout, location, sourcing, plant, stores, warehouses, conveyance, and delivery systems — all functioning under the disciplines of time management and spaciousness.

This journal explores how these elements interact, react, and influence each other within an industrial ecosystem. It emphasizes the strategic role of sourcing and supplier management, the impact of conveyance and spatial design, and the significance of time optimization in achieving seamless, error-free reordering and continuous operational flow.

In the modern industrial landscape, achieving excellence demands more than isolated departmental efficiency. It requires a **harmonized system** in which every component — from raw material sourcing to final delivery — operates in alignment with time and space constraints. A well-planned industrial system is a living organism, where each part reacts to the other, and the overall health depends on their balanced functioning. This study examines the interrelation among eight key stages of industrial operation and extends the discussion to time management, conveyance, and spaciousness as cross-cutting enablers of success.

## 1. SPATIAL LAYOUT

### A. Layout: The Foundation of Flow

The **layout** represents the physical configuration of an organization's facilities — the arrangement of machinery, workstations, and movement pathways. An effective layout ensures:

- Minimal material movement and handling cost
  - Logical sequence of operations
  - Safety, accessibility, and comfort for workers
  - Smooth integration between production and logistics

#### Types of Layouts:

- **Product Layout:** Sequential arrangement for mass production.
- **Process Layout:** Grouping similar machines for varied operations.

- **Fixed Position Layout:** Product remains stationary; materials and workers move.
- **Combination Layout:** Flexible arrangement blending multiple methods.

**Interrelation:** The efficiency of layout directly impacts conveyance, time management, and spatial balance. Poor layout design leads to congestion, delays, and inefficiency across subsequent stages.

### B. Location: The Strategic Anchor

**Location selection** determines the physical base of operations — a long-term decision affecting cost, accessibility, and competitiveness.

#### Key Factors Influencing Location:

- Proximity to raw materials and suppliers
- Transportation facilities and connectivity
- Labour availability and cost
- Market access and customer proximity
- Government policies, taxation, and incentives

**Reaction:** An unsuitable location increases sourcing difficulty, delays conveyance, and inflates logistics cost. Conversely, a strategically chosen location enhances supply reliability and delivery performance.

### C. Sourcing: The Artery of Production

**Sourcing** provides the input lifeline of industrial activity — securing materials, parts, or services at the right quality, quantity, and price.

#### Supplier Mining and Identification

Modern industries use a combination of:

- **Market Research** and trade exhibitions
- **Digital Platforms** (IndiaMART, TradeIndia, Alibaba, etc.)
- **Industrial Networks and Chambers of Commerce**
- **Reverse Marketing** and supplier collaboration

#### Supplier Evaluation

Key evaluation parameters:

- Quality consistency
- Cost competitiveness and Total Cost of Ownership (TCO)
- Delivery reliability and lead time

- Financial stability and reputation

#### Tools Used:

- Vendor Rating Systems
- Weighted Point Method
- Vendor Audits

#### Sourcing Techniques

- **Single vs. Multiple Sourcing:** Balancing consistency and risk.
- **Local vs. Global Sourcing:** Cost efficiency versus availability.
- **Just-in-Time (JIT):** Receiving materials exactly when needed.
- **Vendor-Managed Inventory (VMI):** Suppliers monitor and replenish stock.
- **E-Procurement:** Digitally integrated purchasing systems.

#### Ensuring Timely Input Flow

- Use of Material Requirement Planning (MRP) systems.
- Lead-time monitoring and buffer planning.
- Supplier collaboration for forecasting and logistics synchronization.

**Reaction:** Timely sourcing ensures uninterrupted plant operations, balanced store inventory, and steady warehouse throughput — supporting error-free reordering.

**D. Plant: The Heart of Production :** The plant transforms raw materials into finished goods, where human skill, machinery, and methods intersect.

#### An ideal plant:

- Follows ergonomic and safety standards
- Allows for easy supervision and workflow continuity
- Integrates maintenance and quality control stations

**Interrelation:** The plant depends on stores for material supply, on conveyance for movement, and on time management for scheduling. Any delay in input flow or spatial misalignment affects output rhythm.

#### E. Stores: The Custodian of Continuity

The **stores department** manages incoming and outgoing materials, maintaining the right stock levels for production stability.

#### Functions:

- Receiving, recording, and issuing materials
- Stock level control through minimum–maximum systems
- Preventing pilferage and spoilage
- Implementing automatic reorder points

**Error-Free Reordering:** Using digital inventory tools and barcode systems, stores trigger purchase orders automatically when stock reaches reorder levels — ensuring consistent flow to the plant.

#### F. Warehouses: The Bridge Between Production and Market

**Warehouses** serve as buffers between manufacturing

and delivery. They store finished goods, manage order consolidation, and handle dispatch scheduling.

#### Types:

- Private Warehouses
- Public Warehouses
- Distribution Centres

**Reaction:** Efficient warehouse management ensures timely delivery, supports forecasting, and maintains market responsiveness.

#### G. Conveyance: The Flow of Movement

**Conveyance** integrates all the above systems through **material movement** — both internal and external.

**Internal Conveyance:** Conveyors, forklifts, cranes, AGVs.  
**External Conveyance:** Trucks, rail, or cargo carriers for inter-location transport.

**Interrelation:** Well-planned conveyance reduces travel time, prevents congestion, and complements time management. It also requires adequate spaciousness to allow unimpeded material movement.

#### H. Delivery: The Final Integration Point

Delivery marks the conclusion of the production cycle and the beginning of customer satisfaction.

#### Processes Include:

- Order processing and packaging
- Transportation scheduling
- Tracking and documentation
- Customer confirmation

**Reaction:** Efficient delivery depends on proper warehouse management, clear conveyance routes, and timely coordination with logistics providers.

#### I. Time Management, Conveyance, and Spaciousness: The Triad of Efficiency

##### Time Management

Controls the temporal rhythm of production — ensuring synchronization of all activities:

- Optimized cycle times
- Accurate scheduling
- Real-time monitoring

##### Conveyance

Provides physical movement — linking stores, plant, and warehouse:

- Reduces material handling time
- Supports JIT and Lean principles
- Ensures punctual internal logistics

##### Spaciousness

Enables organized movement and flexibility:

- Prevents congestion and delays
- Enhances safety and worker comfort

- Supports future expansion and layout flexibility

**Interrelationship:** When these three coexist harmoniously —

- Time management dictates when movement occurs.
- Conveyance ensures how movement occurs.
- Spaciousness determines where movement occurs.

Together, they establish a **balanced operational flow**, minimizing idle time, maximizing throughput, and preventing spatial or temporal clashes.

Systemic Integration and Reaction:-

Each element — from **layout to delivery** — interacts dynamically with others.

A delay in sourcing affects production schedules; poor layout constrains conveyance; lack of time control leads to congestion; and limited space restricts workflow. Hence, operational success depends on **feedback loops**, **data-driven monitoring**, and **interdepartmental coordination**.

Error-free reordering is the **self-correcting mechanism** of the industrial system.

It involves:

- Automated stock tracking
- Supplier collaboration via digital platforms
- Predictive analytics for demand forecasting
- Integration of MRP and ERP systems

This mechanism ensures that material inflow aligns perfectly with consumption — eliminating both shortages and excess.

Industrial excellence emerges from the **integration of structure, time, and movement**.

The success of a plant does not depend solely on the efficiency of individual departments, but on how layout, sourcing, conveyance, and time complement one another within the available spatial and logistical framework.

When these components are harmonized through disciplined planning and digital coordination, the result is a **seamless flow system** — efficient, adaptive, and resilient to disruption.

In essence, **layout defines the structure, sourcing fuels the flow, conveyance sustains the rhythm, time management aligns the sequence, spaciousness provides the freedom, and delivery fulfils the promise**.

### 1. Industrial Layout and Integrated Operations Management

An efficient industrial system depends on the synchronized functioning of multiple interconnected components — from the choice of location to the final delivery of goods. This journal explores the eight critical stages of industrial operation — layout, location, sourcing, plant, stores, warehouses, conveyance, and delivery — highlighting their interrelationships,

reactions to one another, and how seamless coordination ensures error-free reordering and operational excellence.

#### 1. Layout: The Blueprint of Efficiency

The **layout** forms the foundation of operational success. It determines the spatial arrangement of equipment, departments, and pathways to ensure smooth workflow, minimal material handling, and maximum safety. An efficient layout:

- Reduces production time and transport distance
- Enhances worker productivity
- Minimizes bottlenecks and idle time

**Reaction with Other Elements:** A poorly designed layout can disrupt material flow, delay sourcing and storage, and complicate conveyance. Conversely, a well-planned layout enhances coordination between sourcing, stores, and production units.

#### 2. Location: The Strategic Base

**Location selection** determines accessibility to raw materials, labour, markets, and infrastructure. It influences transportation costs, supply reliability, and overall competitiveness.

##### Key Factors:

- Nearness to raw materials and suppliers
- Access to markets and transport routes
- Availability of utilities and skilled labour
- Government policies and incentives

**Interrelation:** A strategic location reduces conveyance cost, accelerates sourcing, and improves delivery efficiency. The success of the layout and plant operations depends heavily on the suitability of the location.

#### 3. Sourcing: The Artery of Production

**Sourcing** involves procuring the right quality and quantity of materials at the right time and cost. It builds the foundation for production consistency.

##### Processes Involved:

- Supplier identification and evaluation
- Contract negotiation
- Quality inspection and logistics coordination

**Reaction:** Delays or errors in sourcing directly affect production schedules, store management, and warehouse operations. Thus, sourcing teams must maintain real-time coordination with stores and production departments to enable **error-free reordering**.

#### 4. Plant: The Heart of Production

The **plant** is where value is added — transforming raw materials into finished goods. It integrates manpower, machinery, and methods for optimal output.

**Interrelation:** The plant depends on stores for timely supply, on layout for efficiency, and on conveyance for smooth material flow. The quality and speed of plant

operations dictate warehouse inventory levels and delivery scheduling.

#### 5. Stores: The Custodian of Materials

The **stores department** maintains materials in usable condition, ensuring uninterrupted production. Functions include:

- Receiving and recording materials
- Monitoring inventory levels
- Issuing materials based on requisitions
- Preventing pilferage and deterioration

**Reordering & Reaction:** Stores play a crucial role in **error-free reordering** through:

- Minimum and maximum stock level systems
  - Automatic reordering points
  - Real-time data with digital inventory tools
- Efficient stores management maintains the balance between under stocking and overstocking, directly influencing plant efficiency and warehouse stability.

#### 6. Warehouses: The Link Between Production and Market

**Warehouses** store finished goods before they reach customers or distributors. They provide buffer capacity between production and market demand.

**Interrelation:**

- Receive goods from the plant
- Coordinate with conveyance for dispatch
- Manage inventory for delivery schedules

**Reaction:** A well-managed warehouse ensures smooth delivery and supports reordering based on demand forecasting and sales trends.

#### 7. Conveyance: The Flow Mechanism

**Conveyance** refers to the movement of materials within and beyond the plant. It includes internal material handling systems (conveyors, forklifts) and external logistics (trucks, ships, etc.).

**Impact:** Efficient conveyance reduces handling time, damage, and transport costs. Delays in conveyance can disrupt both production and delivery schedules.

#### 8. Delivery: The Final Frontier

**Delivery** completes the production cycle by transporting finished goods to customers. It reflects the company's reliability and service quality.

**Key Components:**

- Order processing and documentation
- Packaging and labelling
- Route planning and tracking

**Reaction:** Delivery efficiency is the cumulative result of the effectiveness of all prior stages. Any fault in sourcing, storage, or conveyance echoes in delayed or incorrect delivery.

Integrated Reaction and Coordination

The entire system functions as a **chain of interdependent activities**.

- Location and layout set the foundation.
- Sourcing feeds the plant.
- Stores ensure continuous supply.
- Warehouses act as the transition point.
- Conveyance links every phase.
- Delivery fulfils customer demand.

A disruption or error in one stage triggers a **reactive chain** throughout the system. Hence, feedback loops and real-time monitoring are vital to maintain balance.

Error-Free Reordering: The Nervous System

Error-free reordering ensures continuity by maintaining the optimal flow of materials and products. It is achieved through:

- **Digital inventory management systems** (ERP, barcoding, RFID)
- **Automatic reordering points** based on consumption data
- **Cross-departmental communication** between sourcing, stores, and production
- **Data-driven forecasting** using historical demand patterns

When integrated effectively, these tools create a **self-correcting supply system** that minimizes human error and operational delays.

#### PLANT LAYOUTS:-

Plant layout refers to the arrangement of machinery, equipment, and facilities within a manufacturing plant to ensure smooth workflow and material movement. The main types of layouts are:

##### 1. Product or Line Layout

**Model Concept:** Machines are arranged in a sequence according to the steps in the manufacturing process. Each operation follows the previous one directly — like a straight or U-shaped line.

**Example**                      **Model:**                      **P**  
• **Raw Material ! Cutting ! Drilling ! Assembling ! Painting ! Packing**

**Best suited for:** Mass production of standardized goods (e.g., automobile assembly lines, FMCG products).

**Advantages:**

- Smooth, continuous flow of production
- Low material handling cost
- Less work-in-progress (WIP) inventory
- Simplified supervision and control

**Disadvantages:**

- Highly inflexible (difficult to change product design)
- Breakdown of one machine stops the entire line
- High initial setup cost

**Exhibit model idea:** Create a **straight-line cardboard model** with toy machines or labels for each process

step. Use arrows to show movement.

## 2. Process or Functional Layout

**Model Concept:** Machines performing similar functions are grouped together (e.g., all drilling machines in one section, all lathes in another).

Ø **Example Model:**

=9 Drilling Dept.  
=9 Milling Dept.  
=9 Welding Dept.  
=9 Assembly Dept.

**Best suited for:** Job or batch production — where variety is high and quantity is low (e.g., workshops, hospitals).

### Advantages:

- High flexibility in operations
- Better utilization of machinery and labour
- Easy to supervise skilled work
- Maintenance is easier

### Disadvantages:

- High material handling cost and time
- Complex workflow and scheduling
- Requires more floor space

**Exhibit model idea:** Use **colour paper blocks** to represent departments, connected by zigzag lines showing irregular material movement.

## 3. Fixed-Position Layout

**Model Concept:** The product stays stationary, and workers, machines, and materials move around it.

**Example Model:** Used in shipbuilding, aircraft manufacturing, large construction, or power plant installation.

### Advantages:

- No material movement of the main product
- High product quality (customized work)
- Flexibility in scheduling and design changes

### Disadvantages:

- High material handling for tools and parts
- Difficult supervision and coordination
- Idle time for labour and equipment

**Exhibit model idea:** Use a **central large object (ship/ aircraft)** in the middle, with miniature workers and tool symbols moving around it.

## 4. Cellular or Group Layout

**Model Concept:** A hybrid of product and process layout. Machines are grouped into cells, each handling a “family” of similar parts or products.

**Example Model:** Cell 1 ! Component A family  
Cell 2 ! Component B family

**Best suited for:** Batch production where products share similar processing steps.

### Advantages:

- Reduces material movement and lead time
- Encourages teamwork and responsibility
- Combines flexibility with efficiency

### Disadvantages:

- High cost for initial setup
- Requires detailed product classification
- Possible under-utilization of machines

**Exhibit model idea:** Draw several **small islands or “cells”** on a chart, each labelled with the machines and products they handle.

## 5. Combination Layout

**Model Concept:** Integrates two or more types of layouts to suit complex operations.

Example: Process layout in one section and product layout in another.

### Example Model:

- Process layout in machining department
- Product layout in assembly line

### Advantages:

- Combines flexibility and efficiency
- Optimal space utilization
- Suitable for diversified production

### Disadvantages:

- Complex planning and supervision
- Difficult material handling coordination

**Exhibit model idea:** Show **two zones** — one with grouped machines (process layout) and another with a linear flow (product layout), connected by arrows.

Summary Table

| Type of Layout        | Suitable For         | Advantages                     | Disadvantages                         |
|-----------------------|----------------------|--------------------------------|---------------------------------------|
| Product Layout        | Mass Production      | Smooth flow, low handling cost | Inflexible, stoppage halts production |
| Process Layout        | Job/Batch Production | Flexible, better machine use   | Complex routing, more space           |
| Fixed-Position Layout | Large-scale Projects | No movement of product         | Difficult coordination, high cost     |
| Cellular Layout       | Grouped Products     | Teamwork, reduced lead time    | Costly setup, machine underuse        |
| Combination Layout    | Mixed Production     | Balanced efficiency            | Complex management                    |

## Importance of Better Plant Layout in Connection with Inventory Management

A systematic and scientific plant layout is the foundation of efficient production and effective inventory management. Proper arrangement of machinery, storage, and movement paths ensures the smooth flow of materials, reduction of lead time, and control over transportation and warehousing costs. This journal explores the importance of plant layout, various situations where it impacts inventory performance, challenges faced in poor layout planning, and the measures to overcome them. It also provides insights into modern approaches and design principles for creating efficient layouts that support cost reduction, productivity, and organizational growth.

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Plant layout refers to the **physical arrangement of facilities**, machinery, equipment, and work areas within an organization to ensure an efficient flow of materials, men, and information. It has a direct influence on **inventory management**, as it determines how raw materials, work-in-progress, and finished goods are stored and moved across the production cycle. A well-designed layout helps in:

- Reducing **lead time**
  - Controlling **transportation and handling costs**
  - Improving **material flow and space utilization**
  - Enhancing **coordination** between production and inventory departments
- Thus, plant layout acts as a vital link between design, production, and logistics in a manufacturing setup.

A **systematic and scientific plant layout** plays a crucial role in ensuring the smooth functioning of any manufacturing or service organization. It refers to the physical arrangement of different departments, machinery, equipment, storage areas, and service facilities within a manufacturing unit. When planned efficiently, a good plant layout supports **effective inventory management**, which directly impacts productivity, cost, and customer satisfaction.

### 1. Smooth Flow of Inputs

A scientific layout ensures the **uninterrupted and logical flow of raw materials and components** from the point of receipt to the production line. This minimizes unnecessary handling and delays, allowing for better control over inventory levels and preventing material congestion or shortage on the shop floor.

### 2. Reduction in Lead Time

Efficient layout design helps in reducing **lead time** — the time taken from receiving an order to its delivery. Shorter material movement paths, strategic positioning of stores, and well-defined workstations make the production process faster and more predictable.

### 3. Control over Transportation Cost

An optimized layout minimizes internal transportation distances, leading to **reduced material handling costs and fuel expenses**. It also ensures safety and reduces the risk of damage to materials during movement.

### 4. Reduced Warehousing and Maintenance Costs

Better layout planning allows for **appropriate space utilization** in storage areas. With materials placed according to usage frequency and size, inventory is easier to locate and maintain. This reduces warehousing expenses and the cost of maintaining excess or idle stock.

### 5. Overall Cost Reduction

An integrated plant layout coupled with sound inventory

management results in **significant cost savings** through efficient use of space, labour, and machinery. It also prevents wastage of materials and time.

### 6. Selection of Alternative Transportation and Handling Systems

A flexible plant layout allows the management to adopt **alternative modes of transportation and handling systems** — such as conveyor belts, forklifts, or automated guided vehicles (AGVs) — according to production needs and cost considerations.

### 7. Efficient Handling System Inside the Premises

Properly planned layout facilitates a **systematic handling system** that reduces manual effort, enhances safety, and ensures quick transfer of materials from one stage of production to another.

### 8. Study of Sourcing and Material Movement

Effective inventory management begins with **strategic sourcing**. A good plant layout aids in identifying the shortest and most economical routes for material movement and storage, promoting **Just-In-Time (JIT)** practices.

### 9. Smooth Movement of Output

An orderly plant layout ensures that finished goods move smoothly from the production floor to the dispatch section. This reduces delays in shipping, thereby improving **customer satisfaction** and **market responsiveness**.

### 10. Avoidance of Idle Time

By maintaining proper synchronization between material supply and production processes, idle time for men and machines can be minimized. This leads to improved **labour productivity** and **equipment utilization**.

### 11. Safety and Supervision

A well-designed layout also supports **better supervision and safety control**. Clear pathways, proper lighting, and logical placement of machinery reduce accidents and make oversight more effective.

In essence, **a scientific plant layout is the backbone of efficient inventory management**. It ensures an uninterrupted flow of materials, minimizes waste, reduces costs, and enhances productivity. Organizations that regularly review and upgrade their plant layouts in line with technological advancements and operational needs are better positioned to achieve **competitive advantage** in the global marketplace.

### Various Situations Linking Plant Layout and Inventory Management

1. **Material Flow:** When the layout ensures smooth material movement from one workstation to another, delays and blockages in inventory flow are minimized.

2. **Storage and Accessibility:** An efficient layout provides adequate and accessible storage for raw materials, semi-finished, and finished goods.
3. **Just-In-Time (JIT) Operations:** In a JIT system, the layout must support minimal inventory holding with fast turnaround between supply and production.
4. **Warehouse and Dispatch Operations:** Proper layout design near the dispatch area ensures quick loading and unloading, reducing shipping delays.
5. **Alternative Transportation and Handling Systems:** A layout adaptable for conveyors, forklifts, or automated systems allows flexibility in material handling and storage.

#### Challenges in Integrating Layout with Inventory Management

1. **Poor Space Utilization:** Inefficient design may cause congestion or underutilized areas.
2. **Long Material Handling Routes:** Poorly planned routes lead to delays, extra fuel consumption, and higher costs.
3. **Excessive Inventory Holding:** Lack of coordination between production layout and inventory control can result in overstocking or shortages.
4. **Safety and Supervision Issues:** Cluttered layouts increase the risk of accidents and make monitoring difficult.
5. **Lack of Flexibility:** Fixed layouts are unable to accommodate changes in production volume or technology.

#### Measures to Address Challenges

1. **Scientific Study of Material Flow:** Use flow diagrams and time-motion studies to identify bottlenecks and streamline movement.
2. **Space Planning:** Allocate space proportionate to process requirements and accessibility.
3. **Implementation of Lean Manufacturing and JIT:** These systems reduce excess inventory and promote continuous material flow.
4. **Adoption of Automation and Handling Equipment:** Use conveyors, cranes, and AGVs to minimize manual handling.
5. **Safety and Ergonomics:** Ensure pathways are clear, lighting is adequate, and equipment placement minimizes worker strain.
6. **Flexible Design:** Plan layouts that can be restructured based on future needs or process changes.

#### Suggestions for Effective Plant Layout Design

- Locate **stores and warehouses** close to the point of use to reduce movement.
- Ensure **unidirectional material flow** from raw material to finished product.
- Maintain **minimum material handling** by using direct routes.
- Provide **easy access** for maintenance and supervision.
- Keep **adequate buffer space** for temporary storage of materials.
- Use **technology tools** such as CAD and simulation models for layout design and analysis.

#### How to Design Layout to Resolve Issues

1. **Data Collection:** Study production processes, material characteristics, and storage needs.
2. **Process Flow Charting:** Identify the sequence of operations to determine optimal placement of machines.
3. **Space Requirement Analysis:** Estimate the space required for each process and supporting activities.
4. **Develop Layout Alternatives:** Prepare multiple layout options considering material flow, space, and safety.
5. **Evaluation and Selection:** Compare alternatives using cost, flexibility, safety, and future expansion as criteria.
6. **Implementation and Review:** Execute the layout and continuously monitor for performance improvement.

#### Various Approaches to Plant Layout Design

1. **Product Layout:** Machines are arranged according to the sequence of operations for a single product. Suitable for mass production.
2. **Process Layout:** Similar machines are grouped together. Ideal for job or batch production.
3. **Fixed-Position Layout:** Product remains stationary while resources move around it — common in shipbuilding or aircraft manufacturing.
4. **Cellular Layout:** Combines elements of both product and process layouts to form flexible work cells.
5. **Combination Layout:** Used when a single type does not meet all needs; mixes features of various layouts.

A well-designed plant layout, when integrated with sound inventory management, becomes a **strategic tool for operational efficiency**. It reduces waste, minimizes delays, and ensures cost-effective use of space and resources. Continuous review and scientific redesign of layouts according to production trends, technology, and market demand are essential for maintaining

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competitiveness and ensuring long-term sustainability.

## 2. MATERIAL FLOW

### Strategic Sourcing and Supplier Management for Continuous Input Flow

In industrial operations, **sourcing** acts as the arterial system that channels the lifeblood of production — raw materials, components, and services — into the plant. Any delay, quality lapse, or cost inefficiency in sourcing disrupts the entire value chain. Therefore, modern enterprises prioritize **strategic sourcing** and **supplier mining** to ensure the right materials reach the right place at the right time and cost.

#### Objectives of Sourcing

The primary goals of sourcing are:

- Ensuring **uninterrupted material flow** to maintain steady production.
- Achieving **cost efficiency** without compromising quality.
- Establishing **reliable supplier relationships** for long-term stability.
- Maintaining **supply chain flexibility** to adapt to market fluctuations or disruptions.

#### Supplier Mining: Identifying the Right Sources

**Supplier mining** is the systematic process of discovering, evaluating, and developing vendors capable of delivering required raw goods efficiently.

#### Methods of Supplier Identification

1. **Market Research and Direct Inquiry:** Visiting trade fairs, industrial expos, or chambers of commerce to identify potential suppliers.
2. **Digital Supplier Platforms:** Using databases like **IndiaMART**, **Alibaba**, **TradeIndia**, **ThomasNet**, or **government e-marketplaces** to locate suppliers.
3. **Industry Networks and References:** Collaborating with peers, industry associations, or professional consultants for verified contacts.
4. **Reverse Marketing:** Inviting suppliers to propose cost-effective or innovative materials and methods.
5. **Global Sourcing Agents:** Employing agents or procurement consultants who specialize in identifying overseas suppliers for specific raw goods.

#### Supplier Evaluation and Selection

Once potential suppliers are identified, they are assessed through **technical, financial, and operational criteria**.

#### Evaluation Parameters

- **Quality Standards:** ISO certification, adherence to specifications, and consistency.

- **Cost Competitiveness:** Total landed cost (including logistics, duties, and hidden costs).
- **Capacity and Reliability:** Production volume capability and historical performance.
- **Delivery Timeliness:** Lead time, past record of punctuality, and backup systems.
- **Financial Stability:** Balance sheet strength, liquidity, and sustainability.
- **After-Sales Support:** Willingness to provide replacements, technical guidance, or training.

#### Tools for Supplier Evaluation

- **Vendor Rating System (VRS):** Quantitative rating based on performance metrics.
- **Weighted Point Method:** Assigns scores to quality, delivery, price, and service.
- **Cost-Ratio Method:** Relates supplier cost to the value of materials received.
- **Vendor Audit:** On-site inspections and process verification.

#### Sourcing Techniques and Strategies

##### Single vs. Multiple Sourcing

- **Single Sourcing:** One supplier for a given material ensures consistency and stronger relationships but poses risk during disruptions.
- **Multiple Sourcing:** Several suppliers reduce dependency but may complicate quality control and logistics.  
  
! Best practice: Maintain one **primary** and one **backup** supplier.

##### Local vs. Global Sourcing

- **Local sourcing** offers shorter lead times and cultural alignment.
  - **Global sourcing** provides cost advantages and access to advanced technologies.
- ! Modern companies adopt a **hybrid model** balancing cost and reliability.

##### Just-in-Time (JIT) Procurement

Materials arrive **exactly when needed**, minimizing storage costs but requiring flawless coordination with suppliers and transporters.

##### Vendor-Managed Inventory (VMI)

Suppliers monitor the buyer's stock levels and **automatically replenish** when materials reach reorder points — ensuring **error-free reordering**.

##### E-Procurement Systems

Digital platforms integrate purchasing with real-time data analytics, automating:

- Purchase requisitions and approvals
- Tender comparison
- Order tracking and invoicing

This improves **transparency, speed, and cost accuracy**.

Ensuring Timely Arrival and Continuous Flow

Maintaining **input flow** requires synchronization between procurement, logistics, and production planning.

### 1 Lead Time Management

- Record average supplier lead times.
- Include buffer periods for transportation or customs delays.
- Use **material requirement planning (MRP)** systems to trigger timely orders.

### 2 Logistics Integration

- Coordinate with transporters for route optimization and vehicle tracking.
- Establish contracts with multiple logistics partners to avoid dependency.
- Adopt **real-time shipment monitoring** through GPS and digital dashboards.

### 3 Collaborative Planning

- Conduct **joint forecasting** with suppliers based on projected demand.
- Schedule **monthly or quarterly supplier meetings** for feedback and performance review.

Economically Ideal Sourcing

To identify the **economically ideal supplier**, companies use **Total Cost of Ownership (TCO)** rather than just unit price.

**TCO includes:**

- Base price of material
- Transportation and handling costs
- Import duties or taxes
- Storage and insurance costs
- Rejection/rework rates due to poor quality

A supplier offering the **lowest TCO** — not necessarily the lowest price — is considered economically ideal.

Risk Mitigation in Sourcing

- **Diversification:** Avoid dependency on a single supplier or region.
- **Safety Stock:** Maintain minimal buffer stock for critical materials.
- **Long-Term Contracts:** Secure pricing and supply for volatile materials.
- **Contingency Planning:** Have emergency supply routes or alternate vendors.

Sourcing is far more than procurement — it is a **strategic intelligence process** that blends cost analysis, market insight, supplier relations, and logistics coordination. Effective sourcing ensures that materials flow into the production system **without interruption or excess**, supporting steady operations, quality assurance, and profitability.

When coupled with **digital inventory control** and **real-time supplier collaboration**, sourcing transforms from a cost centre into a **value-generating function** — the true lifeline of industrial success.

## 3. INVENTORY DYNAMICS

### 1. Inventory Management and Operational Efficiency Framework

Inventory Dynamics refers to the movement, interaction, and changes that occur within an organization's inventory system over time.

In simpler terms, it's about **how stock flows, why it changes, and what forces affect it** — from raw materials entering the system to finished goods being delivered. It's not just inventory levels — it's the living motion of materials, decisions, timing, and human actions that keep the supply chain alive.

**Core Idea:** "Inventory is Not Static — It's Dynamic"

Inventory reacts, depletes, replenishes, and adapts to:

- Customer demand
- Supplier lead times
- Production schedules
- Market changes
- Internal planning and errors

Main Components of Inventory Dynamics:

| Component              | Explanation                                                           | Effect on the System                 |
|------------------------|-----------------------------------------------------------------------|--------------------------------------|
| Inflow                 | Materials or goods entering the system (purchases, production output) | Increases stock levels               |
| Outflow                | Sales, dispatch, or consumption in production                         | Decreases stock                      |
| Lead Time              | Time gap between ordering and receiving materials                     | Affects when stock is replenished    |
| Demand Fluctuation     | Changes in customer or market demand                                  | Causes variability in required stock |
| Safety Stock           | Buffer inventory to handle uncertainties                              | Stabilizes availability              |
| Reordering System      | Mechanism that triggers replenishment (manual or automated)           | Maintains continuity                 |
| Obsolescence & Wastage | Loss due to aging, expiry, or damage                                  | Reduces usable inventory             |
| Information Flow       | Data about stock levels, orders, and forecasts                        | Guides decision-making               |

**Dynamic Behaviour Example:**

A bottled juice company:

1. **Sourcing:** Raw fruits arrive from farms ! inventory increases.
2. **Production:** Fruits get processed ! raw stock decreases, finished stock increases.
3. **Delivery Spike:** High summer demand ! finished stock quickly depletes.

4. **Reordering Delay:** Suppliers take longer to deliver ! shortage occurs.
5. **Time Management:** Efficient planning minimizes disruption next time.

#### Significance:

- Prevents overstocking and stock outs
- Reduces working capital tied in inventory
- Improves customer satisfaction through timely delivery
- Enhances forecasting accuracy
- Supports sustainable production and logistics decisions

Inventory Dynamics is the science and art of managing the continuous motion of stock — balancing inflow and outflow to ensure smooth operations, minimal cost, and maximum efficiency.

## 2. Time Management, Conveyance, and Spaciousness: The Triad of Operational Efficiency

**Introduction :** In every production or service environment, **time, space, and movement** are inseparable components of efficiency. They form a **triad** that determines how effectively materials, information, and people flow through the system.

- **Time management:** Ensures processes occur without delay
- **Conveyance:** Governs physical movement of materials
- **Spaciousness:** Provides structural freedom for smooth operations

Together, they create a **three-dimensional framework of productivity**: temporal accuracy, spatial order, and kinetic efficiency.

#### Time Management: The Rhythm of Production

Time management is about **synchronization**, ensuring each activity occurs at its designated moment. Key aspects:

- Cycle Time Optimization
- Lead Time Reduction
- Scheduling Precision
- Real-Time Monitoring

**Interrelation:** Poor time management causes congestion in material flow and spatial crowding, disrupting storage and safety.

#### Conveyance: The Flow Mechanism

Conveyance is **the movement of materials, parts, and products** within and between facilities.

#### Techniques:

- Shortest material flow paths
- Automated conveyors, forklifts, or AGVs
- Layout zoning to avoid cross-traffic

- Synchronization with production and dispatch

**Effect:** Well-planned conveyance ensures predictable movement, reduces material handling time, and improves workflow continuity.

#### Spaciousness: The Silent Catalyst

Spaciousness is **optimal utilization of space**, ensuring:

- Smooth material and people flow
- Clear segregation of storage, processing, and transport zones
- Safe operations with minimal risk
- Flexibility for layout adjustments

**Impact:** Improves morale, reduces fatigue, and prevents operational delays.

Dynamic Interrelationship

| Element         | Supports                                              | Result                               |
|-----------------|-------------------------------------------------------|--------------------------------------|
| Time Management | Ensures sequence of conveyance and storage activities | Prevents delays and accumulation     |
| Conveyance      | Accelerates material flow within available space      | Reduces cycle time and handling cost |
| Spaciousness    | Enables unobstructed movement and organized time flow | Enhances efficiency and safety       |

#### Example:

- Wide aisles (spaciousness)
- Synchronized forklift movement (conveyance)
- Production scheduling (time management)  
! Materials arrive exactly when required, reducing idle machine time and congestion.

#### Techniques for Integration

- **Value Stream Mapping (VSM):** Visualize time and flow
- **5S Principles:** Maintain order and space discipline
- **Layout Simulation Software:** Test paths and schedules
- **Lean Flow Design:** Materials “flow” rather than “wait”
- **IoT and Automation:** Real-time monitoring and coordination

#### Outcome:

- Bottlenecks eliminated
- Handling costs reduced
- Production rhythm consistent
- Safety and ergonomics improved
- Overall throughput increased

#### Ergonomics: Definition and Relevance

**Ergonomics** is the scientific discipline concerned with understanding the interactions among humans and other elements of a system, and applying principles, data, and methods to optimize human well-being and overall system performance.

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In simpler terms, ergonomics is about **designing workplaces, tools, and processes to fit the worker**, rather than forcing the worker to adapt to inefficient or unsafe conditions.

### Importance in Inventory and Operational Management

#### 1. Worker Safety and Health:

- o Reduces musculoskeletal injuries from lifting, repetitive tasks, or awkward postures.
- o Prevents fatigue and long-term health issues, which can reduce absenteeism.

#### 2. Operational Efficiency:

- o Well-designed workstations, equipment, and material flow reduce unnecessary movement, wasted effort, and delays.
- o Facilitates faster picking, packing, and material handling.

#### 3. Accuracy and Productivity:

- o Proper ergonomics improves focus and precision, reducing errors in inventory counting, order fulfilment, and machine operation.

#### 4. Psychological Well-being:

- o Comfortable, organized workspaces enhance employee morale, satisfaction, and attention to detail.

### Key Principles of Ergonomics in Inventory Systems

- **Workstation Design:** Tools and controls within easy reach; heights adjusted to worker needs.
- **Material Handling:** Lifting aids, conveyors, and carts to reduce strain.
- **Workflow Layout:** Minimize unnecessary walking or bending by positioning items logically.
- **Environmental Factors:** Adequate lighting, ventilation, and noise control.
- **Task Rotation:** Reduce repetitive strain by rotating employees across different activities.

### 3. Connecting Inventory Dynamics with the Triad

Inventory Dynamics is **the living flow of stock**, while the triad of Time, Conveyance, and Spaciousness **enables that flow efficiently**.

#### Flow Connection:

**[Inflow & Sourcing] ! [Production/Plant] ! [Stores & Warehouses] ! [Conveyance ! Delivery]**

**[Time Management, Conveyance, Spaciousness ensure smooth flow]**

#### **[Error-Free Reordering ! Continuous Inventory Cycle]**

- **Inventory Dynamics** explains what moves and why.
- **Triad of Efficiency** explains how to move it optimally.
- Together, they form a **closed-loop, self-regulating system** that maintains continuity, minimizes waste, and maximizes productivity.

A well-designed inventory system requires **both dynamic management of stock and operational efficiency** in time, movement, and space. Without one, the other fails — flow halts, costs rise, and efficiency drops.

Summary: Inventory Management and Operational Efficiency

1. **Layout** — The Foundation of Flow
2. **Sourcing** — The Artery of Production
3. **Plant** — The Heart of Production
4. **Stores** — The Custodian of Continuity
5. **Warehouses** — The Bridge Between Production and Market
6. **Conveyance** — The Flow of Movement
7. **Delivery** — The Final Integration Point
8. **Time Management, Conveyance, and Spaciousness** — The Triad of Efficiency
9. **Error-Free Reordering** — The Core of Continuity

Inventory management is a dynamic process that ensures the smooth flow of materials, information, and products within an organization. The efficiency of the system depends on the coordinated functioning of several interrelated components.

**Layout** forms the foundation by structuring the physical space to facilitate unhindered movement and workflow. **Sourcing** acts as the artery of production, ensuring timely procurement of raw materials and components, which fuels continuous operations. The **plant** serves as the heart of production, where raw materials are transformed into finished goods, while **stores** act as custodians of continuity, safeguarding inventory and preventing shortages.

**Warehouses** bridge production and market needs, storing finished goods strategically for timely distribution.

**Conveyance** governs the physical movement of materials between stores, plant, warehouses, and delivery points, ensuring synchronization across all stages.

**Delivery** represents the final integration point, connecting production output to customer demand and completing the supply chain cycle.

The triad of **time management, conveyance, and spaciousness** underpins operational efficiency, optimizing process timing, material movement, and space utilization.

Finally, **error-free reordering** forms the core of continuity, maintaining inventory levels and ensuring seamless operations. Collectively, these components establish a robust, adaptive, and efficient inventory management system that minimizes delays, reduces costs, and supports sustained operational excellence.

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# THE 3-I COMPASS: IDENTITY, INTEGRITY, AND INQUISITIVENESS — A UNIVERSAL GUIDE EXTENDED TO MATERIAL MANAGEMENT PROFESSIONALS

DR. M. A. NARASIMHA MURTHY  
SENIOR PROFESSIONAL, AUTHOR, AND LIFELONG LEARNER  
manmurthy@gmail.com

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## Abstract :

**H**uman life and professional life are alike in one respect — both demand direction. Achievements and systems provide speed, but an inner compass provides alignment. This paper presents the 3-I Compass — Identity, Integrity, and Inquisitiveness — as a universal framework for ethical, reflective, and adaptive growth. Beginning from a generic human context and extending to Materials Management and Procurement, it demonstrates how these principles transform operational decisions into ethical practices that sustain credibility, trust, and innovation in complex supply chains.

**Keywords:** Identity, Integrity, Inquisitiveness, Procurement Ethics, Professional Growth, Supply-Chain Leadership, 3-I Compass

## 1. Introduction – The Need for an Inner Compass

Every human being and every professional carries an invisible compass. It balances who we are, how we act, and how we evolve. The 3-I Compass — Identity, Integrity, and Inquisitiveness — anchors this balance. Identity roots us in self-awareness, Integrity aligns conduct with conscience, and Inquisitiveness keeps learning alive. Systems can manage efficiency; only values manage purpose. Like a magnetic compass that does not move the traveler but ensures direction, these principles guide us through uncertainty.

In a domain where every purchase order represents both opportunity and obligation, materials professionals face pressures of cost, compliance, and competition. Modern tools can automate processes, but not judgment. What sustains long-term trust between buyer and supplier is not technology alone but character. The 3-I Compass offers a human-centered framework that reinforces ethics and credibility in decision-making.

Dr. A. P. J. Abdul Kalam's humility, Rahul Dravid's

fairness, and Einstein's curiosity personify the three I's — together forming a timeless guide for ethical and intellectual excellence.

## 2. Identity – Knowing Who You Are

Identity forms the foundation of every journey — personal or professional. It is clarity of self, role, and purpose. Without identity, direction blurs; with it, confidence and belonging grow. Identity must be earned, not announced. Titles or designations do not define it; consistent contribution does. In professional life, demonstrating commitment, delivering results, and honoring promises establish credibility.

A mature identity avoids both extremes — over-assertion that breeds arrogance and under-expression that invites invisibility. True identity blends humility, reliability, and purpose. Dr. Kalam, despite holding the highest office, continued to identify as a teacher — showing that identity grounded in contribution is lasting.

## 3. Integrity – Living True to Values

Integrity is the moral compass that ensures our path remains straight even when pressures bend it. It is not mere compliance but doing right when no one is watching. It begins with individuals but flourishes through culture. Integrity allows no partial practice; honesty cannot be selective. When leaders reward honesty and protect those who act ethically, trust becomes the organization's foundation.

Rahul Dravid exemplified Integrity — his quiet consistency, fairness, and humility turned him into a living symbol of credibility. Integrity safeguards us and answers two questions: How should I live? and What values guide me?

## 4. Inquisitiveness – The Curiosity to Grow

Inquisitiveness is the spark of progress — the urge to ask, explore, and improve. It transforms repetition into reinvention. In today's VUCA

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environment, inquisitiveness ensures relevance and fuels innovation. However, curiosity must be wise and ethical, respecting boundaries while expanding knowledge.

Albert Einstein attributed his breakthroughs to passionate curiosity. Inquisitiveness, guided by Integrity and rooted in Identity, transforms knowledge into wisdom — ensuring that curiosity serves progress, not chaos.

## **5. Extending the 3-I Compass to Materials Management and Procurement**

Procurement professionals operate at the intersection of commerce and conscience. Every quotation, contract, and invoice tests judgment and fairness. The 3-I Compass transforms this field from transactional to transformational, offering a moral and strategic anchor in a digital world.

**Identity in Procurement** – Identity in procurement means dependability, not designation. Delivering the right material at the right time and right cost builds operational identity. Being fair and transparent establishes relational identity, while being seen as a strategic partner strengthens organizational identity.

**Integrity in Procurement** – Integrity forms the backbone of every sourcing decision. Fair bidding, transparent evaluation, and accountable contracting create credibility. A single unethical act can destroy years of reputation. Integrity must therefore be institutionalized through leadership behavior and robust systems.

**Inquisitiveness in Procurement** – Inquisitiveness differentiates a transactional buyer from a strategic supply-chain leader. Exploring e-procurement, AI tools, sustainability practices, and supplier collaboration reflects curiosity guided by ethics and purpose.

## **6. The Interconnection of the 3 I's – The Continuous Loop of Growth and Credibility**

Identity, Integrity, and Inquisitiveness are interdependent virtues that form a self-reinforcing cycle. Identity without Integrity becomes hollow; Integrity without Inquisitiveness becomes rigid; Inquisitiveness without Identity loses direction. Together they form a living loop of growth: Identity attracts recognition, Integrity strengthens trust in that credibility, and Inquisitiveness ensures relevance and renewal.

What holds true for individuals also scales to organizations. A team's Identity defines

reliability; Integrity earns stakeholder trust; Inquisitiveness sustains innovation. Integrity acts as the magnetic field holding Identity steady, while Inquisitiveness fuels movement toward progress.

In Materials Management, this interplay defines credibility. Identity gives a buyer recognition as a trusted partner; Integrity preserves that recognition through fairness; Inquisitiveness renews that identity through innovation. A materials planner who learns new forecasting tools, a warehouse head ensuring accurate stock, or a vendor officer exploring new suppliers — all demonstrate the cycle in motion.

At the enterprise level, the 3-I loop answers three leadership questions: Who are we in the value chain? (Identity); How do we deliver ethically and sustainably? (Integrity); and How do we evolve amid change? (Inquisitiveness). When these align, procurement transforms from cost control to value creation.

For professionals, reflection keeps the compass alive: Does my work reflect who I am? Would I act the same if no one watched? What did I learn today that improves me or my process? If these answers are affirmative, the 3-I Compass is aligned — balancing clarity, honesty, and curiosity in every transaction.

## **7. Real-Life Illustrations and Managerial Implications**

### **Illustrations of the 3-I Compass in Action**

Principles come alive when reflected in real people and stories. The 3-I Compass is not just theory — history, mythology, and modern life reveal how Identity, Integrity, and Inquisitiveness shape destinies and define greatness.

**Karna – The Quest for Identity** Born divine but raised as a charioteer's son, Karna spent his life seeking recognition. Despite immense skill, his uncertain identity shadowed every triumph.

Lesson: Without recognition of identity, even brilliance feels incomplete.

**Ekalavya – The Denied Disciple** Rejected by Guru Dronacharya, Ekalavya taught himself with devotion and surpassed royal pupils. Yet his identity as a true learner was denied. Lesson: Denying identity suppresses talent and limits collective growth.

**Prof. S. Chandrasekhar – Integrity that Opened**

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## Doors

When C.V. Raman upheld merit over nepotism and later Chandrasekhar returned excess travel allowance, both acts reflected integrity — leading to a Nobel-worthy career.

Lesson: Integrity builds trust and opens enduring opportunities.

**Sir Isaac Newton – Inquisitiveness that Transformed Science** A falling apple sparked Newton's disciplined curiosity, turning a simple observation into the law of gravity.

Lesson: Ordinary experiences become extraordinary discoveries through inquisitiveness.

Together, these stories show how the 3-I Compass unites purpose, ethics, and curiosity — proving that while times change, the values guiding excellence remain timeless.

## 8. Conclusion – The Compass as the True North

From the classroom to the boardroom, from society to the family, the 3-I Compass — Identity, Integrity, and Inquisitiveness — remains a lifelong guide. Human life is a journey filled with choices, challenges, and opportunities. What keeps us moving in the right direction is not just talent or ambition but a compass that aligns the self, values, and curiosity. Identity reminds us who we are, Integrity keeps us true to our values, and Inquisitiveness ensures we never stop learning and growing.

The 3-I Compass unites philosophy and practice. Identity provides stability, Integrity ensures credibility, and Inquisitiveness fuels renewal. For Materials Management professionals, this compass converts each transaction into an act of trust and purpose. Just as Lord Shiva's third eye symbolizes awareness beyond illusion, these three eyes — Identity, Integrity, and Inquisitiveness — awaken clarity, ethics, and continuous learning.

The 3-I Compass reminds us that in every transaction lies a reflection of the self.

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## Author Profile

**Dr. M. A. Narasimha Murthy** is a distinguished professional and thought leader with over 35 years of experience in Quality Management, Operations Management, Strategic Consulting, Industrial Engineering, and Leadership Development. He currently serves as Senior Director – Quality Management at a leading German multinational, driving global excellence initiatives across engineering and software domains. A Fellow of the Indian Institution of Industrial Engineering (IIIE) and a CII-Exim Bank National Assessor, Dr. Murthy integrates ancient Indian wisdom with modern management frameworks through original models such as the 9-P Model, 3-T Compass, and START-UP & CRYSTAL Frameworks. He is a certified Lead Auditor across multiple international standards and an intacs-certified Principal Assessor in automotive software quality.

He has served on the Governing Councils of IIIE, BSPIN, and QCFL, and has chaired several national and international conferences. A recipient of the IIIE Fellowship and the Firodia National Award, Dr. Murthy was recently honored by the World Quality Congress as one of the Most Iconic Quality Leaders for his outstanding contribution to the field. He also contributes actively to academia as an Adjunct Faculty, Governing Council Member, and Board of Studies Member at leading engineering institutions.

**Guiding Philosophy:** True excellence emerges when intellect, integrity, and introspection converge.

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## GREENING INDIA'S DIGITAL FUTURE: TERI AND NSEFI SIGN PACT ON SUSTAINABLE DATA CENTERS

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**T**he Energy and Resources Institute (TERI) and the National Solar Energy Federation of India (NSEFI) Green Data Center Coalition today signed a Statement of Intent (SoI) to jointly advance research, policy, and implementation strategies for greening India's rapidly growing data center industry. The collaboration will focus on technical assistance, electricity demand analysis, and pilot demonstrations to accelerate the adoption of reliable renewable energy with storage solutions for data centers at an affordable cost.

Partnership aims to drive research, policy advocacy, and renewable-powered pilots to make India's fast-growing data centers carbon-free

Speaking at the signing, Mr Alekhya Datta, Director, Electricity & Renewables, TERI, said, "TERI projects that India's data centers could consume approximately 390 TWh of electricity by 2070, underscoring the need for timely carbon-free power planning. With renewable energy plus storage already supporting industries in meeting 24x7 demand, a similar pathway can reliably power data centers. The continued decline in solar-plus-storage costs makes this transition both affordable and scalable."

Mr Subrahmanyam Pulipaka, CEO, NSEFI, added, "Data centers are set to become one of the largest electricity consumers in the country by 2030. Through the NSEFI Green Data Center Coalition, we aim to provide a robust platform that unites stakeholders and supports policy, technology, and market solutions to decarbonize the sector. NSEFI will play a pivotal role in demand aggregation and in scaling firm power for data centers through innovative business models, while also enabling states to attract investments by positioning themselves as preferred destinations for sustainable data center growth. Our collaboration with TERI marks a crucial step in building a sustainable ecosystem for data centers in India."

The NSEFI Green Data Center Coalition has been conceived as a dedicated platform to accelerate the decarbonization of data centers by shaping policy and regulatory frameworks, promoting innovative renewable energy instruments such as Virtual Power

Purchase Agreements and round-the-clock storage, and preparing strategies for non-electricity decarbonization including cooling and energy efficiency. It also seeks to strengthen standards and compliance and foster the sharing of best practices on technology and ESG aspects across the sector. To achieve these goals, the coalition will engage with the central and state governments, host sensitization workshops for stakeholders across the value chain, connect data center operators with renewable energy providers, and disseminate global as well as domestic best practices for green data centers.

India is one of the largest data consumers in the world, with over 19 GB of data consumed per person every month. This surge in digital penetration and adoption of data-intensive technologies has fueled the demand for data storage, leading to a proportional rise in energy-intensive data centers. These facilities consume up to 50 times more energy per square foot than standard commercial office buildings. By 2030, data centers could account for as much as 6% of India's total electricity demand, up from less than 1% today. Greening data centers could potentially reduce their emissions by 88%, with transformative impacts for the country's overall decarbonization targets.

The Statement of Intent was signed at the inaugural plenary of the 1st Data Center Summit on Carbon-Free Energy, organized by NSEFI and powered by Amazon. The event was addressed by senior officials from NSEFI and Amazon, with Shri Shripad Yesso Naik, Hon'ble Minister of State for Power, New & Renewable Energy, gracing the occasion as Chief Guest.

By combining TERI's expertise in research and technology assessments with NSEFI's coalition-building and industry advocacy, the initiative aims to chart a roadmap for sustainable data center growth in India. This collaboration will not only strengthen the country's ability to meet its 2030 renewable energy targets but also contribute substantially to reducing carbon emissions by 50% from 2022 levels, making India's digital transition truly green.

Source: [www.teriin.org](http://www.teriin.org)

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## GST 2.0: HEAVY INDUSTRIES SET FOR REVIVAL MSMES TO GAIN

ASHISH KUMAR

**G**ST 2.0 cuts rates on autos, tractors, buses & trucks, boosting demand, jobs & MSMEs. A game-changer for heavy industries and India's growth.

The Government of India's new GST 2.0 regime is being hailed as one of the most transformative policy reforms in recent years for India's heavy industries. By cutting rates across automobiles, commercial vehicles, tractors, buses, and related components, the reform is designed to create a ripple effect that will boost demand, generate employment, support MSMEs, and strengthen India's manufacturing competitiveness.

The changes, announced through the latest GST rationalisation framework, go far beyond tax simplification. They signal a new policy direction: encourage domestic consumption, revive industry growth, promote sustainability, and unlock opportunities for India's MSME ecosystem.

### Automobile Sector: A Revival Pathway

The automobile sector, which has faced repeated slowdowns due to pandemic disruptions, inflationary pressures, and global supply chain shocks, is one of the biggest beneficiaries of GST 2.0.

- **Two-wheelers:** GST on bikes up to 350cc has been slashed from 28% to 18%. Two-wheelers are the lifeline of rural and semi-urban India, used by farmers, gig workers, delivery executives, and small traders. The tax cut is expected to make motorcycles more affordable for lower-middle-class households and young professionals, reducing EMI burdens and supporting financial inclusion through NBFCs and banks.
- **Small cars:** GST on affordable cars has been cut to 18% from 28%. This will stimulate first-time car ownership, particularly in smaller towns where household mobility is a growing aspiration. Dealerships, auto-finance companies, and service garages stand to gain significantly.
- **Luxury and medium cars:** For larger cars, the

government has rationalised taxation by introducing a flat 40% GST and removing the additional cess. This not only simplifies the tax structure but also ensures full Input Tax Credit (ITC) utilisation, something previously restricted due to cess components. For aspirational buyers, this makes larger cars more accessible, while for the industry, it ensures policy stability and investment confidence.

### Tractors and Agricultural Mechanisation

India's position as one of the largest tractor markets globally is set to strengthen further. GST on tractors below 1800cc has been reduced from 12% to 5%, while road tractors above 1800cc now attract 18% instead of 28%.

In addition, tractor parts and critical components such as tyres and gears will now be taxed at just 5%. This change is expected to:

- Reduce the overall cost of tractors, making them more affordable for farmers.
- Boost mechanisation in agriculture, leading to higher productivity in crops such as wheat and paddy.
- Encourage exports by positioning India as a global hub for affordable tractor manufacturing.

For MSMEs manufacturing tractor components, this policy directly translates into higher production orders and stronger integration into domestic and global supply chains.

### Commercial Vehicles: Cheaper Freight, Cheaper Goods

Commercial goods vehicles, including trucks and delivery vans, are the backbone of India's logistics. Trucks carry nearly 70% of the country's goods traffic, making their cost structure a critical factor for inflation.

GST on these vehicles has been reduced from 28% to 18%. This will lower the upfront cost of trucks, reduce

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freight rates, and improve cost efficiency across supply chains. Cheaper freight translates into lower prices for agricultural produce, cement, steel, FMCG, and even e-commerce deliveries.

This measure directly supports the government's **PM Gati Shakti** initiative and aligns with the **National Logistics Policy**, which aims to reduce logistics costs as a share of GDP. For MSMEs that operate small trucking fleets or rely on transport for their goods, this change significantly reduces operating pressures.

In parallel, GST on third-party insurance of goods carriages has been reduced from 12% to 5%, further easing the financial burden on transport operators.

### **Buses: Boosting Shared Mobility**

Buses with seating capacity of over 10 persons will now attract 18% GST instead of 28%. This will:

- Lower capital costs for fleet operators, schools, corporate shuttles, and state transport undertakings.
- Reduce passenger fares, making public transport more affordable.
- Encourage a shift from private vehicles to shared transport, helping reduce congestion and pollution.

By making public transport more affordable, GST 2.0 supports sustainable mobility and creates opportunities for fleet expansion, benefiting both urban and semi-urban India.

### **Auto Components and Ancillary MSMEs**

A significant reform under GST 2.0 is the reduction of rates on auto components to 18%. This has major implications for India's large auto ancillary sector, which is dominated by MSMEs.

From tyres, batteries, and glass to steel, electronics, and plastics, the demand for auto components will rise in tandem with higher vehicle sales. Ancillary MSMEs, which form the backbone of the supply chain, will directly benefit from this demand surge.

Notably, the services linked to goods and passenger transport have also undergone rationalisation. By offering businesses a choice between 5% and 18% GST rates, the government has ensured flexibility while avoiding the cascading effect of taxes.

### **Employment and Financial Inclusion Impact**

The automobile and transport industries collectively support over 3.5 crore jobs in India—directly and

indirectly. From manufacturing and sales to financing, logistics, and maintenance, a revival in these sectors will naturally expand employment opportunities.

- Dealerships and transport services will increase hiring.
- Informal sector jobs such as drivers, mechanics, and service garage workers will benefit.
- Growth in auto sales will stimulate credit demand, helping banks, NBFCs, and fintech lenders expand their retail loan books.

For semi-urban India, where mobility and access to credit are closely linked, GST reforms can be a catalyst for financial inclusion and income growth.

### **SMEStreet Perspective**

The GST 2.0 reforms are more than just tax cuts—they are an economic stimulus package for heavy industries with MSMEs at the core.

- **For manufacturers:** Lower taxes encourage fresh investments under Make in India.
- **For MSMEs:** Higher demand across auto, tractor, bus, and logistics segments means stronger order pipelines.
- **For consumers:** Affordable vehicles and cheaper transport costs improve purchasing power.
- **For the economy:** Rationalisation reduces inflationary pressures and strengthens India's export competitiveness.

### **Lastword**

By rationalising GST slabs across heavy industries, the government has provided a decisive push to demand, employment, and investment. The reform not only simplifies taxation but also creates a multiplier effect across manufacturing, logistics, agriculture, and services.

For MSMEs, which are deeply embedded in every link of these industries, GST 2.0 is a rare window of opportunity to scale operations, innovate, and align with India's long-term economic vision.

India's heavy industries are now poised for a strong revival, and if MSMEs seize the moment, they will play a defining role in making the country a global manufacturing hub.

Source: smestreet.in



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## GST REFORMS 2.0 – MRP REVISION ON UNSOLD STOCK

DR. SANJIV AGARWAL

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### Government allows MRP revision on unsold pre-22 Sep 2025 packaged goods until 31 Dec 2025 with conditions

The government authorized manufacturers, packers and importers to revise the MRP on unsold pre-22-Sep-2025 packaged goods to reflect GST rate changes by stamping, stickering or online printing until 31-Dec-2025 or exhaustion of stock. Original MRP must remain visible and not be overwritten; any increase in revised MRP cannot exceed the tax increase (and reductions cannot exceed the post-tax lower price).

Firms must notify consumers, dealers and relevant legal metrology authorities and publish at least two newspaper advertisements; existing packaging may be used after MRP correction. The measure aims to facilitate implementation of GST rate revisions, prevent profiteering and minimize logistical disruption. - (AI Summary)

Since the recommendations of **56th meeting of GST Council** are to be implemented from 22.09.2025, which majorly relate to reduction of GST rates or exemption from GST in relation to many consumer goods and goods of mass consumption, Central Government has come out with measures which would facilitate the businesses, i.e., manufacturers, packers and importers to use the unsold stocks / inventories of finished goods available with the distribution channels in the system.

Subsequent to GST rate rationalization announced after **56th Council meeting held on 3rd September, 2025** to be implemented w.e.f. 22th September, 2025, Department of Consumer Affairs (Weights & Measures Unit), Ministry of Consumer Affairs, Food and Public Distribution (CAFPD) vide F.No. I-10/14/2020-W&M dated 09.09.2025 issued by Director,

Legal Metrology, Ministry of CAFPD, Government of India has granted permission to the manufacturers or packers or importers of pre-packaged commodities to declare the revised retail sale price (MRP) on the unsold stock as on 22.09.2025 under the Legal Metrology (Packed Commodities) Rules, 2011.

Accordingly, Central Government has permitted manufacturers or packers or importers of pre-packaged commodities to declare the revised retail sale price (MRP) on the unsold stock manufactured/ packed / imported prior to revision of GST, after inclusion of the applicable/ increased amount of tax or after reducing the reduced amount of tax due to change in GST, if any, in addition to the existing retail sale price (MRP) upto 31st December, 2025 or till such date the stock is exhausted, whichever is earlier.

The following are the important points which taxpayers must know:

- Declaration of the changed retail sale price (MRP) shall be made by way of stamping or putting sticker or online printing, as the case may be.
- This shall be subject to the following conditions:
  - o The original MRP shall continue to be displayed and the revised price shall not overwrite on it.
  - o The difference between the retail sale price originally printed on the package and the revised price shall not, in any case, be higher than the extent of increase in the tax, if any, or in the case of imposition of fresh tax, such fresh tax, on account of implementation of GST

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## Act and Rules.

- o In the case of reduction of tax, the revised price shall not, in any case, be higher than the extent of price after reduction of tax, if any.
- o Manufacturers or packer or importers shall make atleast two advertisements in one or more newspapers in this regard and also by circulation of notices to the dealers and to the Director of Legal Metrology in the Central Government and Controllers of Legal Metrology in the States and Union Territories, indicating the change in the price of such packages.
- Any packaging material or wrapper which could not be exhausted by the manufacturer or packer or importer prior to revision of GST, may be used for packing of material upto 31st December, 2025 or till such date the packing material or wrapper is exhausted, whichever is earlier, after making corrections required in retail sale price (MRP) on account of implementation of GST by way of stamping or putting sticker or online printing as the case may be.

The taxpayers dealing with consumer products can now revise the retail price (called maximum retail price or MRP) of unsold stock as per new GST rates which will be made effective from 22.09.2025 by using methods such as affixing stickers, stamping / re-tagging or online printing. Also it has been allowed to use existing packing material / wrappers till 31st December, 2025 on till the stock is exhausted, whichever is earlier.

On the part of businesses, it will be obligatory to ensure that –

- Original MRP is displayed along with the revised MRP so that difference in price is known.
- Consumers, dealers and distributors are informed about price changes through atleast two advertisements in one or more and news papers and public notices etc.

- Original MRP should not be over-written
- Old (Pre-22 September, 2025) rate or MRP must remain visible
- Change in price should atleast match the tax rate change

From Government's view point, such permission will also help check and track malpractices leading to profiteering by some businesses / taxpayers.

Companies will have to do this exercise within a time frame to meet 22 September, 2025 deadline as it would otherwise impact sales in festive season. Companies also ought to update their ERP systems, invoicing software, inventory management software and point of sale counters. They will have to gear up to meet logistic and operational challenges. Smaller businesses will have to deal with more carefully.

This shall provide a major relief to such businesses and facilitate implementation of rate cuts smoothly without any logistical issues. The effect of this timely intervention and allowing businesses to easily implement the GST rate cut decision shall only facilitate ease of doing business, ensure better transparency and removal of confusion in the minds of consumers and is a right step in protecting the interests of consumers.

At the same time, it will help in use of inventory of goods-in-transit and at various levels of distribution network, besides avoiding wastage of goods and saving costs. It is going to ensure smooth implementation of GST rate cuts in a timely and transparent manner, keeping in view the festive season ahead.

Source: [www.taxtmi.com](http://www.taxtmi.com)

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# IMPACT OF GST REFORMS ON INDIA'S INDUSTRIAL CHEMICAL MARKET: A STUDY OF NITRIC ACID, SULPHURIC ACID & AMMONIA (APR–AUG 2025)

## Key Takeaways

- The GST reduction from 18 per cent to 5 per cent on nitric acid, sulphuric acid, and ammonia lowers input costs and eases compliance.
- It strengthens margins for producers, boosts competitiveness in export markets, and improves affordability for end-users.
- The reform stimulates incremental demand across fertiliser, agrochemical, and industrial sectors.

## Executive Summary

India's GST reform: reducing the tax rate on Nitric Acid (HNO), Sulphuric Acid (HSO), and Ammonia (NH) from 18 per cent to 5 per cent under a two-slab system, effective from 22 September 2025 resolves the inverted duty structure. This adjustment reduces production overheads, fortifies the resilience of fertiliser and chemical supply chains. Analysis of price trends during the last few months suggests that, following the GST rate reduction, domestic prices of these chemicals are projected to decline, reflecting lower tax incidence and improved cost efficiencies.

This will:

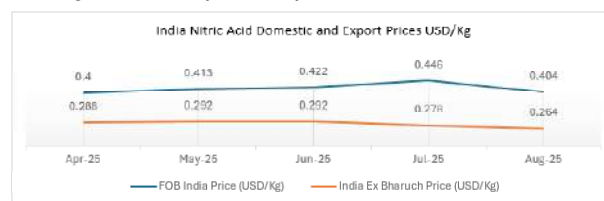
- (a) materially improve downstream manufacturer cash flows and margins,
- (b) make Indian producers more cost-competitive in export markets, and
- (c) stimulate incremental consumption in fertiliser and related segments as effective input costs fall and purchasing power across the chain improves.

## NITRIC ACID (HNO)

Domestic Nitric Acid suppliers can increase profitability by improving operations, positioning themselves strategically, and adding value to their products. Cost savings are achieved by using cheaper raw materials made possible after GST, along with energy-efficient production and economies of scale. Additional gains come from better supply chain management, including streamlined logistics, port handling, and inventory control. Together, these measures help maintain sustainable profit margins in both domestic and international markets.

Export and Domestic Market Margin Benefits Prices surged to \$0.446 /kg in July, representing an increase of approximately 11.5 per cent compared to April. This reflected renewed buying momentum and pre-

buying by industrial and fertiliser sectors abroad due to tariffs, before moderating to \$0.404 /kg in August because of global market adjustments. Overall, the export market demonstrates resilience, with margins sustained through cost-competitive production.



Domestic Ex-Bharuch prices remained relatively stable at \$0.288–0.292 /kg from April to June, reflecting steady demand from fertilisers, industrial chemicals, and specialty applications. A gradual decline to \$0.278 /kg in July and further to \$0.264 /kg in August corresponds to seasonal consumption variations, local inventory adjustments, and competitive pricing pressures in domestic industrial sectors.

## GST Reform Benefits in India's Nitric Acid Domestic and Export Markets

India's Nitric Acid is strategically diversified across the Middle East, Africa, and South Asia/Eurasia, ensuring resilience against demand and geopolitical risks. GST reforms have strengthened the entire value chain:

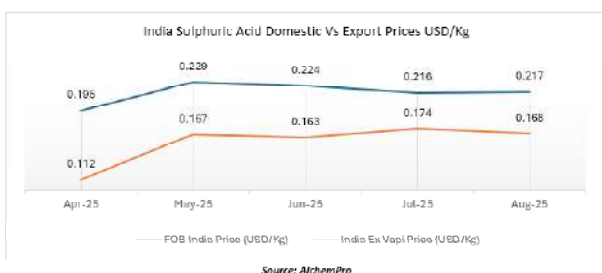
- Producers such as National Fertilizers Limited, GNFC, Deepak Fertilisers, Rashtriya Chemicals and Fertilizers Ltd. (RCF), Chambal Fertilisers & Chemicals Limited benefit from input tax credits, reduced cascading taxes, and lower production costs and increased margin.
- Mid-sized firms such as Sukha Chemical Industries, Prakash Chemicals, Kakadiya Chemicals, Aadhya Shakti Chems, and Vijay Gas Industry benefit from GST simplification through reduced compliance burden and smoother interstate trade.
- Exporters and traders enjoy faster tax refunds and improved margin and liquidity.

With competitive costs, strategic port access, and GST-enabled efficiencies, India sustains a strong global footprint. The outlook remains positive, marked by steady growth, improved price stability, and diversified risk management, reinforcing India's position as a reliable global supplier of Nitric Acid.

Sulphuric Acid (HSO)

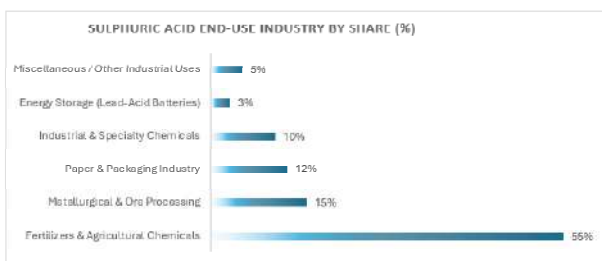
India's sulphuric acid export market exhibited moderate price fluctuations during the period from April 2025 to August 2025. With Ex-Vapi prices ranging between \$0.112–\$0.174 /kg during Apr–Aug 2025 and FOB (Free on Board) prices in dollar per kilogram recorded a peak of \$0.229 /kg in May 2025, followed by a gradual decline to \$0.216 /kg in July 2025, before marginally recovering to \$0.217 /kg in August 2025. The price movement reflects seasonal variations in global demand, raw material cost fluctuations, and competitive pressures in key importing regions.

This GST reform not only strengthens downstream manufacturer margins and eases working-capital pressure but also enhances India's competitiveness in export markets through smoother input tax credit flows and quicker GST refund realisation. Moreover, lower procurement costs across the chain are expected to stimulate incremental consumption, particularly in fertiliser, metals, and chemical intermediates, while simultaneously improving purchasing power and affordability across the entire value chain.



### Export Destinations

Indian Sulphuric Acid is exported to diverse geographies, with a strategic focus on high-demand regions. Key destinations include Middle East / Gulf, North Africa, Sub-Saharan Africa, South Asia / Indian Subcontinent, Central America / Caribbean, North America and Middle East / Western Asia. These regions represent major industrial hubs with significant demand for Sulphuric Acid in fertiliser production, chemical intermediates, and metallurgical processes.



### Sulphuric Acid Major Indian Players

India's sulphuric acid market is supported by a combination of established chemical manufacturers and trading houses: Hindalco Industries Limited, Hindustan Zinc, Gujarat State Fertilizers & Chemicals Limited (GSFC), Prakash Chemicals International Private Limited, Industrial Solvents and Chemicals Private Limited, Kesvi Maxiple LLP, Ankitraj Expotrade Private Limited, Gee Gee Kay Private Limited, DDH Impex, LDH Impex, Biorise Remedies, Kunal Chemicals, Golchha Chemical Industries, Asian Fertilizers Limited and many

more.

### Market Outlook

The Indian sulphuric acid market is expected to maintain steady growth due to the rising industrial consumption across targeted regions. Price stability is likely to be influenced by global raw material availability, regional demand-supply dynamics, and competition from other global exporters. Strategic partnerships with key industrial consumers in Middle East, Africa, and North America could further strengthen India's export position.

### Ammonia (NH)

Ammonia prices in India exhibited significant volatility between April and August 2025, driven by fluctuations in global demand, raw material costs, and seasonal consumption cycles across fertiliser and industrial segments.

- Aqueous Ammonia: Export prices stood at \$0.230 /kg in April 2025, before rising sharply in domestic terms to \$0.260/kg in May and \$0.289 /kg in June, reflecting strong seasonal demand and tariff concern from downstream fertiliser and industrial applications. However, prices corrected to \$0.249 /kg in August, highlighting inventory adjustments and global oversupply pressures.
- Anhydrous Ammonia: FOB export prices averaged \$0.539 /kg in April, with domestic equivalents rising to \$0.760/kg in May and \$0.870/kg in June amid peak fertiliser demand, tightening supply and tariff concern. By August, prices corrected to \$0.570/kg, aligning with reduced procurement activity and softer global benchmarks.

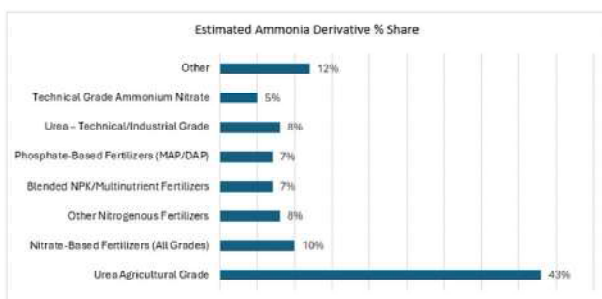


Both aqueous and anhydrous ammonia displayed a pronounced mid-year price escalation followed by correction, reflecting strong seasonality in fertiliser consumption, volatility in natural gas feedstock costs, and international market dynamics.

### Domestic Producers and Exporters Driving India's

#### Ammonia Trade

Ammonia Supply Co, IFFCO, Chambal Fertilisers & Chemicals Limited, Bombay Ammonia and Chemical Company, Jaysons Ammonia and Chemicals Private Limited, Kanpur Ammonia Supply Co, Mysore Ammonia and Chemicals Limited, Prerana Ammonia and Chemicals Private Limited and Surat Ammonia and Chemical Company.



### Agrochemical/Fertiliser Companies & Segments (GST Reform Beneficiaries)

| Company                                                    | Agrochemical / Fertilizer Segment                                                    |
|------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Chambal Fertilisers & Chemicals Ltd.                       | Urea, Nitrogenous Fertilizers                                                        |
| Coromandel International Ltd.                              | Phosphatic Fertilizers (DAP, NPKs), Crop Protection Chemicals, specialty fertilizers |
| DCM Shriram Ltd.                                           | Urea, Agrochemicals                                                                  |
| Mahadhan AgriTech Ltd.                                     | NPK Complex Fertilizers, Crop Nutrition                                              |
| Gujarat Narmada Valley Fertilizers & Chemicals Ltd. (GNFC) | Urea, Ammonia, Nitric Acid, Industrial Chemicals                                     |
| Indian Farmers Fertiliser Cooperative Ltd. (IFFCO)         | Urea, DAP, NPK Fertilizers, Bio-fertilizers                                          |
| Paradeep Phosphates Ltd.                                   | DAP, NPK Fertilizers                                                                 |
| Indian Potash Limited                                      | Complex Fertilizers                                                                  |
| Gujarat State Fertilizers & Chemicals Ltd. (GSFC)          | Urea, Ammonium Sulphate, Agrochemicals (Crop Protection, Micronutrients)             |
| Brahmaputra Valley Fertilizer Corporation Ltd. (BVFCL)     | Urea                                                                                 |
| Krishak Bharati Co-operative Ltd. (KRIBHCO)                | Urea, NPK Fertilizers                                                                |
| Malix Fertilisers & Chemicals Ltd.                         | Urea                                                                                 |
| Kanpur Fertilizers & Chemicals Ltd.                        | Urea                                                                                 |
| Indorama India Pvt. Ltd.                                   | Phosphates, NPK Fertilizers, Crop Nutrition Solutions                                |
| Yara Fertilisers India Pvt. Ltd.                           | Specialty Fertilizers, Micronutrients, Crop Nutrition                                |
| Rashtriya Chemicals and Fertilizers Ltd. (RCF)             | Urea, Complex Fertilizers                                                            |
| Hindustan Urvarak & Rasayan Limited (HURL)                 | Urea and Other Chemicals                                                             |
| Mosaic India Pvt. Ltd.                                     | DAP, MOP, Phosphate Fertilizers                                                      |
| Hindustan Zinc Limited                                     | Sulphuric Acid (byproduct used in phosphate fertilizer production)                   |

### GST Reform Impact on Nitric Acid, Sulphuric Acid, and Ammonia Value Chains

The cut in GST from 18 per cent to 5 per cent on Nitric Acid (HNO<sub>3</sub>), Sulphuric Acid (H<sub>2</sub>SO<sub>4</sub>), and Ammonia (NH<sub>3</sub>) is a decisive policy measure that lowers input costs, corrects duty distortions, and strengthens competitiveness across the fertiliser and chemical value chain. By correcting the long-standing inverted duty structure, the reform reduces procurement costs, streamlines compliance, and enhances liquidity across the supply chain.

#### 1. Impact on Manufacturers

- Large Producers such as National Fertilizers Limited, GNFC, RCF, Chambal Fertilisers, Hindalco, GSFC, IFFCO, and Hindustan Zinc gain from improved input tax credit flows and reduced working capital blockages, translating into stronger operating margins.
- Mid-sized firms including Sukha Chemical Industries, Prakash Chemicals, Kakadiya Chemicals, Aadhya Shakti Chems, and Vijay Gas Industry benefit from simplified compliance and smoother interstate trade, allowing better regional market access.
- Exporters and traders enjoy quicker tax benefits, improved liquidity, and sharper cost competitiveness in international markets.

#### 2. Impact on End Users

- Fertiliser producers (urea, DAP, NPK, and ammonium sulphate manufacturers) will see reduced raw material costs, enabling more affordable nutrient products for the agricultural sector.

- Industrial chemical users such as metals, explosives, dyes, and intermediates industries will benefit from softer input costs, improving production economics and boosting global competitiveness.
- Agrochemical companies leveraging nitric acid and ammonia for downstream formulations will enjoy greater cost flexibility, facilitating market expansion and higher adoption rates.

#### 3. Market Dynamics

- Consumption Growth:** Lower effective input prices will stimulate incremental demand across fertilisers, agrochemicals, and industrial segments, supporting higher domestic offtake.
- Price Softening Downstream:** With cost savings passed along the chain, downstream industries and end-use markets will benefit from moderated price levels, improving affordability and widening market access.
- Export Competitiveness:** By aligning cost structures with international benchmarks, India's chemical and fertiliser producers will consolidate their positions as reliable suppliers to the Middle East, Africa, South Asia, and North America and improve margins.

#### 4. Value Chain Strengthening

This GST reform supports the entire value chain of Nitric Acid, Sulphuric Acid, and Ammonia:

- Upstream:** Reduced tax burden on feedstocks enhances producer margins.
- Midstream:** Fertiliser and industrial chemical producers benefit from lower working-capital requirements and smoother logistics. GST reforms lower input taxation, making raw materials more affordable for midstream fertiliser and chemical manufacturers, while reduced end-product prices stimulate broader consumption and demand growth across downstream markets.
- Downstream:** End-use industries enjoy more stable pricing, fostering competitiveness in domestic and global markets.
- End Consumers:** Farmers and industrial buyers ultimately gain from cost-efficient fertilisers and industrial inputs, reinforcing demand growth.

**Conclusion :** The GST reform is not merely a tax adjustment but a structural correction that enhances profitability, improves affordability, and drives incremental consumption across India's fertiliser and chemical industries. By softening prices for downstream and end-use sectors while reinforcing export competitiveness, the reform secures long-term growth and resilience across the full value chain of Nitric acid, Sulphuric acid, and Ammonia.

Source: ALCHEMPro

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# THE SOLAR SURGE: INDIA'S BOLD LEAP TOWARD A NET ZERO FUTURE

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**“Green Future, Net Zero” aren’t just fancy words but reflect India’s need and commitment, making it the best destination for investment and innovation in renewable energy.[1]**

**- Prime Minister Narendra Modi**

## Key Takeaways

- **India ranks 4th globally in Renewable Energy Installed Capacity, 4th in Wind Power, and 3rd in Solar Power capacity, (IRENA RE Statistics 2025)**
- **India made 1,08,494 GWh of solar power, more than Japan’s 96,459 GWh, and became the world’s third-biggest solar energy producer.**
- **India’s solar module manufacturing capacity jumped from 38 GW to 74 GW during FY 2024–25.**
- **Renewables now make up 50.07% of India’s total installed power capacity of 484.82 GW – a COP26 commitment achieved five years ahead of the 2030 target**

**I**ntroduction : Just a decade ago, India’s solar landscape was in its infancy, with panels dotting only a few rooftops and deserts. Today, the nation has raced ahead to script history: India has officially surpassed Japan to become the **world’s third-largest** solar power producer. According to the International Renewable Energy Agency (IRENA), India generated an impressive **1,08,494 GWh** of solar energy, leaving Japan behind at **96,459 GWh**[2].

India’s cumulative solar power capacity stood at **119.02 GW as of July 2025**. This includes **90.99 GW from groundmounted solar plants, 19.88 GW from gridconnected rooftop systems, 3.06 GW from hybrid projects, and 5.09 GW from offgrid solar installations**, reflecting the country’s diverse approach to expanding renewable energy.[3]

India’s progress in the renewable energy sector reflects the country’s focused policies and strategic planning under national leadership. As part of the pledge made at COP26, efforts are being directed towards reaching the target of **500 GW** of non-fossil fuel electricity capacity by **2030**. This commitment is seen as a key step in India’s clean energy transition and its broader climate goals.

**Record Surge in India’s Solar Capacity** : India lies in the tropical region, with the Tropic of Cancer passing through many states. This gives the country a high potential for solar power generation. The total solar

sector potential of the Indian continent is **748 GW**. States/ UTs like Rajasthan, Jammu and Kashmir, Maharashtra, Madhya Pradesh, and Andhra Pradesh have some of the highest solar potential in the country, making them key drivers of India’s clean energy growth.[4]

## Region

### Major High Potential States

#### Northern & Western

Rajasthan, Gujarat

#### Southern & Central

Karnataka, Tamil Nadu, Andhra Pradesh

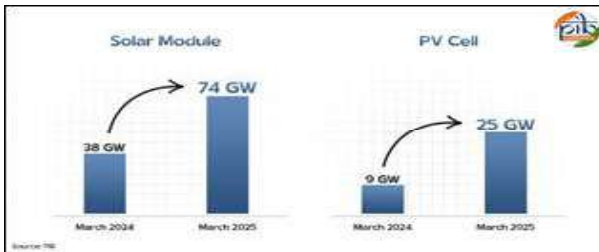
#### Eastern & Other

Maharashtra, Chhattisgarh, Odisha[5]

In July 2025, India’s solar power capacity had increased by 4,000%, and the country’s total renewable energy capacity reached **227 GW**. **Palli village in Jammu & Kashmir** became a notable example, emerging as India’s first carbon-neutral panchayat by running entirely on solar power. Emphasis was placed on the need for energy storage and adoption of new technologies to meet future energy demands. Government schemes like the PM Surya Ghar Yojana and PM Kusum Yojana are playing a key role in helping households and farmers transition to clean solar energy[6]

**Boost in Domestic Solar Manufacturing** : India’s solar manufacturing sector includes key components like **solar modules, solar PV cells, and ingots and wafers**. Producing these within the country supports the domestic economy and reduces dependence on imports. In just one-year, solar module manufacturing capacity nearly doubled—from **38 GW in March 2024 to 74 GW in March 2025**. Similarly, solar PV cell manufacturing rose **from 9 GW to 25 GW**. A big milestone was the start of India’s first ingot-wafer manufacturing facility (2 GW), further strengthening the entire solar supply chain.[7]

**This rapid growth in domestic capacity is strongly supported by government policies**. To promote Indian-made solar products, the government has made it mandatory for projects under schemes like the Rooftop Solar Programme, PM-KUSUM, and CPSU Scheme Phase II to use panels and cells made in India. To make this shift more effective, a **Basic Customs Duty (BCD)** was introduced in April 2022 on imported solar cells and modules. This makes imports more expensive and encourages the use of Indian alternatives—boosting local manufacturing and reducing reliance on foreign suppliers.[8]



## KEY FLAGSHIP INITIATIVES IN SOLAR ENERGY:

The government has launched several flagship initiatives to promote the adoption and development of solar energy across the country.

### 1. PM Surya Ghar: Muft Bijli Yojana



PM Surya Ghar Muft Bijlee Yojana is a central scheme with an outlay of Rs. **75,021 crores** to help one crore Indian households to get up to **300 units of free electricity** every month by installing rooftop solar panels. The government provides a subsidy of **30,000 for 1 kW, 60,000 for 2 kW, and 78,000 for 3 kW** rooftop solar systems or higher. Even if a family takes a loan to install the system, they can still save about 15,000 every year on electricity bills after paying the monthly loan EMI.

Application Process for PM Surya Ghar is as follows:



### 2. PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyaan)

The **PM-KUSUM Scheme** supports farmers in using solar energy instead of diesel. Farmers can get a **30% to 50% subsidy** to install new solar pumps or convert old pumps to solar. They can also build **solar power plants up to 2**

**MW** on their own land and earn money by selling electricity to local DISCOMs. The scheme is carried out by state implementing agencies[9]. Moreover, it is aimed at ensuring energy security for farmers in India, along with honouring India's commitment to increase the share of installed capacity of electric power from non-fossil fuels sources to **50% by 2030** as part of Intended Nationally Determined Contributions (INDCs).[10]

**3. Solar Parks Scheme :** The government is running a scheme called "**Development of Solar Parks and Ultra Mega Solar Power Projects**" to set up large solar power plants connected to the electricity grid, with a target of **40 GW by March 2026**. So far, **53 Solar Parks** with a total capacity of about **39,323 MW** have been approved in **13 states**. Out of these, **18 parks** (10,856 MW) are fully developed, where **10,756 MW** of solar power projects are already working. Another **3140 MW** of solar projects are running in **8 parks** (10,043 MW). In total, **13896 MW** of solar power projects have started operating in **26 Solar Parks**, while the remaining parks are still being developed. India's clean energy growth isn't just reducing carbon emissions—it's changing lives. Large solar parks now provide low-cost electricity, while wind farms in Gujarat and Tamil Nadu meet evening power needs. Bioenergy projects are boosting rural incomes through job creation.[11]

### 4. PM JANMAN: Empowering PVTG Communities through Solar Electrification

The **Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM JANMAN)** was launched to address the development needs of **Particularly Vulnerable Tribal Groups (PVTGs)** through 11 critical interventions across 9 Ministries. A key initiative under this mission and **Dharti Aaba Janjatiya Gram Utkarsh Abhiyan (DA JGUA)** is the **New Solar Power Scheme**, with an outlay of **515 crore**, aimed at electrifying **one lakh un-electrified households** in Tribal and PVTG habitations across **18 states**, promoting inclusive growth and sustainable energy access in remote tribal areas.[12]

### 5. Increase in Solar PV Manufacturing Capacity[13]

Since 2014, India's capacity to make solar PV cells has grown about 21 times, going up from **1.2 GW in 2014** to about **25 GW by March 2025**. Similarly, the capacity to make solar PV modules has grown more than **34 times**, rising from 2.3 GW in 2014 to about 78 GW by March 2025

### Other Important initiatives

• **Floating Solar Projects:** The Omkareshwar Floating Solar Park in Madhya Pradesh is one of Asia's largest floating solar parks, with a planned capacity of **600/MW**. It costs **330 crore**, with 49.85 crore support from the Centre. These solar projects are set up on water bodies to save land and work more efficiently.[14]

• **Agrivoltaics:** Agrivoltaics use solar panels and allow farming underneath, increasing land use and farmer

income. Projects like the Sun master Plant in Delhi and a 105/KW system by ICAR in Jodhpur show India's progress in clean energy.[15]

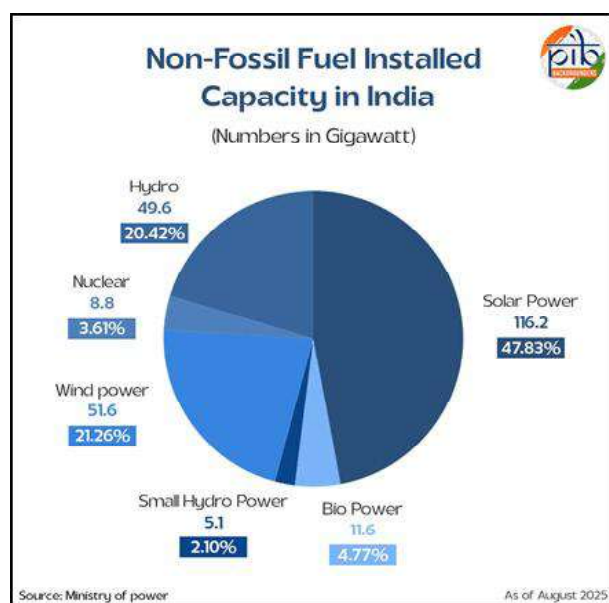
### India's Global Solar Leadership: ISA & OSOWOG

**International Solar Alliance (ISA):** Launched by India and France at COP21 in 2015, the ISA is a global alliance of 100+ countries working to combat climate change through solar energy. It aims to mobilise \$1 trillion in investments by 2030, reduce technology and financing costs, and promote affordable solar solutions. With a special focus on Least Developed Countries (LDCs) and Small Island Developing States (SIDS), the ISA seeks to drive low-carbon growth through cost-effective and transformational energy solutions.[17]

**ONE SUN- ONE WORLD- ONE GRID (OSOWOG):** The 'One Sun, One World, One Grid' (OSOWOG) initiative, launched by India at the ISA Assembly in 2018, envisions a global solar grid under the idea that 'the sun never sets.' Led by ISA, it aims to connect solar resources across regions from South Asia to Africa and Europe, with studies and frameworks already underway

**India's Renewable Sector: An Overview :** India's energy sector uses many different sources to produce electricity. These include fossil fuel sources like coal, gas, lignite, diesel, etc, as well as non-fossil fuel sources like solar, wind, hydro, nuclear and biomass. India's total power capacity has now reached around 485 GW. Out of this, 242 GW comes from thermal power, 116 GW from solar, and 51.6 GW from wind. This shows India's strong move towards clean energy and better energy security.[18]

In the last 11 years, India has made significant progress in renewable energy. To meet the goal set at COP26, the Ministry of New & Renewable Energy (MNRE) is working to reach **500 GW of non-fossil fuel capacity by 2030**.



By **June 2025**, India has installed **242.8 GW** of non-fossil fuel installed capacity, including **233.99 GW of renewable energy** and **8.8 GW of nuclear power**. This now makes up **50.07% of the country's total power capacity of 484.82 GW**. Renewable energy alone has grown almost **three times**, from **76.37 GW in 2014** to **233.99 GW in 2025**, showing a strong move toward a cleaner and sustainable future.[19]

India added a record 29.52/GW of renewable energy in FY2024–25, boosting total clean power capacity to 220.10/GW, up from 190.57/GW last year. This progress brings India closer to its goal of 500/GW non-fossil capacity by 2030, in line with the **"Panchamrit"** climate targets set by the Prime Minister.[20]

India stands **4th** globally in **Renewable Energy Installed Capacity**, **4th in Wind Power capacity** and **3rd in Solar Power capacity** (as per IRENA RE Statistics 2025).[21]

### India's Renewable Energy Growth: 2014–2025

The renewable energy sector in India consists of solar energy, wind energy, hydro power, and bioenergy, all of which help reduce dependence on fossil fuels and support sustainable development. Installed RE capacity has grown from **76.37 GW in March 2014** to **233.99 GW in June 2025**, an increase of nearly **3 times**. [22]

**1. Wind Energy :** India added **4.15 GW** of wind energy in FY 2024–25, taking the total installed capacity to **51.6 GW**.

India ranks **4th globally** in onshore wind with **52.14/GW** installed (as of 31 July 2025), and **30.10/GW** is under implementation[23]. Wind power generated 83.35 billion units from Apr 2024 to March 2025, contributing **4.56%** to total electricity. The country has a wind potential of 1164/GW and an annual manufacturing capacity of 18/ GW. Offshore wind development is guided by the National Offshore Wind Energy Policy (2015), with MNRE as the nodal ministry for projects along India's 7600/ km coastline[24].

**2. Bioenergy :** India has 11.60/GW of bioenergy capacity (including 0.55/GW from off-grid and waste-to-energy) and 5.10/GW from small hydro, with 0.46/GW under construction[25]. To support this, the National Bioenergy Programme (2021–2026) was launched with a 1715 crore budget, offering central financial help for setting up bioenergy projects across the country under the following components. [26]

- 1. Waste to Energy Programme** (Programme on Energy from Urban, Industrial and Agricultural Wastes / Residues)
- 2. Biomass Programme** (Scheme to Support Manufacturing of Briquettes & Pellets and Promotion of Biomass (non-bagasse) based cogeneration in Industries)

Source : PIB

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# THE PATH TO NET-ZERO: BUILDING SUSTAINABLE GLOBAL SUPPLY CHAINS

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## View Larger Image

The global shipping and logistics industry is under increasing pressure to reduce its environmental footprint. This article looks at how innovation, regulation, and industry collaboration will be key to driving progress toward net-zero emissions.

### The Need for Sustainability in Supply Chains

Container shipping is the most carbon-efficient way to transport goods globally, yet it still has a substantial environmental impact. With the industry accounting for around 3% of global greenhouse gas emissions, reducing vessel emissions is critical to meeting global climate targets. In response, the International Maritime Organization (IMO) has set ambitious targets to achieve net-zero emissions by or around 2050, with interim goals of a 20-30% reduction by 2030 and 70-80% by 2040, compared to 2008 levels.

### Industry Efforts to Reduce Supply Chain Emissions

Achieving net-zero emissions in global supply chains requires a combination of innovative technologies, alternative fuels, and operational efficiencies:

#### Alternative Fuels in Shipping

The maritime industry is increasingly exploring alternative fuels such as green methanol, hydrogen, and ammonia as part of broader efforts to decarbonise operations. Many shipping lines, including Maersk, CMA CGM, and Hapag-Lloyd, are investing in dual-fuel vessels and partnerships to accelerate the transition.

Maersk, for example, launched the world's first large container vessel powered by green methanol, the Ane Maersk, which completed its maiden voyage in 2024. It is the first of 18 dual-fuel vessels Maersk plans to deploy by 2025, capable of running on both methanol and conventional fuels to provide operational flexibility during the transition. Similarly, CMA CGM has ordered methanol-powered ships as part of its commitment to carbon neutrality by 2050, while Hapag-Lloyd is investing in LNG-powered vessels with the potential for future alternative fuel conversions.

Beyond individual shipping lines, the industry as a whole is working to scale fuel availability and infrastructure. Partnerships between carriers, fuel producers, and port authorities are critical to ensuring a viable and scalable pathway for alternative energy adoption.

### Decarbonising Port Operations

Ports play a crucial role in sustainable supply chains. In the UK, the Port of Felixstowe has embarked on a comprehensive decarbonisation strategy, including the acquisition of 17 electric gantry cranes and 48 battery-powered terminal tractors, to reduce annual CO emissions. Additionally, the port is exploring hydrogen as a sustainable energy source, collaborating with partners to develop on-site hydrogen production facilities.

These initiatives align with broader European efforts, such as Germany's National Action Plan for Climate-Friendly Shipping, which focuses on alternative fuels, electrifying port equipment, and enhancing energy efficiency. The Port of Hamburg, for instance, has committed to reducing carbon emissions by 50% by 2025 and achieving full climate neutrality by 2040. A key component of this shift includes the installation of shore power facilities, allowing ships to draw electricity from the grid while docked, thereby reducing emissions from idle vessels. European ports are investing heavily in shore power infrastructure, making this a critical step in the effort to create greener ports.

### Sustainable Trucking Solutions

Road transport remains a significant contributor to supply chain emissions. Companies like Maersk are investing in electric trucks to decarbonise their logistics operations and achieve net-zero emissions by 2040. However, the adoption of hybrid and electric trucks faces challenges due to range limitations and the need for a broader charging infrastructure, particularly for long-haul freight.

### Economic and Regulatory Pressures

Transitioning to sustainable practices presents significant economic and regulatory challenges for

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the shipping and logistics industry. Companies must balance the high costs of adopting green technologies with maintaining operational efficiency, while also navigating an increasingly complex regulatory landscape.

### Financial Implications

Investing in green technologies and infrastructure inevitably increases operational expenses. To help offset these costs, various port charges have been introduced, such as the **Green Energy Transfer Levy (GET)**, **Energy Adjustment Levy (EAL)**, and **Emissions Trading System (ETS)**. These charges reflect the costs of transitioning to greener practices, from alternative fuel investments to emissions reductions. While they may raise short-term costs, they are crucial for ensuring long-term sustainability. These levies are designed to encourage investment in lower-emission technologies while holding operators accountable for their environmental impact.

### Regulatory Compliance

The IMO's decarbonisation strategy includes progressively stricter emissions regulations to drive industry-wide change. A key milestone in this transition was the introduction of mandatory emissions data reporting in 2023. In 2024, this data was used to assign performance ratings based on the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII). Ships with poor CII ratings will be required to improve efficiency or risk being idled, reinforcing the push to reduce carbon intensity across the industry.

However, compliance is becoming increasingly complex due to overlapping international and regional regulations. The EU Emissions Trading System (EU ETS) and FuelEU Maritime Regulations, for example, introduce additional financial and operational requirements. From January 2025, the FuelEU Maritime regulation will mandate a 2% reduction in carbon intensity per ship, compelling operators to accelerate efficiency improvements. Without global alignment, these fragmented regulations risk creating costly regional silos, making compliance more challenging and potentially slowing investment in zero-carbon fuels and infrastructure.

### Barriers and Incentives for Green Shipping

Despite growing commitments to alternative fuels, the transition remains slow due to significant cost barriers and infrastructure challenges. Developing supply chains for green fuels like hydrogen, ammonia, and methanol requires substantial investment in production, storage, and bunkering facilities. At

present, liquefied natural gas (LNG) and conventional fuels continue to dominate, as many shipping lines prioritise them for short-term fleet expansion due to their availability and lower costs. Additionally, uncertainty around future regulations and the scalability of emerging technologies has made some companies hesitant to commit fully to alternative fuels.

However, regulatory pressure and market incentives are expected to accelerate change. Stricter emissions targets, carbon pricing mechanisms, and potential penalties for non-compliance are pushing the industry toward greener solutions. At the same time, early adopters of sustainable shipping stand to benefit from enhanced brand reputation, stronger customer relationships, and access to green financing. As technology progresses and costs decline, investment in low-carbon solutions will become increasingly viable, reshaping the industry for the future.

### The Path Ahead

Achieving a sustainable global supply chain requires collaboration between governments and industries, driven by growing consumer demand for greener practices. Consumers are increasingly making purchasing decisions based on sustainability, influencing businesses to prioritise emissions reduction, alternative fuels, and energy efficiency. Organisations that act now will not only contribute to global decarbonisation but also strengthen their market position and ensure long-term compliance with evolving regulations. Proactive investment in sustainability today will help pave the way for a resilient and environmentally responsible supply chain in the future.

In conclusion, the journey toward net-zero emissions in global supply chains is complex and multifaceted. By embracing innovation, adapting to evolving regulations, and working together, the industry can overcome the challenges ahead and make a meaningful impact on global sustainability efforts.

### Sources:

International Maritime Organization (IMO) Net-Zero Emissions Targets  
Maersk's Green Methanol-Powered Vessel, Ane Maersk  
Port of Felixstowe's Decarbonisation Initiatives  
Port of Hamburg's Climate Goals  
Barriers and Incentives for Green Shipping

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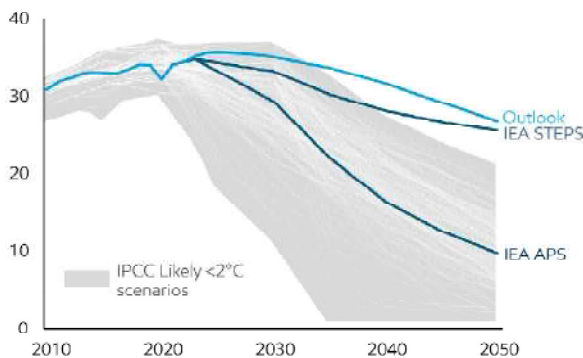
# CO EMISSIONS FALL 25% BY 2050 BUT MORE PROGRESS IS NEEDED

- Efficiency improvements and renewables are necessary but not a complete solution.
- Technologies like hydrogen, carbon capture and storage, and biofuels have yet to reach their full potential but are needed to reduce emissions on a global scale.
- With the right policies and technology advancements, these solutions can help society move closer to achieving its climate goals.
- There are multiple potential emissions pathways to achieve society's climate goals, giving policy makers an opportunity to balance affordability and emissions reduction.

For the first time in modern history, emissions are projected to peak and begin a sustained decline this decade as economies expand and living standards improve. By 2050, we project global CO<sub>2</sub> emissions to decline by 25% from current levels. This happens because efficiency will improve, and the world will use more lower-emissions technologies, including renewables, carbon capture and storage, hydrogen, and biofuels.

## Global energy-related emissions

CO<sub>2</sub> Billion metric tons



Source: 2024 IEA World Energy Outlook; IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios Emissions do not contain industry process emissions or land use and natural sinks

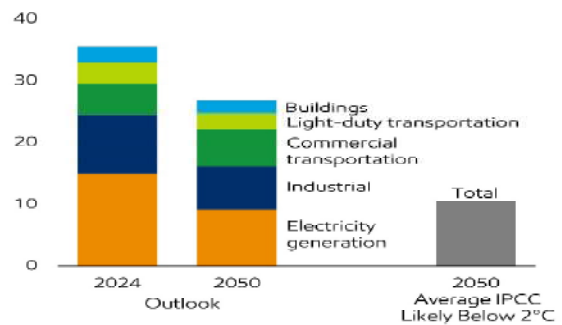
Overall, energy-related CO<sub>2</sub> emissions are projected to peak at approximately 36 billion metric tons per year sometime this decade and then decline to 27 billion

metric tons per year in 2050.

That will be great progress. Even so, more is needed to reach emission levels consistent with keeping global temperature increases below 2°C. The average of the IPCC's Likely Below 2°C scenarios requires energy-related CO<sub>2</sub> emissions to fall to around 11 billion metric tons per year by 2050.

## Energy-related emissions

CO<sub>2</sub> Billion metric tons

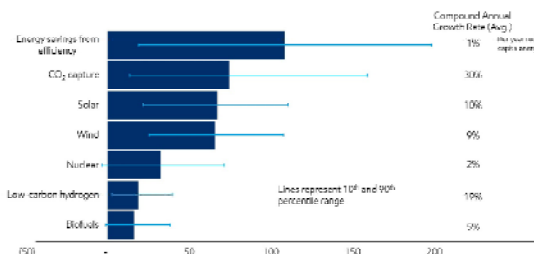


Source: IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios; ExxonMobil analysis Emissions do not contain industry process emissions or land use and natural sinks

The IPCC and our Outlook see the need for both established and emerging technologies to progress faster, in some cases at an unprecedented buildout.

## Solutions deployed in IPCC pathways

Quadrillion Btu growth 2020 to 2050

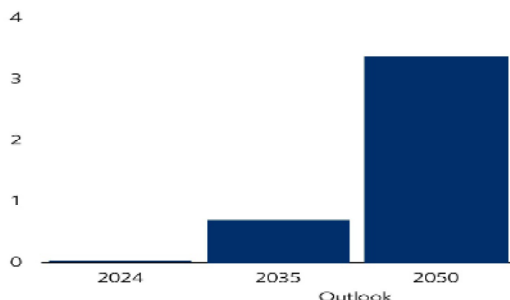


Source: IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios; ExxonMobil analysis; Growth from 2020-2050 across the average IPCC Likely below 2°C scenarios; uncertainty bars represent 10th percentile and 90th percentile scenarios

For example, the IPCC's Likely Below 2°C scenarios suggest that wind and solar needs to grow at an average of 10% per year from 2020 – 2050, which is broadly in line with recent history. However, carbon capture and storage need to grow at more than 30% per year through 2050 to meet the IPCC's Likely Below 2°C scenarios. CCS is not the only technology that will need to be accelerated on an immense scale. Low-carbon hydrogen and biofuels will need to play a much larger role as well.

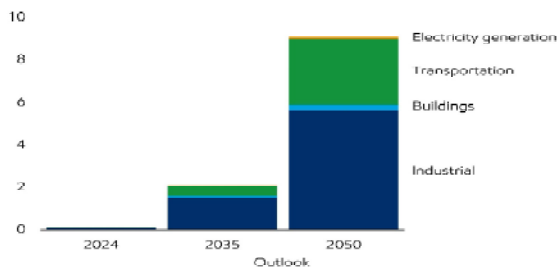
### Carbon capture and storage

CO<sub>2</sub> Billion metric tons per year



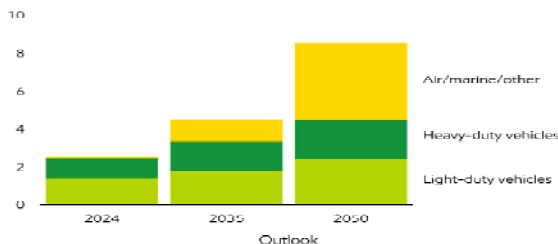
### Low-carbon hydrogen-based fuel use

Quadrillion Btu



### Biofuels use

Million barrels per day of oil equivalent

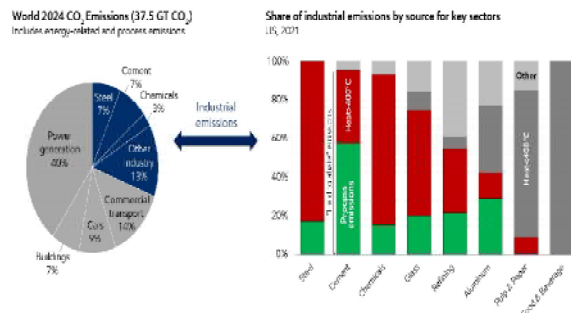


Our Outlook projects that CCS, H<sub>2</sub>, and biofuels will increase ~130x, 80x, and 3x respectively by 2050 vs current levels; however, this is still below the level required in the IPCC Likely Below 2°C scenarios due primarily to a lack of policy support.

Why are CCS, hydrogen, and biofuels essential for reducing emissions?

We know that energy use will increase by 2050 to support a much larger population and economic growth. We also know that fossil fuels remain the most effective way to produce the enormous amounts of energy needed to support commercial transportation, manufacturing and industrial production, due to their high energy

density and ease of transport. That's why a critical goal of any energy transition will be to reduce emissions from these important "hard-to-decarbonize" sectors, which account for ~45% of all CO<sub>2</sub> emissions today (including process emissions, excluding indirect emissions from electricity use).



Source: US Department of Energy Lifford Reports, 2023; ExxonMobil Analysis Excludes off-site power generation

When we say these sectors are "hard-to-decarbonize," what we also mean is that they are "hard-to-electrify." As even the IEA acknowledges, "Generating high-temperature heat from electricity, especially on a large scale and for electrically non-conductive applications, is impractical and costly with today's technologies." (IEA, 2020)

Looking across key industrial sectors, we can see the significant share of emissions from generating heat >400°C where electricity often isn't currently a viable alternative, and from process emissions where chemical transformations of raw materials releases CO<sub>2</sub>.

These sectors will require multiple lower-carbon technologies to meet different needs.

- Carbon capture and storage is the process of capturing CO<sub>2</sub> emissions at the source and injecting it into deep underground geologic formations for safe, secure and permanent storage. CCS on its own, or in combination with hydrogen production, is among the few proven technologies that can significantly reduce CO<sub>2</sub> emissions from high-emitting sectors, including process emissions.
- Low-carbon hydrogen can replace traditional furnace fuel to decarbonize the industrial sector. Hydrogen and hydrogen-based fuels such as ammonia will be important for decarbonizing commercial transportation as technology improves to lower its cost, and policy develops to incentivize the needed infrastructure development.
- Biofuels are expected to play an important role in decarbonizing the transportation space. Biofuels will be critical in helping to reduce emissions in aviation in particular, which cannot rely on electric batteries for commercial air travel.

Energy transition signposts

Our Signpost process helps us track the rate of deployment of key technologies.

|                                              | '19 - '24 Avg <sup>1</sup> | '24 Act <sup>1</sup> | Annual deployment over 2020-2030 |                        |                      |                      |                                    |
|----------------------------------------------|----------------------------|----------------------|----------------------------------|------------------------|----------------------|----------------------|------------------------------------|
|                                              |                            |                      | Global Outlook <sup>2</sup>      | IEA STEPS <sup>3</sup> | IEA APS <sup>3</sup> | IEA NZE <sup>3</sup> | IPCC Likely Below 2°C <sup>4</sup> |
| Efficiency (energy per capita change %/yr)   | 0.3%                       | 0.3%                 | +0.1%                            | +0.3%                  | +1.1%                | +7.0%                | +0.0%                              |
| Solar (GW/yr - v0/yr) <sup>5</sup>           | 160                        | 385                  | 269                              | 339                    | 395                  | 430                  | 375                                |
| Wind (GW/yr) <sup>6</sup>                    | 9+                         | 12+                  | 11+                              | 15+                    | 210                  | 260                  | 140                                |
| CCS (MTA/yr) <sup>7</sup>                    | 1.5                        | 41                   | 25                               | 18                     | 45                   | 125                  | 185                                |
| Nuclear (GW/yr) <sup>8</sup>                 | 0                          | 4                    | 70                               | 70                     | 15                   | 25                   | 15                                 |
| Biofuels in transportation (KBDOE growth/yr) | 3.8+                       | 20.0                 | 1.10                             | 8.4 <sup>9</sup>       | 80.9 <sup>9</sup>    | 44.9 <sup>9</sup>    | 1.25                               |
| Low-carbon hydrogen (MTA/yr) <sup>10</sup>   | 0.2                        | 0.2                  | 0.2                              | 0.2                    | 3.3                  | 9.5                  | 2.1                                |

1. Actuals and history based on IEA history file (2024) and ExxonMobil '25 Global Outlook
2. Hydrogen and CCS history benchmarked from Wood Mackenzie Project Pipeline database (1Q 2025). CCS capacity for point source CO<sub>2</sub> capture (excludes LNG, natural gas processing and upstream oil & gas production)
3. Solar is utility solar; Solar history from BNEF Solar Tracker (1Q 2025); IEA solar projections converted to utility only based on STEPS, APS, and NZE forecast total solar, applying average historic proportion of commercial scale solar based on BNEF solar tracker.
4. Wind capacity deployment history from BNEF Wind Tracker (1Q 2025)
5. Nuclear capacity deployment history from IAEA PRIS Database (1Q 2025)
6. STEPS, APS, and NZE projections from IEA 2024 World Energy Outlook (Oct 2024)
7. IPCC AR6 Scenarios Database hosted by IIASA release 1.0 average of 306 IPCC C3: "Likely below 2°C" scenarios. Efficiency from primary energy per capita, excluding scenarios without 2025, 2030 population data.
8. IEA biofuels growth/yr (KBDOE) starts in '24 to align with '24 World Energy Outlook reporting

These signposts provide valuable insight into current trends and what is needed to achieve a range of potential emissions pathways.

- Solar and wind have seen significant acceleration in deployment over recent years, with the largest growth occurring in China.
- Biofuels are also seeing substantial growth driven by both policy and market factors.
- CCS and low-carbon hydrogen are essential technologies in all projections and scenarios, however, have not yet seen material deployment due to lack of policy support.
- Per capita energy demand has continued to rise, driven by developing countries. This trend is projected to reverse this decade as more efficient solar, wind, and natural gas replace coal in power generation.

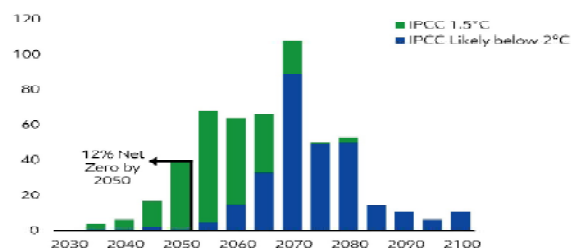
It is also clear that while there is a range of potential outcomes for each solution to 2030, all solutions need to increase deployment this decade. This is the case for our Global Outlook, IEA STEPS, IEA APS, IEA NZE, and the IPCC Likely Below 2°C scenarios.

What is needed to accelerate emissions reduction?

It has now been 20 years since the Kyoto protocol came into force, and 10 years since the Paris climate agreement. Yet, global energy related CO<sub>2</sub> emissions continued to rise at ~1% per year in 2024, which is unchanged vs the 20-year average. This suggests a different policy approach may be needed to reach society's climate goals.

The IPCC scenarios highlight the importance of considering full climate impact when setting emissions targets, not just focusing on net zero timing. In fact, overly focusing on net zero timing has the potential to constrain energy supply, leading to price shocks which can cause consumers to lose confidence in the economy.

**IPCC AR6 projected timing to net zero**  
# of scenarios at net zero CO<sub>2</sub> emissions per 5 year interval



Source : IPCC: AR6 Scenarios Database hosted by International Institute for Applied Systems Analysis (IIASA) release 1.0 . IPCC scenarios label C1, C2, and C3; Net zero CO<sub>2</sub> emissions: when anthropogenic CO<sub>2</sub> emissions are balanced globally by anthropogenic CO<sub>2</sub> removals over a specified period; Anthropogenic CO<sub>2</sub> means all CO<sub>2</sub> (energy-related, process, agriculture, land use). It Excludes non-CO<sub>2</sub> GHGs (e.g., CH<sub>4</sub>, CO, F-gases)

Further, there is no single emissions pathway that defines society's climate goals. Looking at the IPCC Likely below 2°C scenarios (C3), we see the timing of net zero emissions ranges from ~2050 to >2100. Similarly for 1.5°C scenarios (C1/C2), we see the net zero timing ranges from ~2035 to 2080.

So, what is needed to affordably achieve society's climate goals?

-Policy should be designed in such a way to avoid sudden energy price spikes that will reduce consumer confidence AND support long-term economic growth which is essential to improving long-term affordability.

-Technology advancements & deployment, supported by "all of the above" technology neutral policy frameworks, will over time reduce technology cost, further improving affordability.

-Market-driven solutions must ultimately develop to naturally select the most cost-effective technologies for companies and consumers.

Source: corporate.exxonmobil.com

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## BRANCH NEWS

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### CHENNAI BRANCH

#### Annual General Meeting & Annual Get-Together Report IIMM– Chennai Branch

**AGM**      **Date:**      23rd      August      2025  
**Venue:** Madras Management Association (MMA)  
Auditorium, Chennai

**1. Annual General Meeting (AGM) Report :** The Annual General Meeting of the Chennai Branch of the Indian Institute of Materials Management was held on 23rd August 2025 at the Madras Management Association Auditorium. The meeting commenced promptly after verification of the quorum, and Branch Chairman **Mr. K. Nagappan** officially called the meeting to order. He extended a warm welcome to all members and expressed sincere gratitude for their trust and continued support throughout his tenure. Reflecting on the branch's accomplishments over the past two years, Mr. Nagappan highlighted the resilience and commitment of the team in maintaining transparency and accountability, particularly in completing the audited financial accounts. He spoke of several key achievements during the 2024–2025 term, including the successful conduct of **SPECTRUM 2025**, the continued growth of the **DSCM program** under the guidance of Mr. T.A.B. Barathi, and the organization of numerous training programs, workshops, and guest lectures aimed at enhancing the skills and knowledge of members. The Chairman acknowledged the dedicated efforts of the Executive Committee, senior members, faculty, and office staff in ensuring smooth branch operations. Concluding his address, he expressed confidence in the incoming leadership, emphasizing the branch's mission of "Service to the SCM Fraternity," and invited the Honorary Secretary and Honorary Treasurer to present their reports.



The **Honorary Secretary** Dr. B Sampath, presented the annual report covering the period from May 2024 to June 2025, a milestone year in which the Chennai Branch

celebrated its Diamond Jubilee. The Secretary detailed a wide range of activities conducted by the branch, which reinforced its commitment to advancing Supply Chain and Materials Management. Notable highlights included nine monthly knowledge-sharing sessions featuring eminent speakers covering topics such as digital transformation, ethical sourcing, AI in manufacturing, and modern warehousing. The branch successfully conducted an Executive Development Program titled "Discover Your Executive Potential" and organized eleven customized in-house corporate training programs for leading organizations. The flagship event, **SPECTRUM 2025**, aligned with the Diamond Jubilee celebrations, focused on "Driving Sustainable Supply Chain – The Road to Green SCM" and attracted over 80 delegates, including national executives. Materials Management Day was celebrated with an SCM Quiz, which fostered engagement and collaboration within the industry. Membership stood at 416, including a strong base of life members, reflecting the confidence and long-term commitment of professionals. The branch also continued providing academic support for postgraduate and DSCM programs while commemorating the Diamond Jubilee, honoring its legacy and setting a strong foundation for the future. Looking ahead, the Secretary outlined plans to expand EDPs, strengthen academic-industry partnerships, and launch sector-specific conventions in healthcare, logistics, and warehousing during 2025–2026. He concluded by expressing gratitude to the Executive Committee, members, and partners for their contribution to a successful year.



The financial statement was presented by Dr. B. Sampath, Honorary Secretary. The audited balance sheet and the income and expenditure statement for the financial year 2024–2025 were shared, confirming compliance with the National Headquarters' accounting framework. The branch reported a surplus of 1,98,139, reflecting a significant turnaround compared to the previous year's deficit of 22,118.

Although total revenue was lower than in 2023–2024, effective cost management and strategic planning ensured financial stability. Revenue growth was notable in IHT programs and membership subscriptions, supported by the DSCM course. The revenue from SPECTRUM appeared lower, as the accounts for the 2023 and 2024 events had been recorded in the previous year; the surplus from SPECTRUM 2025 will be reflected in 2025–2026.



Operational challenges included the inability to conduct certain EDPs and certificate programs due to coordination gaps, as well as delays in recovering TDS dues from NHQ (20.6 lakh) and pending payments from the University of Madras (12.24 lakh). Despite these challenges, in-house training continued to be a significant contributor to branch revenue.

The annual surplus was transferred to the Professional Development Fund, and the Treasurer recommended retaining the existing auditors. The audit report was formally proposed by Dr. B. Ramesh and seconded by Mr. S. L. Ashok.

The AGM included active participation from members, who shared valuable feedback and suggestions. Mr. S.L. Ashok appreciated the branch's activities and recommended better utilization of the Lakshmi Bhavan building to generate revenue through rentals. Mr. T.A.B.

Barathi commended the office committee for their effective control of expenses and stressed the importance of continued support for EDPs, DSCM courses, consultancy initiatives, and the flagship event, SPECTRUM. Mr. L.K.I. Jayaraj suggested exploring additional income-generation activities to enhance financial flexibility, enabling expanded member gatherings, knowledge-sharing sessions, and other initiatives.

The **Election Officer, Mr. J. Ravishankar**, conducted the elections for the Office Bearers, Executive Committee, and National Council Members for the 2025–2027 term in compliance with IIMM rules. All nominations were valid and uncontested, resulting in the unanimous election of candidates. The newly **elected Office Bearers** included **Mr. T. Sornakumar as Chairman, Dr. B. Sampath as Vice Chairman, Mr. R. Balakrishnan as Honorary Secretary, and Mr. M. Praveenkumar as Honorary Treasurer**. The **Executive Committee members** elected were Mr. B. Sankar, Mr. Arun Natarajan, Mr. V. Chellappa, Mrs. M. Hemavathi, and Mr. T.K. Ranjith. **National Council Members** included Mr. K. Nagappan, Mr. T.A. Brahmendra Barathi, Dr. B. Ramesh, and Mr. S. Balachandran. The AGM concluded with a vote of thanks delivered by the newly elected Vice Chairman, Dr. B. Sampath, marking the formal closure of the meeting in a cordial and collaborative spirit.

## 2. Annual Get-Together (AGT) Report

The **Annual Get-Together** commenced immediately after the AGM, beginning with the traditional invocation song, followed by a welcome address delivered by **Mr. T. Sornakumar**, Chairman of IIMM Chennai. The program featured an inspiring address by **Ms. Kritanya Krishnamurthy**, a renowned motivational speaker, who spoke on the themes of family life and work-life balance, mind control systems, and the importance of harmonizing personal and professional responsibilities. Her presentation was engaging and highly appreciated by members and their families.

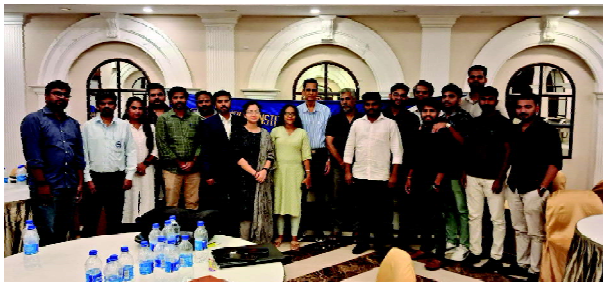
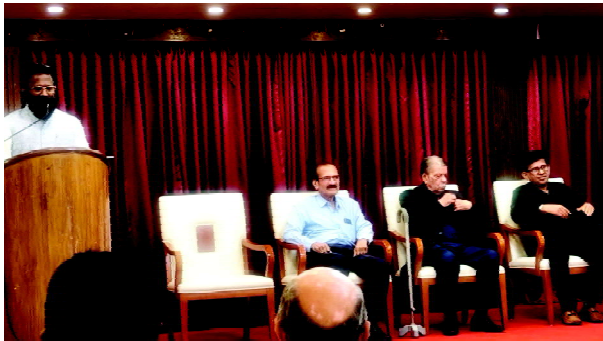
The entertainment segment of the AGT included a **magic show by Magic Raja**, which captivated the audience and was particularly enjoyed by the children of members. The program provided an excellent opportunity for networking and informal interaction among members and their families, fostering a sense of community and camaraderie. The event concluded with a vote of thanks delivered by **Dr. B. Sampath**, followed by a **grand Gala Dinner**, where members and families celebrated the evening together, enjoying lively conversations and socializing in a relaxed, festive environment.

The Annual General Meeting and Get-Together reflected IIMM Chennai's continued commitment to professional excellence, member engagement, and community building within the supply chain and materials management fraternity.

## BANGALORE BRANCH

**20.09.2025 – One day Inhouse Training Program:**

**Indian Institute of Materials Management (IIMM) – Bangalore Branch** conducted a one-day in-house training program on “**Legal Aspects in Purchasing Management and GST Documentation**” for the executives of **Homag India Pvt. Ltd.**, Dabaspeta, Bangalore, at their premises on **20th September 2025**.

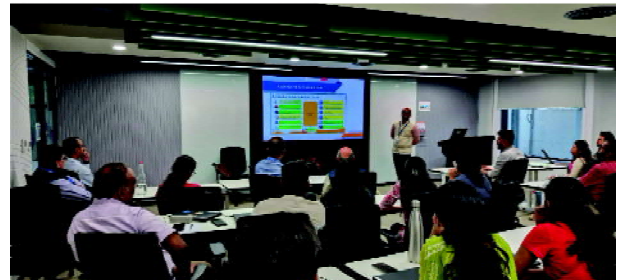
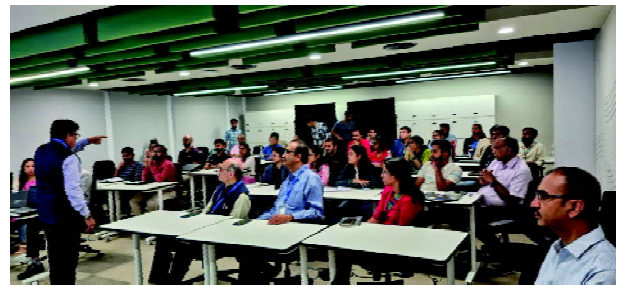


The session on Legal Aspects in Purchasing Management was facilitated by **Mr. M. S. Shankar Narayanan**, Senior Faculty, IIMM – Bangalore Branch. The post-lunch session on GST Documentation was delivered virtually by **CA Navjot Singh** from Delhi via MS Teams.

The program was well-received and featured highly interactive discussions, offering valuable insights into the legal and taxation aspects of procurement management. Approximately **20 executives** participated in the program and provided excellent feedback, commending the relevance and quality of the sessions.

#### **27<sup>th</sup> September 2025 – Get-together meeting SCALE 2025**

**Indian Institute of Materials Management (IIMM) – Bangalore Branch** organized a **Get-Together Meeting** on **27<sup>th</sup> September 2025 at 6:30 PM** at **Hotel Paraag, Bangalore**, for the **Executive Committee Members, Organizing Committee Members, and Sponsors** to celebrate the grand success of the **SCALE 2025 Conference**, held on **6<sup>th</sup> September 2025**.



**Dr. P. Sengottaiyan**, Chairman – SCALE 2025, warmly welcomed all Executive Committee Members, Organizing Committee Members, and Sponsors. He expressed his sincere gratitude for their invaluable support and contribution toward the successful conduct of SCALE 2025. As a token of appreciation, mementoes were presented to the members and Staff.

On this occasion, **Mr. P. M. Biddappa**, Senior Vice President, and **Mr. C. L. Kapoor**, Past National President, were specially honored by **Mr. C. S. Karunakar**, Chairman – IIMM Bangalore Branch.

The evening concluded with a delightful musical entertainment program followed by a fellowship dinner, creating a memorable and enjoyable experience for all attendees.

#### **30<sup>th</sup> September 2025 – Saraswathi Pooja /Ayudha Pooja at IIMM Office Premises:**

**Indian Institute of Materials Management (IIMM) – Bangalore Branch** celebrated **Saraswathi Pooja / Ayudha Pooja** on **30<sup>th</sup> September 2025 at 6:00 PM** at the **IIMM Office Premises**.

The arrangements for the pooja were well organized by **Mr. S. M. Nagaraj** and the staff of the IIMM Bangalore Branch. All Executive Committee Members actively participated in the pooja and joined in celebrating the spirit of the **Dasara Festival** at the office.

**Mr. C. S. Karunakar**, Chairman – IIMM Bangalore Branch, extended warm Dasara greetings to all members and distributed sweets and mixtures to mark the festive occasion.

The event reflected the organization’s spirit of togetherness and cultural harmony.

#### **7<sup>th</sup> October 2025 – Inhouse Training Program**

**Indian Institute of Materials Management (IIMM) – Bangalore Branch** organized a **one-day in-house training**

program on “Strategic Sourcing” on 7th October 2025 for the executives of Triveni Turbines Pvt. Ltd., Bangalore.

The program witnessed the participation of around **30 executives** from the **Stores, Purchasing, and Supply Chain Management** departments. The sessions were conducted by **Mr. G. Balasubramanian** and **Mr. E. Ganesh Kumar**, Senior Faculty Members of IIMM, who enriched the program with live examples and insightful case studies.

The sessions were highly informative and practical, providing participants with valuable perspectives on strategic sourcing. The program received **excellent feedback** from all participants, appreciating the content and delivery.

**8th October 2025 – Inhouse Training Program :** The Indian Institute of Materials Management (IIMM) – Bangalore Branch organized a one-day in-house training program on “**International Trade & Customs**” for the executives of **BOSCH**. The program was attended by **50 participants**. The sessions were conducted by senior faculty members **Mr. R. Sampath Raghavan** and **Mr. C. S. Karunakar**, and coordinated by **Mr. M. R. Achyuth Rao** and **Mr. P. G. Yogindra**. The sessions were highly interactive and informative, and the participants provided excellent feedback on the program.

**11th October 2025 – Workshop :** The Indian Institute of Materials Management (IIMM) – Bangalore Branch organized a **one-day certification workshop** on “Tools and Techniques for Supply Chain Effectiveness” on **Saturday, 11th October 2025**, at **Hotel Paraag**, adjacent to The Capitol Hotel, Raj Bhavan Road, Bangalore.

The sessions were conducted by **Mr. E. Ganesh Kumar** and **Mr. G. Balasubramanian**, senior faculty members of IIMM. The workshop witnessed the participation of **21 professionals from diverse sectors**, who appreciated the workshop’s rich content and engaging delivery. Participants provided highly positive feedback, highlighting the relevance and practical value of the sessions.

## VADODARA BRANCH

IIMM Vadodara Branch successfully conducted a three-days training programme on ‘Materials Management’ from 6th October to 8th October, 2025 at Gujarat Energy Transition Research Institute (GETRI), Vadodara for the Executives and Engineers of Gujarat Energy Transmission Corporation Limited-(GETCO), Madhya Gujarat Vij Company Limited-(MGVCL), Uttar Gujarat Vij Company Limited-(UGVCL), Paschim Gujarat Vij Company Limited-(PGVCL), Gujarat State Electricity Corporation-(GSECL) & Dakshin Gujarat Vij Company Limited-(DGVCL).

The sessions were delivered by expert faculties, Mr. Hariram Rajesh-Materials Planning & Inventory Management, Mr. Vishal Parikh–Purchasing and Contract Management, Mr. Jayant Kumar Thakur–Legal Aspects/Business Laws & Mr. Surendra Dhumal-Soft Skills/Art Therapy. The training contents were structured into 4 sessions on each day with examples, interactive sessions and case studies.

Participants feedback was very positive and well appreciated. Total 37 professionals participated in the training programme.



IIMM Vadodara Branch successfully organized an engaging Evening Talk on the theme “**CONSUMER AWARENESS**” by Mr. Pankaj Desai on 4th October, 2025

evening at IIMM Conference Room. Mr. Pankaj Desai, a Mechanical Engineer, after his retirement from Reliance Industries is giving voluntary services to **Jagrut Grahak Society, Vadodara**-an NGO approved by Government of Gujarat, for the last 10 years.

The session was very interactive and the speaker explained about the key aspects of consumer awareness include knowledge of rights and responsibilities, understanding product quality, safety & pricing, recognizing misleading information & unfair practices and knowing how to seek redressal for grievances. These aspects empower consumers to make right decisions, avoid scams, and promote market accountability by selecting trusted businesses and insisting on fair treatment.



IIMM Vadodara Branch successfully conducted a one-day training programme on **“Analysing and Visualizing Data in Google Data Studio”** on 4<sup>th</sup> October, 2025 at Gujarat Energy Transition Research Institute (GETRI), Vadodara for the Executives and Engineers of Dakshin Gujarat Vij Company Limited-(DGVCL), Paschim Gujarat Vij Company Limited-(PGVCL), Gujarat Energy Transmission Corporation Limited-(GETCO), Gujarat State Electricity Corporation-(GSECL), Gujarat Energy Transmission Corporation Limited-(GETCO). The programme was arranged in the Computer Lab of GETRI. The programme was designed for junior to middle management professionals from different departments including IT. Total 21 persons participated in the training.

The session was delivered by one of IIMM Vadodara's expert faculty members and Chairperson Dr. Bharti Trivedi, who brought in-depth knowledge and practical insights to the training in IT.



## HYDERABAD BRANCH

Under the dynamic leadership and visionary guidance of the New Executive Committee, a highly inspiring and immensely valuable online session titled – **“The Ripple Effect: GST 2.0 Rate Changes – Supply Chain Challenges”** was successfully hosted on September 20, 2025.

This critical session featured **Mr. S.N. Panigrahi**, a well known speaker, who delivered an expert analysis of the impending GST 2.0 Changes & Challenges, specifically detailing the profound impact on vital sectors like FMCG, Pharma, Textile & Clothing, Electronics, GTA, and the Construction/Housing sector.

The event attracted a large number of participants from diverse industries and the tax practitioner community. It was hailed as a very interactive session, distinguished by the active participation and engagement of all attendees. This session was more than an update; it was a motivational catalyst, equipping professionals with the knowledge to transform the challenges of GST 2.0 into powerful opportunities for innovation and sustained growth in their respective supply chains. Thank you.

## PUNE BRANCH

The Indian Institute of Materials Management (IIMM) – Pune Branch conducted a Knowledge Sharing Session and the Case Study Competition Prize Distribution Program on 27th September 2025 at its branch office.

The Knowledge Sharing Session featured Mr. Jagdish Chandnani, Co-Founder, Joint MD & COO at Legacy Lifespaces LLP, one of Pune's renowned construction companies. He spoke on the topic “Opportunities and Challenges in Supply Chain Management in the Real Estate Sector.” The objective of selecting this theme was to help members understand the practical difficulties faced by infrastructure companies in managing their supply chains and the innovative ways through which they overcome these challenges. Mr. Jagdish Chandnani insightful session was highly appreciated by all members present.

Following the session, the Prize Distribution Ceremony for the recently held Case Study Competition was conducted. One of our EC members Dr. Shaji Joseph,

Convenor of the Case Study Competition, emphasized the importance of writing case studies that can serve as guiding references for future generations. He encouraged members to actively participate in such competitions organized by the Pune Branch in the future. Dr. Joseph also explained the evaluation process undertaken by the jury members, highlighting that after a thorough review of the cases received, the three best case studies were selected and awarded prizes.

Mr. Suhas Gawas, Chairman, IIMM-Pune along with Mr. Jagdish Chandnani handed over the mementos and the certificates to the following 3 prize winners.

1st Prize - Ms. Rashmi Aggarwal – Sree Narayana Guru College of Commerce

2nd Prize – Mr. Vighnesh Sandbhor & Mr. Vaibhav Tiwari - ARaymond India Pvt. Ltd.

3rd Prize - Ms. Shalaka Motadoo & Mr. Shohrat Shankar - Search 4 Excellence

The program which witnessed an enthusiastic participation of around 35 members conclude with a vote of thanks by Dr. Kaustubh Khadke, Hon. Secretary, IIMM-Pune.



Mr. Suhas Gawas with Mr. Jagdish Chandani



Case Study – 2<sup>nd</sup> Prize – ARaymond India Pvt. Ltd.



Study – 3<sup>rd</sup> Prize – Search 4 Excellence

**VISIT TO TATA CENTRAL ARCHIVES :** On 24th September 2025, a group of members from IIMM-Pune Branch had the unique privilege of visiting the Tata Central Archives at Pune. This memorable visit was made possible through the initiative of Mr. Mohan Nair, National Councillor, IIMM, who facilitated it via the Sai Health Foundation, an NGO founded by him. The Foundation works under the guiding principles of “Health is Wealth” and “Prevention is Better than Cure”, with a mission to spread awareness and educate communities on key health-related issues.

The Tata Central Archives, established as the first modern corporate archives in India, preserves the invaluable history of the Tata group and the Tata family. The visit gave members a rare opportunity to experience the rich legacy spanning over 150 years, beginning with the pioneering vision of the late Jamsetji Tata, continuing through the leadership of successive generations, and culminating in the inspirational contributions of the late Ratan Tata.

The archives showcased not only the industrial milestones of the Tata group but also their enduring commitment to nation-building, philanthropy, education, healthcare, and community development. Members could see firsthand how the Tata family's ideals and initiatives have shaped India's industrial growth while upholding strong values of social responsibility.

The visit left a profound impact on all participants. Witnessing the journey of the Tatas – from their humble beginnings to their role as builders of modern India – was both motivating and inspiring. The members expressed deep appreciation for the opportunity to engage with such a rich historical and cultural experience, which reinforced the importance of visionary leadership and service to society.



# DMLM INAUGURATION PROGRAMME

**HELD ON SUNDAY, 26<sup>TH</sup>  
OCTOBER 2025**

**AT 11 AM IIMM HALL**

The Inauguration Programme of Diploma in Materials & Logistics Management (DMLM) for the Session September 2025 on Sunday, 26<sup>th</sup> October 2025 at the Institute Hall. The curriculum is intended to impart basic and fundamental knowledge in materials and logistics management to the participants who have little or no exposure to the subject.

The classes as well as the written examination will be held online. Due importance is given to case study, oriented discussion, oral communication and practical exposure of the students to modern warehouse management by making one visit to a warehouse as part of the curriculum.

23 students have joined the programme. Some of the students had joined online from Bihar, Jharkhand, Uttar Pradesh and other districts.

Mr. Debasis Mallick, Chairman of the Education Committee explained the course curriculum of the DMLM Course.

The Chairman, Secretary, Treasurer, Course Coordinator and other members of the executive committee were present at the inauguration function.

Mr. Animesh Chattopadhyay- Chairman, Mr. A.K. Dey- Vice Chairman, Mr. Prasun Ganguly -Hony. Secretary, Mr. Joydip Basak- Hony Treasurer of IIMM, Kolkata, formally inaugurated the course outlining the course curriculum.

Chairman Mr. Animesh Chattopadhyay joined the program through online. He expressed sincere thanks to all the students and requested the students to join online classes regularly.

Tea and lunch were arranged for all of them. During Lunch Break, students were provided lunch packets. During the interaction, most of the students expressed for offline classes as far as possible.

They were distributed course materials for 1<sup>st</sup> semester. The enrolled students made a whatsapp group for online classes and get in touch with each other regularly. Two physical classes were held on that day.

They were distributed Course Materials, I-Card, Pen, Note Book, IIMM Monogram Bag for the 1<sup>st</sup> Semester. The enrolled students made a Whatsapp Group for online classes and get in touch with each other regularly.

After this inauguration program Mr. Sajal Das took a class on Fundamental of SCM and Mr. P.S. Brahma also took a class on Introduction of Business Law.

The following office bearer joined the Inauguration Program of DMLM.

|                        |                                  |
|------------------------|----------------------------------|
| <b>Chairman-</b>       | <b>Mr. Animesh Chattopadhyay</b> |
| <b>Vice Chairman</b>   | <b>Mr. Anup Kumar Dey</b>        |
| <b>Hony. Secretary</b> | <b>Mr. Prasun Ganguly</b>        |
| <b>Hony. Treasurer</b> | <b>Mr. Joydip Basak</b>          |

Mr. Joydip Basak, Hony. Treasurer proposed the Vote of Thanks.

The program ended successfully.





IIMM Research Centre

## CENTRE FOR RESEARCH IN MATERIALS MANAGEMENT (CRIMM)

IIMM has set up CRIMM in Kolkata jointly with the Techno India University which is one of the renowned and largest Private University in West Bengal. A MOU was signed with TIU on 17th of November, 2017. Techno India University, West Bengal, promoted by the well-known Techno India Group is a leading Private University in the state and the country

### Objectives and Activities of CRIMM in brief

- To promote research in materials management discipline.
- To collaborate with industry for furthering the academic advancement of materials management and its application to industry.
- To render assistance to industries in problem solving projects, development activities, etc
- To take up project consultancy work in Materials Management. Centre will act as a nodal point for co-ordination and integration of research information in the field of Materials Management for on-going and completed research work in other countries

### Research Fellowship

The candidate should have a Master Degree in any subject/discipline or equivalent professional

Management qualification i.e. PGDBM, PGDMM etc. with at least 50% marks in aggregate at the graduation and post-graduation level. The candidate should have experience in working in Materials Management discipline or allied areas in industries. In case of highly experienced candidate in the field of Materials Management, and/or Engineering Graduates, Master Degree may be dispensed with. Preference will be given to industries sponsored candidates

The fees for such research studies will depend on the specific problem/area and the tenure, which will be borne by the sponsoring organisation. Those who will take up such Fellowship research studies on their own expenses, will have to bear the expenditure on their own. Successful Research Fellow from CRIMM shall have the unique opportunity to pursue PhD in Techno India University, West Bengal with condensed course work.

### Governing Committee

A steering Committee has been constituted to oversee the working of the centre consisting of nineteen members, eight from Techno India University, West Bengal, eight from IIMM, and three from industry.

For more information please contact

**Prof. (Dr.) Suresh Kumar Sharma**

Jt. Chairman –CRIMM

M: 09818464359

Email: [crimm.sureshiimm@gmail.com](mailto:crimm.sureshiimm@gmail.com)

# BRANCH ACTIVITIES





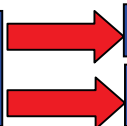
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|--------|-------------------------------------------------------|----------|-----------------------------------------------------------|----------|
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| 2.     | Post Graduate Diploma in Logistics & SCM (PGDL&SCM)   | AICTE    | Graduate in any discipline from any Recognized University | 2 Years  |

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| <b>EASTERN REGION</b>  | BOKARO 8986873175/8986873151 BURNPUR 9434777116 DHANBAD 9470595541<br>DURGAPUR 0343-2574303 JAMSHEDPUR 9308321421 KOLKATA 6291335421/<br>9836123999/9123705058 BHILAI 9407984-81 / 9424136282 NALCO 9437081126<br>RANCHI 7362864717/ 8987788599 ROURKELA 8260711943 RAJKOT 9687001515                                                                                                      |
| <b>WESTERN REGION</b>  | AHMEDABAD 7383012684 / 9909996711 BHARUCH 9998975891 CHHATRAPATI<br>SAMBHAJINAGAR 9423455983 GOA 9423007106 GANDHIDHAM 7046737857/9925066322<br>JAMNAGAR 0288-2750171 MUMBAI 7738543596/9820393639 MUNDRA 9687660068<br>NASHIK 9850730029 / 9356466083/0253-4044406 PUNE 7276010854 SURAT 0261-<br>2802682 VADODARA 7043959060 / 7802053410 VAPI 8758294011 VU NAGAR 9825028050            |
| <b>SOUTHERN REGION</b> | BANGALORE 080-25327252/9148745062/9972441466 CHENNAI 044-23742750/ 9444656264<br>COCHIN 04842203487 / 9400261874 HOSUR 9448018407 HUBLI 0836-2264699/ 9482779440<br>HYDERABAD 9949872010 / 9398910901 KGF 9880994684 MANGALORE 0824-2882203<br>MYSORE 9620001502 TRIVANDRUM 8086011015 ISAKHAPATNAM 9701347694                                                                             |
| <b>CENTRAL REGION</b>  | BHOPAL 8085856437 BHILAI 9407984081 BILASPUR 9425531806 INDORE 9826625417<br>NAGPUR 0712-2229446/9423074072                                                                                                                                                                                                                                                                                |

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[Education.nhqdelhi@iimm.org](mailto:Education.nhqdelhi@iimm.org)