

ISSN 2320-0758

PRICE ₹ 50/-

MATERIALS MANAGEMENT REVIEW



Volume 22 - Issue 10

Date of Publication: 1-8-2026

No. of Pages 1-60

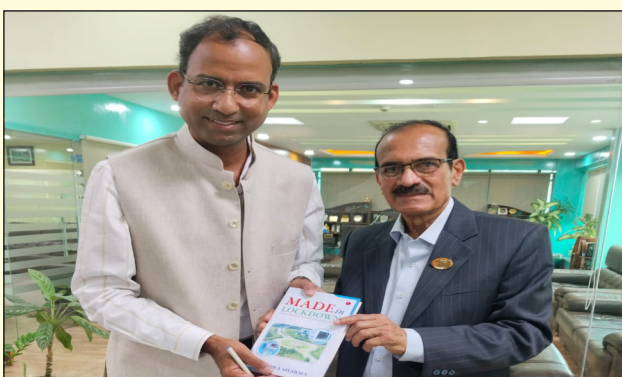
August 2026

NATIONAL COUNCIL MEETING



**209th National Council Meeting of IIMM Organised by the
Visakhapatnam Branch on 2nd August 2026**

IIMM and AMTZ Meet for Strengthening Industry-Institution Collaboration



BRANCH ACTIVITIES





From the Desk of National President & Editor in Chief



Greetings from your National President!!!

Dear All Members of IIMM,

India's supply chain ecosystem is witnessing an unprecedented transformation, driven by digital innovation, infrastructure development, sustainability commitments, and changing global trade dynamics. Supply chain management is no longer viewed merely as an operational function but has evolved into a strategic pillar of business growth, national competitiveness, and customer satisfaction. As India progresses toward becoming a global manufacturing and logistics hub, organizations are redesigning their supply chains to become more agile, intelligent, resilient, and sustainable. The Government of India's continued emphasis on **PM Gati Shakti**, the **National Logistics Policy (NLP)**, **Dedicated Freight Corridors (DFC)**, **Bharatmala**, **Sagarmala**, multimodal logistics parks, and port modernization is significantly improving logistics infrastructure and multimodal connectivity. These initiatives are reducing logistics costs, improving cargo movement, and enhancing India's position in global supply chains.

Artificial Intelligence (AI) has rapidly become the most transformative technology in supply chain management during 2026. Organizations across manufacturing, retail, logistics, and procurement are deploying AI and Generative AI for demand forecasting, inventory optimization, procurement automation, supplier evaluation, warehouse management, route optimization, and customer service. Machine Learning (ML), predictive analytics, and intelligent automation are enabling organizations to make faster, data-driven decisions while minimizing operational risks. Another major trend is the emergence of **end-to-end digital supply chain visibility**. Cloud-based ERP platforms, IoT sensors, RFID technology, GPS-enabled fleet tracking, blockchain-based traceability, and digital control towers are providing real-time monitoring across procurement, production, warehousing, transportation, and distribution. Enhanced visibility is improving responsiveness, reducing delays, and strengthening risk management.

India's expanding e-commerce and quick-commerce sectors continue to reshape logistics operations. Same-day and even 10-minute delivery models have accelerated investments in automated fulfillment centers, robotics, dark stores, AI-powered route optimization, and hyperlocal distribution networks. Last-mile delivery has become one of the most competitive areas of logistics innovation. Global geopolitical uncertainties, changing trade routes, and supply disruptions have reinforced the importance of supply chain resilience. Indian organizations are increasingly diversifying supplier networks, strengthening domestic sourcing, adopting the "China Plus One" strategy, and investing in localized manufacturing to reduce dependency on single-country sourcing while improving business continuity.

Sustainability has become an integral component of modern supply chains. Organizations are implementing Green Supply Chain Management practices through energy-efficient warehousing, electric vehicle fleets, renewable energy adoption, circular economy initiatives, sustainable packaging, waste reduction, and carbon footprint monitoring. ESG (Environmental, Social, and Governance) compliance is increasingly influencing procurement decisions and supplier selection. Procurement is evolving into a strategic business function supported by digital procurement platforms, e-tendering systems, supplier collaboration portals, spend analytics, contract lifecycle management, and supplier risk assessment tools. Procurement professionals are now expected to contribute not only to cost optimization but also to innovation, resilience, sustainability, and long-term value creation.

Warehouse automation is advancing rapidly through the deployment of robotics, automated storage and retrieval systems (AS/RS), autonomous mobile robots (AMRs), warehouse management systems (WMS), barcode and RFID technologies, and AI-assisted inventory management. These technologies are improving operational efficiency, inventory accuracy, and workplace safety. Data analytics is becoming the foundation of supply chain decision-making. Organizations are integrating enterprise resource planning (ERP), transportation management systems (TMS), warehouse management systems (WMS), and business intelligence platforms to create connected digital ecosystems. Real-time dashboards and predictive analytics are helping organizations anticipate demand fluctuations, identify bottlenecks, and improve overall operational performance.

Another important trend during 2026 is the growing emphasis on talent development. As digital technologies become central to supply chain operations, professionals must continuously upgrade their skills in AI, data analytics, digital procurement, sustainability, risk management, cybersecurity, and emerging logistics technologies. Continuous learning, professional certification, and industry-academia collaboration are becoming essential for building a future-ready workforce. Looking ahead, India's supply chains will continue to evolve through AI-driven planning, digital twins, blockchain-enabled transparency, autonomous logistics, smart warehouses, green logistics, and resilient sourcing strategies. Organizations that successfully integrate technology, sustainability, innovation, and resilience will be best positioned to compete in an increasingly interconnected global economy.

The future of supply chain management in India extends beyond the efficient movement of goods. It is about building intelligent, transparent, customer-centric, and sustainable value networks that support economic growth, strengthen global competitiveness, and contribute to national development. The Indian Institute of Materials Management (IIMM), through professional education, industry engagement, research, and knowledge sharing, continues to play a significant role in preparing supply chain professionals to meet the challenges and opportunities of this rapidly evolving landscape.

Thanking you and wishing all the best.

P.M. BIDDAPPA
NATIONAL PRESIDENT
pm.biddappa@yahoo.com, mmr@iimm.org



MATERIALS MANAGEMENT REVIEW

Volume 22 - Issue 10

(August 2026)

CONTENTS

PAGE NO.

■ ETHICAL GOVERNANCE AND INTEGRITY IN PUBLIC SERVICE	5
■ FROM TRANSACTION-CENTRIC OPERATIONS TO EXPERIENCE -CENTRIC INTELLIGENCE - ARTIFICIAL INTELLIGENCE (AI) REDEFINING CUSTOMER EXPERIENCE IN SUPPLY CHAINS. A NEW PARADIGM FOR INTELLIGENT, PREDICTIVE, AND PERSONALIZED VALUE CREATION	7
■ PROCUREMENT TRANSPARENCY & ESG ALIGNMENT A GOVERNANCE IMPERATIVE	12
■ TRANSPORTATION	13
■ BOTTLENECK OF AVIATION: AEROSPACE SPARES IN SUPPLY CHAIN MANAGEMENT	15
■ FROM IQ TO AIQ – THE NEXT FRONTIER OF INTELLIGENCE	18
■ 18 CHALLENGES THE MANUFACTURING INDUSTRY FACES IN 2026	23
■ HOW AUTOMATION BUILDS RESILIENT SUPPLY CHAINS	28
■ UDYAM REGISTRATION PORTAL AND THE UDYAM ASSIST PLATFORM	31
■ HOW GEM IS REVOLUTIONIZING PUBLIC PROCUREMENT IN INDIA THROUGH DIGITAL TRANSFORMATION	33
■ INDIA AIMS FOR 300 MILLION TONNES GREEN STEEL PRODUCTION BY 2030, COUNTERING EU CARBON TAX	34
■ INDIA ACHIEVES MARITIME INDIA VISION 2030 TARGET FIVE YEARS AHEAD BY BECOMING THE WORLD'S LEADING SHIP RECYCLING NATION IN 2025	35
■ INDIA FOR GLOBAL SOURCING: PROVEN MANUFACTURING & IT SUCCESS	36
■ INDIA OUTPACES GLOBAL MANUFACTURING GROWTH AS SUPPLY CHAIN SHIFT BOOSTS ITS APPEAL: ASSOCHAM STUDY	38
■ INDIA STRENGTHENS SUPPLY CHAINS WITH SMARTER CUSTOMS AND LOGISTICS REFORMS	39
■ INDIA'S LOGISTICS CITIES: POWERING THE NEXT WAVE OF TRADE AND GROWTH	40
■ THE BIGGEST BARRIER TO AI IN SUPPLY CHAINS ISN'T TECHNOLOGY	43
■ WHY THE DEPARTMENT OF POSTS AND FLIPKART PARTNERSHIP MATTERS FOR INDIA'S E-COMMERCE LOGISTICS ECOSYSTEM	45
■ THE AUGMENTED PROFESSIONAL – REDEFINING PROCUREMENT INTELLIGENCE IN THE AGE OF AI	46
■ WTO UPDATE WHY IS TRANSIT IN GOODS FREE BUT TRADE IS NOT?	48
■ BRANCH NEWS	51
■ EXECUTIVE HEALTH	56

NO. OF PAGES 1-60

Chief Editor & Publisher
P.M.Biddappa, National President

Core Committee :

V.K. Jain,

Former National President-IIMM

O. P. Longia

Former National President-IIMM

Desk Editor :

Jayanta Chakraborty,

National Councillor - IIMM.

S. N. Panigrahi,

Life member-IIMM, Corporate Trainer,

Mentor and Author

National President :

P.M.Biddappa,

pm.biddappa@yahoo.com

Editors :

Rakesh Kumar Rastogi, Sr.VP -

rkrastogi47@gmail.com

Pankaj Panchbhai, NS&T -

pankajpanchbhai@yahoo.co.uk

Sandeep Singh Bhal, VP Central -

sandeepsingbhal@yahoo.com

Dr. Narendra V Joshi, VP West -

NVJ@rediffmail.com

Rajender Raj, VP North -

rajenderraj.1238@rediffmail.com

Dr. P. Sengottaiyan, VP South-

senblore@gmail.com

Pradip Kumar, VP East -

kumarpradip1@gmail.com

Lalit Raj Meena-Iimm. Past President

meenalalitraj1@gmail.com

Prof. (Dr.) Goutam Sengupta,

Rector- Techno India University

West Bengal, goutamsenguptacbs@gmail.com

Prof (Dr.) V K Gupta, IMT Ghaziabad

dr.vkgupta@gmail.com

Prof. (Dr.) K N Subramanya,

Principal, R V College of Engg.

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

Printed at : Power Printers,

4249/82, 2 Ansari Road, Daryaganj,

New Delhi - 110002



**IIMM is a charter member of
International Federation of Purchasing &
Supply Management**

Edited, Printed & Published by :

INDIAN INSTITUTE OF MATERIALS MANAGEMENT

4598/12 B, 1st Floor, Ansari Road, Darya Ganj, New Delhi - 110 002.

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

E-mail: mmr@iimm.org

Website : www.iimm.org

(Published material has been compiled from several sources, IIMM disowns any responsibility for the use of any information from the Magazine if published anywhere by anyone.)



ETHICAL GOVERNANCE AND INTEGRITY IN PUBLIC SERVICE

PREM NARAYAN, IRSSLIFE FELLOW
IIMM LIFE MEMBER, IRILMM
email:premn2011@gmail.com

Ethical governance and integrity in public service are fundamental concepts for ensuring that public institutions serve the common good in a just, transparent, and accountable manner. These concepts are essential for maintaining public trust, promoting fairness, and ensuring that resources are used efficiently and effectively. Let's break down the key components of ethical governance and integrity in the context of public service:

1. 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 have a say in how their government operates.

2. 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.

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 favors 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.

3. 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 behavior 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 behavior in public service.

4. Promoting Ethical Governance and Integrity

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

Institutional Measures:

- **Clear Codes of Conduct:** Establishing and enforcing clear codes of conduct and ethical standards for public servants helps to set expectations for behavior.
- **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 behavior, with strong legal protections to shield whistleblowers from retaliation.

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.

Political Commitment:

- **Political Will:** Strong political leadership is crucial in setting a tone of integrity and ethical behavior. Political leaders must model ethical behavior 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. 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.

6. Case Studies and Examples

- **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.
- **India:** India has made significant strides in promoting ethical governance with initiatives like the Right to Information Act, anti-corruption laws, and increasing transparency in government procurement.

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.

●●●



FROM TRANSACTION-CENTRIC OPERATIONS TO EXPERIENCE-CENTRIC INTELLIGENCE - ARTIFICIAL INTELLIGENCE (AI) REDEFINING CUSTOMER EXPERIENCE IN SUPPLY CHAINS.

A NEW PARADIGM FOR INTELLIGENT, PREDICTIVE, AND PERSONALIZED VALUE CREATION

**Member Board of Studies & Adjunct Faculty Symbiosis Centre for
Distance Learning (SCDL), Ex NC & Life Member IIMM; Life Member
ISTD; QCFI Consultant, Corporate Trainer, Mentor & amp; Author
snpanigrahi1963@gmail.com**

Introduction : Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the twenty-first century, fundamentally changing how organizations design, manage, and optimize supply chains.

For decades, supply chains were evaluated primarily on five performance dimensions: cost efficiency, product quality, delivery reliability, operational speed, and order accuracy. The strategic focus was on optimizing procurement, inventory, transportation, warehousing, and distribution to achieve operational excellence and maximize efficiency.

However, the digital economy has shifted the focus from back-office, product-centric, cost-focused operations to front-facing, customer-centric value creation. Customers today expect faster deliveries, real-time visibility, personalized services, seamless communication, and proactive problem resolution.

AI is enabling organizations to meet these expectations by transforming every customer touchpoint into an intelligent, data-driven experience. The integration of machine learning, predictive analytics, natural language processing, computer vision, and generative AI is creating highly responsive, adaptive, and customer-focused supply chains. Companies no longer compete solely on products or prices; they increasingly compete on customer experience (CX).

This article examines how AI technologies predictive analytics, agentic automation, and generative interfaces are transforming customer experience (CX) across sourcing, contracting, logistics, and after-sales service, and what this transformation means for professionals, managers, and policymakers.

Understanding AI-Driven Customer Experience in Supply Chains

“When Supply Chains Think Intelligently, Customers Stay Ahead with Confidence and Trust.”

Customer experience (CX) in supply chains is the overall perception customers develop throughout their

complete journey from product search and ordering to delivery, returns, after-sales service, and ongoing engagement. It is shaped by speed, accuracy, transparency, reliability, and responsiveness at every touchpoint. An exceptional supply chain experience builds customer satisfaction, confidence, trust, and long-term loyalty.



AI transforms traditional supply chains into intelligent, predictive, and customer-centric ecosystems. It anticipates customer needs, predicts disruptions, personalizes services, and provides real-time visibility, shifting the focus from operational efficiency to superior customer experience.

Key AI Drivers

- ✓ **Predictive Demand & Inventory:** Reduces stockouts through accurate demand forecasting.
- ✓ **Intelligent Logistics:** Optimizes routes for faster, reliable deliveries.
- ✓ **Proactive Customer Communication:** Provides 24/7 updates through AI chatbots.

- v **Digital Twins:** Simulate disruptions to ensure business continuity.
- v **Automated Exception Handling:** Resolves routine issues quickly for seamless service.

Business Impact

- v Reduced stockouts and improved product availability.
- v Faster, more reliable, and transparent deliveries.
- v Higher On-Time In-Full (OTIF) performance.
- v Enhanced customer satisfaction, trust, and loyalty.
- v Greater operational efficiency, responsiveness, and competitive advantage.

AI is no longer simply optimizing supply chains; it is creating intelligent, resilient, and customer-first supply networks that deliver speed, transparency, personalization, and trust, turning every customer interaction into a lasting competitive advantage.

AI-Powered Demand Forecasting and Product Availability

“Don’t wait for demand. Anticipate desire.” “Predict Tomorrow, Deliver Today.”

One of the greatest customer frustrations arises when the right product is unavailable at the moment it is needed, leading to lost sales, customer disappointment, erosion of trust, and weakened brand loyalty.

AI significantly improves demand forecasting by analyzing historical sales, weather conditions, economic trends, social media sentiment, festivals, promotions, and regional buying behavior. Machine learning continuously refines forecasting accuracy by learning from new data.

Predictive intelligence converts the supply chain from a reactive pipeline into a proactive promise-keeping system. Accurate forecasting minimizes stock-outs and excess inventory.

Customers benefit from better product availability and fewer order cancellations.

Enterprise adoption is accelerating sharply, with Gartner projecting that three-quarters of large enterprises will have adopted AI in supply chain operations, while IBM research found AI-driven forecasting improved accuracy by 85% over traditional models. Capgemini’s research further shows that such applications can cut forecasting errors by up to half and reduce lost sales by nearly two-thirds.

Retail leaders like Amazon and Walmart continuously employ AI forecasting models to improve inventory planning and customer fulfillment.

The result is improved service levels and enhanced customer trust.

The Intelligent Supply Network: Delivering Personalized Customer Experiences at Scale.

Every Customer is Unique. Every order is anticipated, every shipment is personalized, and every customer is treated as a segment of one.

Modern customers expect personalized experiences rather than standardized services. AI analyzes customer purchase history, browsing behavior, demographics, preferences, and purchasing patterns.

Based on these insights, AI recommends personalized products, delivery options, promotions, and communication methods. Recommendation engines significantly improve customer engagement and conversion rates. Retail and consumer-goods firms confirm this shift: a large share of AI budgets are directed at enhancing customer analysis, segmentation, and personalization, alongside faster and more accurate demand forecasting for logistics.

Amazon’s recommendation system reportedly contributes substantially to its sales by offering highly relevant product suggestions. Personalization strengthens emotional connections between customers and brands.

Real-Time Order Tracking and Supply Chain Transparency

“Visibility Creates Trust.”

Customers increasingly demand complete visibility throughout the delivery process. AI integrates GPS, IoT sensors, logistics platforms, and predictive analytics to provide accurate shipment tracking. Instead of generic tracking updates, AI predicts estimated delivery times dynamically.

Customers receive proactive notifications regarding delays or route changes. Predictive visibility reduces customer anxiety and improves confidence. Companies such as DHL and UPS increasingly leverage AI to improve shipment visibility and delivery accuracy. Transparency has become a competitive advantage.

Predictive Customer Service

“Problems Solved Before They Happen.”

AI transforms customer service from reactive problem-solving to proactive customer care. By analyzing historical data, demand patterns, weather conditions, and real-time supply chain signals, AI predicts potential disruptions such as delivery delays, inventory shortages, and logistics bottlenecks before they affect customers.

Organizations can proactively notify customers, recommend alternative fulfillment options, and resolve issues before complaints arise. This predictive approach enhances transparency, builds customer confidence, minimizes disruptions, and transforms customer satisfaction into long-term trust and loyalty.

Predictive service transforms customer satisfaction.

AI Chatbots and Virtual Customer Assistants

“Yesterday’s AI answered questions. Today’s AI resolves them.”

“24x7 Service Without Waiting.”

Artificial Intelligence has revolutionized customer support. AI-powered chatbots provide instant responses to customer queries around the clock. Natural Language Processing enables chatbots to understand conversational language. Customers receive immediate assistance regarding order status, returns, refunds, warranty information, and product availability.

Generative AI has significantly enhanced customer interactions by delivering context-aware, natural, and personalized responses that improve the quality of conversational experiences. However, the defining transformation in the current AI era is the emergence of **Agentic AI** intelligent systems that move beyond simply generating information to autonomously taking action.

While **Generative AI** creates new content such as text, images, code, and recommendations in response to user prompts, **Agentic AI** extends these capabilities by setting objectives, planning multi-step workflows, making decisions, interacting with enterprise systems, and executing tasks with minimal human intervention. Rather than merely assisting users, Agentic AI functions as an intelligent digital collaborator capable of independently completing complex business processes.

In supply chain customer service, this evolution enables organizations to automate routine customer requests, proactively resolve issues, and significantly reduce response and resolution times while enhancing service consistency and customer satisfaction. As repetitive operational tasks are delegated to AI agents, human service professionals are empowered to focus on complex exceptions, strategic decision-making, relationship management, and high-value customer interactions where empathy, judgment, and creativity remain indispensable.

AI-Optimized Logistics and Last-Mile Delivery

“Speed Wins Customer Loyalty.”

Delivery speed directly influences customer experience. The integration of artificial intelligence across the supply chain transforms passive data collection into proactive, automated logistics operations.

AI-powered logistics is transforming supply chain performance by using machine learning and real-time data to optimize transportation, warehousing, and delivery operations. By continuously analyzing traffic, weather, road conditions, vehicle availability, inventory levels, and delivery priorities, AI dynamically identifies the most efficient delivery routes, minimizes delays, and optimizes resource utilization.

Leading logistics companies such as **FedEx** and **UPS** leverage AI-driven route optimization to improve delivery speed, reliability, and operational efficiency. As a result, organizations reduce transportation costs while customers benefit from faster, more predictable, and highly reliable deliveries.

AI-Enabled Product Quality Assurance

“Quality Before Complaints.”

Poor product quality is one of the leading causes of customer dissatisfaction, product returns, and loss of brand trust. AI-enabled Quality Assurance (QA) transforms quality management from a reactive inspection process into a proactive, intelligent, and continuous system. By combining machine learning with computer vision, AI continuously monitors production processes, detects defects with exceptional precision, and identifies non-conforming products before they reach customers.

This significantly reduces human error, product recalls, returns, and warranty claims while accelerating time-to-market. As a result, customers receive consistently high-quality products, strengthening customer confidence, satisfaction, and long-term brand loyalty.

AI Transforming Reverse Logistics

“Returns Should Be Effortless.”

Returns represent one of the most critical touchpoints in the customer experience. AI is transforming reverse logistics by converting a traditionally costly and complex process into a fast, intelligent, and seamless customer journey. By automating return authorization, fraud detection, product inspection, refund processing, and return routing, AI accelerates approvals, reduces processing time, and optimizes product recovery and resale.

The result is a smoother return experience for customers, lower operational costs for organizations, faster inventory recovery, and stronger customer trust and loyalty.

Customer Sentiment Analysis Using AI

“Data Creates Better Decisions.”

Customers continuously express their experiences through reviews, emails, social media, surveys, and support interactions. AI-powered **Customer Sentiment Analysis**, using **Natural Language Processing (NLP)** and **Machine Learning (ML)**, automatically interprets and quantifies customer emotions from this unstructured data at scale.

By identifying satisfaction levels, frustration, urgency, emerging complaints, and evolving customer expectations in real time, AI enables organizations to detect service issues before they escalate. Customer feedback becomes a strategic input for supply chain decisions, driving continuous improvement in product quality, service performance, and overall customer experience.

AI Managing Supply Chain Disruptions

“Resilience Protects Customer Experience.”

Global disruptions including pandemics, geopolitical conflicts, port congestion, and natural disasters can significantly impact customer service and delivery performance. AI strengthens supply chain resilience by continuously monitoring external risk signals, predicting

potential disruptions, and providing real-time visibility across the supply network.

Using predictive analytics, AI recommends alternative suppliers, transportation routes, and contingency plans before disruptions escalate. This proactive approach minimizes stockouts, reduces service interruptions, maintains delivery reliability, and safeguards customer trust. In the AI era, supply chain resilience is no longer just an operational capability; it is a critical driver of exceptional customer experience.

Challenges in AI-Driven Customer Experience

“Ethics Builds Digital Trust.”

Despite its transformative potential, AI-driven customer experience presents important organizational and ethical challenges. Concerns over data privacy, algorithmic bias, cybersecurity threats, high implementation costs, and integration with legacy systems can hinder successful adoption. Equally important is maintaining the right balance between AI-driven automation and the human empathy required in complex customer interactions.

Building lasting digital trust requires responsible AI governance founded on **transparency, explainability, fairness, accountability, and customer consent**. Organizations that protect customer data, eliminate bias, and ensure ethical AI practices strengthen customer confidence, enhance brand credibility, and foster long-term loyalty. In the age of intelligent supply chains, **ethical AI is not just a compliance requirement; it is the foundation of trusted customer experience.**

Emerging Trends Shaping the Future

“Learning Never Stops.”

The future of supply chains is being shaped by rapid advances in AI and digital technologies. **Generative AI** is redefining customer interactions through intelligent conversational systems, while **digital twins** enable organizations to simulate and optimize supply chain decisions before implementation. **Autonomous warehouses, AI-powered robotics, blockchain-enabled transparency, Edge AI, and sustainability analytics** are driving faster fulfillment, greater accuracy, enhanced visibility, and environmentally responsible operations.

As supply chains become increasingly **autonomous, adaptive, predictive, and customer-intelligent**, continuous learning becomes essential. In the AI era, professional success depends not on what individuals already know, but on their ability to continuously learn, adapt, and collaborate with AI to create greater customer value and sustainable competitive advantage.

Recent Real-World Case Illustrations

Innovation Creates Competitive Advantage

Leading organizations are treating AI not as an experiment but as a core capability for building customer-centric, resilient supply chains.

- v **Amazon** uses AI/ML across demand forecasting,

warehouse robotics, personalized product recommendations, and last-mile delivery routing embedding AI into nearly every layer of its fulfillment network.

- v **Walmart** applies AI to demand and inventory forecasting, on-shelf availability, and personalized shopping and search experiences, aiming to reduce stockouts and overstock across its stores and e-commerce operations.
- v **DHL** highlighted AI as a central theme in its 2025 Logistics Trend Radar, pointing to generative AI for freight-route optimization and warehouse layout design, computer vision for inventory tracking, and advanced analytics for demand forecasting with five key AI applications identified for 2025: generative AI, AI ethics, audio AI, computer vision, and advanced analytics.
- v **UPS’s** AI-powered ORION system is one of the best-documented cases in the industry: since full deployment, it has cut roughly 100 million miles driven and 10 million gallons of fuel each year, delivering an estimated \$300,400 million in annual savings. A newer “dynamic ORION” layer, using real-time re-optimization, has trimmed a further two to four miles per driver on top of the original eight-mile-per-driver reduction.
- v **Maersk** uses machine learning and predictive analytics across its network combining IoT data with predictive models to forecast disruptions such as supplier delays or adverse weather, and to recommend or trigger corrective actions supporting real-time shipment visibility and more resilient global logistics planning.

These real-world examples demonstrate that AI has evolved from an experimental technology into a strategic business capability. By transforming data into predictive insights, intelligent automation, and personalized customer experiences, AI enables organizations to improve operational efficiency, strengthen customer loyalty, and build sustainable competitive advantage.

Key Performance Indicators (KPIs) for AI-Driven Supply Chain Customer Experience

“Measure What Matters.”

The success of AI-driven customer experience must be measured through meaningful business outcomes rather than the number of AI solutions deployed. Organizations should monitor KPIs that reflect **customer satisfaction, operational excellence, business impact, and service reliability** to evaluate the effectiveness of AI-driven customer experience in supply chains.

These include **Customer Satisfaction Score (CSAT), Net Promoter Score (NPS), Customer Retention Rate, Customer Lifetime Value (CLV), On-Time Delivery Rate, Delivery Predictability, Order Accuracy, Perfect Order Index, Fill Rate, Forecast Accuracy, Order Cycle Time, Average Response Time, First Contact Resolution, and Return Cycle Time.**

Together, these KPIs provide measurable evidence of AI's impact on customer satisfaction, service reliability, operational efficiency, and long-term business value. In the AI era, **what gets measured gets improved, and what gets improved creates lasting competitive advantage.**

The Limits of the Machine Where Trust Still Needs Humans

"Automation earns speed. Empathy earns loyalty."

AI adoption in supply chains is accelerating, but implementation remains challenging. Many organizations are embracing AI for decision support, predictive analytics, and operational optimization, yet governance frameworks, organizational readiness, and responsible AI practices are still evolving. Rather than replacing existing systems, AI is delivering the greatest value through targeted applications such as demand forecasting, route optimization, and delivery prediction.

At the same time, customers continue to value human empathy and expect seamless access to human support when complex situations arise. The future of customer experience therefore lies not in complete automation, but in the intelligent collaboration between AI and people. Organizations that combine AI-driven efficiency with human judgment, transparency, and empathy will build stronger customer trust and achieve sustainable competitive advantage.

Managerial Implications

"Strategy Turns AI into Customer Value."

Managers should treat customer experience and supply chain management as one integrated strategic function, not separate departments. AI should be viewed as a strategic investment in customer value, supported by high-quality data, responsible governance, strong cybersecurity, and cross-functional collaboration. Organizations must balance intelligent automation with human empathy, especially in complex customer interactions, while continuously measuring customer-centric outcomes. Ultimately, AI maturity is defined not by the number of tools deployed, but by a clear strategy, trusted governance, and sustained business value.

The Road Ahead for AI Research

"Today's Innovation Inspires Tomorrow's Research."

Future research should examine the long-term impact of **Generative and Agentic AI** on customer trust, loyalty, and lifetime value; AI adoption among small and medium-sized enterprises; AI-enabled sustainable customer experiences; ethical and explainable AI governance; digital twins for customer service optimization; Alhuman collaboration models; and cross-cultural differences in AI acceptance. Comparative and empirical studies on **AI-native versus AI-retrofitted supply chains**, along with standardized frameworks linking AI maturity to customer experience and business performance, will provide valuable insights for both researchers and practitioners.

Conclusion

Artificial Intelligence is transforming supply chains from operational networks into intelligent, customer-centric ecosystems- fundamentally redefining customer experience in modern supply chains by combining predictive intelligence, intelligent automation, personalization, and real-time decision-making.

AI enables organizations to anticipate customer needs, improve service quality, and build lasting trust. The organizations that successfully integrate AI with human expertise, ethical governance, and customer-centric strategies will gain sustainable competitive advantage. In the AI era, supply chains will be judged not only by what they deliver, but by how intelligently they anticipate, communicate, and care for customers.

References :

- Accenture. (2024). AI maturity and profitability in supply chain organizations. Accenture Research.
- ABI Research. (2025). Supply chain technologies: AI and robotics automation for resilience. ABI Research.
- World Economic Forum. (2024). Future of Global Supply Chains Report.
- McKinsey & Company. (2024). The State of AI: Global Survey on AI Adoption.
- Deloitte. (2024). Global Supply Chain Trends Report.
- IBM. (2023). AI-driven forecasting accuracy report. IBM Institute for Business Value.
- Chopra, S. (2023). Supply Chain Management: Strategy, Planning, and Operation (8th ed.). Pearson.
- Christopher, M. (2022). Logistics & Supply Chain Management (6th ed.). Pearson.
- Ivanov, D. (2024). The Digital Supply Chain. Springer.
- Klaus, P., & Maklan, S. (2013). Towards a better measure of customer experience. International Journal of Market Research, 55(2), 227246.
- Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harvard Business Review, 93(10), 96114.
- Sharma, A., Shishodia, A., Kamble, S., Gunasekaran, A., & Belhadi, A. (2022). Artificial intelligence adoption in supply chain management: A review and future research agenda. International Journal of Production Research, 60(20), 62756301.
- Wamba, S. F., Queiroz, M. M., & Trinchera, L. (2023). Artificial intelligence and supply chain resilience: Current research and future directions. International Journal of Production Economics, 255, 108709.

● ● ●



PROCUREMENT TRANSPARENCY & ESG ALIGNMENT A GOVERNANCE IMPERATIVE

AVINASH SRIVASTAVA – LIFE MEMBER OF IIMM
VADODARA BRANCH, a_srivastava_in@yahoo.com

ABSTRACT : Procurement has shifted from routine paperwork into a strategic tool that directly shapes governance, risk control and sustainability results. This article explores how open procurement processes build organizational credibility and how ESG principles can be put into action through daily purchasing operations. It highlights key governance risks, the essential role of corporate boards and the practical steps needed to bridge company policy with ground level execution.

INTRODUCTION : In today's fast-moving business world, purchasing is no longer just about cutting costs. It has grown into a core pillar of good governance and long-term sustainability. For Corporate Boards and Independent Directors, the key question has shifted from asking if we are buying at the lowest price to asking whether we are purchasing responsibly, openly and sustainably.

THE EXPANDING ROLE OF PROCUREMENT : In the past, teams evaluated purchasing purely on three factors:

- Cost savings
- Vendor selection
- On-time delivery

Today, purchasing works right at the intersection of operational ethics, compliance and sustainability.

"Opacity is risk: transparency is trust."

Every buying decision directly impacts three core areas:

- **Environment :** Sourcing methods and total product lifecycle footprint
- **Social :** Fair workplace standards, community impact and supplier diversity
- **Governance :** Open processes, clear accountability and audit readiness

"Transparency in procurement is the bedrock of governance."

WHY TRANSPARENCY IN PROCUREMENT MATTERS

Key Insight

Hidden purchasing processes are a primary source of governance risk. Open and straightforward purchasing brings clear benefits:

- Fair competition and an equal opportunity for suppliers
- Lower risk of favoritism and conflicts of interest
- Complete audit trails and clear decision tracking

Essential Enablers:

- Documented procedures
- Clear vendor evaluation rules
- Independent oversight

Openness is not just about checking a compliance box. It is the foundation of institutional trust.

PROCUREMENT AS A DRIVER OF ESG

Purchasing is the exact place where sustainability moves from board policies into real world execution.

"Procurement is where ESG becomes operational."

Environmental (E)

- Sustainable and low-carbon buying choices
- Purchasing decisions based on full lifecycle costs
- Reducing material waste and resource use

Social (S)

- Fair labor standards across supplier operations
- Diverse and inclusive vendor networks
- Positive local community outcomes

Governance (G)

- Clear, open bidding systems
- Strong anti-corruption controls
- Solid internal audit checks

KEY GOVERNANCE RISKS IN PROCUREMENT

Purchasing is a high-risk operational area in large enterprises. Key exposures include:

- Conflicts of interest
- Bid rigging and supplier cartels
- Relying too heavily on a small group of vendors
- Weak supplier due diligence
- Poor contract tracking and enforcement

Note : These issues are not just operational stumbles. They carry serious reputational and strategic risks for the enterprise.

ROLE OF THE BOARD & INDEPENDENT DIRECTORS

Boardrooms must lift purchasing oversight to the highest governance level.

Key Focus Areas:

1. **Policy Strength:** Setting clear purchasing frameworks aligned with sustainability goals.
2. **Process Integrity:** Using standardized systems to minimize personal discretion.
3. **Data-Driven Oversight:** Tracking key metrics through clear executive dashboards covering vendor concentration, ESG checks and policy exceptions.

-
4. **Audit & Vigilance Integration:** Aligning purchasing operations with internal audit and vigilance teams.
 5. **Ethical Culture:** Ensuring doing the right thing takes priority over speed.

BRIDGING POLICY AND PRACTICE

A major governance challenge is the gap between corporate intent and ground level execution. To bridge this gap effectively:

- Train and guide purchasing teams regularly
- Use modern digital platforms
- Maintain continuous process monitoring

Technology Enabler: Digital e-procurement platforms boost visibility, improve audit tracking and drive day-to-day efficiency.

A STRATEGIC PERSPECTIVE

Forward-thinking organizations treat purchasing as a real engine for:

- Supply chain resilience
- Measurable sustainability outcomes
- Long-term stakeholder trust

Connecting purchasing rules directly with ESG goals satisfies regulatory and investor expectations while protecting corporate reputation.

CONCLUSION : Purchasing must move from the background straight to the center of boardroom discussions. Open, ethical and ESG-aligned procurement is not optional. It is a strategic requirement for every well-governed business.



TRANSPORTATION

Logistics giants are racing to keep up with healthcare boom as GLP-1s highlight need for cold storage

LAYA NEELAKANDAN

KEY POINTS

- Shipping and logistics companies are tapping into the growing healthcare market as cold chain and temperature-controlled facilities become more crucial.
- Those companies are investing millions of dollars and strengthening dozens of facilities to meet the evolving needs of shipping pharmaceuticals.
- The explosive growth of medications like GLP-1 weight loss drugs has positioned healthcare as one of the fastest-growing segments for logistics companies.
- As demand rises for specialized medications like GLP-1s, logistics companies including UPS and FedEx are adapting their strategies to be able to better ship and store those pharmaceuticals.
- Most injectable GLP-1 medications, including Novo Nordisk's Ozempic and Wegovy and Eli Lilly's Mounjaro and Zepbound, require refrigerated storage for shipment.
- The Covid pandemic put healthcare logistics at center stage in 2020, as the shipping of temperature-controlled vaccines quickly became a crucial part of keeping the virus at bay. And as more money has been poured into new pharmaceutical innovations, the transportation of those products have come under the spotlight.
- Logistics companies are now investing millions of dollars and strengthening dozens of temperature-controlled facilities to tap into the market.
- In June, UPS announced a new \$48 million investment in temperature-controlled facilities as it sees a growing demand for critical treatments. According to Growth Market Reports, the demand for temperature-sensitive biologics is projected to grow at an 8.3% compound annual growth rate through 2033 and reach a market value of roughly \$39.1 billion.
- Obesity and diabetes drugs, meanwhile, have been booming in popularity. A July Gallup poll found that 11% of Americans take GLP-1 medications for weight loss purposes in 2026, up from just 3% in 2024.
- But if they're not stored and shipped at the correct temperature, they risk losing their efficacy.
- The Food and Drug Administration has warned that improper storage during shipping can affect the medicine's quality and recommends patients do not use GLP-1 drugs that arrive "warm or with insufficient refrigeration."
- Other biologics, like some vaccines, insulin and antibiotics, also require specialized shipment to maintain efficacy. For logistics companies, that means ensuring the proper storage and movement every step of the way.
- **Bulking up**
- Healthcare logistics have proven to be one of UPS' biggest opportunities. On an earnings call with analysts in April, CEO Carol Tomé said the company's global healthcare portfolio has gained market share every year since 2021, generating its first ever \$3 billion healthcare revenue quarter in the first quarter of this year.
- UPS President of Healthcare John Bolla told CNBC that the company is seeing more healthcare companies looking for partners to keep up with the volume.

- “One of the biggest opportunities we see is supporting the shift toward more specialized therapies and more care delivered outside of traditional healthcare settings,” Bolla said.
- He said UPS is experiencing “rapid growth” in biologics, cell and gene therapies, though the biggest challenge is that the margin for error is small — even a brief stray from the correct temperature can ruin the medicines, Bolla said.
- “But that’s also what’s creating such a significant opportunity in healthcare logistics,” he said. “As treatments become more specialized and supply chains become more complex, healthcare companies need partners that can provide not just temperature-controlled storage or transportation, but end-to-end visibility, control and reliability across the entire network.”
- FedEx is also tapping into the trend, launching a life sciences organization earlier this month specifically to support the movement of pharmaceuticals and other healthcare products.
- On an earnings call in June, FedEx’s Chief Customer Officer Brie Carere told analysts that healthcare transportation revenue in fiscal year 2026 reached nearly \$10 billion.
- “We’re building end-to-end solutions focused on global pharma customers, and what’s so important with global pharma is that you have to recognize that there’s a patient at the end of every delivery or someone that’s waiting to be treated,” said Nick Gennari, FedEx’s president of healthcare. “So we take this very, very seriously.”
- With GLP-1s specifically, Gennari said there’s an increasing complexity to delivering those medications, with forms ranging from injectables to oral pills and going direct-to-consumer. But with that complexity comes a growth opportunity for FedEx, which he said is “ideally positioned.”
- Gennari said FedEx has specialized technology, including its machine learning engine that allows customers to see product movement with predictive abilities, as well as its technology that identifies healthcare products and treats each differently depending on its unique needs.
- Gennari also said he’s “very comfortable” with the company’s base capabilities and its plans for expansion, including cold-chain logistics.
- “Much of the infrastructure that’s required to be successful in this space, we already have. We have the airline; we have an incredible schedule; we have the lift capabilities. The network is hardened and works very well,” he said.
- **Complex supply chains**
- C.H. Robinson told CNBC the logistics company had surpassed \$1 billion in revenue in healthcare logistics alone over the past year, largely due to the growth in GLP-1 drugs, as it has been investing in temperature-controlled facilities.
- “You need to really have that end-to-end connectivity, so you’ve got to have a really nice network and infrastructure built out in order to properly service the healthcare customers,” said Ronnie Davis, the company’s vice president of North American surface transportation.
- Davis said the supply chain for medications has also become more complicated. In addition to requiring refrigeration, many drugs have a short shelf life and need to be delivered in precise windows of time.
- “A lot of the innovation has been on getting the drugs to the market,” Davis said. “I think what you’re starting to see is that’s really putting stress on the capabilities of the cold chain supply chains in the marketplace. ... With the rise of GLP-1s and other specialized medicine, it’s really creating a competitive nature for the same refrigerated supply resources that are there and, quite candidly, that supply is not unlimited, it’s constrained.”
- Davis said C.H. Robinson is working to amp up its capabilities, especially to keep up with the higher volume. At the same time, he added, pharma companies are also trying to get creative to bring their products to market with a longer shelf life.
- That innovation is also intersecting with the growth of artificial intelligence capabilities, according to Hendrik Venter, CEO of DHL Supply Chain. The logistics company uses AI to monitor critical life science products, tracking temperatures and anticipating where an issue might happen.
- “You’re seeing the industry moving from conventional to biopharma,” Venter told CNBC. “You need to have a supply chain that is resilient and capable of shipping in all of these various temperature zones.”
- The company announced last year that it plans to invest 2 billion euros (\$2.25 billion) in health logistics by 2030, with half of that allocated to the Americas.
- A lot of pharmaceutical companies are also outsourcing their warehousing activities to DHL, Venter said. The company takes over those facilities, manages them and integrates them into the rest of their network.
- DHL launched a pharmaceutical air corridor around the world, with a dedicated aircraft and connected network that ensures the drugs are not being shipped through separate regulatory environments.
- “You cannot lose a shipment. You cannot replace it. It needs to be delivered on time, every time, in the right quality and temperatures,” Venter said. “So we continue to selectively look at how to strengthen that network.”

Source: cnbc.com

●●●

BOTTLENECK OF AVIATION: AEROSPACE SPARES IN SUPPLY CHAIN MANAGEMENT

PALLIKKARA VISWANATHAN LIFE MEMBER OF IIMM HOSUR BRANCH
vid_shy@yahoo.com

Abstract: Instability of raw materials, geopolitical instability, being blocked by interrupted systems, the criticality of limited manufacturing, sourcing complex items, forging, castings, and availability of limited titanium capacity, have become permissible constraints in supply chain.

Alternative supply requires airworthiness, testing, extended requirement, planning, coordination, control of materials, components, proper lead-time, timeliness, heavily regulated, introduction of alternative suppliers, requiring airworthiness certification, regulatory certification, allowing frictions in aviation, aerospace industry in supply chain.

Non-availability of spares, have been driving aerospace industry to hold additional maintenance, repair, overhaul, inventory spares, leading to higher holding cost, critical capital investment, stock piling, driving to surplus inventory in supply chain.

Aviation, aerospace industry is deeply dependent on mainly casting, forging, electronic instrumentation, machined components, proper tooling, unplanned repairs, engine overhauls, forecast of spare part demand, with complete comprehensive ability on the inspection of components, design, in order to build, act as a strategy, managing intellectual property, as the weakest link in supplier network in supply chain.

Introduction: Most effective way to mitigate supply chain risks in aviation, aerospace industry, is through improved confidence, is intentionally reducing, completely responding to the required materials, to procure, source from specific suppliers, globally, as to optimise operational efficiency, in aviation, aerospace industry, so as to create a vulnerability in the event of disruption, thus developing relationship with multiple suppliers, manufacturers, internationally so as to reduce the impact or delay in supply chain.

Low-mix, high volume production in aviation, aerospace industry does allow manufacturers to standardise components, materials, availability, on shop-floor operations, having limited scope, for machined products, with complexity on precision required at every stage, coupled with stringent quality control, with necessity of human intervention throughout in supply chain.

Manufacturing in aviation, aerospace industry have critical shortage in titanium (**heat-resistance, high strength electric property, strength-to-weight**), Gallium (key item for semiconductor, an integral part) tantalum (

refractory metal, molybdenum tungsten based composites) Cobalt (hard lustrous silver grey metal for manufacturing high strength super alloy permanent magnets), rare earth alloys does lack of domestic supply, as Micro-Small-and-Medium-Enterprises, lack global standardisation, certification, poor visibility, forces bigger aviation, aerospace organisations to import, with heavy reliance on bloated surplus holding cost (incurring excessive hidden, inflated expenses) in supply chain.



AVIATION/AEROSPACE SPARES: Purpose/Study: Real-time visibility between smaller suppliers, Original Equipment Manufacturers causes panic buying, procurement, in the sector relying on various small parts, so as to make Original Equipment Manufacturers, highly vulnerable to disruption to raw materials shortages, quality control, surplus inventory; cost incurred to aerospace industry globally becomes vulnerable (contributing to massive financial loss due to production) to supply chain.

Policy matters in aviation, aerospace, industry, manufacturing system in Micro-Small-and-Medium-Enterprises, have been considered to be underdeveloped, as they lack certification, regulations, policy matters, testing infrastructure, documentation, digitalisation, as the need for bigger aviation, aerospace manufactures to import spare parts becomes essential in supply chain. Original Equipment Manufacturer, in order to build a costly in-house production, if complete manufacturing is to be handed over to Micro-Small-and-Medium-Enterprise, as handhold shift (operational continuity, prevent equipment issues, minimise disruption) then with proper tooling, shared facility as a policy will not be a constraint in supply chain.

Demand uncertainty, unexpected equipment failure, does make it difficult to forecast for spare parts,

equipment, for demand accurately, also holding high inventory of aviation, aircraft spare becomes rather expensive, with limited suppliers, having specialised in aviation, aerospace spares, are often few, with longer lead-times spares, equipment manufacturing have longer lead-times in supply chain.



AVIATION/AEROSPACE SPARES: Most aviation, aerospace spares, equipment, components, are imported from international manufactures, within the global disruptions, fluctuations in exchange rates, increase in cost, as critical aviation spares takes longer period, delayed custom clearance, import documentation, inspections, having limited Maintenance, Repair, Overhaul expansion, many complex repair overhauls centre still requires components, equipment in supply chain.

Limited suppliers, vendors, manufactures of certified aviation, aerospace spares, equipment, approved certified suppliers, reduces procurement, sourcing flexibility, challenges to inventory management, to balance the high cost, on the stock of spares, equipment against the risk on the ground situations of aerospace in supply chain.

Delays in transportation, cargo, road transportation, last-mile delivery, is liable to affect the availability of critical component, equipment on the demand uncertainty, unscheduled maintenance, unexpected component failure, does make spare parts, equipment, spontaneously difficult, with shortage of skilled technical, maintenance, personnel, is liable to slow procurement, sourcing, inspection, inventory management in supply chain.

Supply chain in aviation, aerospace industry does have the pressure of component shortage, instrument calibration, raw-materials, production scheduling, quality control, regulations, policies, limited manufacturers of Original Equipment Manufacturer, engines, skilled labour, also among smaller suppliers, disruption, risk, increase in inventory cost, as every components must adhere to strict quality, inspection, achieving the best parameters, as this has shorten the lead-time in delivery in supply chain

Specialised high strength aluminium alloy, having maximise strength-to-weight-fatigue, resistance,

governed by extremely good quality control, standardisation requiring good traceability, with super alloys, specialised steel, titanium alloy required for critical components like landing gear, engines, blades, since indigenous materials are not being able to be sourced, procured, are imported internationally in supply chain.

Installation of certified spare instruments in aerospace industry, Maintenance, Repair, Overhaul, must avail certification, calibrated, automation test in an aerospace industry, as procurement, sourcing of different indigenous instruments, approved collaborated tools, have no provision in the aerospace industry, it becomes liable for aviation, aerospace industry, for spare instruments to be shipped from overseas, from global manufactures, also being then annually re-calibrated, thus creating compounding delay in supply chain.

Driven heavily by global shortages in aviation, aerospace supply chain, raw-material is a complex situation, casting, forgings, with a surge on demand for aerospace industry, engine demand, durability, have become an issue in supply chain, giving priority to scarcity of raw-materials, have been causing Maintenance, Repair, Overhaul, delays by pricing, cost, so as to stock surplus spare-parts, due to unpredictable delivery, having longer ground period for engine, then on sourcing emerging as an alternative hub for precision machining, structural work packages, as sourcing, procurement from suppliers are increasingly being integrated into globalisation, with Original Equipment Manufacturers, having taken the challenges on capacity utilisation in supply chain.

Recommendations: Requirement of high-strength aluminium alloy used extensively in air-frames, structural assembly, machining of high-grade titanium structural components, engine parts, due to its strength-to-weight corrosion ratio, resilience, where weight reduction is critical, in special alloys, super alloys, required for turbine blades, hot-section equipments, so as to withstand temperature, advanced composites provide strength, on reducing the strength of weight in aviation, aerospace industry, as majority of the material are not procured, sourced indigenously, as they are imported from selected supplier's globally, internationally are controlled by the vulnerability(over reliance on single source, which expose operation to external shock) on the material dependence in supply chain.

Shortage of material in aviation, aerospace industry is the semi-conductor,(assembly, testing, marking, packaging) unavailability of the chip, has caused delay, procurement, sourcing indigenously has delayed Maintenance, Repair, Overhaul, the Avionics Flight Control adopted system, as electronic components, require specific facility, extended lead-time, allocation, delivery, (outsourced, semiconductor, assembly, testing) plant which are a constraints in supply chain.

Efficient facts must be adopted in service in aviation, aerospace industry, increasing demand for spare parts, recurring for structural checks, strict traceability, requirement of components, documentation, essential

during Custom clearance, compliance, tracing for strict-air-worthiness, on the direction that frequently contained on the shipments of aviation, aerospace spares in supply chain.

Reliance on heavily driven by imported spares, for aerospace industry, repairs of Original Equipment Manufacturers, have the lapses for proper tooling (**such as lost jigs, untracked assembly assets, outdated digital tracking**) having to indulge in shortages, with aerospace, aviation industry facing delays, obsolete, excess inventory, non-moving inventory, depending upon indigenous Maintenance, Repair, Overhaul spares, with expansion, rather than tracking imported spares, in aviation aerospace industry in supply chain.

Heavy investment on proprietary capital tooling often undergoes licensing barrier, intellectual property restriction, in aviation, aerospace industry, that is likely to limit on the ability for a secure, essential maintenance, providing proper tooling, and structural repairs in supply chain.

Unpredictable supply of imported spares, in aerospace, aviation industry, procurement, sourcing from international, global organisation of repute, having collaboration, joint-venture, consistent supplier require in huge capital investment, additional stock of spares, incurring holding cost so as to mitigate downtime in supply chain.

Conclusions: Availability of raw materials, in global economy, resource gaps in titanium, rare earths metals, is likely to delay Original Equipment Manufacturers engine parts, in order to shift the design strategy in aviation, aerospace industry to procure, source, local components, advanced composites, Maintenance Repair Overhaul spares as part of the assembly in supply chain

Sourcing, procurement of raw materials, heavily depending upon global supplier in aviation, aerospace industry, essential materials like aerospace alloys, nickel, gallium, titanium, semi-conductors, array of instrumentation, creating supply chain vulnerable to geo-political (global politics, trade regulation, impact movement of goods) disruption, that is likely to shift to advanced coatings design, (to enhance product performance, reduce environmental footprints, streamline manufacturing) better modified spares relying upon advanced composites, (carbon filtered reinforced polymers metal matrix materials) that demand specific manufacturing process transiting production reliance away from the traditional adopted demand casting (on demand make-to-order in supply strategy) method as a system in supply chain.

Recommendations: Predictive maintenance insights data problems, (manual tracking, prevents action, delaying) utilising improved material demand forecasting, predictive maintenance, encouraging vendors, manufactures, in aviation, aerospace industry, to adopt principles of market, as a resilience, (adapt) to Original

Equipment Manufacturers, so as to facilitate be access, to third party repairs, sourcing on capitalising **on used unserviceable material**, also on **cannibalising spare parts**, as an immediate alternative for new Original Equipment Manufacturers in supply chain.

Volatile delivery, complex customisation, classification of submission procedure in aviation, aerospace spares, components, equipment, engines, spares, dependence upon international vendors, suppliers, globally sourcing material, fulfilling an order, has extended a turnaround times in the working capital, as more significantly shifted to more focus on Maintenance, Repair, Overhaul spares, in aviation, aerospace when required spares, for repair are available, the ability to deliver becomes an operational factor in supply chain.

Local spare parts requirement in aviation, aerospace industry in supply chain, designed becomes resilient, (rapidly recovers from disruption) for operational with stock piling, as high value repairable items, (like engine, landing gear,) becomes a source of strategy in Maintenance, Repair, Overhaul, to increase the bottleneck (initial stages of production where raw materials, spare parts, are sourced, stored , consumed, requires forecasting) to shift from repaired capacity to spare part availability in the flow of material in supply chain.

Limitations: Possession of low-end machining capacity in aviation, aerospace industry, various constraints in advanced forging, casting, heat treatment, the aviation, aerospace industry does not have the capability to produce high-stressed components, turbine blades, air-frame structural's, as the industry does not have the facility for domestic fabrication facilities, infrastructure to build specialised, high reliability electronic component locally in supply chain.

Dependence upon on 80% import substitution, aviation, aerospace spares, engineering services, raw-materials, components equipment, sourced globally, internationally, remains highly vulnerable to issues in logistics, as regulations, latency obtaining certification, qualifying alternative spare part, component, qualifying new-suppliers require multi-process which scales down the local supplier's (deliberately reducing reliance on local vendor) in supply chain.

Demand forecasting, vendor management inventory is liable to reduce stock outs in aviation, aerospace industry, with visibility in artificial intelligence, machine learning, as Maintenance, Repair, Overhaul engine spares, turbine disks, shafts, air-turbine starters, have long been with extreme shortage, with long periods of induction time, as there is delay in critical machined spares in supply chain. Specialised casting, forging, as existed foundries have exited the capital investment in aviation, aerospace needed to meet the surging demand in supply chain.

●●●



FROM IQ TO AIQ – THE NEXT FRONTIER OF INTELLIGENCE

DEBASIS MALLICK, NATIONAL COUNCILLOR, KOLKATA

debasis_mallick@yahoo.com

Intelligence Quotient, or IQ, is a century-old concept used by educational institutions, businesses, psychologists, and researchers to assess a person's cognitive abilities. These abilities include reasoning, memory, problem-solving, analytical thinking, and logical judgment. IQ has been widely applied in education, job selection, and aptitude testing for military and public utility services. The concept was first applied by Alfred Binet, who, along with Theodore Simon, developed the Binet-Simon scale to measure the intelligence of school children. William Stern later introduced the simple formula for calculating IQ.

IQ = Mental Age/Chronological Age x 100

The transition from IQ to EQ (Emotional Quotient) has taken nearly eight decades – in fact it was more of an evolving process, because it was observed that intelligence alone cannot lead to success of an individual. A person with a high intelligence quotient may not become a successful leader or an entrepreneur or for that matter a team builder. So, the cognitive ability of an individual must be supplemented with certain other traits that are sometimes in-born or can be acquired with training and upskilling. Some of these traits are as follows:

- Self-confidence
- Self-awareness
- Self-regulation
- Judgmental ability
- Human empathy
- Motivation

These are the core components of EQ. The personality tests comprise both IQ and EQ. Daniel Goleman has popularized the concept of EQ through his book on Emotional Intelligence published in 1995.

Are the soft skills and EQ traits one and the same?

Management Institutes put lot of emphasis on the development of soft skills nowadays. Soft skills of an individual and EQ are, no doubt, relatable but they are not the same. Here are the unique characteristics that differentiate EQ from soft skills.

Difference between EQ and Soft Skills

Aspect	Emotional Quotient	Soft Skills
Nature	Internal Awareness	External Actions
Visibility	Implicit	Explicit
Development	Intrinsic	Upskill or reskilling possible
Scope	Self-awareness, motivation, self-regulation, empathy	Communication, listening, negotiation, teamwork, team building
Focus	Emotions	Demonstration - physical

Case Study of Blockade of the Strait of Hormuz

Having established the relationship between EQ and soft skills, both of which are important to strategic management, we can now examine how IQ, EQ, and soft skills work together during complex managerial crises. Real-world disruption offers a more practical lens than theory alone, because it shows how leaders interpret risk, coordinate responses, and communicate under uncertainty. The Strait of Hormuz crisis is, therefore, a useful case study for understanding decision-making in a high-stakes energy and supply-chain environment. The Strait of Hormuz is one of the world's most critical energy chokepoints, carrying a large share of seaborne oil and liquefied natural gas trade. Any disruption in this narrow passage can quickly affect crude oil prices, freight rates, insurance costs, fertilizer supplies, and industrial inputs such as aluminum and plastics.

The crisis triggered the following disruptions leading to a severe supply chain crisis not limited to war zone only.

- **Navigational risks:** Over 1600 vessels suffered severe satellite positioning interference, jeopardising safety in passage for these vessels.
- **Safety in passage:** In the month of February more than 120 vessels used to pass daily through the strait before the Gulf war broke out – after the blockade by Iran the numbers reduced to merely 10.
- **Insurance sector:** Maritime underwriters immediately withdrew war-risk coverage which raised the cost of premiums by ten times. Without coverage, major carriers, such as Maersk, MSC, Hapag-Lloyd halted operations through Hormuz.
- **Oil volatility:** International Brent crude that was trading at \$72/barrel pre-war shot up to \$120/barrel. International Energy Agency reported massive shortage of crude oil exceeding 14 million barrels a day.
- **LNG shock:** Industrial clusters worldwide suffered a severe power shock.
- **Industrial raw materials:** The blockade also stalled delivery of plastics, aluminium, fertilizers. Naphtha prices surged 48%, 4 million tonnes of gas-based products like methanol and ammonia held up, as export of 7 million tonnes of cracker feedstocks stalled.
- **Fertiliser shortage:** As the Persian Gulf is the global production nucleus for nitrogen-based fertilisers,

such as, urea and ammonia and phosphorus-based fertilisers, the closure created huge fertiliser shortage for India and Brazil.

How Resilient is the Macro Supply Chain Management?

The Hormuz blockade exposed weaknesses in traditional inventory management approaches such as Just-in-Time (JIT) inventory and the pursuit of a high inventory turnover ratio for efficient working capital management. It triggered cascading supply-chain failures across several

countries, causing severe shortages of energy, fertilizer, food, and industrial raw materials. The worst-affected countries included Japan and South Korea among developed economies, and Malaysia, the Philippines, Pakistan, Sri Lanka, and Bangladesh among developing economies. East African countries such as Somalia, Kenya, Tanzania, and Mozambique also experienced acute food shortages. It is therefore useful to examine how the world's two most populous countries, India and China, managed the crisis at the macro level.

Strategic Macro Supply Chain Management – China Vs India

Strategy Dimension	China	India
Dependence on Import	7.80 million barrels of crude/Day (75% of total consumption)	4.93 million barrels of crude/Day (88% of total consumption)
Foreign Policy & Diplomacy	Massive economic leverage over Iran calling for safe navigation and deescalation, at the same time strategic partnership with Saudi Arabia.	Tactfully used diplomatic channels to secure naval escorts for safe passage of its vessels when blockade of Hormuz seemed impenetrable.
Activating Alternate Routes/Sources	Partially bypassed the maritime route through Hormuz by maximizing crude import from Russia and Kazakhstan through Siberia -Pacific pipeline.	India ramped up alternative maritime route by importing from Russia, West Africa, Brazil and USA.
Buffer Stock Management	Maintains a massive reserve of 90 days buffer, while the duration of Gulf war was for 100 days.	India's buffer was for 40 days, and by the time the crisis aggravated India could find out alternate routes and sources.
Futures and Options	Fast track the development of China Pakistan Economic Corridor (CPEC) to transport crude overland through Pakistan's Gwadar Port. Leverage Kirkuk-Ceyhan pipeline to Iraq through Turkey.	Developing Great Nicobar Transshipment Project to safeguard alternative maritime trade chokepoints. Future planning includes land based strategic gas reserve in Chandi Khol, Bina and Bikaner.

Managerial Lessons from the Hormuz Blockade

From the management perspective, the Hormuz crisis shows that supply-chain resilience depends not only on analytical intelligence - but leaders must also use data to assess risk, communicate calmly, coordinate across functions, and activate contingency plans before disruption intensifies.

The crisis highlights the combined importance of IQ, EQ, and soft skills. IQ enables managers to interpret complex information and evaluate options; EQ helps them preserve trust, morale, and composure; and soft skills support collaboration, negotiation, and disciplined execution during prolonged uncertainty.

At the macro level, countries with stronger preparedness, diversified sourcing, diplomatic agility, and buffer-stock strategies responded more effectively. Others faced severe economic pressure, including price rise, supply shortages, and cascading disruptions across energy, fertilizer, food, and manufacturing sectors.

The key managerial capabilities required in such a crisis include:

- Data-driven risk assessment and scenario planning
- Clear communication with stakeholders and operating teams
- Cross-functional coordination across procurement, logistics, finance, and operations
- Timely activation of alternative routes, suppliers, and inventory buffers
- Emotional steadiness, trust-building, and team motivation under pressure

A balanced combination of IQ, EQ, and soft skills therefore enables management to anticipate shocks, respond with discipline, and strengthen supply-chain resilience. The following matrix illustrates how different combinations of IQ and EQ influence managerial effectiveness during an energy crisis triggered by the Hormuz blockade.

MANAGERIAL EFFECTIVENESS IN TACKLING ENERGY CRISIS DUE TO HORMUZ BLOCKADE

	LOW IQ	NORMAL IQ	HIGH IQ
LOW EQ	- Failure to anticipate blockade - Poor understanding of a complex problem - Making impulsive decisions	- Understand the complexity of the problem - Failure to communicate and coordinate - Doesn't have the ability to work under crisis	- Analyses the situation well - Data driven approach - Poor communication and collaboration
NORMAL EQ	- Lacks assessment capability - Able to communicate with others - Good intensions but lacks analytical ability	- Balanced approach - Analytical ability - Makes sound and practical decisions - Maintains team morale	- Analyses the situation well and makes informed decisions - A team man - Deliver results with discipline
HIGH EQ	- Building trust & confidence - Initiates dialogue for a probable solution - Inability to solve a complex problem	- Makes practical decisions with long lasting effect - Instill confidence and teamwork - Adapts and learns quickly	- Making innovative solutions - Communicates clearly and consistently - Builds resilience

A high IQ combined with strong emotional intelligence is ideal for managing a global crisis such as the Hormuz blockade. Such situations are especially challenging because they require both diplomatic engagement and precise operational decisions. However, this may not always apply at the organizational level, where decision-making is usually shaped less by the dynamics of government policy and more by existing regulatory and policy frameworks. In such micro-level crises, a manager with average intelligence, emotional balance, and sound judgment can often resolve problems effectively.

Moving Towards AIQ : The world is entering an era defined by speed, accuracy, and scale. Artificial Intelligence strengthens managerial decision-making by processing large volumes of information quickly, automating end-to-end workflows, and offering predictive insights that would otherwise take considerable time and effort to develop.

In practical terms, AI can help managers:

- Analyze complex data sets with greater speed and consistency.
- Generate forecasts and scenarios to support better planning.
- Reduce repetitive manual effort in due diligence and reporting.
- Improve the quality and timeliness of strategic decisions.

Consider a finance manager preparing a major investment proposal. Traditionally, the manager may spend several days building financial models, conducting sensitivity analysis, comparing alternatives, and seeking independent verification of the results. With AI as a decision-support tool, much of this analysis can be accelerated. The manager can test multiple scenarios, identify risks, validate assumptions, and receive data-backed recommendations in a fraction of the time.

AI does not replace managerial judgment; rather, it enhances it. By combining human intelligence with artificial intelligence, managers can move from intuition-led decisions to evidence-based, faster, and more scalable decision-making. This emerging capability may be described as AIQ: the ability to understand, use, and integrate AI effectively in managerial thinking and action.

Defining AIQ

"AIQ is a quantitative measure of AI system's ability to learn, assimilate, reason, resolve, evaluate, perform and predict across a wide array of tasks."

The major difference between AIQ and IQ is whereas IQ is the measurement of human cognitive ability, AIQ seeks to evaluate machine intelligence.

This gives rise to the next question – how do we measure AIQ? Unlike the measurement of IQ level of a human where a set of questions and cognitive tests are carried

out, AI measurement is more complex due to its vastly different architectures. We must admit that we are still in the ideating stage, though researchers endeavour to evaluate AI capability with the help of the following dimensions.

- Learning ability
- Reasoning ability
- Adaptability
- Problem solving
- Knowledge transfer
- Creativity
- Communication
- Decision making

How AIQ transforms the Management Philosophy : AIQ becomes meaningful when it is applied to real managerial situations. The following examples illustrate how managers can use AI not as a substitute for human judgment, but as an intelligent support system that improves speed, accuracy, foresight, and execution.

- **Finance and investment decisions:** A finance manager evaluating a new project can use AI to compare multiple investment scenarios, forecast cash flows, identify sensitivity to interest rates, inflation rate or exchange rates, and highlight financial risks while undertaking an investment decision. This enables faster due diligence and more evidence-based recommendations with a reasonable degree of accuracy.
- **Supply-chain resilience:** In a disruption such as this closure of strait of Hormuz, geopolitical crisis, or sudden rise in freight cost, imposition of trade barriers, AI can analyse supplier exposure, inventory levels, alternate shipping routes, and demand patterns and cascading effects impacting a supply chain. A manager with strong AIQ can use these insights to activate alternate source of supply, adjust stock buffers, and reduce the impact of shortages.
- **Customer service and market intelligence:** AI can scan customer feedback, complaints, sales trends, and social media signals to detect dissatisfaction or changing preferences for substitutes. Managers can take this valuable input, and then redesign products by resorting to value engineering, recommending process improvement, reorienting service processes, or launching targeted communication channel before the issue escalates.
- **Human resource planning:** AI can help HR managers identify skill gaps, predict workforce demand, recommend training priorities, and support succession planning. AIQ enables leaders to interpret these recommendations responsibly while still considering employee aspirations, morale, and organizational culture.
- **Crisis management:** During a sudden business shock, AI can generate early warning signals, simulate alternative responses, and support real-time dashboards for decision-makers. Managers with AIQ can combine these outputs with EQ and soft skills

to communicate calmly, coordinate teams, and act decisively under pressure.

• **Value-added service at every organizational level:**

In traditional management structures, large volumes of information flow upward and downward, but middle managers often add limited value to it. Phil Fersht, CEO of HFS Research, sharply criticizes this relay function of middle management, noting that junior teams produce work, managers translate it for leadership, leadership makes decisions, and managers then translate those decisions back down. A similar pattern existed in operations management, where jobs were physically moved from one machining centre to another by progress personnel who added no direct value but remained part of the organizational structure. In an AI-enabled architecture, each manager can evaluate data directly and apply judgment to make faster, more informed decisions, thereby accelerating organizational decision-making.

These examples show that AIQ is not merely technical knowledge. It is the managerial capability to ask the right questions, interpret AI-generated insights, recognize limitations, and combine data intelligence with human wisdom. In this sense, AIQ becomes a natural extension of IQ, EQ, and soft skills in the age of intelligent systems.

From Supply Chain Management to Supply Chain Orchestration

Supply chain orchestration is an end-to-end management approach that uses AI to connect activities, partners, and decisions either sequentially or simultaneously. Like an orchestra in which many musicians perform in harmony, an orchestrated supply chain brings all stakeholders onto a shared platform with a common context. This reduces fragmented decision-making, prevents functional silos, and enables procurement, sourcing, logistics, and sales teams to work in alignment rather than assigning blame or communicating in isolation.

Returning to the Hormuz blockade case study, the broader lesson is that future energy management will rely less on micromanaging individual suppliers and more on orchestrating a national energy network. This applies not only to India but to other countries as well. Organizations and economies that combine strong IQ, EQ, and AIQ will be better positioned to maintain balanced supply levels and withstand major shock waves with greater resilience. AI enabled supply chain management (AIQ) is expected to address the energy crisis arising out of Hormuz not in isolation but take cognizance of the supply chain disruptions affecting shipping, refining, fertilizers, petrochemicals, aviation fuel, LPG, LNG, logistics and raw materials for manufacturing. The organizations and Government that combines high IQ (Analytical ability and reasoning), EQ (Diplomatic acumen and coordination) and AIQ (Predictiveness and fast decision making) will be able to take a proactive approach to respond fast with least possible economic disruption. Moving a step further from the IQ-EQ matrix exhibited earlier, I would now like to introduce an AIQ-EQ matrix to explain how with the

assistance of Artificial Intelligence in which AIQ augments EQ, the anticipation, optimization, trust, diplomacy are blended to achieve the most desirable result in the Hormuz blockade crisis.

AIQ-EQ Matrix for managing Hormuz Crisis

AIQ/EQ	LOW EQ	HIGH EQ
LOW AIQ	• Blockade not anticipated • Fragmented decisions • Poor planning and coordination • Response reactive not structural • Outcome - Shortage and price hike in energy and other raw materials	• Diplomatic success • Excellent coordination • Limited predictive capability • Delayed decisions because emerging risks not detected early • Outcome – Problem persisted largely due to the absence of foresight and technical incompetence to integrate AIQ with EQ.
HIGH AIQ	• Technically brilliant – timely prediction of a crisis • Weak diplomacy and lack of coordination • AI predicts tanker congestion, shortage and inventory depletion • Outcome – Partially successful in the latter period largely due to finding out alternate sources.	• AI predicts escalation of energy cost well in advance • End-to-end supply chain orchestration – intelligent use of AI • Strategic autonomy in sourcing • Diplomatic engagement to permit safe passage for vessels stuck up • Coordinated stock releases • Resilient supply chain • Outcome – Success in matching the supply with the domestic demand. Futuristic plan for alternate routes and sources.

Conclusion: Integrating AIQ and EQ for Resilient Supply Chains

The future of macro supply chain management will not depend on analytical intelligence or emotional competence in isolation. It will depend on the ability to integrate AIQ with EQ so that leaders can anticipate geopolitical disruptions, coordinate timely responses, and adapt before such disruptions escalate into wider economic crises.

This integrated approach enables decision-makers to:

- Predict emerging risks through AI-supported analysis and early warning signals.
- Coordinate diplomatic, operational, and logistical responses with clarity and speed.

- Maintain trust, confidence, and collaboration among stakeholders during uncertainty.
- Build resilient supply chains that can absorb shocks and recover with minimum disruption.

In this sense, AIQ strengthens the predictive and analytical dimension of management, while EQ ensures balanced judgment, communication, and human coordination. Together, they form the foundation of a more adaptive and resilient approach to managing future supply-chain crises.

● ● ●

18 CHALLENGES THE MANUFACTURING INDUSTRY FACES IN 2026

LISA SCHWARZ, SENIOR DIRECTOR OF
GLOBAL PRODUCT MARKETING

Modern manufacturers must overcome many challenges to remain competitive in an increasingly global market. Some of these challenges are new, such as understanding and implementing emerging automation and artificial intelligence technologies, while others are old news to manufacturers, like finding skilled workers and managing inventory. Either way, manufacturers of all sizes can benefit from a deeper appreciation of their biggest challenges and in many cases, deploying AI tools and intelligent AI agents can address both types of challenges. By implementing strategies to address the 18 challenges discussed in this article, manufacturers can improve efficiency, increase profitability, and build long-term success.

What Are Manufacturing Challenges?

Manufacturing challenges can be any obstacle that hinders operations and impedes growth for manufacturing businesses. These challenges, such as regulatory compliance, supply chain disruptions, and data security, directly affect many aspects of a manufacturing business, including production rates, productivity, and profitability. Manufacturers cannot overcome these challenges without first understanding the ins and outs of their business. To do so, modern manufacturers can use new technology, including sophisticated business software with automation and AI-powered capabilities, to increase their visibility, gain a more detailed and accurate view of operations, and identify vulnerabilities and opportunities for improvements. By understanding the unique issues facing the manufacturing sector and analyzing how challenges directly impact operations, business leaders can devise and implement innovative solutions for a more resilient operation.

Key Takeaways

- § Manufacturers face both internal challenges, such as inefficient management and staffing issues, and external pressures, including shifting market trends, evolving customer preferences, and supply chain disruptions.
- § By understanding and proactively addressing these

challenges, manufacturing professionals can implement new strategies to maintain their competitive advantage and increase profitability.

- § A range of advanced technologies including automation and AI-powered solutions can mitigate the impact of these challenges and create a more flexible and resilient organization that is better equipped to overcome future obstacles.

Manufacturing Industry Challenges Explained : The manufacturing industry faces a barrage of constantly changing challenges. According to the National Association of Manufacturers Q4 2025 Manufacturers Outlook Survey, only 69.9% of manufacturing executives surveyed said they're feeling positive about their company's outlook well below the historical average of 74%. Additionally, 73% of those surveyed highlighted trade uncertainties as their top business worry, and 72% said they need more skilled production workers. In short, both finances and operations remain significant concerns in the face of precarious global circumstances.

To better weather these conditions, manufacturers must take a close look at the challenges they face and strategically plan for the future. Many issues stem from external factors, such as the impact of political and regional upheaval on materials and sourcing, shifting market trends, and regulatory changes. But manufacturers also face internal challenges, including inefficiencies in inventory management, staffing shortages, and low worker safety standards. By proactively addressing these challenges while exploring advanced solutions featuring automation and AI, manufacturers can create a more effective operation and build long-term success. However, they must carefully plan and implement these new strategies deliberately. Rushing new technology or investments can strain resources and end up reducing efficiency, potentially resulting in additional challenges and frustrated staff.

Top 18 Manufacturing Industry Challenges : Below are 18 of the biggest internal and external challenges facing manufacturers. Manufacturing professionals can study these challenges to help inform their strategies and build a more resilient and profitable business.



While individual circumstances vary, this infographic outlines 18 widespread challenges manufacturers face as they strive to stay competitive in today's market.

1. **Lack of skilled workers:** Many manufacturers face a significant shortage of skilled workers, with nearly half (48%) of manufacturing executive respondents to Deloitte's 2025 Smart Manufacturing and Operations Survey citing moderate to significant challenges in filling production and operations management roles. Talent shortage can be caused by several economic forces, including an aging workforce and tight competition for tech-savvy workers. To address this challenge, many manufacturers track industry trends, such as wages and benefits packages, to ensure that they offer competitive employment options to retain workers. Manufacturers can also enhance their current workforce by investing in technology training programs to upskill employees for the era of AI-powered smart manufacturing. Additionally, many manufacturers partner with local community organizations and educational institutions to create creative recruiting strategies, such as internships and work programs, to bring in more skilled workers.
2. **Inflation:** During inflationary periods, prices rise across the economy, impacting just about every industry, including manufacturing. As costs rise, manufacturers seeking to maintain their margins face pressures to either raise their prices or reduce their costs. These costs include raw material procurement, freight and transportation and rising wages. Many manufacturers spend inflationary periods reassessing where to reduce costs, such as renegotiating supplier contracts or auditing their supply chains to find inefficient areas that can be improved without compromising quality and employee satisfaction. AI tools can analyze a cross section of incoming data from logistics vendors, quality inspections, real-time pricing, and other incoming data for insights that help optimize internal costs. Additionally, if competitors' prices are rising, manufacturers may be able to pass some of these higher costs on to customers without losing business.

3. **Inventory and project management:** Effective inventory management helps manufacturers find the balance between having enough stock on hand to meet customer demand and minimizing excess to reduce storage costs and clutter. To maintain that balance as customer demand evolves, project management involves detailed planning, coordination and execution of production processes to keep operations on schedule and on budget. However, many of these challenges are exacerbated by external pressures that are difficult to manage internally. These external pressures include demand fluctuations, supply chain disruptions and difficulties coordinating among the multiple parties involved in manufacturing projects. To more effectively track all these inventory variables, managers can leverage advanced inventory and project management systems, typically integrated within a larger enterprise resource planning (ERP) solution. These solutions use automation and centralized data to more accurately forecast demand; companies can also deploy an AI agent focused on inventory management to watch for shortages, notice trends, and make predictive insights. All of this gives managers real-time visibility into their operations, enabling them to make agile, data-driven decisions and quickly pivot operations when conditions change.
4. **Consumerism trends:** Keeping up with consumerism trends can be difficult, especially in the fast-paced ecommerce world, where products can go viral overnight. Many customers prioritize more than just price when shopping, considering factors such as ethical production processes, a personalized shopping experience and fast shipping options. However, without careful and deliberate planning, these offerings can lead to higher production costs and lower product quality. To satisfy modern customers without falling behind, manufacturers need to be more customer-adaptive, innovative and agile, often through a combination of market research, targeted product development, and data-driven digital advertising all with the ultimate goal of building reliable brand awareness that customers trust. Advanced AI tools can help with this by providing sentiment analysis of product reviews, customer feedback, and social media mentions.
5. **Worker safety:** The nature of manufacturing work often involves heavy machinery, hazardous materials, and strenuous physical labor, all of which pose safety risks to employees. Manufacturers must prioritize a safe working environment, not only as a moral obligation, but also to comply with regulations. Failure to comply with local worker protections and safety standards can lead to accidents, injuries and financial and legal liability. To ensure a safe work

environment, manufacturers must implement regular safety training and properly allocate protective equipment. After safety protocols are established, managers must continuously monitor and update them to ensure that working conditions are up to current standards. However, maintaining these high safety standards is not without costs, and manufacturers must be prepared to invest in new equipment, continuous training and the latest technologies to ensure worker safety, including automation for high-risk jobs. For example, AI agents can track incoming IoT data on tools and equipment to flag problems and predictive maintenance before injuries occur. When done correctly, prioritizing worker safety not only protects employees, but also contributes to increased productivity and morale, ultimately benefiting both staff and the business.

6. **Selling direct to consumers:** Online platforms have allowed manufacturers to bypass traditional retail channels and sell their products direct to consumers (D2C), causing a significant shift in manufacturing operations. By cutting out third parties, selling D2C can bring manufacturers increased profit margins and greater control over brand image, but it also presents unique challenges. Manufacturers that directly sell goods must operate their own ecommerce operation, including website management, digital marketing, returns, and customer service. This also requires logistics management, including inventory control, order fulfillment, and shipping. Many modern manufacturers rely on technology to overcome these challenges. For example, order fulfillment systems with scanners and automated data collection that tracks orders and monitors key performance indicators (KPIs), such as lead times and perfect order rates, help ensure that customers get what they ordered, when they expect it.
7. **Supply chain disruptions:** Many modern manufacturers rely on complex global supply chains, and disruptions present a significant hurdle for the industry. These disruptions stem from diverse causes, such as geopolitical conflicts and extreme weather events, and can slow shipments, reduce product quality, increase costs, and lead to resource scarcity. Manufacturers can prepare for these complications by strengthening existing supplier relationships to gain preferential treatment; diversifying their supplier base; and leveraging digital tools for better visibility, including KPI monitoring software and AI-powered monitoring of incoming data related to logistics. In fact, strengthening existing relationships and diversifying suppliers were the top two supply chain risk mitigation strategies listed in the Deloitte supply chain study, with 83% and 81% of executives

emphasizing them, respectively. By anticipating these disruptions through data analytics and strategic planning, manufacturers can better weather supply chain complications, mitigate negative impacts when disruptions occur, and stay ahead of the competition.

8. **Regulatory changes:** Navigating the ever-changing landscape of manufacturing regulations requires ongoing vigilance and updating. These regulatory changes impact many areas, including product safety, environmental impact, and labor practices, and can significantly affect business operations. For example, a shift in carbon emission regulations might require manufacturers to invest in more efficient equipment to reduce emissions. If the manufacturer has facilities in different locations, each one may have different rules that must be followed. Noncompliance can lead to financial and legal consequences, as well as damage a company's reputation. Therefore, manufacturers must stay current with regulatory updates through regular compliance audits, often by relying on external experts who closely follow changes in the industry and/or software to monitor compliance including AI tools for automating tasks such as tracking the latest regulatory shifts. By regularly updating their standards and protocols, manufacturers can stay ahead of upcoming regulatory changes to spread out the investment costs. These investments may come with additional benefits, such as potentially reducing costs and building a more efficient operation.
9. **Data security:** Modern manufacturers increasingly rely on technology and digitalization, leading to an increased emphasis on the secure collection and storage of vast amounts of sensitive data. Data breaches pose significant risks, including financial penalties and regulatory consequences. Additionally, manufacturers often suffer reputational damage after a data breach, which can hurt revenue when customers no longer feel that their personal and financial information is secure and take their business elsewhere. Businesses must regularly check and update their data security protocols, and many cloud-based business platforms will automatically update software and use AI to identify and react to the latest cybersecurity threats. However, data security measures include more than just encrypting information though that is a major challenge on its own. Robust cybersecurity also requires regular employee training to proactively prepare staff for external threats, such as malware, ransomware, and phishing attacks. Manufacturers should also have a recovery plan to minimize downtime and ensure business continuity if data breaches or shutdowns occur.

10. Scaling the business: Perhaps the toughest challenge facing growing manufacturing businesses is timing. Scale too early, and manufacturers can face financial strain and operational challenges from dead stock and overstrained resources. Scale too late, and they risk missing profit opportunities and falling behind competitors that are seizing a larger market share. Technology can help manufacturing professionals get the timing right as they scale, with ERP solutions offering tools to effectively manage growth and create scaling strategies based on real-time data, not hunches. For example, a company can deploy an AI agent to oversee complex cross-functional processes and apply best practices as business scales to include multiple product lines, production teams, or manufacturing facilities. By leveraging these tools, manufacturers can develop a comprehensive strategic plan to align operations with overall business goals, market trends, competition, and technological advancements. This helps manufacturers meet increasing demand, while minimizing the risks of bottlenecks and delays from pushing operations too quickly and exceeding production capacity.

11. Globalization: Globalization presents challenges for the manufacturing industry, but it also presents opportunities. On one hand, it increases competition, as manufacturers must compete with companies from around the globe. On the other hand, it can open new markets and allow for more diverse material sourcing from different parts of the world, potentially reducing costs and minimizing the risk of a single-source disruption leaving a manufacturer unable to produce goods. Overcoming these challenges and seizing these opportunities requires manufacturers to deftly navigate the complexities of international trade regulations, cultural differences, fluctuating exchange rates and more. To adapt to this global mindset, manufacturers can leverage technology, such as ERP systems, to manage these complex supply chain issues, automatically convert currency calculations, ensure compliance with international standards, and effectively compete and succeed in the global market.

12. Attracting qualified leads: Manufacturers relying on traditional marketing strategies to attract qualified leads may be left behind as savvy competitors rise to the top of the highly competitive digital market. Modern marketing strategies often focus on building trust through relevant and targeted advertising and are crucial for generating leads. However, the personalized nature of these ads, tailored to each potential customer's unique preferences and needs, can create management challenges for manufacturers. Some manufacturers benefit from

partnering with marketing agencies with industrial expertise to better understand their target customer bases and how best to reach them. Additionally, manufacturers can use software with built-in sales dashboards to effectively leverage data to track marketing KPIs, such as conversion rates and cost per customer acquisition, to inform strategies and replicate successes.

13. Sustainability: Sustainability has become a major aspect of manufacturing, not just for its role in reducing costs and improving efficiency, but also to meet the demands of increasingly environmentally conscious consumers. However, achieving a sustainable manufacturing operation typically requires significant investment. Through collaboration among departments and with environmentally conscious consultants, manufacturers can effectively evaluate the potential costs and impacts of sustainability strategies, such as conserving energy and using environmentally friendly materials. Manufacturers can deploy AI tools to analyze sustainability metrics, such as energy usage and waste levels created by production, for both monitoring and insights. This strategic approach can help ensure that manufacturing leaders are making sound investments to reduce their environmental footprint.

14. Lack of demand forecasting: Without reliable demand forecasting, manufacturers may experience losses due to overproduction or underproduction. Overproducing goods leaves manufacturers with shelves cluttered with dead stock, increasing carrying costs and slowing operations. Underproduction can lead to stockouts and frustrated customers. Both can result in reduced profits and customer dissatisfaction. To improve demand forecasting, manufacturers can leverage AI tools to analyze detailed and accurate sales data for better alignment of production schedules with market trends, customer behavior, and other factors that influence demand. In particular, AI agents can process data at speeds unmatched by humans, while analyzing without the inherent bias brought in by individuals for a more thorough examination of deeper demand patterns. By utilizing AI technology, managers can make more informed decisions to optimize production processes and better meet customer needs.

15. Increased revenue and sales: As a manufacturer's revenue and sales grow, so does the complexity of tracking and monitoring incoming orders. Managers must carefully monitor production to make sure that the higher order volume can be fulfilled and customer demand can be met on time and without sacrificing quality. Additionally, business leaders

must track financial performance and cash flow to ensure that as sales increase, accounts receivable keeps pace and effectively collects payments from customers. Similarly, higher production volumes typically lead to higher costs, and financial teams must make sure to pay bills on time or risk harming relationships with suppliers and accruing additional penalties and fees. By carefully monitoring performance during growth periods, manufacturers can make sure that increased revenue and sales lead to higher profits and business growth without putting unnecessary strain on operations.

16. Capacity constraints: As manufacturers increase sales, they must also keep an eye on production capabilities. By overexerting processes, manufacturers can create bottlenecks, leading to missed deadlines, dissatisfied customers, and lost business opportunities. Overcoming these limits on production, known as capacity constraints, requires a multifaceted approach that includes regularly evaluating business performance through order fulfillment KPIs, such as lead times and turnover rates. Businesses struggling against capacity constraints can identify bottlenecks by using a centralized ERP system to gain a holistic view of their supply chain. Manufacturers with a streamlined view of operations, including production, inventory, and sales, can better understand their capabilities and gain insights into what improvements are needed to support larger order volumes ultimately earning the business more revenue and higher profits. AI can be particularly useful in these situations by examining historical data to identify both macro and micro causes for bottlenecks that lead to constraints and capacity challenges.

17. Maintenance and overheads: For manufacturers, maintenance and overheads make up a large portion of costs and must be carefully managed to prevent wasted resources and frustrating slowdowns. Manufacturers require functioning and efficient equipment to meet production deadlines and customer demand. Regularly testing efficiency with performance-monitoring technology allows manufacturers to take a proactive approach to repairing, updating, and replacing equipment. By combining IoT sensors on tools and equipment with an AI agent tracking usage lifecycles and maintenance trends, teams can switch to proactive maintenance that ultimately reduces risk and problems. This often saves money in the long run with small, predictable repairs, rather than large overhauls when equipment unexpectedly breaks. Additionally, other overhead costs, particularly those associated with inventory and storage, can be reduced by adhering to data-driven demand forecasts to minimize overproduction and carrying

costs.

18. Automation: Automation is more than just robots on the assembly line, though many companies greatly benefit from automating some of their direct manufacturing processes. Automation can be implemented throughout a manufacturers organization, including data collection and quality control, through both AI-powered tools such as a cloud ERP solution or deployment of AI agents for specific monitoring and analysis purposes. Manufacturers must use automation strategically, however, as the initial investment can be sizable. This investment requires both financial resources and time and labor to train staff to properly use these tools for increased productivity and business benefits. But when implemented properly, AI-driven automation can reduce labor costs and minimize many manual, error-prone tasks, such as counting inventory and tracking orders as they move through the supply chain with automated barcode scanners. With careful planning, manufacturing leaders can use AI technology to speed up production lines, streamline inventory management, and create a more efficient company with lower costs and higher margins.

How Technology Can Help Solve Manufacturing Challenges

Technology is constantly changing how manufacturers operate. Manufacturers can benefit from recent technological advancements, from sophisticated ERP software systems that increase data visibility to agentic AI integrations that monitor, analyze, and execute cost-savings initiatives. These systems also use automation and AI to help decision-makers better model scenarios and develop actionable strategies to improve operations, increase profitability, and gain competitive advantages.

The interconnected nature of modern business systems allows manufacturers to implement other technology, such as the Industrial Internet of Things (IIoT) devices that collect and report real-time information. This up-to-date information gives managers and decision-makers detailed insights into potential bottlenecks, slowdowns, and complications throughout the manufacturing process. This technology is especially important as supply chains become more complex and global because large, disjointed supply chains are more likely to experience disruptions and slowdowns. By proactively identifying weaknesses and vulnerabilities, manufacturers can plan contingencies to better address future challenges.

Source: www.netsuite.com

●●●

HOW AUTOMATION BUILDS RESILIENT SUPPLY CHAINS

KAREN KROLL

Resilience is the new efficiency. As automation touches every supply chain process—from picking to final delivery—future-proof solutions demand clean data, a holistic vision, and the right software backbone to weather any disruption.

Automation is among the top 10 supply chain trends for 2026, according to the Association for Supply Chain Management. One reason is the ongoing quest for supply chain resilience.

“Automation is no longer just about driving efficiency. It’s about building a more resilient and scalable supply chain,” says Chris Musson, director, solution consulting with Dematic, which provides supply chain automation solutions. Given continued supply chain disruptions, flexible automation solutions that allow operations to adapt as needs change have become critical.

Newcastle mobile work stations enable workers to complete critical tasks directly on the warehouse floor

Speed is another key driver, says Kevin Ledversis, vice president of sales with Newcastle Systems, which offers mobile workstations. Orders, especially for ecommerce, increasingly need to be turned around quickly—at times, within hours. It’s difficult to meet these deadlines solely with employees, no matter how capable and dedicated. Labor challenges also are prompting automation initiatives. As consumer demand exploded during the pandemic, many companies found they couldn’t scale or retain the labor they needed, says Keith Moore, chief executive officer with AutoScheduler, which provides a warehouse orchestration platform. So, they turned to automation.

To meet these challenges, supply chain automation is changing shape. To start, it’s moving beyond addressing isolated challenges, Musson says. While many organizations begin automation initiatives by targeting specific pain points, such as throughput constraints, more are considering how solutions can work together to support resilience, flexibility, and efficiency. The need for flexibility also influences the solutions chosen, says Reuben Scriven, research manager with Interact Analysis. Given unpredictable demand and growth trends, companies are opting for configurable systems that they can adapt, scale, and modify.

As ecommerce has grown, so has the prevalence of smaller handling units, such as “eaches” and cases,

creating exponentially more complex logistical operations, Scriven says. Sophisticated hardware and software are needed to manage these processes. Solutions are “going up in the air, as opposed to just going wide,” or using both vertical and horizontal space within a warehouse, says Steven Simonson, senior managing director with Alpine Supply Chain Solutions. The more efficient use of space is key in smaller facilities, such as micro-fulfillment centers, and in urban locations.

Brownfield implementations, or retrofits of existing facilities, currently are outpacing new, or greenfield initiatives, says Dan Calahan, sales director with Swisslog, a logistics automation firm. As a result, automation solutions often need to work effectively within existing facilities. Automation solutions will continue to evolve and advance, as both technology and supply chain operations themselves change. Currently, automation impacts numerous processes within supply chain operations.

PUTAWAY AND PICKING

Autonomous mobile robots reduce the time workers spend walking, freeing them to concentrate on specific functions such as picking or putaway.

Solutions such as goods-to-person systems, and autonomous mobile robots (AMRs) or autonomous guided vehicles (AGVs) can bring significant value to putaway and picking processes, says Jeff Peterson, senior director of warehouse with Ryder. Because they slash the time workers spend walking, employees can concentrate on specific functions, such as picking or putting away.

TAKING ORDERS AND REROUTING SHIPMENTS

Agentic artificial intelligence (AI) refers to systems that are capable of independent decision-making and autonomous behavior. These solutions are well suited to automate both analytical and transactional tasks in logistics, says Sri Sripada, managing director of the supply chain and operations practice with West Monroe. In an order capture operation, for instance, AI agents can ingest orders from multiple channels, validate the data, check credit and inventory, and create or update orders in operational systems like a WMS, all without manual intervention.

Moreover, even employees who aren’t engineers or computer scientists often are able to use AI, says Daniel Sokolovsky, co-founder and CEO with Warp, which applies

AI to transportation. In several years, an employee should be able to say, 'I want my robot to do this,' and the AI solution will figure out how it should do that, he adds.

ORCHESTRATION LAYERS

Warehouse orchestration solutions can synthesize data from multiple sources, such as the WMS and inventory management solution, to create optimized plans for a facility. For instance, if a warehouse manager learns about an unscheduled rush order that's arriving in 20 minutes, they may drop other work and reprioritize staff to accommodate the order, Moore says.

But how many employees should move? Pulling more workers than necessary might cause service failures, detention charges, or overtime. A single decision can encompass dozens of smaller, interacting decisions, and all need to be considered to effectively run a site, Moore says. An orchestration layer can inform this decision.

INVENTORY VISIBILITY AND TRANSPORTATION WITHIN A WAREHOUSE

Include the warehouse staff in automation decisions because new technology only works when it genuinely improves employees' day-to-day efficiency.

Technology promises to play an increasing role in inventory visibility. "We're seeing big improvements," Scriven says. For example, autonomous mobile robots can travel through a warehouse and capture image and barcode data on inventory levels, reducing the need for cycle counting. AMRs and AGVs can handle transportation tasks within warehouses without requiring fixed paths, so they're often well-suited for operations that need to adapt to changing volumes, layouts, or workflows, Musson says. They also can be deployed incrementally and expanded over time, so companies can scale as their needs evolve.

PACKAGING

While packaging automation and solutions have always been in demand, their popularity likely will grow as parcel shipping becomes more expensive, and more scrutiny is placed on shipment size, Calahan says. When choosing a solution, multiple considerations come into play. One is the importance of true, three-dimensional right-sizing. Not all machines right-size in three dimensions, and those that do typically are more expensive and take up more space, so most facilities will have fewer of them. The packing process then needs to be designed to keep the machines fully used at all times.

Another factor is whether you're able to pick an entire order discretely, or if you need to sort it, Calahan says. With discrete picking, the automated packaging should be designed to feed empty containers directly to the workstation. This changes the facility design.

DIGITAL TWINS

Applications for digital twins, or virtual representations of a process or system, are expanding from simulations to guiding decision making, Sripada says. Previously a digital twin might simulate, say, the impact of labor shortages on a supply chain. When AI is embedded, the digital twin can both simulate different scenarios, and test alternative options, such as rerouting shipments or changing sourcing locations. It also can score the options, based on cost, service, or other criteria, and recommend an optimal course of action.

AUTOMATION IN ACTION

Lob.com, a direct mail automation platform for more than 12,000 brands, works with multiple print partners. An AI-powered decision engine dynamically evaluates capacity, cost, location, service level, and other information to determine the best partner for every mail piece, says Brent Hagan, chief supply chain officer. The engine then optimizes routing to balance speed, reliability, and margin.

Machine-learning models continuously learn from the outcomes, such as delivery performance and transit times, to steadily improve the partner selection process, he adds. This turns "the print network into a self-optimizing system rather than a static routing table," Hagen says. The company says its supply chain can now power millions of highly personalized mail pieces, at speeds and costs that rival digital channels.

LOGISTICS AND TRANSPORTATION

Outside the warehouse walls, technology is streamlining logistics operations. For example, Circle Logistics uses an automated system to screen potential new carrier partners. The system determines if the carrier meets criteria regarding equipment, insurance, and other qualities that are required to work with Circle, says Derek Holst, senior vice president. An employee generally gets involved once a carrier is qualified. The company is also testing several AI programs that track packages and manage exceptions. These can elevate exceptions that fall outside the norm, so an employee can intervene, says Gary Horton, vice president of sales and operations.

REALITY CHECK

Ryder's automation distribution center in the St. Louis area is a highly advanced facility featuring 1.3 miles of conveyors, 44 dock doors, and high-tech inventory management systems.

While automation can make numerous supply chain operations more effective, challenges remain. One is the newness of many solutions. Holst estimates that within three to five years, some vendors will have exited the market. "It's a challenge to make sure you take on the right tech partner," he adds. As warehouses introduce automation, many end up with a mix of automated and manual processes. The "seams" between the processes

can become challenging, Moore says.

For example, a manufacturing warehouse installed an automated storage and retrieval system (ASRS) for its finished products. However, getting from the production lines to the ASRS required traveling a long hallway. To avoid this, the company turned to AGVs. However, this required a forklift operator to drop pallets at one end, but in an area with limited capacity. The AGVs would then drive the pallets to the induction point.

Because of the limited capacity, however, the workers had to perfectly sync with the speed with which the AGVs were moving to load and unload the ASRS. Ultimately, the forklift operators spent more time waiting for the pallets than they did just driving down the corridor. A warehouse orchestration solution can help with this type of challenge. Some companies, such as retailers, must manage dramatic business peaks. For these businesses, labor is usually more flexible than automation in both capability and availability, Moore says.

Automation technology has yet to effectively improve every process. For example, solutions to automate unloading operations include depalletizing systems and conveyors. However, items often shift in transit or aren't in the order expected. "Automation likes things that are very consistent," Peterson says.

Typically, the more controlled the environment in which an automation solution will operate, the more targeted and cost-effective it can be. So while it may be possible to automate the process for unloading cargo that changes from one truckload to the next, the solution likely would be expensive. On the flip side, when loading trucks, trailers need to be as full as possible to keep costs in check. If all boxes are the same type and size, machines often can load the trailer and maintain density, Calahan says. When box sizes vary, however, a human's ability to "jenga" generally results in very dense floor-loaded trucks, he adds.

Even as technology automates more supply chain operations, human interaction remains critical, Holst says. For instance, an employee might talk with a potential carrier that doesn't quite meet the requirements needed to partner with Circle. The employee can then suggest changes the carrier can make to become qualified. A software solution isn't going to do that.

"You're losing a relationship-building aspect," he adds.

11 WAYS TO LEVERAGE AUTOMATION

The following guidelines can help supply chain organizations gain greater value from their automation solutions.

1. **Start with solid software and processes.** Installing automation solutions atop outdated software likely

will lead to bottlenecks, because the software isn't able to support the automation.

2. **Ensure data quality.** Artificial intelligence relies heavily on data and data quality. A lack of clean, unified data makes it difficult for AI to synthesize the information and make recommendations.
3. **Map the changes needed.** Just because a system is automated doesn't mean it will produce great efficiencies. The changes need to be mapped, tested, and adjusted as needed.
4. **Implement cybersecurity measures.** Security risks can increase when using solutions that incorporate AI or automation. Controlling who can access the data and ensuring proper governance, among other steps, can mitigate these risks.
5. **Consider support requirements.** These are sometimes underestimated, especially with complex systems. For example, if a system that controls several dozen AMRs suddenly crashes, it could shut down an entire location. The maintenance and support program should factor in this risk.
6. **Think through how solutions will work together.** Automation needs to work seamlessly with existing systems without causing downtime, particularly in brownfield environments. Along with the physical integration, consider how different technologies can be orchestrated to work together. Without coordination between equipment, workflows, and decision-making, automation can create new silos, instead of eliminating them.
7. **Consider older technologies.** Something as simple as barcoding can add value, especially when deployed within an operation that was using paper-based, manual processes.
8. **Ask how to access your data once it's in the system.** This isn't always easy to determine upfront. For instance, is it necessary to call the vendor and initiate an expensive project? Or, can you get to it through an API or other technology?
9. **Weigh the costs and benefits of flexibility.** It may cost more to design scalability and flexibility into a solution, but these may be needed to meet business requirements. For instance, if a supply chain works with both cylindrical and square items, a robotic arm that can only pick up one or the other probably will fail to provide the value needed to justify the investment.
10. **Recognize no silver bullets exist.** Few supply chain processes can be addressed with a single piece of automation. Instead, multiple technologies often need to work together.
11. **Get your staff's opinion.** It's not unusual to find

employees ignoring a new technology solution when it fails to truly boost efficiency. According to Derek Holst, senior vice president of Circle Logistics, “You’ll know the technology is right when your staff demands that you keep it.”

AUTOMATIONS OTHER HALF: RESKILLING THE SUPPLY CHAIN WORKFORCE

Automation is often framed as a replacement for human labor, but the reality is more nuanced: it is a powerful partner. As autonomous mobile robots (AMRs) handle the walking for putaway and picking, and agentic AI systems manage routine transactional tasks, the nature of human work fundamentally changes. The key to building a resilient supply chain isn’t just installing technology; it’s reskilling the people who operate it.

The workforce of tomorrow needs to evolve from manual operators to automation overseers and data analysts. New critical skills include:

Maintenance and robotics management. As sophisticated hardware is deployed, technicians with mechatronics and software knowledge are needed to maintain and troubleshoot complex systems.

Orchestration and data analysis. Warehouse orchestration platforms require skilled managers to interpret synthesized data, make high-stakes decisions,

and adjust the optimized plans. Furthermore, the reliance on AI for decision-making underscores the need for staff proficient in ensuring “clean, unified data” for accurate machine learning models.

Exception handling. Automation thrives on consistency. However, items often shift in transit or aren’t in the order expected. Human flexibility—the ability to “jenga” varied-size boxes or address unexpected cargo—becomes invaluable for managing these exceptions, preventing bottlenecks in mixed-process environments.

Relationship building. In roles such as logistics, human interaction remains critical. A software solution won’t “suggest changes the carrier can make to become qualified,” a necessary part of the relationship-building process, says Derek Holst of Circle Logistics.

Ultimately, the goal is to leverage the unique strengths of both. Technology handles the repetitive, data-intensive tasks, freeing employees to concentrate on problem-solving, strategic decisions, and the essential human relationships that hold the supply chain together.

You’ll know the transition is working when, as Holst suggests, “your staff demands that they keep” the new technology because it genuinely boosts their efficiency.

Source: www.inboundlogistics.com



UDYAM REGISTRATION PORTAL AND THE UDYAM ASSIST PLATFORM

Udyam Registration Portal and the Udyam Assist Platform, two landmark digital initiatives of the Ministry of Micro, Small and Medium Enterprises are formalizing enterprises, expanding access to Government support and strengthening the MSME ecosystem

Udyam Registration Portal provides official identity to MSMEs through a simple, paperless, self-declaration-based and free-of-cost online registration process; The Udyam Assist Platform complements this initiative by bringing informal micro enterprises into the formal economy

These initiatives are empowering Women, SC/ST entrepreneurs, rural enterprises, traditional artisans, first-generation entrepreneurs and youth-led start-ups by making Government support more accessible and inclusive

India’s entrepreneurial landscape is witnessing a

remarkable transformation. As the nation moves towards becoming a global manufacturing and innovation hub, entrepreneurship is emerging as one of the strongest drivers of economic growth, employment generation and inclusive development. Today, millions of individuals are moving beyond the conventional search for jobs and creating enterprises that generate livelihoods for themselves and others.

At the centre of this transformation is the **Udyam Registration Portal** and the **Udyam Assist Platform**, two landmark digital initiatives of the Ministry of Micro, Small and Medium Enterprises. These platforms are formalizing enterprises, expanding access to Government support and strengthening the MSME ecosystem.

Formalising MSME

Udyam Registration Portal provides official identity to Micro, Small and Medium Enterprises through a

simple, paperless, self-declaration-based and free-of-cost online registration process.

The Udyam Assist Platform complements this initiative by bringing informal micro enterprises into the formal economy. It enables enterprises that may not yet have GST registration or are not covered under the Income Tax system to receive formal recognition as micro enterprises through verified data submitted by authorised Udyam Assist Partners. Together, these platforms are creating a more inclusive ecosystem by ensuring that even the smallest enterprises can become part of India's formal economy.

Through the Udyam Assist Platform, authorised partners such as banks, NBFCs and other lending institutions help these enterprises obtain formal recognition as Udyam Assist Certificate holders, enabling them to access various Government initiatives meant for micro enterprises. The platform is playing a crucial role in expanding financial inclusion and strengthening grassroots entrepreneurship.

Udyam Registration Process

The Udyam Registration process has been designed to be quick, transparent and hassle-free.

Step 1: Visit the Udyam Registration Portal.

Step 2: Enter Aadhaar details of the proprietor, partner or authorised signatory.

Step 3: Validate PAN details.

Step 4: Fill in enterprise details such as business name, address, bank details and business activities.

Step 5: Submit the application through self-declaration.

Step 6: Upon successful verification, an e-Certificate with a unique Udyam Registration Number is generated instantly.

Benefits of Udyam Registration : Obtaining Udyam Registration opens the door to a wide range of Government support measures designed to help MSME grow.

Access to Government Schemes : Registered MSME become eligible to avail benefits under various schemes of the Ministry of MSME on finance, technology upgradation, quality certification, skill development, market access and entrepreneurship promotion.

Easier Access to Institutional Credit : Udyam

Registration helps enterprises establish their formal identity, making it easier to approach banks and financial institutions for business loans and credit support.

Protection against Delayed Payments : Registered MSME can seek protection relating to delayed payments from buyers, helping improve business cash flow. The MSME Online Dispute Resolution (ODR) Portal is a digital platform, which facilitate the speedy, transparent, and cost-effective resolution of delayed payment disputes involving Micro and Small Enterprises. The portal enables end-to-end online dispute resolution, from filing a claim to conciliation, arbitration, and final resolution.

Participation in Public Procurement : Udyam-registered enterprises can participate in Government procurement opportunities and benefit from procurement policies aimed at promoting MSME.

Access to Quality and Technology Support : MSME can avail assistance for quality certification, technology upgradation, lean manufacturing, digitalisation and productivity enhancement through various Ministry initiatives.

Market Promotion : Registered enterprises can participate in domestic and international exhibitions, trade fairs and buyer-seller meets organised under different MSME programmes to expand their market reach.

Driving Inclusive Growth : The combined impact of the Udyam Registration Portal and the Udyam Assist Platform extends beyond business registration. These initiatives are empowering Women, SC/ST entrepreneurs, rural enterprises, traditional artisans, first-generation entrepreneurs and youth-led start-ups by making Government support more accessible and inclusive.

By simplifying the registration process and expanding the formal MSME base, these digital platforms are helping transform entrepreneurial aspirations into successful enterprises, contributing significantly to the vision of Viksit Bharat@2047.

Today, more than 8.9 crore enterprises have been registered on the Udyam Registration Portal and Udyam Assist Platform, providing employment to over 38 crore people across the country.

Source: PIB

● ● ●

HOW GEM IS REVOLUTIONIZING PUBLIC PROCUREMENT IN INDIA THROUGH DIGITAL TRANSFORMATION

ELETS NEWS NETWORK

At the **Digi Governance Knowledge Exchange Summit** organised by **Elets Technomedia** and **IT Department, Government of Kerala**, **AV Muralidharan**, Chief Buyer Officer (States), **Government e Marketplace (GeM)** shared his insights.

In the rapidly evolving landscape of governance and digital innovation, the Government e-Marketplace (GeM) has emerged as a groundbreaking initiative in India's public procurement sector. Launched on August 9, 2016, GeM was envisioned as a unified, transparent, and efficient online marketplace for goods and services used by government entities. With procurement values surpassing 14 lakh crore to date, it stands tall as one of the most successful digital transformations undertaken in the past decade.

GeM was designed to overhaul the traditional public procurement systems, which were often plagued by inefficiencies, delays, lack of standardization, and limited transparency. By digitizing the entire procurement process, GeM has not only streamlined government buying but also democratized access, enabling entrepreneurs, startups, and micro and small enterprises (MSEs) to become suppliers to the government.

The Birth of a Digital Procurement Revolution
The launch of GeM was backed by the vision of creating a single national marketplace. Prior to GeM, public procurement faced several challenges including inconsistent tendering processes, lack of standard documentation, and the absence of a centralized platform. For example, different government organizations maintained separate websites, making it difficult for vendors to track and respond to tenders. GeM solved this fragmentation by offering an end-to-end digital solution for procurement, ensuring uniformity, transparency, and ease of use.

Transparency, Efficiency, Inclusivity: The Core Pillars of GeM
GeM operates on three foundational pillars: transparency, efficiency, and inclusivity. The platform makes every procurement detail publicly accessible. From product categories and listed prices to active tenders and finalized contracts, every step in the buying process is visible and verifiable. This level of transparency was previously unattainable in conventional procurement models.

Efficiency is another cornerstone. Features like reverse auctions, demand aggregation, and automated workflows have significantly reduced procurement timelines and costs. Multiple studies estimate that using GeM results in approximately 10% cost savings for government buyers.

Inclusivity plays a vital role in GeM's mission. The platform has onboarded over 20 lakh sellers, including 10 lakh MSEs. This ecosystem includes startups, self-help groups, women entrepreneurs, and vendors from rural and remote regions. By simplifying registration and providing digital tools, GeM empowers even the smallest suppliers to compete for government contracts.

GeM's Impact on the Economy and Governance
GeM is not just a procurement platform; it's a catalyst for economic inclusion and reform. The scale of its operations is staggering. In the last financial year alone, procurement worth 5.43 lakh crore was conducted. For the current year, the platform aims to reach 7 lakh crore.

Government expenditure accounts for nearly 20% of India's GDP, a significant portion of which goes into procurement. GeM has made it possible for common citizens and small businesses to become part of this vast expenditure framework. This democratization of government spending ensures better value for money and accountable governance.

Advanced Features and Buyer-Seller Interactions
One major innovation in GeM is its transparent tendering and bidding system. Buyers must disclose reasons for rejecting technical bids, giving sellers opportunities to respond and rectify issues. This fosters a more inclusive and fair procurement environment.

Buyers benefit from tools like reverse auctions and demand aggregation that make procurement more competitive and cost-effective. To further enhance trust, GeM is commissioning studies, including a comprehensive vendor assessment and product quality evaluation by institutions like IIT Delhi. These measures are aimed at safeguarding quality standards and improving buyer satisfaction.

Promoting Government Policies and Legal Compliance
GeM actively supports government directives such as the Make in India initiative and reservations for MSEs and women-owned businesses. Vendors are required to declare local content percentages in their product listings, allowing buyers to prioritize domestic products. The platform also ensures land compliance through detailed vendor assessments, including checks on beneficial ownership.

Furthermore, the platform is integrating cooperative societies and local governance bodies such as rural panchayats, broadening its footprint and impact even further.

State-Level Adoption and the Road Ahead
Currently, central government departments use GeM

mandatorily, while states have the option to adopt it. States like Uttar Pradesh have shown remarkable progress by making GeM mandatory and standardizing procurement procedures. The success of the UP model is now being promoted to other states to push for uniform adoption.

GeM continues to look ahead with plans to include works contracts in its offerings, further expanding the horizons of government procurement. Strategic collaborations, such as with the Kerala government, indicate a growing commitment across states to embrace this digital marketplace.

Conclusion : GeM stands as a beacon of how digital technology can revolutionize public procurement. Its unwa-

vering commitment to transparency, efficiency, and inclusivity has resulted in a more accountable and accessible system. By unlocking opportunities for small businesses and ensuring better value for the taxpayer, GeM is not just modernizing procurement but transforming the very way governments interact with citizens and the economy. As the platform continues to scale and evolve, it holds the promise of setting global benchmarks in e-procurement. If you want to explore more about how GeM works and how you can be a part of this impactful ecosystem, visit the GeM portal and witness the future of public procurement in India.

Source: egov.eletsonline.com



INDIA AIMS FOR 300 MILLION TONNES GREEN STEEL PRODUCTION BY 2030, COUNTERING EU CARBON TAX

RADHIKA SSCANX NEWS TEAM

A I Summary : India has set an ambitious goal to produce 300 million tonnes of green steel by 2030, with 50 million tonnes targeted for export. This initiative is in response to the EU's upcoming Carbon Border Adjustment Mechanism. The government is implementing a five-star rating system for steel manufacturers and has launched five pilot projects for green hydrogen in the steel sector. Financial commitments include nearly 20,000 crores distributed under the Green Hydrogen Mission and incentives for electrolyser manufacturing. The government aims to reduce green hydrogen costs to under \$2 and has seen green ammonia auction costs drop to 49.75 per kg. This initiative is expected to reduce carbon emissions by 50 million tons and create 6 lakh jobs.

In a significant move towards sustainable steel production, India has set an ambitious target of 300 million tonnes of green steel production by 2030. This initiative comes as a strategic response to the European Union's impending Carbon Border Adjustment Mechanism, which will impose tariffs on steel imports based on their carbon content.

Government's Push for Green Steel : Minister of New and Renewable Energy, Pralhad Joshi, has urged steel manufacturers to accelerate green steel production with a five-star rating system. This push is aimed at avoiding potential export barriers arising from carbon taxes in international markets.

Key Targets and Initiatives

- **Production Target:** 300 million tonnes of green steel by 2030
- **Export Goal:** 50 million tonnes of green steel exports by 2030
- **Green Hydrogen Projects:** Five pilot projects underway in the steel sector
- **Green Hydrogen Hubs:** Development of seaports at

Kandla, Paradip, and Tuticorin

Financial Commitments and Incentives

The government has demonstrated its commitment to the green transition through substantial financial allocations:

- Nearly 20,000 crores distributed under the Green Hydrogen Mission
- Incentives awarded for 3,000 MW of electrolyser manufacturing

Cost Reduction Goals : The government aims to significantly reduce the costs associated with green hydrogen production:

- **Target:** Bring green hydrogen costs to under \$2
- **Green Ammonia:** Auction costs have dropped from over 100 per kg to 49.75 per kg

Environmental and Economic Impact : The green steel initiative is expected to have far-reaching effects:

- **Carbon Emission Reduction:** 50 million tons
- **Job Creation:** 6 lakh jobs through 125 GW capacity addition

Global Context : This move by India is particularly significant in light of the EU's Carbon Border Adjustment Mechanism. By focusing on green steel production, India is positioning its steel industry to remain competitive in the global market while also contributing to environmental sustainability. The shift towards green steel production represents a major step in India's commitment to reducing its carbon footprint while maintaining its position as a key player in the global steel industry. As these initiatives unfold, they are likely to reshape the landscape of steel production not just in India, but potentially on a global scale.

Source: scanx.trade



INDIA ACHIEVES MARITIME INDIA VISION 2030 TARGET FIVE YEARS AHEAD BY BECOMING THE WORLD'S LEADING SHIP RECYCLING NATION IN 2025

CURRENT HUNT TEAM

India has emerged as the world's leading ship recycling nation in 2025, achieving a major target of the Maritime India Vision (MIV) 2030 five years ahead of schedule. According to the latest report by the United Nations Conference on Trade and Development (UNCTAD), India has secured the top global position in ship recycling.

Key Findings of the Report

- India's share in global ship recycling increased from 30.1% in 2024 to 35.4% in 2025.
- Ship recycling volume in India recorded an impressive 60% increase, rising from 1.86 million Gross Tonnage (GT) in 2024 to 2.99 million GT in 2025.
- India surpassed all other countries to become the largest ship recycling nation in the world.
- According to the Baltic and International Maritime Council (BIMCO), more than 16,000 ships are expected to be recycled globally over the next decade.
- With its current market share, India is well-positioned to recycle approximately 500,600 ships annually in the coming years.

Key factors behind this achievement

- Policy Reforms:** India has implemented the Recycling of Ships Act, 2019, which aligns with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC).
- Modern Infrastructure:** The government has provided financial assistance of 53.5 crore for the modernization of ship recycling yards, enabling 115 facilities to become HKC-compliant.
- Incentive Schemes:** A Ship-breaking Credit Note Scheme has been launched, under which ship owners receive 40% of the recycled ship's scrap value as a credit note; this can be utilized for new ship construction at Indian shipyards.
- Expansion Plans:** The Alang ship recycling yard in Gujarat is being expanded, with the aim of reaching a total recycling capacity of approximately 9 million

Light Displacement Tonnage (LDT).

Government of India Initiatives

- Recycling of Ships Act, 2019:** Enacted to align India's ship recycling ecosystem with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC). India ratified the HKC in 2019. Its objective is to ensure environmentally sound and safe ship recycling practices.
- Modernization of Ship Recycling Yards:** Financial assistance of 53.5 crore was provided for yard modernization. This helped 115 ship recycling facilities become HKC-compliant.
- Credit Note Scheme for Ship-breaking:** Ship owners receive a credit note equivalent to 40% of the scrap value of the recycled ship. This credit note can be used to pay up to 5% of the cost of a new ship built in an Indian shipyard. This promotes both ship recycling and domestic shipbuilding.
- Inclusion in the list of EU-approved recycling facilities:** The government is making efforts to include Indian ship recycling yards in the list approved under the European Union Ship Recycling Regulation.
- Continuous engagement with European authorities** is underway to facilitate this approval.
- Expansion of Alang Ship Recycling Yard:** Planned expansion of the Alang ship recycling yard. The goal is to increase national recycling capacity to approximately 9 million Light Displacement Tonnage (LDT). The Gujarat government has prepared a comprehensive master plan to upgrade infrastructure and meet future demand.

Maritime India Vision (MIV) 2030: Launched by the Ministry of Ports, Shipping and Waterways in 2021 as a roadmap to transform India into a leading global maritime nation. It focuses on port modernization, shipping, shipbuilding, inland waterways, logistics efficiency, sustainability and job.

Source: currenthunt.com

● ● ●

INDIA FOR GLOBAL SOURCING: PROVEN MANUFACTURING & IT SUCCESS

ANISHI GUPTA, DIGITAL MARKETING SPECIALIST

Should we consider India for Global Sourcing both manufacturing AND IT/tech services?

For many Western companies, India has traditionally occupied two very different positions within **global sourcing strategies**. On one hand, it has been recognised as a global leader in **IT services, software development, and technology outsourcing**. On the other hand, it has often been viewed as an emerging or supplementary option for **manufacturing**, rather than a primary production hub.

That distinction is rapidly becoming outdated. As India for Global Sourcing, supply chain resilience, and digital transformation become increasingly interconnected, businesses are being forced to reassess how and where they operate. Manufacturing and technology are no longer separate operational pillars. They are now deeply integrated components of modern enterprise strategy. This shift has made a critical question unavoidable: **should India be considered not just for manufacturing or IT services individually, but for both together and at scale?**

The answer matters because today's competitive advantage lies not simply in cost efficiency, but in **execution speed, operational resilience, digital integration, and long-term scalability**.

Why This Question Matters in Today's India for Global SourcingSourcing Environment

The structure of **India for Global Sourcing** has fundamentally changed. Western companies are no longer optimising purely for labour arbitrage or lowest-cost manufacturing. Instead, sourcing decisions are increasingly shaped by **geopolitical risk, trade disruptions, supply chain fragility, and the need for end-to-end visibility**.

Recent years have exposed the vulnerabilities of overly concentrated sourcing models. In response, companies are actively pursuing **China+1 strategies, multi-country sourcing, and more diversified operational footprints**. At the same time, digital transformation has accelerated across industries, making **technology infrastructure, data integration, and IT capability** central to manufacturing success.

In this environment, the separation between **manufacturing hubs and technology hubs** is no longer efficient. Businesses now need locations that can support **physical production and digital execution** simultaneously. This is where India's evolving position in **India for Global Sourcing** becomes strategically significant.

India for Global Sourcing Established Strength in IT and Tech Services

India's role as a global powerhouse for **IT and technology services** is well-documented and widely accepted. Over the past three decades, India has built deep and scalable

capabilities across **software engineering, cloud computing, enterprise IT services, cybersecurity, data analytics, and artificial intelligence**.

For Western enterprises, India has become a preferred destination for **global capability centres, product engineering teams, and 24/7 delivery models**. The country offers access to a large pool of highly skilled technical talent, mature delivery frameworks, and the ability to scale digital operations rapidly. This maturity has made India a cornerstone of **global IT sourcing and technology outsourcing** strategies.

What is often underestimated, however, is how this digital depth directly supports manufacturing operations. Modern manufacturing environments rely heavily on **enterprise systems, automation software, manufacturing execution systems, and data-driven decision-making**. India's ability to design, implement, and manage these systems at scale creates a natural bridge between technology and production.

India's Rapidly Maturing Manufacturing Ecosystem

In parallel with its IT growth, **India's manufacturing ecosystem** has undergone a significant transformation. Historically, India's factories were largely focused on serving domestic demand, with limited export orientation and inconsistent integration into global supply chains. That reality has changed.

Driven by policy reform, infrastructure investment, and increasing participation in **global sourcing networks**, India now supports **export-ready manufacturing** across a wide range of industries. Improvements in **quality standards, regulatory compliance, and logistics capability** have enabled Indian manufacturers to meet the expectations of Western markets more consistently.

India today supports high-volume production in sectors such as **electronics manufacturing, automotive components, pharmaceuticals and healthcare, industrial and engineered goods, textiles and apparel, and renewable energy equipment**. Importantly, this growth is no longer limited to low-value manufacturing. Many Indian facilities now operate with process maturity, quality discipline, and operational sophistication comparable to other established manufacturing hubs.

Where Manufacturing and Technology Truly Converge

The most compelling reason to consider India for both manufacturing and IT services lies in the convergence of these two capabilities. Modern manufacturing is no longer defined solely by machinery and labour. It is increasingly shaped by **digital systems, real-time data, and automation**.

Factories today depend on **ERP platforms, supply chain software, predictive maintenance systems, AI-driven quality control, and data analytics dashboards**. India's unique advantage is that the teams building and maintaining these

digital systems can operate within the same ecosystem as manufacturing operations. This proximity reduces friction, improves coordination, and accelerates innovation.

For companies engaged in **global sourcing**, this integration allows for tighter control over production, better visibility across supply chains, and faster response to operational challenges. Rather than managing technology remotely and manufacturing locally or vice versa, India enables a more cohesive operating model.

Why Global Sourcing Leaders Are Reassessing India Holistically

Western sourcing leaders are increasingly viewing India not as a single-function destination, but as a **multi-capability sourcing hub**. This shift is being driven by the need for **resilience, speed, and operational integration**.

India's combination of **manufacturing scale, engineering depth, IT capability, and cost efficiency** makes it uniquely positioned within **global sourcing strategies**. Unlike some emerging manufacturing hubs that offer scale without digital maturity, or technology hubs that lack production capability, India increasingly delivers both.

This holistic value proposition is particularly attractive for companies pursuing **China+1 sourcing models**, where India acts not as a marginal add-on but as a primary secondary hub capable of supporting complex, long-term operations.

Use Cases Where India Delivers Strong Dual Capability

India's ability to support both manufacturing and technology is most evident in use cases where digital integration is critical. Many export-oriented factories in India are supported by locally developed enterprise systems that manage production planning, inventory, compliance, and logistics. Technology teams work closely with operations to optimise performance, reduce downtime, and improve quality consistency.

Product-based companies are also leveraging India's dual strengths by placing **R&D, software development, and manufacturing** within the same geography. This proximity shortens development cycles, improves collaboration between design and production teams, and accelerates time-to-market.

In addition, India plays a growing role in **supply chain technology**, supporting platforms for vendor management, compliance tracking, logistics optimisation, and export documentation. These capabilities are increasingly critical for Western companies managing complex, multi-country sourcing networks.

India for Global Sourcing : Challenges Companies Must Still Navigate

Despite its advantages, India is not a uniform or frictionless market. Capability varies by **region, sector, and supplier maturity**. Companies that approach India expecting a plug-and-play experience often encounter misalignment, delays, or quality issues.

The most common challenge is the disconnect between manufacturing operations and IT strategy. When these functions are treated separately, businesses fail to capture the full value of India's ecosystem. Successful engagement

requires clear governance structures, alignment between digital and operational teams, and strong local execution.

India rewards companies that invest time in understanding its operating environment and building long-term partnerships rather than pursuing purely transactional sourcing relationships.

Execution Discipline as the Real Differentiator

The defining factor in successful sourcing from India is not capability, but **execution discipline**. Companies that succeed are those that design clear operating models, integrate technology with manufacturing goals, and maintain consistent oversight.

Western organisations that invest in **preparation, governance, local expertise, and relationship continuity** are already operating integrated manufacturing and technology ecosystems in India with strong results. Those that do not often struggle, not because India lacks capability, but because execution frameworks are weak.

How India for Global Sourcing Compares to Other Global Sourcing Hubs

Few global locations offer the same combination of **manufacturing scale and IT depth**. Some regions provide low-cost production without digital sophistication, while others excel in technology services but lack industrial capacity. India increasingly stands out by delivering across both dimensions.

Within **global sourcing and China+1 strategies**, India is emerging as a central pillar rather than a peripheral option. Its ability to support both physical production and digital operations positions it as a long-term strategic base rather than a short-term alternative.

Final Perspective: India for Global Sourcing—Manufacturing and IT Together

So, should Western companies consider India for both manufacturing and IT or tech services?

The answer is **yes when approached strategically**.

India today is capable of supporting **large-scale manufacturing, advanced IT services, and digitally integrated operations** within a single ecosystem. The companies seeing the greatest success are not asking whether India can deliver. They are focused on how to structure their sourcing models, governance frameworks, and partnerships to capture their full potential.

India is no longer just a place to make products or write code. It is increasingly a place to build **integrated systems, scale global operations, and align technology with production**.

India for Global Sourcing Is No Longer the Question — How Companies Engage Is

FAQs: India for Global Sourcing, Manufacturing & IT

Is India for Global Sourcing a good destination in 2025 and beyond?

Yes. **India for Global Sourcing is increasingly central to global sourcing strategies** due to its **manufacturing scale, engineering talent, and IT/tech capabilities**. Companies are using India to build **resilient, diversified supply chains** that

support both physical production and digital operations.

Can India for Global Sourcing support both manufacturing and IT services at scale?

India is one of the few countries that can support **large-scale manufacturing and advanced IT services simultaneously**. This allows companies to integrate **production, technology, data, and supply-chain systems** within a single ecosystem, improving speed and operational control.

How does India for Global Sourcing compare to China in global sourcing strategies?

India is not replacing China but **complementing it within China+1 sourcing models**. It offers **long-term capacity growth**, strong **engineering depth**, and expanding **export readiness**, making it a preferred secondary hub rather than a marginal alternative.

Which industries benefit most from India for Global Sourcing in manufacturing and IT?

Industries such as **electronics, automotive components, pharmaceuticals, industrial goods, textiles, renewable energy, and technology-enabled manufacturing** benefit most from India's combined strengths in **production scale and digital capability**.

What is the biggest risk when India for Global Sourcing manufacturing and IT from India?

The main risk is not capability but **execution**. Companies that succeed invest in **clear governance, local expertise, and long-term partnerships**. Those expecting a plug-and-play model often underperform. **ET2C** is best suited for **global buyers, international manufacturers, and sourcing teams** that want to enter or expand in India for Global Sourcing with strong quality control, local accountability, and long-term sourcing discipline.

Source: et2c.com

●●●

INDIA OUTPACES GLOBAL MANUFACTURING GROWTH AS SUPPLY CHAIN SHIFT BOOSTS ITS APPEAL: ASSOCHAM STUDY

AVISHEK BANERJEE

India's manufacturing growth averaged 4.15% in the post-pandemic period, nearly two percentage points above the global average, as companies diversify supply chains beyond China, according to ASSOCHAM.

India is emerging as one of the biggest beneficiaries of the post-pandemic realignment of global supply chains, with its manufacturing sector outperforming the global average as multinational companies increasingly diversify production beyond China, according to a study by industry body ASSOCHAM.

The study, Global Manufacturing Undergoing Strategic Realignment: India Emerges as a Key Beneficiary of Supply Chain Diversification, found that India's average manufacturing growth rose to 4.15% during 2022-25 from 3.44% in the pre-pandemic period (2016-19).

This helped the country move from nearly one percentage point below the global average to almost two percentage points above it, underscoring its growing competitiveness amid the global shift towards China+1, nearshoring and friendshoring strategies.

India joins emerging manufacturing leaders

The analysis, covering the world's 10 largest manufacturing economies that account for nearly 65% of global manufacturing output, showed India joining the United States, Germany, France, Italy and the United Kingdom in outperforming the global manufacturing average after the pandemic.

In contrast, Chinawhile retaining its position as the

world's largest manufacturing economy slipped from 2.4 percentage points above the global benchmark before the pandemic to 2.26 percentage points below it during 2022-25. Mexico remained the strongest performer, while Russia continued to post above-average manufacturing growth.

Policy reforms, infrastructure drive fuel momentum

ASSOCHAM attributed India's improving manufacturing performance to expanding domestic demand, infrastructure upgrades, better logistics, rising investor confidence under the China+1 strategy and policy initiatives such as the Production Linked Incentive (PLI) schemes, PM Gati Shakti and industrial corridor development.

The report also recommended accelerating logistics projects, strengthening domestic supplier ecosystems, promoting Industry 4.0 technologies and leveraging free trade agreements to deepen integration with global value chains.

"The global manufacturing landscape is undergoing a gradual but important shift. Companies are no longer looking at efficiency alone; they are equally focused on resilience and diversification. India's improving manufacturing performance reflects the impact of sustained reforms and growing investor confidence," said Nirmal K. Minda, President, ASSOCHAM.

Source: www.fortuneindia.com

●●●

INDIA STRENGTHENS SUPPLY CHAINS WITH SMARTER CUSTOMS AND LOGISTICS REFORMS

SHREYANSH MANGLA

India is sharpening its approach to trade and logistics by strengthening customs systems and improving supply chain resilience at a time when global shipping routes continue to face uncertainty.

India is sharpening its approach to trade and logistics by strengthening customs systems and improving supply chain resilience at a time when global shipping routes continue to face uncertainty. As geopolitical tensions create disruptions across key maritime corridors, the countrys latest policy focus aims to ensure that manufacturers, exporters and importers can continue operating with fewer delays and greater certainty.

Rather than relying solely on new roads, ports and railways, policymakers are increasingly focusing on making existing infrastructure work more efficiently. Faster customs clearance, better risk management, digital documentation and closer coordination between government agencies are emerging as key tools in reducing logistics costs and improving trade competitiveness. These reforms complement Indias wider infrastructure strategy, which has seen sustained investment in highways, freight corridors, ports, airports and multimodal transport networks.

The renewed emphasis comes as international supply chains continue to adapt to changing geopolitical realities. Disruptions around major global shipping routes have highlighted the importance of resilient trade systems. Indias customs authorities are working to minimise bottlenecks through technology-driven inspections, data sharing and streamlined compliance procedures. This allows trusted businesses to move cargo more efficiently while maintaining strong security standards.

For the infrastructure sector, these developments extend beyond ports and border checkpoints. Efficient customs operations reduce turnaround times for cargo, improve warehouse utilisation and strengthen connections between manufacturing hubs, logistics parks and export gateways. As businesses increasingly seek predictable delivery schedules, seamless

movement across the supply chain becomes a major competitive advantage.

Digital transformation is playing a central role in this effort. Automation, electronic documentation and intelligent risk assessment systems are helping reduce manual intervention and improve transparency. Businesses can expect quicker processing times, fewer compliance hurdles and better visibility throughout the import and export journey. These improvements are particularly valuable for industries that depend on just in time manufacturing and integrated global supply chains.

Indias broader infrastructure strategy also supports these initiatives through programmes aimed at integrating road, rail, ports, inland waterways and aviation. Combined with logistics policy reforms, these investments are designed to lower transportation costs, improve connectivity and strengthen the countrys position as a global manufacturing and export destination. Continued investment in digital infrastructure further enhances the efficiency of goods movement across the country.

Industry experts believe resilient supply chains will become one of the defining strengths of modern economies. Infrastructure is no longer measured only by physical assets but also by the efficiency of systems that connect them. Faster customs processes, smarter logistics planning and stronger coordination between public and private stakeholders can significantly improve the ease of doing business while supporting long term economic growth.

As India continues to modernise its logistics ecosystem, the combination of world class infrastructure and efficient trade facilitation could help businesses respond more effectively to global market changes. The result is a supply chain that is not only larger, but also smarter, more reliable and better prepared for future challenges.

Source: xinfra.onextelcommunication.com



INDIA'S LOGISTICS CITIES: POWERING THE NEXT WAVE OF TRADE AND GROWTH

SAKSHI.S.BASUTKAR

From metros to Tier-2 cities, India's logistics hubs are evolving with policy support, investment, and modern supply chain design.

India's logistics landscape is undergoing a quiet but structural transformation. What were once scattered warehouses on the edges of cities are now evolving into large, integrated logistics ecosystems that combine storage, processing, distribution and value-added services. These developments are increasingly being described as logistics cities, multi-functional hubs designed to support trade, manufacturing and consumption at scale.

According to OneUnion Solutions, India's logistics and warehousing sector has moved decisively away from fragmented, unorganised facilities towards large-format, planned parks driven by formal demand and institutional investment. This shift is being shaped by changes in how goods are produced, moved and consumed, and by the growing need for efficiency across supply chains.

At the centre of this transition is a clear rethink of what logistics infrastructure is meant to achieve. Instead of serving as passive storage points, modern logistics parks are being designed as long-term platforms that enable faster movement of goods, lower costs and better reliability that are the key requirements for a trade-driven economy like India.

Institutional capital and the rise of integrated ecosystems

Industry leaders argue that institutional capital has been a decisive force behind this evolution. Anshul Singhal, Managing Director of Welspun One, says the sector is seeing a "clear shift from land-led warehousing to integrated logistics ecosystems," driven by investors looking for scale, compliance and long-term asset quality.

"Today's logistics parks are being designed as long-term platforms, combining Grade-A warehousing, light manufacturing, and value-added services within compliant, well-governed environments that ensure asset quality and operational reliability at scale," Singhal notes.

This perspective aligns closely with broader industry observations. OneUnion Solutions, a logistics and supply chain advisory firm that tracks trends in India's warehousing and freight ecosystem highlights that the entry of domestic and global investors has raised standards across the sector, accelerating the adoption of Grade-A warehousing, professional park management and technology-led operations. These investments are

no longer focused only on land appreciation but on creating ecosystems that can support complex supply chains over decades.

The emphasis on governance and compliance has also made these logistics cities more attractive to large occupiers, particularly those with global operations and strict quality requirements.

Demand drivers: Manufacturing, retail and e-commerce

The demand side of this transformation is being driven by a mix of manufacturing, organised retail and e-commerce. According to Anshul Singhal, occupiers across these segments are consolidating operations into organised facilities that offer proximity to consumption centres and flexibility to support automation-led supply chains.

This trend is reflected in multiple industry analyses. OneUnion Solutions notes that manufacturing-led demand has increased steadily as companies look to optimise inventory and align production more closely with distribution. At the same time, organised retail and e-commerce players are prioritising large, centralised hubs that can serve multiple markets efficiently.

Astravise Services, a logistics analytics and advisory firm focused on freight movement and supply chain optimisation in India, points out that freight movement patterns in India are changing as companies adopt hub-and-spoke models to reduce transit times and logistics costs. In this model, logistics cities act as primary nodes that connect regional markets to national freight corridors.

For e-commerce players in particular, scale and speed have become non-negotiable. Large logistics parks allow them to integrate warehousing, sorting and distribution functions within a single location, improving turnaround times and reducing operational complexity.

Location strategy: Proximity and connectivity

One of the defining features of emerging logistics cities is their strategic location. Rather than being driven solely by low land costs, developers and occupiers are increasingly prioritising proximity to consumption centres and access to transport infrastructure.

Astravise Services highlights that India's major logistics hubs are clustered around key freight corridors, ports and urban centres, enabling smoother freight flows and better optimisation of road and rail networks. This

connectivity allows logistics cities to function as trade engines, linking production clusters with domestic and international markets. Singhal echoes this view, noting that well-planned logistics-led developments connect production clusters to ports, freight corridors and urban markets, helping reduce transit times and improve supply chain resilience.

Established regions such as Mumbai Metropolitan Region(MMR), Delhi-NCR, Chennai and Bengaluru continue to dominate logistics activity due to their market size and infrastructure depth. However, the way logistics is organised within these regions is changing, with a move towards larger, master-planned parks rather than dispersed facilities.

Metro corridors as logistics anchors

Metro regions remain the backbone of India's logistics network, but their role is evolving. According to Astravise Services, cities such as Delhi, Mumbai and Bengaluru act as convergence points for freight flows, handling goods destined for both domestic consumption and onward distribution .

These metros are increasingly supported by peripheral logistics cities located along highways, expressways and rail corridors. The aim is to balance proximity to urban demand with the space and infrastructure needed for large-scale operations.

OneUnion Solutions observes that rising land costs and congestion within city limits have pushed logistics development towards well-connected peripheral zones, where large-format parks can be developed with better planning and regulatory compliance . These peripheral logistics cities serve as extensions of urban economies, absorbing freight activity that cities can no longer accommodate efficiently.

The role of planning and governance

A recurring theme across industry analyses is the importance of planning and governance in enabling logistics cities to function effectively. Singhal points to proactive land aggregation, single-window clearances and alignment with national initiatives such as Gati Shakti as key accelerators.

Government policy has begun to reflect this thinking. A press note issued by the Press Information Bureau (PIB) outlines the government's efforts to improve logistics efficiency through coordinated planning, infrastructure integration and reduced compliance burden. These measures are intended to support the development of organised logistics hubs that can lower overall logistics costs. The combination of policy support and private capital has created conditions where logistics cities are no longer isolated real estate projects but part of a broader economic strategy.

The rise of Tier-2 and Tier-3 logistics cities

While metro corridors continue to anchor India's logistics

network, a significant part of the next growth phase is unfolding in Tier-2 and Tier-3 cities. Rising land costs, congestion and regulatory constraints in metros have pushed both developers and occupiers to look beyond traditional hubs.

According to Varuna's analysis on emerging warehousing trends, Tier-2 and Tier-3 cities are increasingly attracting organised logistics development due to lower costs, improving infrastructure and growing consumption demand. These locations are no longer viewed only as secondary markets but as strategic nodes that extend the reach of national supply chains.

Varuna, an Indian logistics company providing transportation and warehousing services, with a strong presence in regional markets, notes that improvements in highways, expressways and regional connectivity have made it viable for companies to serve multiple markets from smaller cities. As a result, logistics parks in these locations are being designed with scalability in mind, allowing occupiers to expand operations as demand grows.

This shift is also closely tied to manufacturing expansion. As production units move into industrial clusters outside major metros, logistics cities are emerging alongside them to support inbound raw materials and outbound finished goods.

Extending reach while controlling costs

Cost optimisation remains a major driver behind the expansion into smaller cities. Varuna highlights that occupiers are increasingly balancing proximity to end consumers with operating efficiency, using Tier-2 and Tier-3 hubs as regional distribution centres that complement metro-based facilities.

These hubs allow companies to shorten delivery timelines without bearing the full cost burden of operating exclusively in high-priced urban markets. In effect, logistics cities in smaller locations are becoming critical links between national freight corridors and local consumption zones.

This distributed network approach is particularly important for retail and fast-moving consumer goods companies, which require both scale and speed across diverse geographies.

Urban distribution centres and last-mile pressure

As logistics cities expand on the peripheries, pressure within urban areas is also reshaping how logistics is organised closer to consumers. JUSDA Global's analysis of urban distribution centres in India points to growing demand for smaller, strategically located facilities within or near cities to support last-mile delivery.

According to JUSDA Global, a global supply chain solutions provider specialising in urban distribution and technology-led logistics, rapid growth in e-commerce and same-day or next-day delivery expectations has increased

the need for urban distribution centres that can handle high-frequency, low-volume movements. These centres are often linked operationally to larger logistics cities located outside city limits.

This two-tier structure like the large logistics cities for bulk handling and urban centres for final distribution is becoming a defining feature of modern supply chains. It allows companies to optimise inventory placement while responding quickly to consumer demand.

However, JUSDA Global also notes that land availability, zoning regulations and traffic constraints remain challenges for urban logistics infrastructure. As a result, careful planning and integration with city logistics policies are essential.

Bhiwandi: A logistics city in practice

Few locations illustrate the concept of a logistics city better than Bhiwandi, near Mumbai. FM Logistic, a multinational third-party logistics provider offering warehousing and distribution services across India, describes Bhiwandi as the backbone of India's supply chain network, owing to its strategic location and concentration of warehousing and distribution facilities.

Situated close to Mumbai's consumption markets and connected to major highways, Bhiwandi has evolved from an informal warehousing cluster into a large, organised logistics hub. FM Logistic notes that the area handles significant volumes of goods destined for western and central India. What makes Bhiwandi particularly relevant is the way it demonstrates both the opportunities and challenges of logistics-led development. On one hand, it shows how proximity to markets and infrastructure can drive scale. On the other hand, it highlights issues related to congestion, land-use planning and the need for better governance.

The transition of Bhiwandi towards more organised, Grade-A logistics parks reflects the broader national trend identified by OneUnion Solutions, where older clusters are being upgraded to meet modern supply chain requirements.

Policy push and government alignment

Government policy has played an increasingly important role in shaping the logistics ecosystem. A Press Information Bureau (PIB) release outlines initiatives aimed at reducing logistics costs through coordinated infrastructure planning, simplified regulations and improved inter-ministerial alignment.

These efforts are intended to support the creation of integrated logistics hubs that can function efficiently across modes and regions. The focus on planning and coordination aligns with industry calls for logistics cities that are developed as part of a broader economic framework rather than as isolated projects.

Anshul Singhal emphasises the role of state governments in this process, particularly in land aggregation and single-

window clearances. According to him, alignment with national initiatives such as Gati Shakti can significantly accelerate logistics-led development.

Policy support has also encouraged private investment by reducing uncertainty and improving the viability of large-scale projects. As a result, logistics cities are increasingly seen as long-term infrastructure assets rather than short-term real estate plays.

Linking logistics cities to trade competitiveness

Beyond domestic efficiency, logistics cities have important implications for India's global trade ambitions. Singhal points out that well-planned logistics-led developments connect production clusters to ports, freight corridors and urban markets, helping improve export competitiveness.

Astravise Services notes that optimised freight flows and reduced transit times are critical for improving reliability in supply chains, a key factor for exporters operating in global markets. Logistics cities play a central role in this by consolidating cargo, improving handling efficiency and reducing delays.

As manufacturing output grows and supply chains become more integrated, the ability to move goods quickly and predictably will be a decisive advantage. Logistics cities, by design, are meant to deliver this reliability at scale.

The road ahead

Looking ahead, the contours of India's logistics map are becoming clearer. Established corridors such as MMR, Delhi-NCR, Chennai and Bengaluru are expected to deepen their roles as logistics anchors, while emerging nodes like Pune's Talegaon are well positioned to evolve into logistics-driven trade hubs, according to Singhal.

Industry analyses suggest that success will depend not just on scale, but on planning, governance and integration. As One Union Solutions notes, the next phase of growth will favour players who can deliver compliant, technology-enabled and well-managed logistics environments.

In this context, logistics cities are no longer optional infrastructure. They are becoming central to how India produces, trades and consumes goods. If executed well, they have the potential to reduce costs, improve resilience and strengthen India's position in global supply chains.

For a country seeking to expand manufacturing and boost exports, the emergence of logistics cities may well prove to be one of the most important enablers of growth in the years ahead.

Source: www.itln.in



THE BIGGEST BARRIER TO AI IN SUPPLY CHAINS ISN'T TECHNOLOGY

KEVIN BROWN, DELL TECHNOLOGIES'
EVP OF GLOBAL OPERATIONS AND CSCO

Kevin Brown, Dell Technologies CSCO, emphasizes that successful AI adoption begins long before deployment, requiring organizations to simplify processes, standardize decision-making and build a strong operational foundation

Executive takeaways

- **AI is a force multiplier, not a transformation strategy.** AI amplifies the strengths and weaknesses of existing supply chain operations, making process readiness more important than technology selection.
- **Simplification should come before automation.** Organizations should eliminate unnecessary approvals, redundant reporting and inefficient workflows before introducing AI to prevent automation from scaling bureaucracy rather than value.
- **Standardization creates trustworthy AI.** Consistent processes, metrics and decision frameworks enable AI to generate reliable insights, benchmark performance, predict risk and scale best practices across the enterprise.
- **Agentic AI shifts automation from analysis to execution.** Once supply chains are simplified and standardized, agentic AI can orchestrate workflows, launch corrective actions, monitor exceptions and help organizations move from reactive decision-making to autonomous operations.
- Most companies investing heavily in artificial intelligence (AI) for their supply chains are skipping the most important step. Before asking what AI can do, they need to ask whether their supply chain is ready for it. AI is not a transformation strategy. It is a force multiplier. It amplifies whatever system it inherits. Point it at a clean, disciplined operation, and it delivers extraordinary results. Point it at a fragmented operation filled with complexity and inconsistency, and it simply scales those problems faster.
- That distinction matters more than ever. Leaders see the potential of autonomous planning, procurement and logistics—yet results consistently fall short. The issue is rarely the technology itself. More often, organizations are trying to automate complexity rather than eliminate it.
- 3 steps to success
 - Before deploying AI, supply chain leaders should focus on three fundamentals: Simplify. Standardize. Automate. Each step depends on the one before it. Skip a step and AI magnifies the inefficiency rather than creating value.
 - 1. Simplify before you scale
 - Many organizations view AI as a way to untangle the complexity their supply chains have accumulated over time. AI does not dissolve complexity. It encodes it.
 - Simplification starts by questioning not just how work gets done but why. Most organizations have built up layers of approvals, reviews, handoffs and reporting requirements that were created for a specific purpose but never removed once they no longer apply.
 - The symptoms are familiar. Checkers checking the checkers. Reports produced, reviewed and never acted on. Forecasts updated weekly because they always have been, even when less frequent updates would deliver the same accuracy. Documents created for one meeting, converted into presentations for a review meeting, then translated back into actions.
 - AI does not benefit from any of this. It absorbs

all of it.

- The goal is to redesign workflows with a clean-sheet mindset. Remove organizational barriers. Eliminate activities that do not create value. Reduce unnecessary approvals. Connect AI directly to the underlying data sources and decision points rather than routing information through layers of spreadsheets, presentations and reviews.
- The highest-return automation project is often the process you stop doing entirely. Organizations will need to simplify first, creating the conditions for AI to operate effectively. Those that don't simply automate bureaucracy.
- 2. Standardize for reliability
- Once you remove complexity, standardization makes AI trustworthy. AI excels at repeatable, consistent work. It struggles when every team follows different rules, definitions and decision criteria.
- Supplier performance management is a clear example. In many organizations, procurement teams evaluate suppliers differently across commodities, regions and business units. Metrics vary. Weightings differ. Scoring methods evolve independently. One team prioritizes cost, another quality, a third delivery performance—each using a different measurement framework.
- Without standardization, AI cannot reliably identify performance patterns, benchmark suppliers, predict risk or recommend actions across the enterprise. The data may exist, but it lacks a common language.
- Standardization does not mean eliminating judgment; it means creating a common framework for how work is performed, measured and evaluated. When teams operate consistently, AI can learn from larger datasets, generate more reliable recommendations and scale best practices across the organization.
- This is as much a cultural challenge as a technical one. Success requires organizations to align on common workflows, metrics and decision frameworks before introducing automation.
- 3. Automate to compound the gains
- With complexity removed and standards in place, automation creates lasting value, dramatically reducing the time between identifying a problem and taking action.
- Consider supply-and-demand balancing. Teams often spend significant time gathering inputs, validating assumptions, building spreadsheets and creating supply-and-demand views for future planning cycles. The work is repetitive, sequential and resource-intensive. AI changes the economics of that process. Rather than building one supply-and-demand balance at a time, AI can simultaneously generate scenarios across multiple commodities, suppliers and regions for the next three to six months. What once required hours or days of manual effort can be completed in minutes. More importantly, AI can initiate workflows, assign actions, track follow-ups and escalate exceptions automatically.
- This is where agentic AI becomes powerful. It does not simply generate recommendations. It orchestrates execution.
- As these agentic workflows enter production, most will keep humans in the loop. Over time, organizations will build confidence by validating decisions and gradually expanding autonomy.
- Build a supply chain worth amplifying with AI
- The companies that win with AI will not necessarily be the first to deploy it. They will be the ones that make it easiest for AI to operate effectively. They will simplify workflows, standardize decision-making and eliminate unnecessary complexity before introducing automation.
- AI will transform supply chains. The question is not whether that transformation will happen. The question is whether your organization is building the foundation required to benefit from it. AI amplifies whatever system it inherits. Leaders who create disciplined, resilient and scalable operations today will gain more than efficiency tomorrow. They will create a competitive advantage that compounds over time.

Source: www.scmr.com

● ● ●

WHY THE DEPARTMENT OF POSTS AND FLIPKART PARTNERSHIP MATTERS FOR INDIA'S E-COMMERCE LOGISTICS ECOSYSTEM

As a leader in India's e-commerce landscape, you understand that logistics and fulfillment are more than operational challenges—they are strategic levers shaping your growth and competitive position. The recent partnership between the Department of Posts and Flipkart is a watershed moment that could redefine how e-commerce platforms like yours navigate last-mile delivery complexities, especially as you seek to scale deeper into India's tier-2 and tier-3 markets.

Why This Partnership Should Matter to You : In your quest to expand market reach, optimize unit economics, and deliver exceptional customer experiences, logistics plays a pivotal role. The Department of Posts, with its unmatched national presence, paired with Flipkart's cutting-edge fulfillment capabilities, offers a blueprint for overcoming entrenched last-mile challenges. If you are building or managing a D2C brand, marketplace, or quick-commerce service, this partnership signals new operational possibilities to reduce delivery costs and improve service reliability.

Whats Happening: A Strategic Alliance Unfolds : The agreement between India Post and Flipkart leverages India Post's enormous footprint spanning even remote rural areas integrated with Flipkart's advanced logistics technologies and urban network. This hybrid model aims to accelerate package delivery speed, enhance fulfillment accuracy, and reduce dependence on costly private courier networks in less accessible regions. It strengthens the ecosystem by turning a vast existing public infrastructure into a force multiplier for commercial e-commerce operations.

Key Business and Market Impacts to Track

- **Driving Market Expansion:** You can expect faster entry and operational scaling in smaller towns previously underserved by private logistics, unlocking fresh customer cohorts.
- **Reducing Last-Mile Delivery Costs:** Logistics often consume a significant chunk of your costs; tapping into postal services can boost your unit economics by lowering delivery spends, helping sustain profitability.
- **Enhancing Customer Loyalty:** Improved delivery timelines and dependability underpin repeat purchases and higher customer lifetime value—critical metrics in today's competitive marketplace.

Strategic Insight: A Model for Sustainable E-Commerce Growth : This collaboration exemplifies how blending legacy infrastructure with modern logistics platforms can foster a resilient and scalable supply chain. It aligns well with government initiatives to digitize postal services and support open network commerce programs like ONDC, encouraging interoperability and inclusivity in retail. For your business,

this represents a strategic opening to innovate on delivery solutions, reduce friction, and position your customer experience advantageously.

"In e-commerce, growth matters but retention is what turns traffic into a business."

"The real edge is not only in selling faster, but in building a brand, a system, and a customer relationship that lasts."

Practical Takeaways for E-Commerce Leaders

- Assess your current logistics footprint in less penetrated markets and identify where postal network integration could enhance reach and reduce costs.
- Explore partnerships or API integrations that leverage India Post's delivery infrastructure to optimize your last-mile strategies.
- Monitor government policies on open network commerce to align your operations with emerging frameworks, maximizing the benefits of digital postal services.
- Use this opportunity to enhance fulfillment speed, a critical conversion and retention lever for your D2C or marketplace brand.

Risks and Challenges to Consider : While promising, the integration of postal services with private e-commerce logistics may present challenges such as service quality variability, technological alignment, and operational coordination hurdles. You should remain vigilant on execution risks that could impact delivery consistency, customer satisfaction, or internal supply chain complexity.

What You Should Watch Next : Keep an eye on pilot outcomes of this partnership in key regions and nascent collaborations between other digital retailers and public infrastructure providers. These developments could signal new industry standards and compel you to revisit your logistics strategies to stay competitive.

Conclusion: A Turning Point in India's E-Commerce Delivery Ecosystem

The Department of Posts and Flipkart logistics partnership represents more than a new alliance; it is a strategic evolution enhancing the fabric of India's e-commerce delivery landscape. If you want to future-proof your fulfillment models, improve cost structures, and deepen market penetration, this hybrid postal-private logistics framework is a development you cannot afford to overlook. "When logistics, customer trust, and unit economics align, digital commerce growth becomes far more durable."

Source: ecommerce.theceo.in



THE AUGMENTED PROFESSIONAL – REDEFINING PROCUREMENT INTELLIGENCE IN THE AGE OF AI

SWAPNIL DUBEY, CHAIRMAN MUMBAI BRANCH
swapnil.dubey@iimmmbai.org

For over three decades, we have watched the procurement profession navigate a relentless current of change. We have evolved from clerical purchasers to commercial negotiators, and from cost center managers to value creators. We have adapted to the age of the ERP, the internet, and global sourcing. Yet, today, we stand at the precipice of what is undoubtedly our most significant transformation yet: **the age of Artificial Intelligence**.

The dominant narrative surrounding this shift is often fueled by anxiety. It paints a dystopian picture of a future dominated by cold, flawless algorithms, where human intuition is sidelined by data-driven automation. The question whispered in conference rooms from Mumbai to Manhattan is the same: **“Will AI replace the procurement team?”**.

However, after examining the trajectory of our function, it's clear that this narrative is myopic. The future I see is not a binary choice between human and machine. Instead, we are witnessing the emergence of a symbiotic partnership - a new alloy that blends the scale and speed of AI with the strategy, empathy, and creativity of the human spirit.

The traditional differentiators—analytical capability, process efficiency, commercial rigour—are being absorbed into digital platforms. But the emerging differentiators—empathy, ethical courage, creativity, relationship advisory—cannot be automated. They can only be amplified. By automating the transactional, AI is amplifying the relational. In this future, procurement is not automated; it is elevated. It is becoming more “HumAlne”.

The Great Paradox: Why Digital Means More Human : We face a striking paradox: the more digital procurement becomes, the more human it must be. As algorithms rapidly absorb the transactional load—automating spend categorisation, generating RFX documents, and routing workflows—they are creating unprecedented space for human skills that were always valuable but often buried under administrative burdens.

Historically, our value rested on hard skills: negotiation, category expertise, spend analysis, RFX management, price benchmarking, risk/ financial assessments etc. While these remain essential, they are now table stakes. The production boundary of what technology can do has shifted. AI can now answer the questions of “what” and “how much” with inhuman precision.

Therefore, the differentiating value of the senior procurement professional is shifting upward:

- From reading data to interpreting meaning.
- From running RFPs to architecting business outcomes.
- From transactional execution to ecosystem orchestration.
- From cost savings to risk mitigation, innovation, and resilience

The most successful procurement leader of the next decade will not be the one who competes with the machine on computation, but the one who integrates with it to unlock wisdom. The future belongs to the integrator.

The “HumAlne” Handshake: Symbiosis in Action : To understand this synthesis, we must look at how the “AI-Led

Paradigm” (quantitative, fast, efficient) and the “Human-Centric Paradigm” (qualitative, contextual, empathetic) come together. This is the “HumAlne Handshake” - a deliberate partnership where the output of one becomes the input for the other. Let us examine three critical domains where this handshake is redefining our function.

1. The Augmented Negotiator : In the traditional model, negotiation preparation was a labour-intensive process of gathering distinct data points.

- **The AI Prelude:** Today, the AI engine acts as the ultimate analyst. It can analyse terabytes of historical spend, real-time market indices, and supplier financial data to define the optimal price point and the Zone of Possible Agreement (ZOPA). It provides a data-backed benchmark invisible to the human eye.
- **The Human Overture:** Armed with this intelligence, the procurement professional enters the room not as a haggler, but as a value architect. The human focuses on the dynamics no spreadsheet can capture: reading the room, sensing hesitation, and understanding the strategic value of a concession. By taking over repetitive, data-heavy, rules-based activities, AI frees professionals to focus on the skills that no machine can replicate.

The AI handles the arithmetic; the human handles the architecture. This allows us to craft win-win terms that secure not just a price, but a commitment to shared innovation.

2. Crisis Management and Resilience

Nowhere is this symbiosis more potent than in risk management, particularly within the complex supply chains we manage in India.

- **The AI Nervous System:** Imagine an AI dashboard scanning global news and satellite imagery. It identifies that a sub-tier supplier located in a specific industrial belt in Tamil Nadu is in a region experiencing unprecedented flooding. It flags this instantly, long before a manual check would occur.
- **Human Response:** The procurement leader does not send an automated penalty notice. Instead, they make an empathetic phone call to the Tier-1 supplier: “Our systems indicate a potential disruption. We are in this together. What alternate capacity can we help you secure?”

This approach transforms a potential contractual failure into a demonstration of partnership. It leverages the Indian spirit of Vishwas (trust) and Jugaad (innovative problem solving) to build resilience that is culturally aligned and strategically sound. Negotiation outcomes rarely hinge on data alone. They hinge on:

- Reading the room—the micro-expressions, tone, timing
- Managing power asymmetries in cross-cultural environments
- Navigating internal politics and external constraints
- Crafting win-win solutions beyond numbers
- Building trust that endures beyond a single contract

3. The Ethical Guardian : As ESG moves from a buzzword to a boardroom mandate, the “HumAIne” model becomes our moral compass.

- **Transparency at Depth:** AI serves as a transparency machine, scanning thousands of entities to flag potential financial distress, geopolitical disruption, or non-compliance events in sub-tier suppliers. It can detect patterns in public disclosures that suggest emerging ESG risks.
- **Courage and Compassion:** However, data without context is dangerous. The human professional provides ethical reasoning. Instead of simply delisting a struggling MSME supplier identified by AI, the human leader can provide mentorship and patient capital to help them grow.

This aligns perfectly with national initiatives like “Make in India,” where strengthening the domestic supply chain requires not just auditing, but capability building.

4. Architecting the New Foundation: Data for the “HumAIne” Era : This visionary partnership cannot be built on the fractured data foundations of the past. Our legacy ERP systems, designed for transactional recording and linear reporting, are the equivalent of trying to power a supercomputer with a car battery. They feed the AI paradigm but starve the human one. To enable the “HumAIne” handshake, we must architect a new data bedrock.

The Unified Procurement Knowledge Graph : Traditional ERPs store data in rigid structures. While functional, they do not reflect the interconnected nature of supply ecosystems.

The Problem

- Supplier risk is linked to logistics, which is linked to geopolitical factors.
- Carbon emissions are connected to materials, locations, and production methods.
- Contract obligations relate to pricing models, service levels, and timelines.

These relationships cannot be captured with tables alone.

We must move beyond isolated databases to a “Knowledge Graph.” In this model, every entity—a supplier, a part, a contract, a logistics route—becomes a “node”. These nodes are interconnected by “edges” that define relationships, such as “supplies,” “is located in,” or “has a risk event with”. This allows us to ask profoundly strategic questions. For instance: “Show me all single-source suppliers for our new EV battery module, whose primary factory is in a water-stressed district, and who are also supplying our main competitor”.

In a traditional setup, this is a week-long data excavation. With a knowledge graph, it is a single, instant query. The AI navigates the graph to find the answer, and the human applies strategic context to decide the action.

The Unstructured Data Reservoir : We must also tap into the 80% of data we have largely ignored: the unstructured data reservoir. This includes the qualitative essence of our operations—contract clauses, email sentiments, audit reports, and news articles.

By applying Natural Language Processing (NLP) and sentiment analysis, we can mine this reservoir for early warnings. Is the tone of communication with a strategic partner becoming increasingly negative? AI can flag it, allowing the human professional to intervene and repair the relationship before it fractures.

Federated Learning and Trust : In an Indian context, where suppliers (especially MSMEs) may be hesitant to share sensitive data due to trust issues, we must explore “Federated Learning”. This approach sends the AI model to the data source rather than extracting the data into a central

repository. It preserves supplier confidentiality while providing the ecosystem-wide insights we need. This is how we build a trust-based digital ecosystem.

5. Cultivating the “HumAIne” Procurement Leader : This new era demands a new breed of procurement leader. The traditional competency model, which prized tactical negotiation and process management above all, is becoming obsolete. We are now building “T-shaped” professionals.

This requires a shift in two distinct “muscle groups”:

1. From “Soft Skills” to “Essential Human Skills” : We must stop referring to empathy, ethical reasoning, and storytelling as peripheral “soft skills”. They are core strategic capabilities. They enable us to translate AI-driven insights into compelling narratives for the C-suite.

- **Empathetic Influence:** The ability to understand motivations and fears across stakeholders.
- **Storytelling:** Crafting narratives that translate data into alignment and urgency.
- **Ethical Judgment:** Making decisions based on integrity and values, not just algorithmic outputs.

2. From “IT Literacy” to “AI Fluency” : Leaders need not be data scientists, but they must be fluent in the language of AI.

- **Prompt Engineering:** Knowing how to ask the right strategic questions to extract value from AI.
- **Bias Detection:** The wisdom to detect when an algorithm is basing its output on skewed or incomplete data.
- **Systems Thinking:** Recognizing how suppliers, markets, and risks interlink.

We must be able to look a machine in the eye, metaphorically speaking, and challenge its output.

A Leadership Provocation : Procurement transformation cannot be software-led alone. It must be behaviour-led. Does your organisation invest equally in emotional intelligence and AI training?

Are you promoting the best negotiator—or the best relationship builder?

The leaders of the next decade will not be those who control processes, but those who influence ecosystems.

Conclusion: The Integrated Ascension : The journey ahead is not about resisting the rise of AI, nor is it about nostalgically clinging to purely human past. It is about deliberate and thoughtful integration. We are shedding the tactical to embrace the relational. We are moving from being cost-takers to value-creators, from process managers to ecosystem architects. By automating the transactional, AI is amplifying the relational.

The most successful procurement organizations of the future will be those that fuse the computational power of the machine with the wisdom of the human. They will understand that the true power of AI is not in replacing our judgment, but in illuminating the path so our judgment can be applied where it matters most. We are not being automated out of existence. We are being augmented into a new realm of strategic relevance. The ultimate competitive advantage will go to organisations that pair advanced AI with profound human skills—empathy, ethics, creativity, and courage. We are becoming, in the most profound sense, more HumAIne.

I leave you with a question to reflect upon for your own function: **What is one process you can automate tomorrow to free up your team for a more human conversation today?**

●●●



WTO UPDATE

WHY IS TRANSIT IN GOODS FREE BUT TRADE IS NOT?

ROBERT STAIGER, CHIEF ECONOMIST

In my previous two posts on the value of the WTO, I argued that when governments set trade policies independently, they focus on domestic effects but often overlook the costs imposed on trading partners. International trade agreements help governments take account of these cross-border spillovers (terms-of-trade externalities) by encouraging reciprocal negotiations over trade policy. While these negotiations will reduce trade protection, they will not necessarily lead to free trade. But if governments do not generally commit themselves to free trade, why has freedom of transit for goods been seen differently?

Why - from an economic perspective - should ships passing through the Strait of Hormuz or goods crossing a country's territory enjoy a near-unconditional right of transit while tariffs remain the subject of lengthy negotiations?

This puzzle is clearly visible when comparing the WTO with other areas of international law, such as the regimes of maritime passage under the United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS treats free transit for goods through straits used for international navigation as close to an unconditional entitlement.

The puzzle also appears inside the WTO. Article V of the General Agreement on Tariffs and Trade (GATT) - "Freedom of Transit" - requires that traffic merely passing through a member's territory - goods that begin and end their journey beyond that member's frontier - "shall be exempt from customs duties and from all transit duties" apart from charges for transportation or charges commensurate with administrative expenses or the cost of services actually rendered. An imported good is treated differently. A WTO member may set a tariff and remain in full compliance with the GATT; it may not impose a comparable transit duty on goods that simply cross its territory on their way elsewhere.

So, the same puzzle appears twice: once with reference to the WTO and UNCLOS regimes of maritime passage, and once again within the GATT itself. Why would international law allow negotiated tariffs in one situation while imposing an essentially unconditional rule of free transit for goods in another?

The answer lies in the same economic logic developed in my previous posts. This post looks at the puzzle in three steps. First, it revisits the issue of tariffs and market power that underlies the terms-of-trade theory of the

GATT/WTO (i.e. when a government raises a tariff, it can affect not only domestic prices and the quantity of imports but also the prices received by foreign exporters). Second, it applies that logic to taxes and other restrictions on goods that merely pass through a territory. Finally, it explains why the same economic reasoning leads to negotiated tariff commitments in one case but to a simple rule of free transit in the other - and why the GATT contains both approaches side by side.

Tariffs, market power and the "political optimum"

The terms-of-trade theory of the GATT/WTO developed in Bagwell and Staiger (1999) starts from an observation already introduced in my previous post: a tariff imposed by an economy with market power does not affect only its own consumers and import-competing firms. It can also depress the price received by foreign exporters, shifting part of the cost of protection onto trading partners. Because governments have an incentive to exploit this effect, unilateral tariff setting can lead to outcomes that are collectively inefficient. This is the cross-border spillover that, as argued in my previous post, the GATT/WTO exists to help governments "negotiate away".

The important question is what remains once that cost-shifting incentive has been removed. Bagwell and Staiger refer to this as the political optimum: the tariff a government would choose on purely domestic grounds, absent any ability to shift costs onto foreigners. This tariff need not be zero. Even if a government faces all of the costs of its actions, it may still want to set a tariff to raise revenue where other forms of taxation are costly to administer, to protect a sector for domestic political reasons, or to address a domestic market failure when it lacks better policies to do so.

This helps explain why the objective of GATT/WTO negotiations was never free trade as such. The negotiating rounds documented in my previous posts were a process through which governments exchanged reciprocal reductions in the component of their tariffs driven by terms of trade considerations, not a mechanism for reducing every tariff line to zero. Reciprocity - a balanced exchange of market access commitments - helps neutralize the incentive to manipulate terms of trade, while the non-discrimination principle of most-favoured nation (MFN) - where all WTO members are treated equally - helps ensure that the resulting commitments extend across the WTO membership. What remains, in principle, is each government's own

domestic political optimum - and because that optimum differs across economies and products, there is no single tariff level to which the system is expected to converge.

This is also why tariff negotiations are important. The outcome is not predetermined. Governments must use the negotiations to find a set of mutually acceptable commitments, taking account of their own domestic objectives as well as the reciprocal concessions offered by others.

What the same logic implies for goods that are only passing through

Now suppose the same logic is applied to a different policy instrument: a tax or charge imposed on goods that merely pass through a jurisdiction. The goods begin their journey elsewhere and are destined for somewhere else. They are not imported for domestic consumption, and they do not compete with domestic producers.

What is the political optimum for such a charge?

The answer turns out to be different from the tariff case. A tariff can retain a domestic component once the motive of cost-shifting to the foreign party has been removed: it may raise revenue from domestic sources, protect a domestic sector, or fulfil other domestic policy objectives. A pure transit charge for goods has no equivalent domestic dimension. The goods are not consumed in the transit economy, do not compete with its industries, and do not generate a domestic policy rationale comparable to the one that may justify imposing a tariff.

The direct burden of a transit charge falls completely on foreign parties: exporters, importers, carriers, or even consumers in third economies. The cost-shifting motive remains, but the domestic component that might otherwise still exist after reciprocal bargaining - the political optimum - disappears. In that sense, the terms-of-trade externality associated with a transit charge appears in unusually pure form.

This is the key difference. For the imposition of a tariff, international bargaining removes the incentive to shift costs abroad while leaving room for legitimate domestic objectives. For a pure transit charge, there is no comparable domestic objective to preserve. The same logic that can justify negotiated tariffs therefore suggests a zero charge on goods traffic that merely passes through a jurisdiction.

Seen in this light, GATT Article V's flat exemption of transit traffic from customs duties and transit duties reflects the fact that the underlying economic situation is different from the tariff case. UNCLOS reaches a similar result for international straits used for goods navigation. The same economic structure helps explain why both legal regimes converge on a strong rule of freedom of transit for goods.

A tariff, however, is not the only instrument that can have an economic impact on goods traffic. Unnecessary delays at customs, excessive documentation requirements, customs escorts, guarantee deposits and other

procedural burdens can reproduce similar effects without being labelled as charges.

This is where the WTO framework becomes especially useful. GATT Article V establishes the basic principle of freedom of transit but Article 11 of the Trade Facilitation Agreement goes further by disciplining the formalities, documentation requirements and customs procedures applied to goods in transit. The economic argument is straightforward: once direct transit duties are prohibited, complex procedural practices should not become an indirect substitute for seeking the same type of economic gain. This can be understood as the transit-law counterpart of the concern raised by James Meade, and discussed in my first post in the value of the WTO series.⁽¹⁾

Charging for specific services

Of course, none of this implies that goods transit need be entirely costless. Moving goods safely and efficiently across a jurisdiction may require infrastructure, border facilities, customs administration, etc.

This point is reflected in GATT Article V. While transit duties are prohibited, the Article allows charges for transportation and charges commensurate with administrative expenses or the cost of services actually rendered. The same point is made in the law of the sea. UNCLOS does not prevent coastal states from charging for specific services they provide, such as pilotage, towage or port facilities. Under separate legal arrangements, tolls charged by the operators of constructed waterways, such as the Suez and Panama canals, are also permitted. All of these share a feature that a pure transit tax lacks: the objective is not to prevent governments from recovering legitimate costs, but to distinguish such charges from measures whose purpose is to seek economic benefits from goods simply passing through the territory.

This is the same distinction made by the GATT in the case of tariffs, and it is worth noting how closely the two texts track each other, despite having been drafted decades apart by different negotiators for different purposes. A tariff that funds a public good or reflects a government's domestic preferences for income distribution has a legitimate claim to be part of a GATT/WTO trade bargain, because a real domestic cost or benefit underlies it. A transit charge that reflects a real cost of service has an equivalent claim to exist under GATT Article V or under UNCLOS.

What these regimes rule out, each in its own domain, is the component that exists only to seek economic benefit from a foreign party who bears the cost of the policy but has no seat at the bargaining table of the transiting jurisdiction or the tariff-setting government.

Main takeaway

The comparison between tariffs and goods transit illustrates the broader logic of the terms-of-trade theory developed in my previous posts.

The GATT/WTO is not designed simply to promote free trade. Rather, it seeks to remove governments' incentives to shift the costs of their trade policies onto others while preserving room for legitimate domestic policy objectives. In the case of tariffs, this means negotiated commitments that reflect each government's own domestic priorities once the terms-of-trade motive has been neutralized.

Transit of goods is different. Because goods merely passing through a jurisdiction have no domestic economic implications, there is no rationale for imposing taxes or unnecessary restrictions on them. The same economic logic that supports negotiated tariffs therefore justifies a general rule of free transit for goods. Viewed from this perspective, the strong protection of freedom of transit found in GATT Article V, reinforced by the disciplines of the Trade Facilitation Agreement and echoed in the international law governing sea navigation, is not an exception to the economic logic of the multilateral trading system. It is one of its clearest applications.

My next post will be the latest instalment in the Value of the WTO series, where I will look at the results from a quantitative trade model to consider the implications of abandoning MFN.

References : Bagwell, Kyle, and Robert W. Staiger (1999). "An Economic Theory of GATT." *American Economic Review* 89(1): 215-248.

Footnotes

1. Meade wrote: "One cannot hope to see the abandonment of protective devices except in the framework of all-round international agreement, since unilateral action is quite likely to cause the free-trade country to lose more from a deterioration in its terms of trade than it gains from the expansion of trade. But as soon as any attempt is made to limit protective devices, a whole host of domestic economic arrangements must be brought under examination. Tariffs and quantitative import restrictions are not the only means for protecting domestic industries. Subsidies, domestic taxes, domestic price and quantity controls, nationalization schemes - all can be used for similar purposes. Yet all of these instruments may be perfectly legitimate instruments of policy for the attainment of certain other perfectly legitimate objectives. ... If a more liberal international economy is to be established by international agreement, one must search for a working compromise between the need effectively to curb protective devices and the need to give national governments freedom to adopt effective domestic economic policies for the attainment of legitimate domestic objectives." "The Theory of International Economic Policy, Volume Two: Trade and Welfare", by J. E. Meade. Oxford University Press, London: 1955, p 570 Back to text

Source: WTO Website



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.

BRANCH NEWS

BANGALORE BRANCH

IIMM Bangalore Branch Activity report for publication in forth coming issue of Materials Management Review:

29.04.2026 -Seminar on “Navigating Geo-Political Challenges: Policy Measures and Preparedness to Build Resilience”:

The Indian Institute of Materials Management (IIMM), in association with the Bangalore Chamber of Industry and Commerce (BCIC), successfully organized a seminar on “**Navigating Geo-Political Challenges: Policy Measures and Preparedness to Build Resilience**” on **29th April 2026** at Hotel Holiday Inn, Bengaluru. The event witnessed an enthusiastic response from industry professionals, exporters, supply chain practitioners, and management executives.

Dr. Kotraswamy M (IRS), Commissioner of Central Tax, Bengaluru North Commissionerate, graced the occasion as the Chief Guest and delivered an insightful keynote address on the changing global trade landscape and the need for resilient business strategies. Technical sessions by experts from EXIM Bank, ECGC Limited, and IIMM covered strategic export support, ECGC’s relief measures, and the RoDTEP scheme. A panel discussion featuring eminent industry leaders deliberated on managing risks, building resilience, and reinventing global trade practices. The seminar received excellent feedback from participants, who appreciated the quality of the deliberations, practical insights, and networking opportunities. The event concluded successfully, reinforcing IIMM’s commitment to knowledge sharing and professional development.

22.05.2026: 10th Professor Ravi Ravindran Annual Endowment Lecture:

The **10th Professor Ravi Ravindran Annual Endowment Lecture** was successfully organized by the **Indian Institute of Materials Management (IIMM), Bengaluru Branch**, on **22nd May 2026** at **Hotel Paraag, Raj Bhavan Road, Bengaluru**, in a hybrid mode. The annual lecture, instituted in memory of the late Professor Ravi Ravindran, continues to serve as a prestigious platform for disseminating knowledge and fostering discussions on emerging trends and challenges in Supply Chain Management and Logistics.

The lecture was delivered by **Professor G. Raghuram**, Professor (Emeritus), Chanakya University and Gujarat Maritime University, on the thought-provoking topic “**Challenges to Logistics Infrastructure Development.**” The event witnessed an enthusiastic participation of IIMM members, supply chain professionals, academicians, industry representatives, and students, both in person and through the online platform.

In his insightful address, Professor Raghuram highlighted the pivotal role of logistics infrastructure in enhancing India’s global competitiveness and sustaining economic

growth. Referring to the significant allocation of over 22% of the Union Budget 2026–27 towards infrastructure development, he explained how initiatives such as the **PM Gati Shakti National Master Plan**, the **National Monetisation Pipeline**, and other flagship programmes are transforming the country’s logistics landscape. He emphasized that integrated multimodal infrastructure is essential to reduce logistics costs, improve supply chain efficiency, and strengthen India’s position in global trade.

The speaker also drew attention to the persistent challenges confronting infrastructure development, including project delays, land acquisition issues, financing constraints, cost overruns, regulatory hurdles, environmental clearances, and inadequate coordination among multiple agencies. He stressed the importance of adopting technology-driven planning, data-based decision-making, public-private partnerships, and policy reforms to address these challenges effectively.

The lecture generated considerable interest among the participants, who actively engaged in an interactive question-and-answer session. The discussions covered topics such as multimodal transportation, port-led development, digital logistics, urban freight management, sustainability, and the future role of artificial intelligence and digital technologies in logistics planning and execution.

Participants appreciated the speaker’s deep domain knowledge, practical insights, and lucid presentation. The lecture provided valuable perspectives on the opportunities and challenges associated with India’s ambitious infrastructure development agenda and reinforced the importance of collaborative efforts among government, industry, academia, and professional bodies in building a world-class logistics ecosystem.

The programme concluded with a vote of thanks, followed by networking over dinner. The event received excellent feedback from participants, who acknowledged it as a highly informative and intellectually enriching session. Through this annual endowment lecture, IIMM once again reaffirmed its commitment to promoting professional excellence, knowledge sharing, and continuous learning among the materials management, logistics, and supply chain fraternity.

22.06.2026: IIMM Bengaluru Signs MoU with St. Joseph’s Institute of Management:

The **Indian Institute of Materials Management (IIMM), Bengaluru Branch**, signed a **Memorandum of Understanding (MoU)** with **St. Joseph’s Institute of Management (SJIM), Bengaluru**, on **22nd June 2026** to foster academic–industry collaboration in the fields of Supply Chain Management and International Trade. The MoU aims to bridge the gap between academic learning and industry requirements through jointly conducted Management Development Programmes (MDPs), specialized courses, faculty development initiatives, research projects, and workshops. Key areas of collaboration in-

clude **Supply Chain Analytics, International Trade**, research studies, and programmes on the people side of supply chains. The partnership will also facilitate joint certification programmes, knowledge sharing, and industry-oriented training for students, faculty members, and working professionals. Initially valid for a period of two years, the MoU marks a significant step towards strengthening industry-academia collaboration and reflects IIMM Bengaluru's continued commitment to developing future-ready supply chain and logistics professionals.

28.06.2026 :Webinar on “Transportation & Warehousing Excellence – The Backbone of Domestic and International Logistics”:

The **Indian Institute of Materials Management (IIMM), Bengaluru Branch**, in collaboration with the **National Institute of Technology (NIT) Calicut – Centre of Excellence in Logistics & Supply Chain Management**, successfully organized a webinar on **“Transportation & Warehousing Excellence – The Backbone of Domestic and International Logistics”** on **28th June 2026**, commemorating **National Logistics Day**.

The webinar featured **Mr. R. Sampath Raghavan**, a distinguished Supply Chain and International Trade professional with over four decades of experience in logistics, customs, and trade compliance, as the keynote speaker. Drawing upon his vast industry experience, he highlighted the critical role of transportation and warehousing in ensuring efficient domestic and international logistics operations. He emphasized the importance of integrated logistics planning, warehouse optimization, multimodal transportation, digital transformation, and regulatory compliance in building resilient and cost-effective supply chains.

The session also covered emerging trends in logistics, best practices in warehouse management, and the growing significance of technology-driven logistics solutions in enhancing operational efficiency and customer satisfaction. Participants actively interacted with the speaker during the question-and-answer session, making the webinar highly engaging and informative. The webinar witnessed enthusiastic participation from IIMM members, industry professionals, academicians, research scholars, and students from across the country.

The programme received excellent feedback from the participants, who appreciated the practical insights and contemporary perspectives shared by the speaker. The successful conduct of the webinar reaffirmed IIMM Bengaluru Branch's commitment to promoting professional excellence and continuous learning in the fields of materials management, logistics, and supply chain management.

08.07.2026: IIMM Bengaluru Explores Industry-Integrated MBA Programme with Srinivas University : A delegation from the **Indian Institute of Materials Management (IIMM), Bengaluru Branch**, visited **Srinivas University, Bengaluru Campus**, on **8th July 2026** to explore avenues for academic collaboration aimed at enhancing the professional qualifications of IIMM members. The IIMM delegation comprised **Shri Karunakar C. S., Branch Chairman, Dr. P. G. Yogendra, Shri R. Sampath Raghavan**, and **Shri K. V. Sudheendra**, who held detailed discussions with the University

leadership on launching a one-year MBA programme designed specifically for working professionals and members of IIMM.

The meeting was chaired by **Dr. Adithya Kumar Maiya, Registrar – Academics and Development, Srinivas University**, and **Smt. Padmini Kumar, Governing Body Member and Resident Director, Bengaluru Campus**. At the outset, **Dr. S. K. Prasad, Dean, Srinivas University, Bengaluru Campus**, made a comprehensive presentation on the University's **Industry Integrated MBA Programme**, highlighting its curriculum, flexible learning model, industry-oriented pedagogy, and its focus on developing future-ready management professionals.

During the deliberations, both institutions discussed the possibility of jointly offering a **one-year Industry Integrated MBA Programme** tailored to the needs of professionals in materials management, procurement, logistics, supply chain management, and allied sectors. The proposed programme is intended to provide IIMM members with an opportunity to enhance their managerial competencies while continuing their professional careers. The discussions also focused on aligning the curriculum with contemporary industry requirements and integrating practical learning through industry engagement and case-based teaching.

The meeting concluded on a positive note, with both IIMM and Srinivas University expressing their commitment to establishing a mutually beneficial academic partnership. It was agreed to take forward the proposal under the University's **Industry Integrated MBA Programme** initiative after completing the necessary academic and administrative formalities.

The collaboration is expected to create significant value for IIMM members by providing access to quality management education and supporting their career advancement in an increasingly competitive business environment. The interaction reflects IIMM Bengaluru Branch's continued commitment to strengthening industry-academia partnerships and creating meaningful learning opportunities that contribute to the professional development of its members.

INDORE BRANCH

Invitation Meeting with Mr Himanshu Prajapati youngest IAS MP To & MD with MP IDC to assist him on Logistics Solution Dr Sandeep Tare Chairman IIMM Indore Br. along with Mr Himanshu Prajapati MD- MPIDC.

GURUGRAM BRANCH

Grand Inauguration of IIMM Gurugram Branch – A New Milestone in IIMM's Growth

The Indian Institute of Materials Management (IIMM) achieved another significant milestone on 21 June 2026 with the inauguration of its 56th Branch at Gurugram, one of India's foremost industrial and corporate hubs. The establishment of the Gurugram Branch reflects IIMM's unwavering commitment to strengthening its national presence and advancing professional excellence in Procurement, Materials Management, Logistics, and Supply Chain Management.

The inaugural ceremony was graced by Shri P. M. Biddappa, National President, IIMM, as the Chief Guest. The event was attended by Shri L. R. Meena, Immediate Past National President and Guest of Honour; Shri V. K. Jain, Former National President and Convenor of the Gurugram Branch Formation Committee; Shri R. K. Rastogi, Senior Vice President; Shri Rajender Raj, Vice President (North); Shri Pankaj Panchbhai, National Secretary & Treasurer; and Shri Devanand Trivedi, Former Vice President (West), whose vision and initiative inspired the establishment of the new branch. The programme also witnessed enthusiastic participation from industry leaders, academicians, professionals, and members of the Institute.

The programme commenced with Saraswati Vandana and the ceremonial lighting of the lamp. As the inauguration coincided with International Yoga Day, the celebrations began with a yoga session led by Shri Mahesh, emphasizing the importance of physical well-being, mental wellness, and holistic development.

A memorable highlight of the ceremony was the hoisting of the IIMM Gurugram Branch Flag and the launch of the official branch website, symbolizing the formal induction of the Gurugram Branch into the ever-growing IIMM family and its commitment to digital connectivity.

In his inaugural address, Shri P. M. Biddappa reflected on IIMM's remarkable journey since its inception in 1975 and highlighted its contributions towards professional education through AICTE-approved programmes, executive development initiatives, conferences, seminars, workshops, and industry-focused training. He urged professionals to actively participate in IIMM's mission of creating globally competent supply chain leaders.

Shri V. K. Jain described the formation of the Gurugram Branch as a landmark achievement in IIMM's Golden Jubilee journey. He highlighted Gurugram's transformation from the historic land of Guru Dronacharya into one of India's leading centres of industry, technology, and innovation, housing over 250 Fortune 500 companies. He expressed his gratitude to National President Shri P. M. Biddappa for approving the proposal during the National Council Meeting at Kolkata and appreciated the wholehearted support extended by Senior Vice President Shri R. K. Rastogi. He also congratulated Shri Pankaj Varma, Shri Amit Choudhary, Shri Sudhanshu Sharma, Shri Sameer Chhibber, and Shri Devanand Trivedi, whose dedication and teamwork transformed the vision into reality.

Addressing the gathering, Shri Pankaj Panchbhai, National Secretary & Treasurer, congratulated the founding team and appreciated their collective efforts in launching the Institute's 56th Branch. He emphasized that Gurugram offers tremendous opportunities for expanding IIMM's educational programmes, professional certifications, executive development programmes, and industry engagement.

Shri L. R. Meena, Immediate Past National President, commended the consistent growth of IIMM and emphasized the importance of continuous learning and professional development to address the rapidly evolving challenges of global supply chains.

The newly elected Branch leadership, comprising Shri Pankaj Varma (Chairman), Shri Amit Choudhary (National Councillor), and Shri Sameer Chhibber (Vice Chairman), presented the vision and roadmap of the Gurugram Branch. Their presentations focused on the transformative role of Artificial Intelligence in Supply Chain Management, illustrating how AI is reshaping procurement, warehousing, inventory optimization, logistics, demand forecasting, and strategic decision-making. A special recognition was accorded to Shri Devanand Trivedi, whose foresight and persistent efforts laid the foundation for establishing the Gurugram Branch. His leadership inspired a dedicated team that successfully translated the vision into reality.

The programme concluded with a networking luncheon, providing an excellent opportunity for members, industry leaders, academicians, and professionals to exchange ideas, strengthen professional relationships, and explore future collaborations.

Vision for the Future : Located in one of India's fastest-growing business ecosystems, the IIMM Gurugram Branch aspires to emerge as a Centre of Excellence for Procurement, Materials Management, Logistics, and Supply Chain Management. The branch will actively promote IIMM's educational programmes, executive development initiatives, certification courses, seminars, workshops, and industry-academia interactions while encouraging knowledge sharing in emerging areas such as Artificial Intelligence, Digital Supply Chains, Industry 4.0, Sustainability, and Data Analytics.

With the support of industry, academia, government organizations, and the professional community, the Gurugram Branch is poised to become a vibrant platform for innovation, leadership development, professional networking, and lifelong learning. The inauguration of the 56th Branch is more than the opening of another IIMM chapter; it represents the Institute's continued journey of growth and its steadfast commitment to building a stronger, more connected professional community that will contribute meaningfully towards Viksit Bharat through knowledge, collaboration, innovation, and excellence.



HYDERABAD BRANCH

udyamena hi sidhyanti kâryâG/i na manorathai%/|
nahi suptasya siC/hasya praviceanti mukhe m/[gâ%/||

Tasks are accomplished only through effort, not by daydreaming.

June 2026 Sem Exams: IIMM Hyderabad Branch successfully conducted the June Sem 2026 exams. Students are highly determined and interested in our IIMM AICTE approved Courses studies to pave their career and to reach the expectations of their organizational goals.



International Yoga Day – June 21st

ŪarīramādyaA/ khalu dharma-sâdhanam |
"The human body is indeed the first instrument for fulfilling one's dharma (duties and purpose in life)."

IIMM Hyderabad Branch celebrated International Yoga Day on June 21st briefly. Students did some yoga-asanas. They enjoyed the Yoga session.

"yatra sadhavaḥ sanmilanti tatra sarvaṃ susiddhyati"

"Where the wise, noble, or righteous gather, everything is successfully accomplished. That is IIMM"

KOLKATA BRANCH

Report on: Entrance Test for PGDMM & PGDSCM/L – July 2026 Session

The Entrance Test for the **PGDMM** and **PGDSCM/L** programmes for the **July 2026 Session** was successfully conducted on **Sunday, 12th July 2026**, from **11:00 a.m. to 12:30 p.m.**, at **IIMM Hall, 8B, Short Street, Kolkata – 700017**. A total of **26 candidates** appeared for the entrance examination. Following the written test, all eligible candidates participated in the **viva voce**, which constituted the second stage of the admission process.

The programme was efficiently coordinated by **Mr. Sajal Das**, Course Coordinator and Board of Studies Member, with the support of **Mr. Tapas Chakraborty**, Senior Education Officer, and **Mr. Sudip Sengupta**, Junior Officer.

The applicants included **graduates and B.E./B.Tech. professionals** from various reputed companies, representing diverse professional backgrounds and job roles. The entrance test and viva voce were conducted smoothly and concluded successfully. The candidates are now awaiting the declaration of the entrance test results and the commencement of the admission process for the July 2026 Session.



VADODARA BRANCH

Evening Lecture on "Resilient Supply Chains: From Crisis Response to Sustainable Growth" by Mr. Avinash Srivastava on July 18, 2026 at IIMM Hall.

Mr. Avinash Srivastava (Retired AGM, Hindustan Copper Limited) is a dedicated and seasoned professional with thirty-one years of experience in Materials Management across the engineering, mining, and port terminal industries. Adept at aligning procurement strategies with corporate goals. Skilled in analysing and evaluating bids, providing timely advice on procurement issues and adapting to changing scenarios. He possesses comprehensive knowledge of customs regulations and provides professional consulting services in Supply Chain & Materials Management, helping businesses enhance operational efficiency, improve working capital utilization, and achieve sustainable cost savings.



Brief of the Talk: Resilient supply chains evolve from reactive crisis response into proactive, long-term drivers of sustainable growth by embedding flexibility, visibility, and collaboration.

Resilience is not merely holding costly safety inventory or building defensive margins. It is the systemic organizational capability to anticipate major market shifts, absorb unexpected economic shocks, adapt to real-world limits, and recover rapidly.

While Resilience focuses on absorbing market shocks, protecting production assets, and restoring normal operations, Agility focuses on the velocity of adjustment, allowing firms to pivot operations quickly when challenges occur.

Sustainability has shifted from an optional marketing footprint to a core mandate for business survival. A significant portion of an enterprise's environmental, social, and carbon footprint resides within its upstream supply network.

Evening Lecture on “Sarcopenia - progressive, age-related loss of skeletal muscle mass, strength, and function” by Dr. Sejal Shah & Team on June 20, 2026 at IIMM Hall.

Dr. Sejal Shah is an Orthopaedic Surgeon with more than 25 years of clinical experience. Dr. Shah is the founder of “Dr. At Doorstep” and “Nisarg Orthopedic & Maternity Hospital”.

Sarcopenia is the progressive, age-related loss of skeletal muscle mass, strength, and performance, commonly known as **the silent muscle thief**. It typically begins around age 30, with adults losing 3% to 8% of muscle mass per decade, a process that accelerates significantly after age 60. This condition drastically increases the risk of falls, fractures, and a loss of independence.

In India, a growing elderly population has led to an increased risk of falls, fractures, and hospitalizations, as well as a higher dependency on caregivers. The prevalence of **sarcopenia** rises significantly after the age of 60, affecting up to one in three older adults depending on their overall health status. This condition silently depletes muscle mass and strength as people age.

Key Characteristics:

Healthcare providers do diagnose sarcopenia based on three core features:

- **Low muscle mass:** A decrease in the size and number of muscle fibers.
- **Low physical performance:** Slow walking speed or trouble rising from a chair or climbing stairs.
- **Low muscle strength:** Weakened grip strength or difficulty lifting.

Causes:

- **Natural Aging**
- **Physical inactivity:** A sedentary lifestyle accelerates muscle decay and obesity; this damage is further compounded by prolonged bed rest, smoking, and excessive alcohol consumption
- **Poor protein intake:** Inadequate protein intake and certain nutrient deficiencies, particularly Vitamin D, are major drivers of muscle loss
- **Chronic disease:** Chronic inflammation and diseases like COPD or diabetes or heart diseases.

Warning Signs:

- **Walking slower** – A noticeable decline in walking speed—especially when you struggle to keep up with peers during regular walks.
- **Stair difficulty** – experiencing unusual fatigue or weakness while climbing stairs or mild slopes.
- **Weakened grips** – difficulty opening jars, turning doorknobs or carrying groceries.

Risk factors: Diabetics, heart diseases, obesity, long bet rests, smoking & alcohol. Signs families should look for include frequent falls, weight loss, reduced activity, and difficulty with daily tasks.

Assessment & Prevention: Medical history, physical examination, grip strength test, walking speed, body composition test. Though the loss of muscle mass is a natural part of aging, sarcopenia is not considered an

inevitable condition and can be slowed, managed, or even partially reversed

Resistance Training: Weightlifting and strength exercises—such as using bands or bodyweight—are the most effective interventions for rebuilding muscle and maintaining neuromuscular function. Exercise is the best medicine, and strength training is the most effective form. It is never too late to start. Recommended activities include walking, chair exercises, resistance bands, light weights, yoga, and balance training.

Nutritional Support: Protein is the building block of muscle. Include protein in every meal by adding items like dal, pulses, milk, curd, paneer, eggs, and soya products. Consuming adequate, high-quality protein throughout the day helps stimulate muscle protein.

An action plan for seniors involves moving daily, eating enough protein, monitoring health, and staying socially active; while sarcopenia is common, it is manageable.

Glimpses of the Evening Talk



EXECUTIVE HEALTH

YOUR AYURVEDIC GUIDE TO STAYING HEALTHY & DISEASE-FREE THIS RAINY SEASON

Dr. P. Rahmathulla [B.A.M.S., M.D (Acu.), P.G.D.H.C (Apollo Hyderabad), Chief Physician
Dr. P. Alikutty's Ayurveda and Modern Hospital - Kottakkal

The monsoon season brings a welcome respite from the heat, but it also brings unique health challenges. Do you often feel sluggish or experience digestive issues during the monsoon? Or perhaps you're wondering, "What are some practical Ayurvedic tips I can follow to avoid getting sick during the monsoon?"

Ayurveda, the ancient science of life, offers timeless wisdom to navigate these changes. This guide provides Ayurvedic diet and lifestyle tips for staying healthy during the monsoon season, helping you embrace the rains without falling ill. Let's dive into Monsoon Wellness Ayurveda!

1. Understanding the Monsoon & Your Body (Ayurvedic Perspective)

The rainy season, or Varsha Ritu as it's known in Ayurveda, has a profound impact on our bodies. Understanding this is the first step towards healthy rainy season living.

The Ayurvedic View of Monsoon (Ritu Charya): Why Monsoon Affects Us

According to Ayurveda, each season has specific qualities that influence our doshas – Vata, Pitta, and Kapha. During the monsoon, the atmosphere becomes cool, damp, and windy. These qualities can easily disturb our internal balance.

Key Dosha Changes in Monsoon:

Vata Aggravation and Pitta/ Kapha Accumulation

The primary dosha that gets aggravated during monsoon is Vata. Vata is associated with dryness, coldness, and movement. The windy, unpredictable weather of the monsoon can increase Vata, leading to issues like joint pain, bloating, and dryness.

While Vata is aggravated, Pitta and Kapha can also accumulate. The dampness can increase Kapha, leading to colds and congestion, while the general environmental changes can sometimes affect Pitta, impacting digestion.



Common Monsoon Challenges: Digestive Issues, Colds, Joint Pains, Skin Problems

It's common to experience a weakened digestive fire (Agni) during the monsoon. This can lead to indigestion, bloating, and even diarrhoea. Colds, coughs, and joint aches are also frequent visitors. Skin problems like fungal infections can also flare up due to the humidity.

2. Ayurvedic Diet for Monsoon Wellness (Ahar)

"How does Ayurveda suggest we adjust our diet and daily routine to stay healthy when it's constantly raining?" Your diet plays a crucial role in preventing monsoon diseases with traditional Ayurvedic remedies and daily routines.

Foods to Embrace: Light, Warm, Cooked & Easily Digestible Meals

To support your digestive fire, opt for light, warm, and freshly cooked meals. Soups, stews, and khichdi (a rice and lentil dish) are excellent choices. Grains like rice and barley are generally easier to digest.

Herbs & Spices for Monsoon: Ginger, Turmeric, Cumin, Black Pepper

These aren't just for flavour! Ginger, turmeric, cumin, and black pepper are powerful digestive aids and immune boosters. Include them generously in your cooking. A warm ginger-honey concoction can work wonders for a sore throat.

Foods to Avoid: Raw Salads, Heavy Meats, Deep-Fried Items, Cold Beverages

During monsoon, your digestion is weaker. Avoid raw salads, as they can be difficult to digest and may carry contaminants. Heavy meats and deep-fried items can burden your system. Stay away from cold beverages and ice cream, as they dampen your digestive fire and can aggravate Vata.

Hydration Wisdom: Boiled & Warm Water, Herbal Teas

It's tempting to drink cold water, but boiled and warm water is highly recommended. It helps flush out toxins and keeps your digestive system happy. Sip on herbal teas like ginger tea, tulsi tea, or cumin-coriander-fennel (CCF) tea.

3. Daily Routines for Monsoon Health (Vihar)

Beyond diet, your daily routine significantly impacts your well-being. This section covers holistic Ayurvedic approaches to boost immunity and manage common ailments in the rainy season.

Dinacharya (Daily Regimen) Adaptations for Rainy Season

Rise early and practice a gentle routine. Oil pulling with sesame oil can be beneficial. Keeping your environment clean and dry is also crucial.

Importance of Adequate Rest & Sleep

The dampness and lack of sunlight can make you feel

lethargic. Ensure you get adequate rest and sleep to allow your body to rejuvenate and strengthen its immunity.

Gentle Exercise & Yoga for Monsoon (e.g., specific Asanas to balance Vata)

While intense workouts might not be suitable, gentle exercise and yoga can be very beneficial. Asanas like Paschimottanasana (seated forward bend) and Marjaryasana (cat-cow pose) can help balance Vata. Focus on movements that are grounding and calming.

Personal Hygiene & Cleanliness Tips

With increased humidity, personal hygiene is paramount. Take warm baths, keep your clothes dry, and wash your hands frequently.

Protecting Yourself from Dampness & Cold

Wear appropriate clothing that keeps you warm and dry. Avoid sitting in damp clothes. Use umbrellas and raincoats when stepping out.

4. Herbal Remedies & Home Care for Common Monsoon Ailments

Even with precautions, you might encounter common monsoon ailments. Here are some natural solutions.

Digestive Aids: Natural Solutions for Indigestion, Bloating, Diarrhoea

For indigestion, a mixture of ginger juice and honey can help. For bloating, a pinch of asafoetida in warm water can be effective. In case of mild diarrhoea, a concoction of roasted cumin powder with buttermilk can provide relief.

Respiratory Relief: Combating Colds, Coughs, and Sore Throats

Steam inhalation with a few drops of eucalyptus oil can clear congestion. Turmeric milk (haldi doodh) is excellent for coughs and sore throats. Chew on a piece of ginger with a pinch of salt for a sore throat.

Joint Care: Managing Aches and Pains in Damp Weather

Regular self-massage (Abhyanga) with warm sesame oil can alleviate joint pain. Applying warm compresses can also provide relief.

Skin & Hair Care: Preventing Fungal Infections and Hair Fall

Keep your skin dry and clean. For fungal infections, apply a paste of neem leaves. For hair fall, a warm oil massage with bhringraj or Brahmi oil can be beneficial.

Boosting Immunity Naturally

Regular consumption of Chyawanprash, a traditional Ayurvedic herbal jam, is excellent for boosting overall immunity. Turmeric, ginger, and amla are also potent immune boosters.

5. Ayurvedic Therapies & Preventive Care

For deeper healing and prevention, consider these Ayurvedic therapies.

Detoxification & Panchakarma (Brief Introduction & When to Consider)

Panchakarma are five traditional detoxification therapies.

While complex, a brief introduction helps. They can be very effective for deep cleansing and balancing doshas, but should only be done under the guidance of an Ayurvedic physician.

(Click the link below to know More on our Panchakarma Treatment: Treatments | Dr. P. Alikutty's Ayurveda & Modern Hospital - Kottakkal

- Abhyanga (Self-Oil Massage) for Monsoon

Abhyanga, a daily self-oil massage, is highly recommended. Use warm sesame oil, especially before bathing. It calms Vata, nourishes the skin, and strengthens the body.

- Nasya (Nasal Application) for Respiratory Protection

Nasya involves applying a few drops of warm sesame oil or specific Ayurvedic nasal drops (like Anu Tailam) into each nostril. This helps protect the respiratory passages from infections and keeps them lubricated.

Consulting an Ayurvedic Physician: When Professional Guidance is Needed

While these tips are helpful, for persistent or severe health issues, it's always best to consult an Ayurvedic physician. They can provide personalized advice and treatments.

6. Lifestyle Tips for Mental & Emotional Well-being in Monsoon

The gloomy weather can sometimes affect our mood. Let's explore how to keep your spirits high.

Managing Monsoon Blues

Staying Positive

Engage in activities you enjoy. Listen to uplifting music, read books, or spend time with loved ones. Keep your home well-lit and cheerful.

Connecting with Nature (Safely)

Even during the rains, find safe ways to connect with nature. Observe the greenery, listen to the rain, or take a short walk in a well-protected area.

Mindfulness & Meditation

Practicing mindfulness and meditation can help you stay grounded and calm amidst the external changes. Even a few minutes of deep breathing can make a difference.

Embracing these Ayurvedic diet and lifestyle tips for staying healthy during the monsoon season can truly transform your experience. By understanding your body and making conscious choices, you can enjoy the beauty of the rainy season while staying healthy and disease-free.

What's one small change you're ready to make to your routine this monsoon for better health?

Wish you a healthy monsoon.

Source: drpalikuttysayurveda.com





IIMM Research Centre
**CENTRE FOR RESEARCH IN
MATERIALS MANAGEMENT (CRIMM)**



Minutes of meeting of CRIMM at SAP conference room of TIU, WB on 27th March, 2026

Agenda of BOG Meeting of CRIMM at SAP Conference Room on 27 th March 2026 at 3.30 pm

1. Introduction of BOG members of CRIMM
2. Proposed activities of CRIMM during the next financial year to be discussed and adopted
3. Introduction of Certificate program, if any, proposed for the next financial year to be discussed and adopted.
4. Introduction of Project Management programs in collaboration with Project Management Institute USA, if any, proposed for the next financial year to be discussed and adopted.
5. Scope of fundamental research in Supply Chain Management
6. e-Journal of CRIMM
7. Discussions on Financial Performance of CRIMM
8. Support from IIMM
9. Opening of overseas Research Centres
10. Execution of renewal of CRIMM Agreement
11. Press release
12. Any other point of relevance
13. Close of Meeting

Introduction of BOG members of CRIMM

BOG Member nominated by IIMM

- 1) Mr. Malay Chandan Mazumdar Jt, Chairman
- 2) Dr. Nripendra Kumar Member
- 3) Dr. Y Venkata Ramana Member
- 4) Dr. Dibakar Swain Member
- 5) Gajanan Palankar, Fellow - CRIMM Member
- 6) P Sengottaiyan, Fellow - CRIMM Member
- 7) Dr. Samar Roy Chowdhury Member
- 8) Mr. Animesh Chattopadhyay Member

BOG Member nominated by TIU,WB

- 1) Prof. (Dr) Goutam Sengupta, Rector TIU, WB - Joint Chairman
- 2) Prof. (Dr) Debashis Chaudhuri, Dean (Engineering, Projects, Students Affairs), TIU, WB- Member
- 3) Prof. (Dr) S N Roy, Adjunct faculty, TIU,WB- Member
- 4) Prof. (Dr) Tripti Chakrabarti, Dean Basic Sciences, TIU,WB- Member
- 5) Prof. Asoke Kumar Paul, Associate Professor, TIU,WB- Member

- 6) Prof. (Dr.) Debabrata Bhattacharjee, Professor, TIU,WB- Member
- 7) Mr. Soumitra Bhowmick, Vice President and CFO, Techno India Group-Member
- 8) Dr. Paramita Sen, Assistant Professor, Rector's Office, TIU,WB- Member

Advisor

- 1) Mr. Asok Dasgupta, Advisor
- 2) Dr. PK Dey, Professor, Aston Business School, UK
- 3) Prof. (Dr) Gautam Majumdar, Pro Vice Chancellor, TIU,WB

Board of Research Studies

- 1) Prof (Dr) Goutam Sengupta,(Chairman)
- 2) Prof.(Dr.)S N Roy
- 3) Prof (Dr) Debashis Chaudhuri
- 4) Dr. D. Rajasekar
- 5) Dr. A.V. Shama Sundar

Proposed activities of CRIMM discussed and adopted

- 1.0 Target of CRIMM fellowship :
Target for the Calendar year 2026:
10 – 15 Fellowship
- 2.0 National and Global Summits: 4 per year
- 3.0 Consultancy
Kept in abeyance. Prof SN Roy will prepare an approach paper BY MID MAY, 2026

Introduction of Certificate/Diploma program -proposed and adopted.

- 1.0 Certificate program on Supply Chain Management may be launched by TIU in collaboration with CRIMM (It will be discussed and National President of IIMM to revert back.
- 2.0 Certificate program on Purchasing Management may be launched by TIU in collaboration with CRIMM (It will be discussed and National President of IIMM to revert back.).
- 3.0 Certificate/Diploma program on Logistics Management
- 3.1 Diploma program may be launched by TIU in collaboration with CRIMM (It will be discussed and National President of IIMM to revert back.
- 3.2 Kolkata Branch of IIMM should give a preference TIU/CRIMM while approaching other Universities on matters of launching joint certificate courses. TIU will send a request letter to Chairman Kolkata Branch to this effect.

For more information please contact

MALAY C MAZUMDAR, Jt. Chairman – CRIMM

M: 9909910964 / 9726425331 Email: malay_mazumdar@yahoo.co.in, crimm.malayimm@gmail.com



BRANCH ACTIVITIES





भारतीय सामग्री प्रबंधन संस्थान
Indian Institute of Materials Management

NHQ - Plot No. 102-104, Sec.-15, Institutional Area, CBD Belapur, Navi Mumbai - 400614

Next Admission

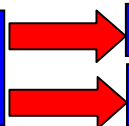
AUGUST

2026 SESSION

Explore a career in Management of Purchasing, Supply Chain, Logistics & Materials Management

AICTE APPROVAL – F.NO. Western/ 1-46216228266/2026/EOA

Post Graduate Diploma



Materials Management

Logistics & SCM

THROUGH DISTANCE (CORRESPONDENCE) MODE

FRESH GRADUATES CAN ALSO APPLY - ENTRANCE TEST on 9th August 2026 at ALL IIMM BRANCHES

S. No.	Programmes	Approved	Eligibility	Duration
1.	Post Graduate Diploma in Materials Management (PGDMM)	AICTE	Graduate in any discipline from any Recognized University	2 Years
2.	Post Graduate Diploma in Logistics & SCM (PGDL&SCM)	AICTE	Graduate in any discipline from any Recognized University	2 Years

PROSPECTUS CAN BE OBTAINED FROM FOLLOWING IIMM BRANCHES
Prospectus Cost Rs.1000/- & By Post Rs.1100/-

REGIONS	CITIES
NORTHERN REGION	ALWAR - 9731245655/ 787775655 AJMER-9928019295 AYODHYA – 9415402109 BHIWADI – 9828588567 CHANDIGARH 9815314430 / 0172-2556646 DEHRADUN 7906443191 DELHI 011 -41354969/9810830427/9818664267 GREATER NOIDA 9818464359 JAIPUR 9799299157 KANPUR 7897000150 / 9935032495 LUCKNOW 9415752999 LUDHIANA 0161-5212268/9815549987 RAE BARELI 9451077744 UDAIPUR 7568419514, 9772704888
EASTERN REGION	BOKARO 8986873175 / 8986873151 BURNPUR 9434777116 DHANBAD 9470595541 DURGAPUR 0343-2574303 JAMSHEDPUR 9308321421 KOLKATA 6291335421 / 9836123999 / 9123705058 NALCO NAGAR 9437081126 RANCHI 7362864717/ 8987788599 ROURKELA 8260711943
WESTERN REGION	AHMEDABAD 7383012684 / 9909996711 BHARUCH 9998975891 CHHATRAPATI SAMBHAJINAGAR 9423455983 GOA 9423007106 GANDHIDHAM 7046737857/9925066322 JAMNAGAR 0288-2750171 MUMBAI 7738543596/9820393639 MUNDRA 9687660068 NASHIK 9850730029 / 9356466083/0253-4044406 PUNE 7276010854 SURAT 0261-2802682 VADODARA 7043959060 / 7802053410 VAPI 8758294011 VITTHAL V NAGAR 9825028050
SOUTHERN REGION	BANGALORE 080-25327252/9148745062/9972441466 CHENNAI 044-23742750/ 9444656264 COCHIN 048422203487 / 9400261874 HOSUR 9448018407 HUBLI 0836-2264699/ 9482779440 HYDERABAD 9949872010 / 9398910901 KGF 9880994684 MANGALORE 0824-2882203 MYSORE 9620001502 TRIVANDRUM 8086011015 VISAKHAPATNAM 9701347694
CENTRAL REGION	BHOPAL 8085856437 BHILAI 9407984081 BILASPUR 9425531806 INDORE 9826625417 NAGPUR 0712-2229446/9423074072

A form can be downloaded from www.iimm.org.in/register and can be submitted to nearest IIMM Branch

For more information, please visit : www.iimm.org

NHQ-Mumbai 022-45001022

iimmedu@iimm.co.in

NHQ-Delhi Office : +91 99908 99961

education.nhqdelhi@iimm.org