CYIENT

SUPPLY CHAIN EXCELLENCE IN MANUFACTURING

Effective Lean Practices Enhancing Supply Chain Efficiency in Manufacturing

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Abstract

In today's dynamic global market, manufacturing supply chains face mounting pressures, from evolving customer expectations to disruptions and geopolitical uncertainty. This whitepaper explores how leading manufacturers are transforming their supply chains into agile, resilient, and data-driven ecosystems. It highlights strategies such as digitization, predictive analytics, and real-time visibility to drive operational efficiency and gain a competitive advantage.

The Case for Supply Chain Transformation in Manufacturing

In manufacturing, the supply chain is a complex, multi-tiered network managing the flow of materials, components, and data from suppliers to production and final distribution. A well-structured supply chain shortens lead times, stabilizes inventory, and aligns production with demand—crucial in Just-In-Time (JIT) and Lean environments where disruptions cause downtime, higher costs, and reduced throughput.

Advanced Supply Chain Management (SCM) systems integrate ERP, MES, and PLM platforms to synchronize procurement, production planning, and logistics in real time. Cyient manages these critical functions to ensure smooth execution and operational alignment. Additionally, Cyient's strong BOM management guarantees accurate component traceability and material availability throughout manufacturing, reducing variability and delays.

Challenges of Traditional Supply Chain Models

Supply chains are expected to be agile, resilient, and cost-efficient, while simultaneously meeting growing customer demands for quality and speed. However, global sourcing complexities, volatile demand, supply disruptions, and heightened sustainability pressures are exposing the limitations of traditional supply chain models.

A recent report found that 64% of aerospace and defense firms experienced at least one major supply chain disruption in 2025, showing only marginal improvement from the previous year. Many cited prolonged lead times and persistent material shortages. While 65% of companies have adopted or plan to adopt AI and digital tools, most report that fewer than 10% of business processes are currently digitized.

Key Challenges Include

Siloed and disparate systems that hinder smooth data flow and coordination

Poor data governance and lack of standardization, leading to inconsistent and unreliable information

Limited visibility and transparency across suppliers and production processes, making it difficult to track progress or resolve issues

Inconsistent quality and compliance across different suppliers, especially problematic in regulated industries

Difficulty managing supplier data across geographies and projects, complicating collaboration and oversight

Long lead-times, excess inventory, and logistics inefficiencies, which increase costs and reduce responsiveness

Cyient's Framework for Effective Supply Chain

A robust, data-driven, and digitally connected supply chain empowers manufacturers to respond swiftly to market changes, mitigate risks, optimize costs, and improve operational performance. According to recent projections, the global supply chain digital transformation market was valued at US$1.21 billion in 2024 and is projected to reach US$2.93 billion by 2033, growing at ~10.3% CAGR from 2025 onward. Notably, over 38% of suppliers now use real-time shipment or inventory tracking, up from 29% in 2021.

Improving supply chain efficiency requires a combination of strategic planning, digital tools, lean practices, and collaboration. Cyient adopts a structured approach to enhance supply chain performance through the following focus areas:

1. **Sourcing Strategy and Supplier Performance Management**
2. **Design-to-Supply Alignment**
3. **Leveraging Technology to Automate Supply Chain Processes**

Cyient helps accelerate its customers' journey toward a streamlined supply chain and supplier management. Below are real-world use cases implemented across our customer base that address common supply chain challenges.

1. Sourcing Strategy And Supplier Performance Management

An effective sourcing strategy is essential for optimizing supply chains, minimizing costs, and securing sustainable competitive advantage. To ensure strategic alignment, organizations should:

- Align sourcing decisions with business goals and market dynamics
- Conduct comprehensive supplier market analysis leveraging data-driven insights
- Foster long-term partnerships and strong collaboration with key suppliers
- Implement structured risk management and mitigation frameworks
- Focus on long-term value creation and encourage supplier-led innovation

Cyient's Effective Sourcing Strategies:

1a. Avoid Single-Source Dependency: Building a Dual/Multi-Sourcing Strategy:

To ensure continuity and mitigate supply risks, Cyient helps clients identify high-risk, single-source items and prequalify multiple suppliers. This involves geographic diversification and tiered supplier relationships, integrated into a broader risk management framework.

Use Case:

For a North American customer, Cyient resolved a single-source dependency challenge related to weld overlay materials. The client had been relying on a sole supplier, which limited cost transparency and exposed them to potential supply risks. To address this, Cyient conducted a detailed market analysis and successfully onboarded an alternate Canadian supplier who met all technical and quality benchmarks. This expansion of the supplier base improved procurement leverage, enhanced risk mitigation, and ensured greater continuity of supply, ultimately strengthening overall supply chain resilience and operational efficiency.

OUTCOME

- 30% cost reduction on weld overlay materials
- Dual sourcing strategy implemented to reduce dependency
- Competitive pressure created on the incumbent supplier
- Over 20 new suppliers added to the client's supply base annually

BENEFITS

- $1.2 million in annual savings and Improved supply chain resilience
- Greater negotiation leverage with the original supplier

1b. Cost Optimization through Supplier Sourcing

Cost optimization involves strategically selecting and managing suppliers to reduce procurement expenses without compromising quality or reliability. Cyient supports this by identifying competitive sources, negotiating favorable terms, and leveraging global source networks.

Use Case:

A client urgently needed Knife Edge Gate Valves but faced budget and timeline constraints. U.S.-based suppliers quoted over $340,000 with an 18-week lead time, far beyond the customer's budget of $100,000 and a 10-week window. Cyient identified a qualified Indian manufacturer and placed an order for $72,000 with an 8-week lead time.

OUTCOME

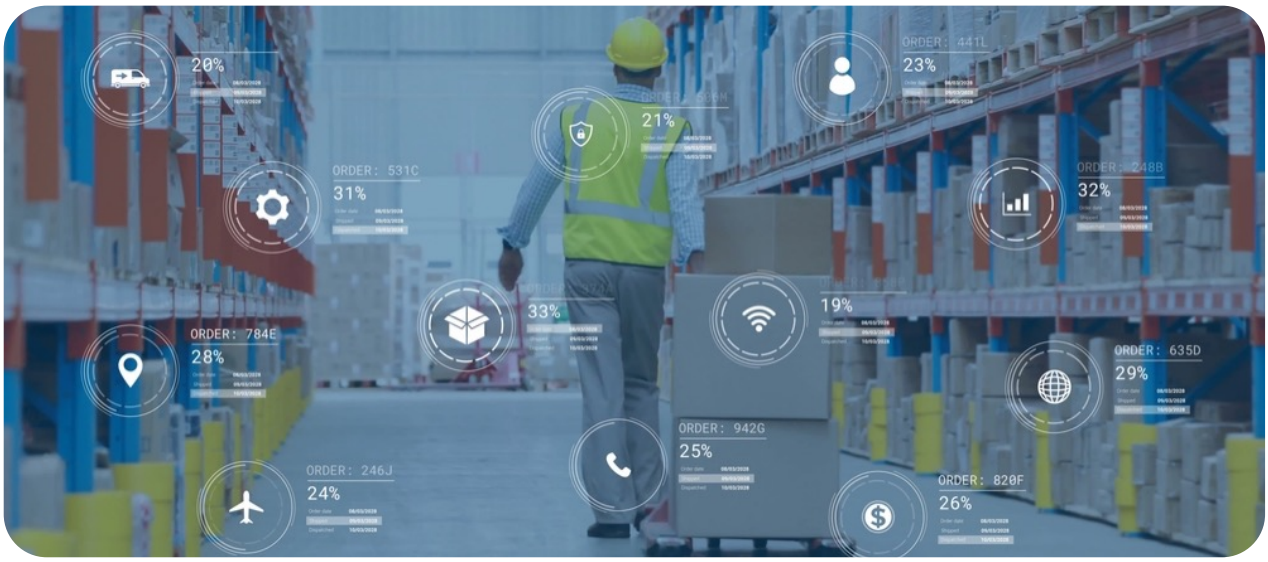
- 79% cost savings compared to domestic sourcing
- 56% lead time reduction (18 weeks → 8 weeks)
- Maintained product quality and operational reliability
- Strengthened customer trust through agile and innovative procurement

1c. Supplier Performance Management (SPM):

Supplier Performance Management (SPM) is a core element of Cyient's supply chain strategy. We select suppliers aligned with customer goals and proactively manage risks. Our SPM framework continuously monitors delivery, quality, compliance, and innovation to ensure lasting value.

Using digital tools and advanced analytics, Cyient tracks supplier performance in real time, enabling swift issue resolution and ongoing improvement. The framework includes defined performance metrics, regular reviews, and transparent communication to maintain alignment with operational objectives.

Suppliers are evaluated on criteria such as on-time delivery, rework rates, responsiveness to technical queries, adherence to project schedules, and technical expertise. This comprehensive, data-driven approach ensures consistent quality, strengthens partnerships, and builds a resilient, high-performing supply ecosystem that drives long-term operational excellence.



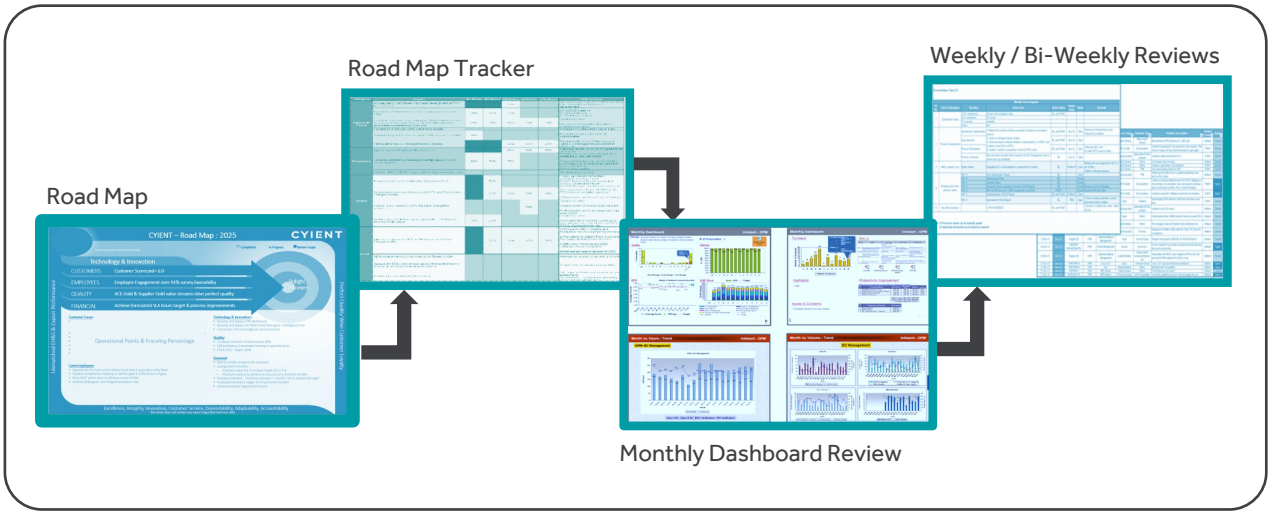
Performance Monitoring:

Cyient monitors supplier performance through a balanced scorecard approach, focusing on five key dimensions such as cost, quality, delivery, sustainability, and risk. This method enables data-driven decision-making and fosters accountability across the supply base.

To support this framework, Cyient followed a structured review cadence:

- Annual roadmaps are developed with defined targets and strategic goals.
- Weekly calls are conducted to address operational issues in real time.
- Monthly dashboard reviews evaluate process KPIs.
- Quarterly reviews assess progress against these targets.

Each process is assigned a dedicated owner and at least two trained backups to ensure continuity and accountability. This disciplined governance model strengthens supplier relationships, drives continuous improvement, and enhances overall supply chain resilience and performance.



2. Design-to-Supply Alignment

Engineering Change Management (ECM):

ECM is essential for maintaining agility and responsiveness in product development and manufacturing. At Cyient, engineering change requests follow a structured review and decision-making process during Change Order (CO) incorporation, ensuring that necessary changes are implemented in the subsequent procurement cycle

Use Case:

Cyient has established a standardized Engineering Change Order (ECO) process to manage updates to Bills of Materials (BOMs) and engineering data, including Change Requests (CRs) and Service Bulletins (SBs), ensuring traceability and regulatory compliance throughout the product lifecycle. This process promotes coordination across engineering, procurement, manufacturing, and maintenance, reducing risks of non-conformance and disruption.

When a CR or SB arises—due to safety, design improvements, cost savings, or supplier changes—Cyient manages it through a controlled Change Order workflow, reviewed by stakeholders and integrated into procurement and production cycles. BOM updates are accurately captured and communicated across systems, maintaining alignment between design and production.

Integration with customer systems enables real-time tracking, audit readiness, and configuration control, enhancing product quality, reliability, and compliance. Fully managed by Cyient, this process improves decision-making, minimizes risk, and ensures only approved parts and configurations are used, resulting in better quality, compliance, and efficient maintenance for aircraft in service

Value Addition:

- Over 90% of COs are incorporated within the 14-days target window
- A standardized BOM change process ensures consistency and timely implementation
- Introduced visibility into new parts through COs, with forecasting of obsolete parts

3. Leveraging Technology to Automate Supply Chain Processes

Cyient transforms aerospace supply chains through advanced technology and automation. By integrating IoT, predictive analytics, and AI-driven demand forecasting, Cyient improves supply chain visibility and resilience for OEMs and Tier-1 suppliers. These solutions optimize inventory, shorten lead times, and enhance supplier collaboration, enabling data-driven decisions across the value chain.

Cyient's end-to-end digital transformation helps clients proactively manage risks and adapt quickly to market changes. Automation in procurement, inspections, and logistics—using intelligent systems and robotic process automation (RPA)—reduces manual work, speeds up throughput, and ensures compliance with aerospace quality standards.

With a focus on innovation and continuous improvement, Cyient is a strategic partner in building smarter, future-ready supply chains.

In this approach, Cyient provides extensive support in the following areas

1. Optimization of OEM Inventory using Predictive Analysis
2. Automation of Change Order Management Process

3.1. Optimization of OEM Inventory using Predictive Analysis

The aircraft OEMs operate within a complex supply chain where maintaining optimal inventory levels of spare parts and components is critical to ensure uninterrupted production and customer support.

For an aircraft OEM, inventory management relies heavily on historical consumption patterns, manual assessments, and decentralized decision-making across programs and facilities.

The absence of a standardized forecasting or optimization framework often results in either excess inventory tying up capital or shortages of spares impacting schedules and aftermarket commitments.

This highlights a growing need to enhance inventory visibility and balance across the enterprise through more data-driven, predictive management practices.

Process Steps:

- Cyient reviews the Request for Action received from sites and initiates the necessary part replacement, including generating return numbers.
- If the requested part is available at customer plants, it is shipped immediately.
- If the part is out of stock or at the minimum order quantity (MOQ) level, it is backordered. The supply chain or buyer is then notified to initiate procurement.
- Procurement & Delivery: Once the part is procured, it is shipped to the respective OEM.

Challenges:

- Delays in part shipment due to stock unavailability at OEM locations
- No demand forecast for unplanned failures, leading to stock-outs
- High safety stock levels at OEMs, with dead inventory offering little value
- Safety stock includes slow-moving or obsolete parts
- High turnaround time (TAT) for part delivery to OEMs

Cyient's Predictive Solution:

Cyient can provide an integrated predictive-inventory solution for an aircraft OEM that ingests historical consumption, maintenance schedules (checks/inspections), fleet utilization, lead times and supplier performance to generate spares parts demand forecasts and inventory plans. The solution aligns MRO and OEM planning by modelling intermittent/sporadic spare demand, inspection-driven replacements and current supply-chain constraints.

The key features of the solution include:

- Time-series & multivariate forecasting
- Intermittent-demand specialized models for low-volume, sporadic spare parts
- Probabilistic risk scoring and AOG prediction to prioritize parts and preposition stock
- Supply-chain constraint modelling and optimization

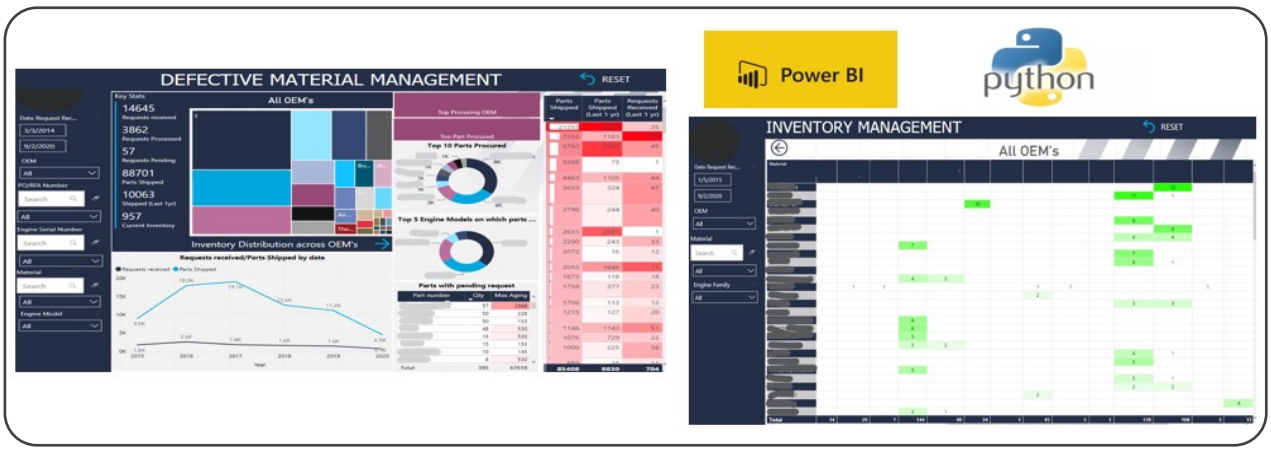
Specific deliverables include:

- SKU-level demand forecast horizon (e.g., 1, 3, 6, 12 months) with prediction intervals and confidence scores
- Dynamic reorder points, optimized safety stock per location and program (including centralized vs regional stocking)
- AOG / criticality heatmap and short-term "next-72-hours" risk alerts for high-impact parts
- Inventory classification dashboards (critical, essential, non-critical) and aging / obsolescence flags for working-capital reduction.
- Supplier performance & lead-time analytics (probability distributions of lead time) to drive safety-stock uplift and alternative sourcing suggestions
- Business impact KPIs: forecast accuracy, inventory days of supply (DoS) by class

The solution, developed using Power BI and Python, enables advanced analytics and visualization for data-driven inventory decisions.

OUTCOME:

- 50% reduction in safety stock value at OEMs
- 80% accuracy in predicting top part failures
- 50% reduction on part delivery turnaround time
- Advanced forecasting improved demand-supply alignment
- Part shipment TAT reduced from 14 days to under 3 days
- OEM consignment stock accuracy improved to 99%, exceeding the 95% benchmark



3.2 Automation of Change Order Management Process

Manual supply chain operations, particularly data extraction and analysis, are often time-consuming, error-prone, and difficult to scale. Cyient addresses these challenges through Robotic Process Automation (RPA), which automates high-volume data extraction across multiple sources in real time. This transformation enhances speed, accuracy, and responsiveness while reducing manual intervention.

Cyient has taken full responsibility for the Engineering Change Order (ECO) process, helping customers manage complex updates related to Change Requests (CRs) and Service Bulletins (SBs). Using integrated digital tools such as PLM, SAP, and Digital Thread (DT) systems, alongside workflows like Request for Action (RFA), Cyient ensures traceability, regulatory compliance, and structured change control. While some post-ECO processes remain manual due to the complexity of aerospace change logic, Cyient maintains high process integrity through strong governance and deep domain expertise.

Key Highlights:

- RPA enables real-time, high-volume data extraction across the supply chain
- Manual ECO processes are digitized using PLM, SAP, and DT platforms
- End-to-end traceability and compliance in engineering changes
- Post-ECO manual tasks are governed by rigorous quality checks to maintain safety and regulatory alignment.

Building Future-Ready Supply Chain

Effective sourcing strategies and strong supplier performance management form the foundation of a resilient supply chain. Aligning design with supply capabilities ensures feasibility and reduces early-stage risks. Leveraging digital tools improves visibility, responsiveness, and decision-making.

Finally, embedding a culture of continuous improvement is essential for driving long-term competitiveness and achieving supply chain excellence.

About the Author

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The author has over 20 years of experience in aerospace supply chain operations, digital transformation, and global program delivery. He has supported the operations program management group for North America Aero Engine Customer. Throughout his career, he has led numerous digital transformation initiatives, delivered measurable cost savings and deployed predictive solutions using Python and AI. His expertise spans material planning, procurement, and supply chain optimization, with a strong focus on driving operational efficiency and strategic value.

About Cyient

Cyient (Estd: 1991, NSE: CYIENT) delivers intelligent engineering solutions across products, plants, and networks for over 300 global customers, including 30% of the top 100 global innovators. As a company, Cyient is committed to designing a culturally inclusive, socially responsible, and environmentally sustainable tomorrow together with our stakeholders.

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