



RESHAPING THE PAPER AND PACKAGING INDUSTRY WITH AI

Abstract

Paper and packaging enterprises need a new technological approach that can reimagine ways of working across the fiber-to-paper-to-packaging value chain. It must support profitable growth amid volatile recovered-fiber prices, energy-intensive operations, tightening sustainability regulation, and relentless e-commerce-driven demand for corrugated and fiber-based formats. Manual, repetitive, and quality-critical processes must be replaced with automated, smarter, and compliant practices that protect margins, minimize waste, and uphold food-contact safety and traceability.

Introduction

The paper and packaging industry is undergoing a significant change. A structural shift from single-use plastics toward recyclable, biodegradable fiber-based packaging, combined with the explosive growth of e-commerce, is reshaping demand and forcing producers to reimagine their value chains. The new goal is smarter, cleaner, and more predictive operations, from pulp mill to converting plant to last-mile shipper. Agentic AI and generative AI (GenAI), when implemented effectively, have the potential to reimagine paper and packaging operations. However, this calls for

strong data management and trust in AI models.

What enterprises need is a way to strategically implement AI through value-based approaches. The Infosys AI First Value Framework is a purpose-built framework, guided by six principles: orchestration, data-driven insights, modernization, transformation, innovation, and trust. It provides a systematic approach with defined tools that can help paper and packaging enterprises harness AI for greater success.



Overview of Paper and Packaging Industry Challenges

The global paper and paperboard packaging market has grown steadily, with fiber-based packaging demand rising from roughly 385 million tonnes in 2018 to over 420 million tonnes in 2024, driven by plastic substitution and e-commerce. Corrugated cases alone now account for an estimated 80% of e-commerce shipments. Yet producers face intense margin pressure: recovered fiber (recycled) price indices in Europe swung more than US \$50 per tonne within 2024 as new containerboard capacity outpaced collection growth, squeezing converter EBITDA.

At the same time, the industry runs on a high-energy, capital-intensive model. Pulp drying, steam generation, and drying sections make mills among the most energy-hungry manufacturing operations,

while tightening extended-producer-responsibility (EPR), PFAS, and recyclability regulations raise the compliance burden. Over 70 countries have introduced regulatory roadmaps targeting single-use plastics, indirectly accelerating fiber demand while adding traceability and reporting obligations.

Paper and packaging operations generate vast amounts of data, from wood-yard and pulping through the paper machine, coating, printing, die-cutting, and warehousing. But without the right infrastructure and tools, producers are unable to effectively leverage this data for smarter operations. Moreover, AI adoption remains fragmented, delivering value through isolated use cases but falling short of system-wide transformation. The real opportunity lies in connecting operational data to scale AI across the enterprise, enabling integrated, predictive, and optimized decision making from fiber to finished shipper.

Infosys AI First Value Framework: Unlock AI Value in Paper and Packaging Industry

The Infosys AI First Value Framework comprises six key pillars, helping organizations prioritize areas for AI investment, enhance data quality, embed AI into operations, deploy AI agents, enable autonomous

decision making, and modernize legacy systems. Together, these pillars form a cohesive, end-to-end roadmap based on a core principle: for AI to be transformative, it must be trusted.

Infosys AI Hexagon: **Paper and Packaging Industry**

Ethical, transparent, and accountable AI

- AI-led ESG platforms for compliance
- Human-in-the-loop oversight
- Explainable AI for critical shop-floor decisions
- AI Guardrails for responsible fiber sourcing

Bring AI to the shop floor for safer, self-optimizing operations

- AI-powered digital twins for machine sensor data
- Vision-based defect and effluent monitoring
- Autonomous handling, palletizing, warehousing

Modernize aging paper mills and packaging plants

- Faster troubleshooting with AI knowledge preservation
- OT/IT integration: QCS, DCS, MES, quality, ERP
- Automated contract review and lifecycle mgmt

Sequence AI bets across fiber sourcing, pulp, paper, and converting for fastest payback

- AI playbooks and value discovery workshops
- Value engineering and margin models
- Maturity assessments and opportunity mapping
- Rapid prototyping and POCs with Topaz

Unify mill, plant, and supply chain data for reliable AI

- Connected forest, woodyard, fiber-quality data
- Predictive RCA and CAPA from historical data
- Smart packaging design and simulation
- Productivity optimization across plants

Move from static reports to AI copilots and agents

- AI grade changes and machine tuning boost OEE
- AI order allocation across sister plants
- Automated sustainability and CoC reporting
- Agentic SCM swarms to boost productivity/efficiency



Paper and packaging enterprises looking to scale AI across critical operations must first lay the foundation for ethical, transparent, and accountable design. They need explainable decision making and human-in-the-loop (HITL) governance to ensure safety, product quality, and environmental, social, and governance (ESG) alignment. Practicing responsible AI emphasizes trust alongside autonomy.

Leveraging deep manufacturing and process-industry experience and strategic partnerships with leading enterprises, Infosys has contextualized the Infosys AI First Value Framework for the paper and packaging industry. The framework addresses pressing challenges and delivers specific, measurable value from AI adoption. With this approach, producers can focus on decarbonizing mills, maximizing fiber yield, and deploying autonomous converting lines. Further, they can unlock value with AI

that converts data into insight, enables outcome-driven automation, and embeds quality and safety as built-in engineering principles.

Strengthening Paper and Packaging Operations with the Six AI Pillars

The Infosys AI First Value Framework helps paper and packaging organizations unlock AI value across six value pools, described below:

1. Orchestrate: AI strategy and engineering

Transforming paper and packaging operations with AI requires strategic vision and clear direction. Typically, producers test several disconnected pilots on individual machines or plants that offer limited visibility into true return on investment (ROI) and lack a clear path to scale across the mill network.



The 'Orchestrate' pillar moves AI from experiments to enterprise-wide deployment with clarity and speed. Through strategic scaffolding, it identifies the highest-value use cases across the value chain, builds contextualized business cases, and enables rapid prototyping.

Infosys offerings that drive AI orchestration for paper and packaging enterprises are:

- Paper and packaging AI playbooks and value discovery workshops
- Value engineering, and margin-impact models
- Maturity assessment and mill-to-shelf opportunity mapping
- ROI frameworks tailored to industry KPIs such as overall equipment effectiveness (OEE), fiber yield, waste/broke rate, and right-first-time quality
- AI Radar for prioritized investment decisions across mills and converting sites
- Fiber-to-market AI Canvas that maps use cases across pulping, paper making, converting, and logistics
- Rapid prototyping & POC designing using Infosys Topaz fabric

2. Insight: Data for AI

AI models need high-quality data. Paper and packaging data is

highly complex and fragmented. Distributed control systems (DCS), quality control systems (QCS), manufacturing execution systems (MES), enterprise resource planning (ERP) platforms, laboratory information systems, and warehouse systems often exist in silos. Such data is typically characterized by inconsistent formats, poor quality, and limited accessibility.

The 'Insight' pillar consolidates fragmented data into a unified, domain-specific data platform. This acts as the key foundation for accurate, scalable AI models.

Infosys offerings that support AI insights for paper and packaging enterprises include:

- Connected forest, woodyard, and fiber-quality data
- Predictive RCA and CAPA recommendations leveraging historical operational data
- Smart packaging design and simulation for faster product commercialization
- Productivity improvement by paper mill/box plant process optimization

3. Transform: Process AI

Typically, paper and packaging operations rely heavily on rule-based control, manual scheduling, and reactive decision making across grade changes, coating, and printing.

The 'Transform' pillar augments existing workflows and applications with AI agents and co-pilots, driving predictive and intelligent operations. It transforms key areas such as machine throughput, fiber and energy efficiency, print and board quality, and ESG compliance.

Infosys offerings that drive AI transformation for paper and packaging enterprises are:

- Autonomous AI agents for production scheduling and order-to-trim optimization
- AI-optimized grade changes and machine tuning to improve OEE, reduce breaks, and lower energy and waste costs
- AI-optimized order allocation across sister packaging plants to reduce costs, improve operational efficiency, and ensure on-time customer delivery
- Automated sustainability and chain-of-custody reporting
- Agentic Swarm for SCM to improve productivity and OTD

4. Modernize: Agentic AI legacy modernization

Many paper and packaging companies rely on aging MES, ERP, and custom-built control systems that are expensive to replace and risky to decommission. Such systems are barriers to AI adoption due to difficult integrations and low-quality data, limiting operational agility.

The 'Modernize' pillar uses AI agents to upgrade legacy assets progressively. Rather than disrupting operations with a rip-and-replace approach, it connects siloed systems using an application programming interface (API) economy.

Infosys offerings that support agentic AI modernization for paper and packaging enterprises are:

- Faster troubleshooting and decision-making using AI driven process knowledge preservation and automation
- Unlock trapped operational data through intelligent OT/IT integration of QCS, DCS, MES, quality, maintenance and ERP
- Automated contract review and lifecycle management

5. Innovate: Physical AI

In the future, a significant share of paper and packaging operations is expected to become highly autonomous. Critical activities such as grade transitions, sheet-break detection, roll handling, palletizing, and equipment health

tracking are increasingly moving toward AI-embedded, edge-intelligent systems that make real-time decisions with minimal human intervention.

The 'Innovate' pillar embeds AI directly into physical mill and converting equipment (Printer-slotter, Die cutter, Flexo folder gluer etc.,) and edge infrastructure. This allows operations to shift from reactive to self-optimizing.

Infosys offerings that drive AI innovation for paper and packaging enterprises are:

- Capability to capture, interpret and act on sensor data of paper and packaging machine through AI based autonomous digital twin systems
- Vision-based paper sheet/web-defect detection and effluent monitoring for safety and compliance
- Autonomous material handling, robotic palletizing, and automated roll/warehouse logistics
- AI-powered safety surveillance around nips, rewinders, and material handling zones

6. Assure: AI trust

Safe operations and consistent quality are critical for all paper and packaging personnel. Safety incidents, quality escapes, food-contact non-conformance, and ESG non-compliance can result in steep penalties, recalls, and reputational damage. Thus, it is vital for producers to understand and trust the predictions and decisions of AI systems.

The 'Assure' pillar governs every AI deployment across the Infosys AI First Value Framework. It provides guardrails, explainability, and human oversight in all safety, quality, and sustainability-critical environments.

Infosys offerings that drive AI assurance for paper and packaging enterprises are:

- Integrated AI led ESG platforms for compliance reporting
- Operator-in-the-loop/human oversight for critical actions and explainable AI for shop-floor operational decisions
- Ensure responsible effluent discharge through AI-powered compliance monitoring
- AI governance/guardrails for responsible sourcing of fiber-based products

Transformative AI Use Cases for Paper & Packaging Manufacturing

1. Vision-based paper sheet/web-defect detection and effluent monitoring for safety and compliance

AI First Value Framework pillars: Innovate (Physical AI) + Assure (AI trust)

Detecting web defects such as holes, wrinkles, streaks, and edge cracks at machine speed is beyond reliable manual inspection, while effluent discharge must stay within tightening environmental limits. AI-driven computer vision inspects the running sheet in real time to flag and classify defects, and complementary models monitor effluent parameters against permitted thresholds. Together they protect product quality, reduce customer claims, and provide auditable evidence of environmental compliance.

Expected outcomes:

- Higher right-first-time quality and lower claim rates
- Real-time, auditable compliance for effluent discharge
- Reduced waste from earlier defect detection

2. Productivity improvement by paper mill/box plant process optimization

AI First Value Framework pillars: Insight (Data for AI)

Paper mills and box plants run complex, interdependent processes where suboptimal setpoints quietly erode throughput and yield. AI models trained on consolidated process and quality data recommend optimal operating conditions across pulping, the paper machine, and converting, and AI co-pilots surface these recommendations to operators. This shifts operations from reactive adjustment to continuous, data-driven optimization.



Expected outcomes:

- Improved throughput and overall equipment effectiveness (OEE)
- Higher fiber and energy yield
- More consistent product quality across shifts
- Minimized waste
- Reduction in time to achieve quality stabilization

3. Connected forest, woodyard, and fiber-quality data

AI First Value Framework pillars: Insight (Data for AI) + Orchestrate (AI strategy and engineering)

Fiber cost and quality begin in the forest and woodyard, yet data on species, moisture, density, and inbound quality is often fragmented and disconnected from downstream operations. A unified data platform links forest, woodyard, and laboratory fiber-quality data with production systems, giving mills a single, trusted view of raw-material characteristics. This enables predictable furnish planning and better yield from every tonne of fiber.

Expected outcomes:

- Unified, trusted view of fiber quality from forest to furnish
- Better furnish planning and reduced fiber variability
- Foundation of clean data for downstream AI models

4. Automated contract review and lifecycle management

AI First Value Framework pillars: Modernize (Agentic legacy modernization)

Supplier, customer, and logistics contracts carry obligations, pricing terms, and renewal dates that are costly to track manually across a large enterprise. A GenAI solution using large language models (LLMs) reviews contracts, extracts key clauses and obligations, flags risks and deviations from standard terms, and manages renewals and milestones across the contract lifecycle. This reduces legal effort and commercial leakage while improving compliance.

Expected outcomes:

- Faster contract review with fewer manual hours
- Reduced commercial and compliance risk from missed obligations
- Proactive management of renewals and key milestones

5. Predictive RCA and CAPA recommendations leveraging historical operational data

AI First Value Framework pillars: Insight (Data for AI)

When quality escapes or process upsets occur, root-cause analysis (RCA) is often slow and reliant on individual expertise. ML models trained in historical operational, quality, and failure data identify the most probable root causes and recommend corrective and preventive actions (CAPA). This accelerates problem resolution and helps prevent recurrence across sites.

Expected outcomes:

- Faster, more consistent root-cause identification
- Data-backed CAPA recommendations that reduce recurrence
- Captured institutional knowledge, less dependence on individuals

6. Smart packaging design and simulation for faster product commercialization

AI First Value Framework pillars: Insight (Data for AI)

Bringing a new pack format to market involves many design, structural, and material iterations that are slow and costly when done physically. Generative AI and simulation explore design options, test structural performance and material use virtually, and optimize for cost, strength, and recyclability before prototyping. This compresses the design cycle and speeds commercialization.

Expected outcomes:

- Shorter design-to-commercialization cycle time
- Optimized material use, cost, and recyclability
- Fewer physical prototypes and faster iteration

7. AI-optimized grade changes and machine tuning to improve OEE, reduce breaks, and lower energy and waste costs

AI First Value Framework pillars: Transform (Process AI) + Innovate (Physical AI)

Grade changes and unstable machine conditions are major sources of sheet breaks, off-spec production, and energy waste. AI-driven advanced process control (APC) predicts and optimizes grade transitions and continuously tunes machine parameters such as basis weight, moisture, and speed. This stabilizes the process, shortens transitions, and cuts energy and waste.

Expected outcomes:

- Higher OEE and shorter grade-change transitions
- Fewer sheet breaks and off-spec production
- Lower energy consumption and waste (broke) costs

8. AI-optimized order allocation across sister packaging plants to reduce costs, improve operational efficiency, and ensure on-time customer delivery

AI First Value Framework pillars: Transform (Process AI) + Orchestrate (AI strategy and engineering)

Allocating customer orders across a network of sister plants involves trade-offs between capacity, capability, freight cost, and delivery commitments that are hard to optimize manually. AI agents evaluate plant load, machine suitability, logistics cost, and due dates to recommend the optimal plant for each order. This lowers total cost to serve while ensuring on-time delivery.

Expected outcomes:

- Reduced production and freight cost to serve
- Improved capacity utilization across the plant network
- Higher on-time-in-full (OTIF) customer delivery

9. Automated sustainability and chain-of-custody reporting

AI First Value Framework pillars: Transform (Process AI) + Assure (AI trust)

Sustainability, extended-producer-responsibility (EPR), and chain-of-custody obligations require accurate, traceable reporting across a complex fiber supply chain. AI automates the collection, validation, and consolidation of sustainability and chain-of-custody data and generates audit-ready reports and dashboards. This reduces manual reporting effort and strengthens the reliability of ESG disclosures.

Expected outcomes:

- Reduced manual effort in sustainability and ESG reporting
- Audit-ready, traceable chain-of-custody evidence
- Fewer compliance gaps and reporting errors

10. Agentic Swarm for SCM to improve productivity and OTD

AI First Value Framework pillars: Transform (Process AI)

Supply chain management (SCM) spans demand, inventory,



production, and logistics decisions that are typically handled in silos. A coordinated swarm of AI agents works across these functions, negotiating trade-offs and orchestrating decisions end to end in near real time. This improves responsiveness, raises productivity, and protects on-time delivery (OTD) as conditions change.

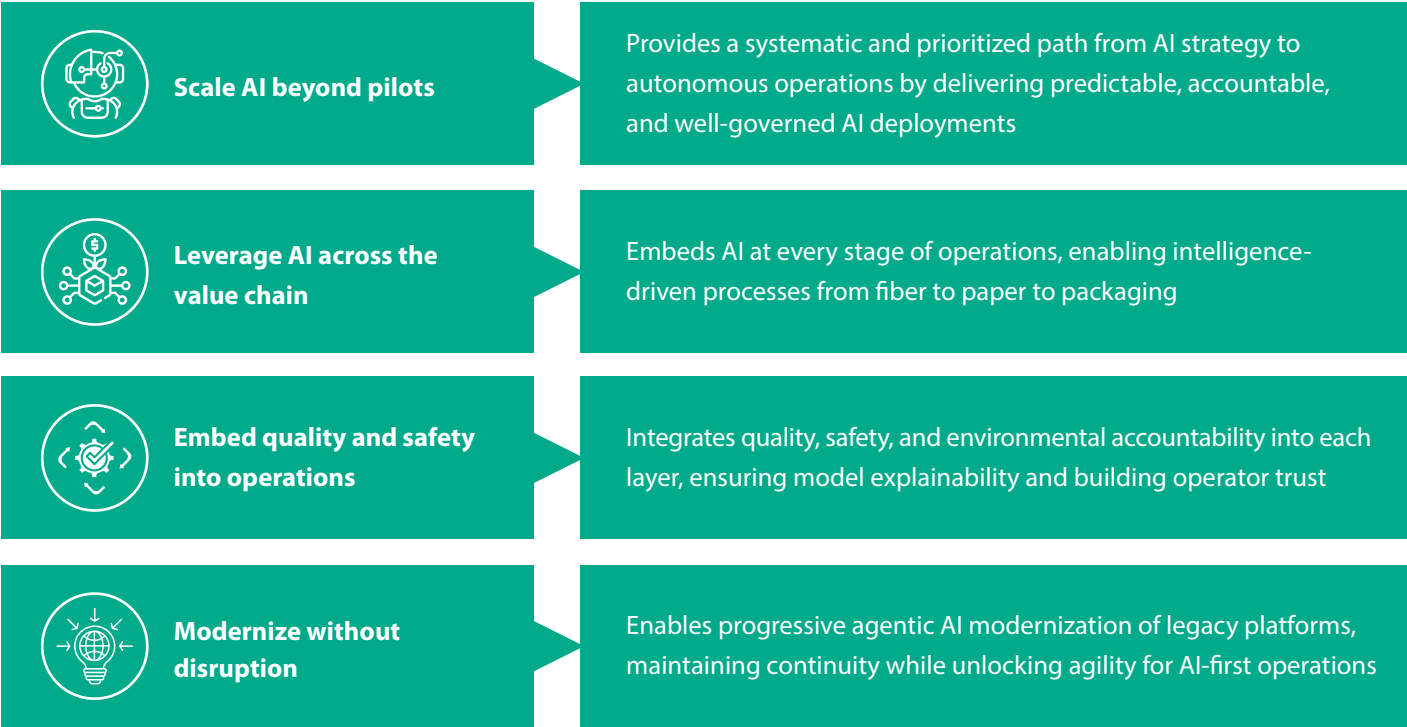
Expected outcomes:

- Improved end-to-end supply chain productivity
- Higher on-time delivery (OTD) performance
- Faster, coordinated response to disruptions

Infosys Differentiators: Key Takeaways for Paper and Packaging Leaders

With deep experience across process and discrete manufacturing and thousands of specialists across more than 15 countries, Infosys brings strong domain knowledge to the paper and packaging sector. Leveraging deep industry experience and technological expertise, Infosys brings depth and scale to drive successful AI-first transformations with measurable and scalable value.

The Infosys AI First Value Framework for the paper and packaging sector helps enterprises achieve the following outcomes:



Conclusion

As paper and packaging enterprises race to meet surging demand for sustainable, fiber-based packaging, they are also contending with volatile input costs, energy-intensive operations, and tightening regulations. To succeed, they must upgrade existing systems, integrate advanced technologies, and reimagine operations for predictability, efficiency, quality, and safety. Agentic AI and GenAI can be game-changers in this journey, provided they are adopted using a value-based transformation framework.

The Infosys AI First Value Framework is a purpose-built framework of six interconnected AI pillars, designed

to address critical challenges in paper and packaging operations. Aiming to deliver real transformation in addition to efficiency gains, the framework comes with specific offerings that map AI adoption to key functions, including yield, quality, sustainability, and workforce readiness.

It is time for paper and packaging leaders to take decisive action and embed AI across people, assets, and decision making. Those who lead such transformation will define the next era of the industry, reshaping the entire fiber-to-paper-to-packaging value chain



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