Supply Chain Resilience in the MedTech Industry

Leveraging AI
for Enhanced Resilience

eraneos

MedTech Supply Chain in 2025: From Risk to Resilience with AI

- Up to **30% inventory reduction** through AI-enabled forecasting and inventory optimization
- Supply chain shocks can cause **≈ 38% of one year's earnings loss** over a decade if unmitigated
- **48% of MedTech executives** say supply chain risks significantly affect their 2025 strategy
- Non-labor healthcare supply costs increased by **≈ 10% in 2024**, pressuring efficiency and resilience

The MedTech industry is under increasing pressure to deliver life-saving innovation amid a volatile global environment. Pandemics, geopolitical shifts, and natural disasters have revealed deep supply-chain vulnerabilities. New EU and global regulations, inflation, cybersecurity threats, and long product lifecycles add further complexity.
At the same time, sustainability expectations and digital transformation demand unprecedented transparency, agility, and collaboration across the value chain.

AI and GenAI can transform MedTech supply chains from reactive firefighting to proactive resilience — enabling predictive analytics, scenario modelling, and real-time risk detection to safeguard supply continuity, patient safety, and compliance even in turbulent times.

Six key challenges prevent MedTech companies from effectively achieving a resilient Supply Chain

Supplier and Geographic Concentration Risk

Heavy reliance on single-source or regionally concentrated suppliers creates vulnerabilities. If a critical supplier or region is disrupted, production and distribution can stall.

Global Disruptions & Geopolitical Instability

Trade tensions, sanctions, regional conflicts, extreme weather, and pandemics expose MedTech's global supply chains to sudden shocks, driving shortages, cost spikes, and delays.

Limited End-to-End Visibility and Data Fragmentation

Supply chain data remains siloed and inconsistent across tiers. This lack of harmonized, real-time insight makes it difficult to anticipate risks or respond quickly.

Regulatory, Compliance, and Sustainability Complexity

Expanding and diverging global regulations (e.g., EU MDR/IVDR, CSRD, LkSG) add compliance burdens. Ensuring all suppliers meet quality, safety, and ESG standards strains agility.

Product Lifecycle & Component Obsolescence

Long device lifecycles create risks when components become obsolete, suppliers exit the market, or servicing requirements extend for decades, threatening continuity of supply.

Cost & Margin Pressure

Inflation, rising raw material and logistics costs, and declining MedTech financing put pressure on resilience investments. Balancing cost efficiency with risk buffering remains a core challenge.

eraneos

MDR: Medical Device Regulation, IVDR: In Vitro Diagnostic Regulation, CSRD: Corporate Sustainability Reporting Directive, LkSG: Lieferkettensorgfaltspflichtengesetz

From Vulnerability to Agility: Resilient Supply Chains with the following strategies

Key Challenges

Supplier and Geographic Concentration Risk

Global Disruptions & Geopolitical Instability

Limited End-to-End Visibility and Data Fragmentation

Regulatory, Compliance, and Sustainability Complexity

Product Lifecycle & Component Obsolescence

Cost & Margin Pressure

Solution Strategies

Risk Management

Building resilience by reducing dependencies and preparing for disruption.

- Diversify suppliers and regions to avoid single points of failure
- Create targeted buffer stocks for critical components
- Extend warning time by days so you can reroute, pre-buy, or switch sources in time.
- Run scenario simulations & stress-tests (digital twins) for preparedness

End-to-End Transparency

Creating visibility and trust across the entire supply chain.

- Integrate real-time multi-tier data (suppliers, logistics, inventory)
- Standardize supplier, logistics, and compliance data (incl. UDI) to speed audits and cut reporting errors.
- Deploy supply chain control towers for continuous monitoring
- Share compliance & ESG data across partners to meet regulatory requirements

Agility

Enabling fast adaptation to changing market, regulatory, and sustainability needs.

- Use AI/ML forecasting to align production with volatile demand
- Rapidly qualify and onboard alternate suppliers when disruptions occur
- Implement flexible manufacturing & distributed production (“micro-factories”)
- Bundle CSRD/LkSG evidence and shorten sustainability reporting cycles.

Unstructured data is the core problem to be address to achieve initial successes in building a more resilient, efficient supply chain.

AI offers the opportunity to achieve relevant initial successes in this area quickly.

In the subsequent slides, we illustrate this hypothesis by guiding you through AI use case examples that help handle unstructured data and enable more data-driven supply chain management, thereby making it more resilient.

The utilization of GenAI holds great potential for MedTech companies to efficiently handle unstructured data, thereby creating a **more resilient Supply Chain**

1 Risk Management

2 End-to-End Transparency

3 Agility

1. Supplier Risk Monitoring & Compliance Summarization

Problem: Supplier instability, ESG/CSRD obligations, and geopolitical risks create complexity. Manual review of supplier reports, certifications, and contracts is slow and error-prone.

Solution: Use GenAI/NLP to automatically parse and summarize supplier reports, ESG disclosures, contracts, and news. Provide risk scores highlighting financial, compliance, or sustainability risks.

Why Relevant: With CSRD, MDR, and LkSG, supplier compliance is business-critical in MedTech. Early risk detection can reduce supply interruptions by up to 25% and cut expedite costs by 15% through proactive mitigation.

Reference Example: *DocAI for Site Lease Contracts (Telecom)* and *OCR/LLM Document Parsing (Railway)* — AI parsing of 50k+ unstructured contracts to extract compliance-critical insights.

Reference | **04** Reference | **05**

2. Early Warning System with Multimodal Sentiment & Event Analysis

Problem: Disruptions (strikes, extreme weather, cyber incidents) often appear first in weak signals hidden in local news, social media, or IoT data. Traditional monitoring misses them.

Solution: Apply GenAI with sentiment analysis and multimodal data (text, IoT/weather, image feeds) to detect anomalies and flag early indicators of disruption.

Why Relevant: Anticipating risks days earlier enables proactive action such as rerouting logistics or securing backup suppliers. Clients achieve 30% faster response time to disruptions and 20% lower emergency logistics costs.

Reference Example: *360° NPS Customer Voice (Automotive)* — AI-driven sentiment analysis of thousands of voices; approach transferred to supply chain signals.

Reference | **02**

All AI solutions are designed for responsible data usage, ensuring the protection of PHI and PII, complete audit trails, and a Human-in-the-Loop review for every critical decision.

eraneos

The utilization of GenAI holds great potential for MedTech companies to efficiently handle unstructured data, thereby creating a **more resilient Supply Chain**

3. GenAI-Driven Data Harmonization for Multi-Tier Visibility

Problem: Supplier and logistics data across tiers is fragmented and inconsistent, preventing a unified view of the supply chain.

Solution: Use GenAI to standardize contracts, invoices, and shipment data into structured formats, enabling integration into a single multi-tier control tower.

Why Relevant: Full E2E visibility reduces reporting effort by up to 40% and cuts time-to-insight by 30%. For MedTech, this transparency is crucial to managing compliance, sustainability, and risk across regulated networks.

Reference Example: *Efficient Document Parsing (Railway)* and *Inventory Cost Reduction (Manufacturing)* — harmonizing fragmented operational data to unlock transparency and efficiency.

Reference | **04** Reference | **05**

4. Predictive Inventory & Demand Management

Problem: Inaccurate demand forecasts lead to stockouts of critical devices or costly overstock.

Solution: Combine GenAI with ML to integrate sales, hospital utilization, external events, and market signals for high-accuracy forecasts.

Why Relevant: Predictive forecasting enables 20% fewer stockouts and 10% lower working-capital requirements. Especially critical in MedTech, where volatile demand for diagnostics or consumables can directly impact patient care.

Reference Example: *Forecasting for Material Requirement Planning (Manufacturing)* — AI-powered forecasting improved inventory planning across multiple units.

Reference | **02** Reference | **08**

The utilization of GenAI holds great potential for MedTech companies to efficiently handle unstructured data, thereby creating a **more resilient Supply Chain**

5. AI/GenAI-Powered Scenario Simulation & Digital Supply Chain Twin

Problem: Manual scenario planning is too slow and incomplete, missing key risks (regulatory shifts, geopolitical conflicts, supplier insolvency).

Solution: Train GenAI on historical disruptions and regulatory data to auto-generate “what-if” scenarios. Integrate into a digital twin for stress-testing responses.

Why Relevant: Predictive simulation enables MedTech firms to cut scenario-planning time by up to 50% and reduce disruption recovery costs by 15%. This helps safeguard supply continuity and patient care through proactive risk management.

Reference Example: *Digital Twins for Wind Turbines (Energy)* and *Digital Twin for Aerospace Oxygen System (MRO)* — predictive modelling and simulation applied to supply chains.

Reference | **06** Reference | **07**

6. Sustainable Material Sourcing with GenAI Summarization & Traceability

Problem: Ensuring suppliers comply with ESG/CSRD rules and sustainability requirements requires analyzing dispersed, unstructured certification and reporting data.

Solution: Use GenAI to summarize ESG data, verify provenance, and cross-check suppliers. Combine with IoT/blockchain for traceability of critical materials.

Why Relevant: Automated ESG analysis can reduce supplier audit time by 30% and cut compliance reporting costs by 20%. Strengthens both regulatory compliance (CSRD, LkSG) and brand reputation in the MedTech ecosystem.

Reference Example: *ESG Reporting for Financial Services (SFDR)* — AI-supported ESG data integration and reporting; methodology transferred to MedTech supply chains.

Reference | **03**

What can you do to **utilize GenAI** to establish a more **resilient** MedTech **Supply Chain**?

MedTech companies can unlock immediate benefits by starting small and scaling fast. Focus on the most critical resilience levers — risk monitoring, transparency, and agility — and apply GenAI where it drives measurable impact.

Risk Management

Automate Supplier Risk Monitoring: Ingest and summarize supplier reports, ESG disclosures, and compliance data with GenAI to proactively flag financial or sustainability risks.

Set Up Early Warning Systems: Use GenAI sentiment and event analysis across social media, local news, and IoT/weather feeds to detect disruption signals before they escalate.

End-to-End Transparency

Break Down Data Silos: Apply GenAI to harmonize fragmented supplier, logistics, and compliance data into standardized formats for a unified dashboard.

Improve Forecasting: Combine GenAI with ML to generate highly accurate demand and inventory predictions, reducing stockouts and excess.

Agility

Simulate Disruption Scenarios: Deploy GenAI-powered supply chain twins to model geopolitical, regulatory, or supplier risks and develop robust contingency playbooks.

Accelerate Sustainable Sourcing: Use GenAI to analyze ESG reports and certifications, verifying provenance and ensuring compliance with CSRD/LkSG.

We create real impact -
From GenAI ideas to a prioritized, ROI-backed use case in one week

Contact our experts
to unlock your potential →

Ole Sadzio
Senior Consultant
ole.sadzio@eraneos.com

Dr. Marc Lämmel
Senior Manager Data Science
marc.laemmel@eraneos.com

Philipp Süßlin
Senior Consultant
philipp.suesslin@eraneos.com

eraneos

About Eraneos
Eraneos is an international strategy, transformation and technology consulting group, dedicated to empowering organizations to thrive in an ever-changing digital age. By bringing together top-tier experts from business and tech, we help clients to continuously raise the bar in successful transformations, from strategy to execution. Whether we're designing future-ready organizations, unlocking the potential of data and AI, or securing businesses with cutting-edge cybersecurity, we deliver results pragmatically. Our team of around 1,200 dedicated professionals is based in offices across Switzerland, Germany, the Netherlands, Spain, Denmark, Sweden, Austria, the UK, Singapore, and the USA, and seamlessly blends global perspectives with strong local roots. In 2024, Eraneos realized a turnover of EUR 263 million.

Reference | **01**

An **AI-powered legal platform** streamlines risk assessments and ensures global compliance

Industry: Automotive **Year:** 2024 **Country:** Germany

Client

A premier international automotive company that boasts an extensive portfolio of vehicles and a widespread operational network, facilitating global connectivity. It is committed to pioneering advancements and to drive innovation within the automotive industry.

Initital Situation

- Launching and operating digital car services globally requires careful consideration of rapidly evolving regulatory landscapes and legal risks
- Traditionally, the legal assessment of a digital service can take up to three months, while development often only takes two weeks

Approach and Solution

- An AI-enabled solution that streamlines the legal risk assessment of digital car services on one digital platform, thereby aligning development and risk-assessment processes
- Developers can obtain a pre-assessment at a click of a button and legal experts can focus on high-risk cases and specific enquiries based on the pre-assessment

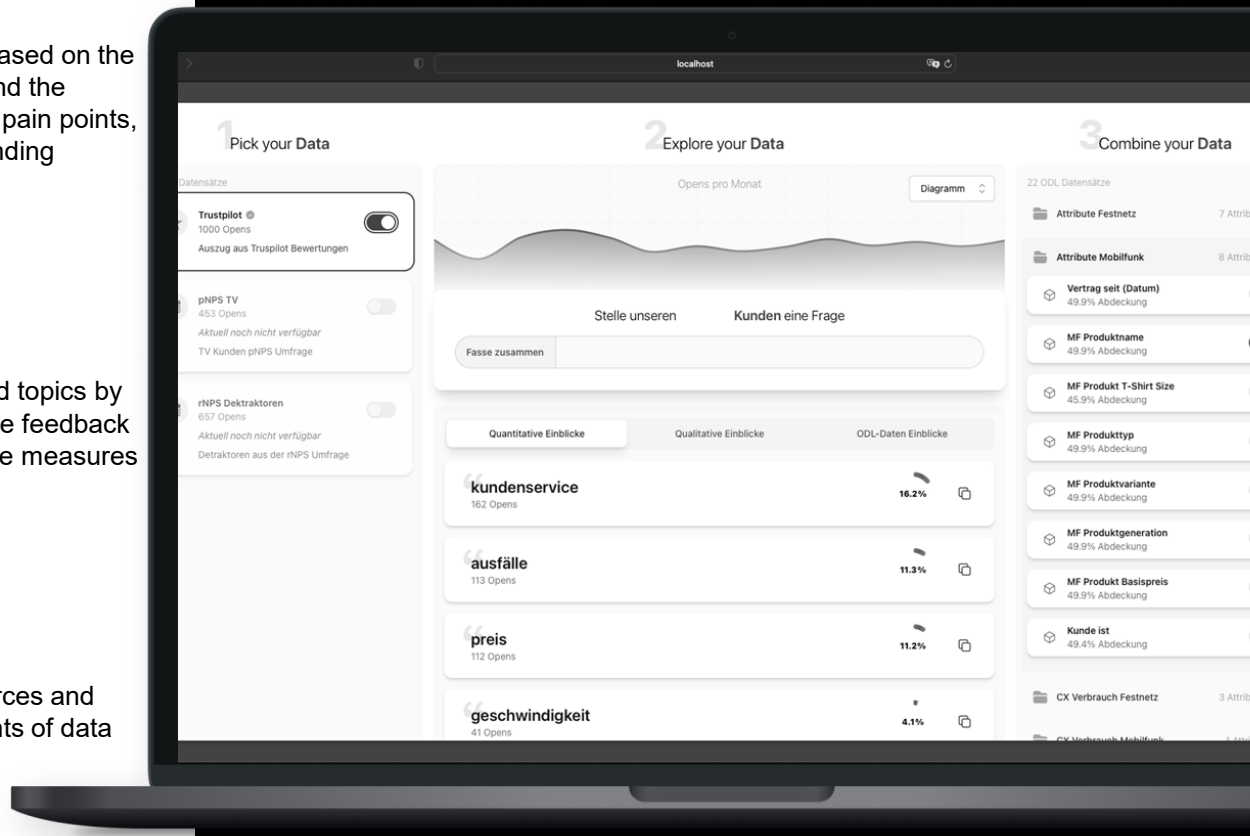
Impact

- Reduced time-to-market timeline for all legal assessments by a about 30%
- Target volume of assessed serviced is met
- Fast adaptation to regulatory changes to remain compliant while efficiently managing resources
- Devemplment teams can focus on innovation, service enhancement, customer experience improvement, and strategic planning

eraneos

360° NPS Customer Voice - The combination of LLMs with the latest AI methods allows for an in-depth analysis of customer data

Generation of analytical insights from customer feedback/data on a scalable level.



Q&A Engine

Chat functionality for question-based interaction with customer feedback: Comprehensive semantic understanding, detection of thematic context, and identification of correlations for direct interaction with thousands of customer voices

Top Topics

AI-supported formation of topic clusters based on the summarization of large amounts of text and the extraction of relevant content (e.g., major pain points, positive aspects) with semantic understanding

Sentiment Analysis

Natural language processing enables the interpretation of moods and tones of customer feedback as well as the detection of irony and sarcasm.

Quantification

Determining the relevance of the identified topics by ascertaining the number of mentions in the feedback texts for optimized prioritization of possible measures

Temporal Development

Representation of the development of identified top topics over time, as well as derivation of trends and identification of newly emerging problems

Upload

Unlimited addition of new knowledge sources and uncomplicated processing of large amounts of data

eraneos

Reference | **03**

Setup of reportings for ESG Principal Adverse Impact Indicators (PAI) for funds of a financial service company

Industry: Financial Services **Year:** 2023 **Country:** Germany

Client

The client is an investment and asset development company focused on generating and managing essential assets on behalf of its clients. They manage around EUR 15 bn on behalf of institutional investors worldwide and are active in clean energy, infrastructure, real estate and green logistic projects. The client is fully BaFin regulated.

Initital Situation

- Subject to Regulation (EU) 2019/2088 (SFDR) affecting both the company and the funds it manages
- SFDR mandates PAIs disclosure, assessing sustainability impact of investments.
- SFDR compliance necessitates extensive data collection, processing, and reporting, causing additional workload across several departments.

Approach and Solution

- Develop a new asset reporting process within the Data Integration Platform
- Integrate various data sources including CRM, portfolio tools, manual inventories etc.
- Model the ESG PAI data within Snowflake for annual or quarterly reporting across all funds
- Create a PowerBI report compliant with SFDR
- Implement historization and logging
- Establish assets in the central Collibra Data Catalog for organization-wide transparency

Impact

- Fully compliant ESG PAI reporting according to regulation
- Disclosures enable comparison of investments based on their climate, environment, and social impacts
- Disclosures are published on a company-wide basis for the public and on a fund-by-fund basis
- Investors can now report PAIs to their own customers and can use ad hoc PAI statements for their respective funds

eraneos

Reference | **04**

DocAI for Site Lease Contract Analysis
Solution to extract data from 50k+ complex documents

Industry: Telecommunication **Year:** 2023 **Country:** Germany

Client

A leading telecommunications company in Germany, renowned for its extensive mobile network coverage and innovative digital solutions. This customer offers a wide range of services including mobile phone contracts, broadband internet, and TV packages, significantly contributing to the country's digital infrastructure.

Approach and Solution

- Use OCR and image enhancement techniques for document digitization
- Use Deep Learning to analyse and extract document layout and structure
- Use NLP to identify and classify multi-level named entities (business-critical contract information)
- Use self-learning approach with human-expert-in-the-loop for AI training
- Seamless integration of AI model results into workflows and tools existing on client side

Initital Situation

- Contract documents only available as unstructured (scanned) data
- Business critical contractual information for 50k site lease contracts not readily available
- Missed deadlines and contractual obligations leads to significant business costs
- Missing transparency and high manual effort

Impact

- Business-critical contract information available as structured database
- Management Dashboard for overview of contract status
- Workflow integration through automatic ticket creation in MS Task Planner
- Flexible DocAi solution for easy extension and scalability to similar use cases

eraneos

Reference | **05**

Efficient and accurate document parsing with prebuilt OCR and language models

Industry: Railway **Year:** 2024 **Country:** Switzerland

Client

A railway company that specializes in the Europe-wide leasing and management of freight wagons, making significant contributions to rail logistics with innovations like the modular IT solution and the flex freight system. It maintains a large fleet of freight wagons.

Initital Situation

- Employees in 120 workshops prepare various documentation e.g. damage reports on freight wagons
- These documents are usually submitted as PDFs or images
- Employees manually classify the documents and transfer their contents into the document management system (DMS)

Approach and Solution

- We introduced an AI tool that can classify the documents, extract their contents, transfer them into the target schema
- The solution rests on the combination of a prebuilt OCR model with large language models and an AI-steered trail-and-error feedback loop
- We conducted a PoC to test three competing parsing strategies

Impact

- The PoC demonstrates that our extremely efficient approach yields high-quality results, with >90% accurately parsed fields per document on average
- In a follow-up project phase, it is productionized as a “grey-processing” solution
- Since no training is required, the solution can be easily extended to new document types and other use cases, like data cleaning or data classification

eraneos

Reference | **06**

Developing **Digital Twins for wind turbines** and laying digital foundation for optimized maintenance and development

Industry: Energy **Year:** 2020 **Country:** Germany

Initital Situation

- Growing installed base and lack of transparency about components installed has become a major challenge in the wind industry
- Move from selling products to selling service requires full control of the asset lifecycle
- Handling vast amounts of monitoring data and making them relevant for service execution as well as preventive and predictive service planning

Approach and Solution

- Create a service specific product structure based on wind industry wide standards
- Link all relevant information to the product structure and, in addition, structure it accordingly
- Integrate graphical models, bill of materials, documents and transactional data into one user interface
- Enable Digital Twin to support all maintenance and service related tasks by applying analytics methods

Impact

- All required information is available and can be used in an intuitive manner; high amounts of information are aggregated with a focus on improving decision making
- Standardization reduces time for resource ramp up and minimizes resource usage required
- Service and maintenance optimization, more control and predictive actions supporting minimization of down times and efficient maintenance related processes

eraneos

Reference | **07**

Improvement of a **digital twin for monitoring and maintaining** the crew emergency oxygen system in aircrafts

Industry: Aerospace **Year:** 2022 **Country:** Germany

Initital Situation

- Aircraft collect large amounts of data that can be used to assess and monitor the health of various systems
- The emergency oxygen system for the crew is of paramount importance for safety
- An existing digital twin was based on a manually adjusted Kalman filter model
- The sensor data were tracked but not adequately described, leading to unreliable predictions

Approach and Solution

- The mathematical model behind the existing predictor was improved with state-of-the-art adaptive Kalman filters
- A strategy for semi-automatically adjusting the model parameters was developed and implemented to cut down model development time
- Dedicated specialised Kalman filters were trained for different states of the emergency oxygen system
- Based on the Kalman filter predictions, additional maintenance messages were added to notify aircraft engineers and maintenance personnel of sudden changes of the system

Impact

- A better description of the sensor data provides the basis for reliable alerts and maintenance notifications
- The digital twin now has a strongly reduced reaction time and is able to identify trends in the data much more quickly and accurately
- An improved notification system allows for additional configurable alerts for the maintenance crews

Project Details

- **Language:** Python
- **Platform:** Google Cloud Platform
- **DevOps:** Bitbucket, Git CI/CD, Docker/Kubernetes, Cloud Build, Terraform
- **Data Mgmt.:** Cloud SQL, Cloud Storage, Pandas
- **AI & ML:** Kalman filter, Predictive maintenance
- **Visualization:** Custom-built web portalx

eraneos

AI-enabled supply chain resilience proven across complex **Manufacturing** environments

Production Data Platform

Development of a data platform architecture concept and MVP deployment. Conducting requirement and market analysis as well as vendor assessments

Inventory Cost Reduction

Concept and Development Solution for Inventory Cost Reduction. Reduce part shortages, minimize obsolete inventory, increase supply chain transparency, and optimize cash flow by avoiding premature part orders

Shopfloor OT Security

OT security maturity program for over 30 plants implementing a risk-based approach within a central shared service organization, optimizing the operating model, reducing implementation costs and reaching targeted NIST CSF-defined maturity

Anomaly Detection for Welding Points

To address increasing production complexity and limited AI resources, an affordable, customizable AI packages for SMEs was developed. Based on this premise, developing a scalable anomaly detection capability within an open-source platform

Intelligent Parts Management

Optimizing asset allocation and streamlining supplier relationships. By implementing an e-matching program across European locations, improving inventory management and matching assets with spare parts catalogs, leading to efficient resource utilization

Forecasting for Material Req. Planning

Data model analysis and process mapping as input for an AI-driven forecasting tool in secondary material requirement planning across three highly diverse business units