KUEHNE+NAGEL

Healthcare Logistics

Supply chain design: Balancing the service level, sustainability, and cost equation

Designing supply chains for resilience

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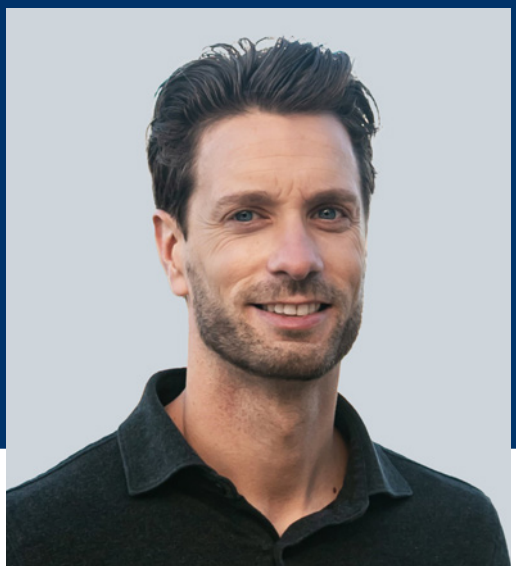


Pieter Blom

Historically, supply chains were designed to ensure a robust and efficient flow of materials and information from origin to destination. The focus was on delivery success and cost efficiency, with an emphasis on lean inventory, optimised manufacturing processes, and extended global sourcing. Recent global disruptions and the COVID-19 pandemic underscored the need for more resilient and flexible supply chain strategies, challenging long-standing operational assumptions.

It became clear that supply chains shouldn't be designed merely to optimise cost and efficiency, but designed collaboratively, to be agile and resilient, especially in healthcare where lives are dependent on products being where they are needed, when they are needed.

The evolution of thinking around supply chains for healthcare

The concept of supply chain management emerged in the 1980s, with the introduction of the first ERP systems, covering areas such as finance, planning, and resource and material management. However, supply chain management was introduced incrementally in the healthcare industry, where traditionally the priorities were clinical outcomes rather than supply chain optimisation.

However, driven by the high-value, time sensitive nature of many modern medicines, the pharmaceutical industry was one of the first healthcare sectors to embrace sophisticated supply chain setups. In the 1990s, the introduction of Good Distribution Practice (GDP) guidelines marked a turning point, establishing regulatory frameworks that demanded robust, traceable supply chains capable of maintaining product integrity from manufacturing to patient administration.

For medical devices and MedTech equipment, the watershed moment came in 2013 with the global implementation of the Unique Device Identification (UDI) system. The requirement for end-to-end traceability throughout the supply chain fundamentally altered how medical device supply chains were designed and operated.

Features of an agile and resilient supply chain setup

- **Resilience through redundancy**
  Robust healthcare supply chains are built on the principle of strategic redundancy. This doesn't mean inefficient duplication, but rather it means always having a plan B—a thoughtfully designed alternative that activates should the primary channels fail.

- **Quality through visibility and traceability**
  There can be zero tolerance for deviation and temperature excursions in healthcare product supply chains. Around-the-clock visibility is essential. Real-time tracking isn't just about knowing where products are; it's about understanding their condition at every moment, enabling immediate intervention, and building the basis for corrective and preventive action (CAPA).

- **Patient-centric design**
  The most effective healthcare supply chains are designed backward from patient needs rather than forward from manufacturing constraints. This means understanding not just what products patients need, but when and where they need them.

- **Technology as an enabler**
  Possibilities in the design of healthcare supply chains are being shaped by emerging technologies. Artificial intelligence enables demand forecasting that accounts for disease patterns, seasonal variations, and demographic trends. Advanced analytics can predict supply disruptions before they occur, triggering automated responses that maintain continuity of care.

- **The global imperative**
  The challenge isn't just delivering healthcare products to profitable markets in the developed world but also ensuring that lifesaving and life-enhancing treatments reach remote populations worldwide. Innovative approaches to distribution and flexible supply chains with the ability to operate effectively in challenging environments are essential.

- **Regulatory agility**
  Few other industries face the regulatory complexities of the healthcare industry. Supply chains must be designed to adapt rapidly to changing compliance requirements across multiple jurisdictions while maintaining operations efficiency.

Prepare for the unpredictable with Kuehne+Nagel's Supply Chain Design team

In an era defined by uncertainties such as geopolitical shocks, climate change, and fluctuating customer demand, Kuehne+Nagel helps you use disruption as a catalyst for innovation and growth. We co-design healthcare product supply chains together with you that are resilient, agile and sustainable—supply chains that are designed to weather and bounce back from any disruption, built with sustainability and efficiency in mind, and ready to pivot in response to rapidly evolving market dynamics. Close collaboration and partnership between customer, account management teams and Supply Chain Design Consultants are key for success.

Using a clear structured, lean methodology our Supply Chain Design Consultants balance your demands for resilience, cost and sustainability. This approach leads to an enhanced supply chain setup, helping you reach your strategic goals through innovative supply chain solutions with a global reach and local know-how.

Responding to customer demand with core strategic supply chain consulting services

Through interactive customer demand analysis in workshops, we help identify value areas within our transparent and structured framework (Demand Driven Service Offering):

- **Supply chain transformation advisory**
- **Inventory assessment**
- **Logistics operations**
- **Sustainability decarbonisation framework**
- **Digital consultancy**

Once the value areas have been identified, tailored strategies that drive improvements in healthcare product supply chains are implemented.

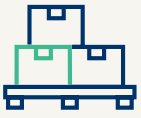
Our global network of over 270 fully GxP-compliant, HealthChain certified, road, sea, air and contract logistics facilities, along with a suite of digital tools and healthcare logistics services makes implementing optimal end-to-end solutions for your healthcare supply chains possible.

Optimising key demand areas

In today's rapidly changing, digital world, supply chains must be agile, able to quickly adapt and leaders need to be willing to adjust strategies and processes to ensure resilience now and in the future. Recent customer engagements have shown a particular need in four key demand areas:

Lead time and network optimisation
By taking advantage of our extensive network of cross-dock facilities, healthcare providers can enhance their operational efficiency, reduce costs, and, most importantly, improve patient outcomes.

Cold chain packaging optimisation
Shifting from active to passive packaging and shipping your healthcare products along our cool corridors (an end-to-end +2 to +8°C passive-packaging solution) results in cost and sustainability gains.



Minimum order quantity and transport mode optimisation
Understanding the reasons behind current stuffing procedures, and understanding the minimum order quantities, allows efficient ways of stuffing and stacking pallets in FTL trailers to be designed.

Equipment optimisation and pallet configuration
Comprehensive analysis of the data across shipment types helps identify further potential for equipment optimisation. Consolidation, pallet heights, stacking capability, and the use of container freight stations are taken into consideration.

Conclusion: building supply chains for the future

Healthcare industry supply chains operate under unique pressures that distinguishes them from virtually every other industry. The overriding need to ensure patient safety creates an uncompromising demand for quality and reliability, while at the same time regulatory compliance adds layers of complexity that can disrupt product accessibility. Temperature-sensitive biologics require cold chain integrity across thousands of miles and multiple touchpoints. Emergency supplies must be available within hours, not days, yet inventory carrying costs for specialised equipment can be astronomical.
It is no longer enough for logistics service providers to just offer transportation, warehousing and distribution services; they must now also act as trusted supply chain design collaborators, data enablers, and strategic advisors. The question is no longer whether to invest in supply chain optimisation, but whether your current setup and your current business partners are ready for the next disruption.

In the healthcare industry, where the margin for error is measured in human lives, investing in supply chain design is not just a competitive advantage; it is a moral imperative.

About us

With approximately 82,000 employees at almost 1,300 sites in close to 100 countries, the Kuehne+Nagel Group is one of the world's leading logistics providers. Headquartered in Switzerland, Kuehne+Nagel is listed in the Swiss blue-chip stock market index, the SMI. The Group is the global number one in air and sea logistics and has strong market positions in road and contract logistics.

Kuehne+Nagel is the logistics partner of choice for 400,000 customers worldwide. Using its global network, logistics expertise and data-based insights, the Group provides end-to-end supply chain solutions for global companies and industries. As a member of the Science Based Target Initiative (SBTi), Kuehne+Nagel is committed to sustainable logistics by reducing its own environmental footprint and by supporting its customers with low-carbon logistics solutions.

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