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Coordination

Clinical trials

# Modernizing clinical trial logistics to deliver value

Managing complexity, accelerating timelines, and embracing innovation

## Executive Summary

Global clinical development has entered an era defined by scale, complexity, and precision. Trials now span continents, therapeutic modalities have diversified, and timelines are compressed by both scientific and competitive pressures. Clinical trial logistics planning, once viewed as a downstream function, has become a strategic enabler of speed, reliability, and regulatory confidence.

This paper explores how biopharma organizations can design and operate supply systems capable of absorbing complexity while maintaining control. It examines the interplay between infrastructure, technology, and collaboration that defines high-performing clinical logistics today and explains:

- How scalable, standardized networks enable flexibility across regions while maintaining quality and compliance.
- How digital integration and predictive tools transform visibility into foresight and reduce operational risk.
- How synchronized processes and shared data accelerate timelines without sacrificing control.
- How collaborative governance and continuous improvement turn operational consistency into strategic advantage.

Taken together, these capabilities mark a shift from reactive logistics management to proactive supply design. By aligning infrastructure, data, and expertise, biopharma organizations can create systems that not only support clinical execution but also accelerate development outcomes.

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# Modernizing clinical trial logistics to deliver value

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## Introduction

Global clinical development is expanding at a pace that tests the limits of coordination. Trials now span continents, involve multiple therapeutic modalities, and rely on intricate supply chains that must deliver materials under tight timelines and stringent controls. For biopharma leaders, logistics has become a strategic discipline that determines whether promising therapies reach patients efficiently and compliantly.

Clinical supply operations once considered a back-end function now sit at the intersection of scientific progress, regulatory rigor, and financial stewardship. The question is how to design systems capable of absorbing complexity while sustaining speed, reliability, and adaptability.

## The expanding web of complexity

Advances in trial design, such as adaptive and decentralized models and hybrid enrollment strategies, together with the rise of complex molecules and modalities, have introduced new logistical demands across global studies. Shipments that once moved between a handful of depots now cross dozens of borders, each with its own import rules, labeling requirements, and cold-chain constraints.

Differences in regulatory requirements across regions compound the challenge. Customs clearances, VAT exposure, and evolving trade agreements can delay delivery or increase cost. Even within a single region, patient-centric designs require flexible fulfillment approaches, such as direct-to-patient or hybrid distribution. Every additional node in that network increases the surface area for risk.

These realities have shifted how organizations think about logistics. The priority is no longer simply to move investigational product efficiently; it is to construct supply systems resilient enough to operate amid uncertainty. That means building redundancy, enabling real-time visibility, and ensuring that data and decisions flow seamlessly across functions.



## Achieving speed through precision

As trials expand in scope and intricacy, the ability to move quickly without losing control has become essential. Compressing cycle times depends on removing structural friction—redundant handoffs, sequential workflows, and fragmented oversight that slow progress and obscure accountability.

Leading organizations are aligning their clinical research, manufacturing, and supply operations within unified frameworks that enable data continuity and shared decision-making. When manufacturing, packaging, and distribution teams work from synchronized forecasts and digital schedules, adjustments to enrollment or protocol amendments can be enacted without cascading delays.

Analyses across the industry have shown that integrated approaches can significantly shorten development timelines by eliminating the procedural lag that accumulates when each function operates in isolation<sup>1</sup>.

An example of these gains in practice can be seen in the impact of Thermo Fisher Scientific's recent investments in integrated sourcing, labeling, and packaging operations, which have achieved cycle-time reductions of up to 50% by harmonizing processes across sites and eliminating redundant handoffs (see "Turning automation into advantage").

## Turning automation into advantage

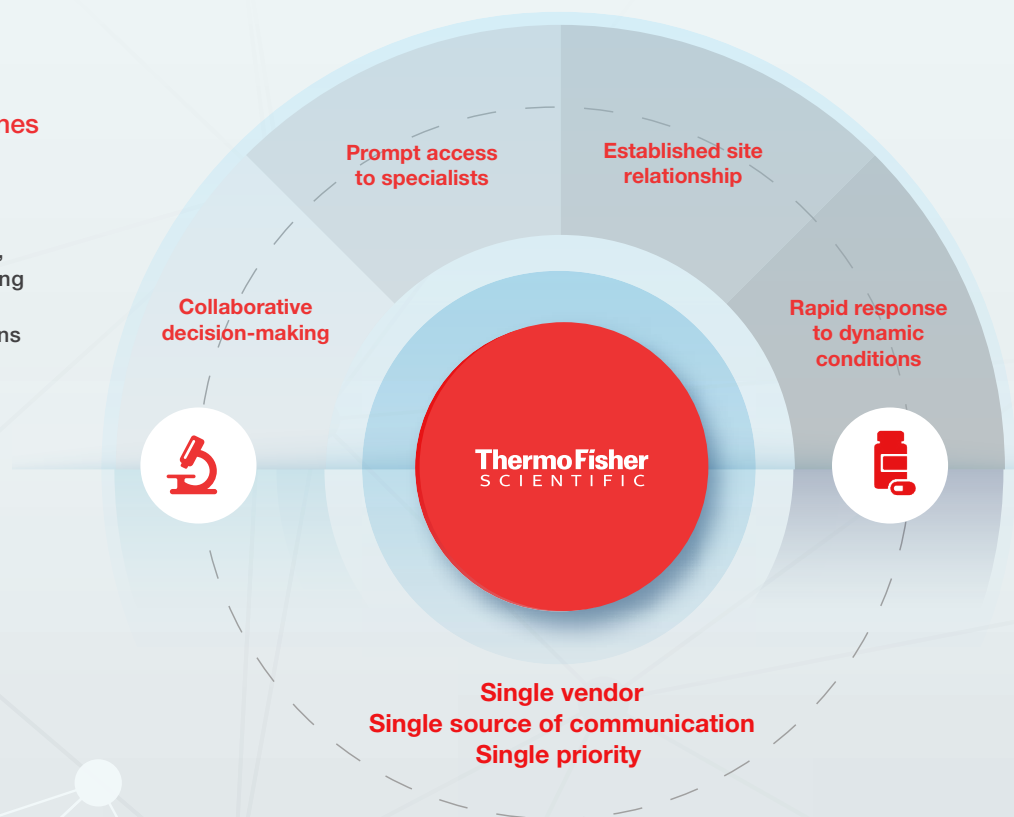
When a global customer needed to cut lead times and improve productivity across more than 70,000 annual shipments, Thermo Fisher Scientific collaborated with the customer to design an AI-driven solution for distribution order intake. The goal was to replace a four-day manual process that often required help-desk intervention with a fully automated workflow built on machine learning and business logic.

Within months, order-generation time **dropped from 4 days to under 15 minutes**, with a 90% first-pass yield across more than 2,000 orders. The system now scales to manage roughly 42,000 orders per year, integrating seamlessly with interactive response technology (IRT) platforms.

This collaboration shows how **targeted automation** can **reduce waste, enhance quality, and accelerate the clinical supply chain** without adding risk. Behind the numbers is a broader shift toward intelligent infrastructure comprising systems designed to continuously learn, adapt, and improve.

## Unified communication streamlines coordination

A single, coordinated communication framework connects decision-makers, specialists, and regional sites—enabling faster collaboration and more agile responses to changing study conditions



## Digital integration and predictive insight

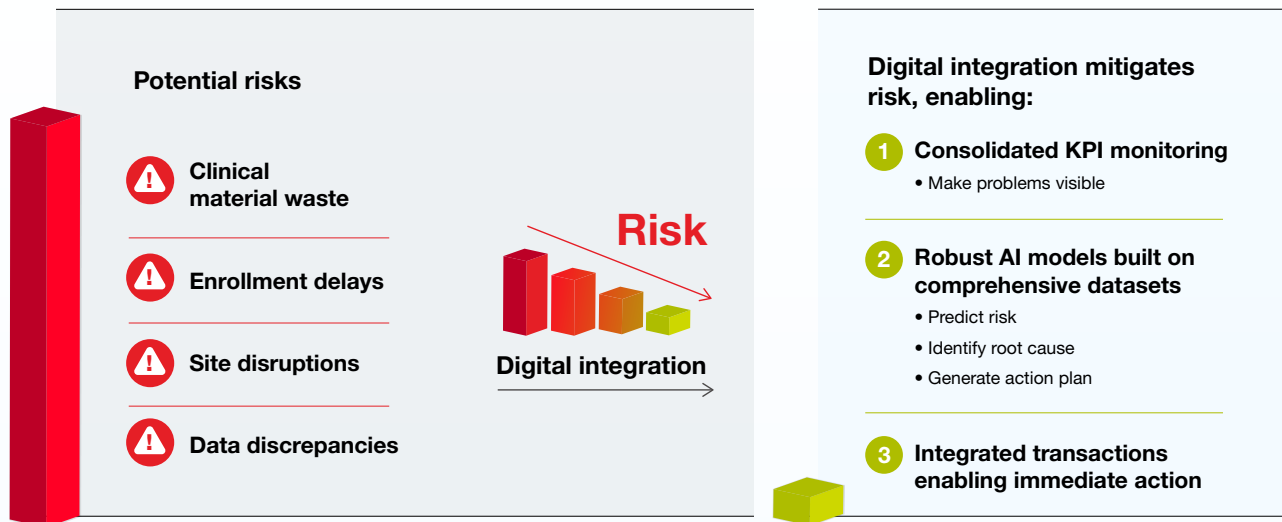
Technology has transformed the supply chain from a reactive system into a predictive one. Integrated data platforms now link demand planning, labeling, packaging, and distribution, allowing biopharma companies to view the movement and condition of materials in near real time.

Predictive analytics help identify emerging risks, such as enrollment fluctuations, temperature excursions, or customs bottlenecks, before they escalate into disruptions. And automated order-intake systems can process thousands of distribution requests in minutes, freeing specialists to focus on exceptions rather than transactions.

Advances in digital labeling and smart packaging extend those benefits to the patient interface—improving visibility, safety, and compliance. Studies have shown that connected packaging can increase medication adherence by approximately 20% by providing real-time access to dosing and study information<sup>2</sup>.

Automation within facilities adds another layer of precision. Robotic storage and retrieval systems, advanced labeling lines, and digital quality controls reduce manual handling, increase consistency, and strengthen data integrity. Together, these technologies make it possible to act on insights as they emerge, maintaining both schedule and product integrity.

### Predicting and mitigating operational risks is key to managing the timeline and budget of clinical studies



Digital integration reduces operational risk by connecting data across systems, enabling early intervention and continuous visibility.



## Scalability and global redundancy

The hallmark of an effective clinical supply strategy is an infrastructure that can adapt as studies evolve, expand, or shift geographically without losing control. Building that kind of flexibility depends on coordinated systems, aligned standards, and a network designed to share both capacity and information.

A globally distributed network of harmonized facilities allows companies to adjust regional loading, respond to shifting demand, and maintain continuity when political or logistical disruptions occur. Customs warehouses, bonded depots, and free-trade zones strengthen that resilience by keeping materials in motion while limiting duty exposure and administrative delays.

Industry benchmarking has shown that sponsors supported by globally harmonized supply partners can reduce transfer timelines by up to 30% and lower compliance risk across regional transitions<sup>3</sup>.

Maintaining consistency is the key to sustaining that resilience. When sites across continents follow the same operating procedures, quality systems, and digital interfaces, studies can move between regions without interruption or added risk, ensuring continuity, compliance, and control at scale.

## Innovation as continuous discipline

Sustainable innovation in logistics is rarely the result of a single breakthrough. It evolves through iterative problem-solving: Automating label production to recover weeks from the schedule, deploying AI to reduce manual order entry, or using simulation modeling to align inventory with patient enrollment.

These improvements compress timelines and reduce variability. They also create feedback loops through which data captured from one trial informs the design of the next. Over time, this cumulative learning becomes a competitive asset, translating operational excellence into development advantage.

## Defining value in clinical logistics

Delivering value in clinical logistics depends on balancing the factors that determine performance—speed, reliability, and cost—within a system designed to adapt to change. Each of these elements is shaped by how networks are built, data are used, and people work together.

For biopharma organizations, success depends on bringing those factors into alignment through a cohesive strategy that includes:

- **Scalable networks** that anticipate regulatory and geopolitical shifts
- **Digital intelligence** that converts visibility into foresight
- **Collaborative operations** that turn complexity into coordinated action

As clinical programs diversify and decentralize, these variables will only grow in importance. Companies that treat logistics as a strategic capability rather than a back-office function will be positioned to advance therapies efficiently, reliably, and with greater confidence in every outcome.

### Infrastructure designed for scalability

Thermo Fisher Scientific's global clinical supply network provides the structure and consistency needed to manage complex, multi-regional studies:



**30+ CGMP facilities** and **50+ audited depots** supporting regional flexibility and redundancy



Harmonized quality and digital systems that **embed standardization across geographies**



**Customs warehouses, bonded depots, and free-trade zones** that **minimize trade and tax impact**



**Integrated labeling, packaging, and distribution operations** to **accelerate cycle times**



**Real-time visibility** and **forecasting tools** that **align planning and execution**

Together, these capabilities enable customers to scale confidently, maintaining quality and compliance across every region.



Watch the [on-demand webinar](#) for expert perspectives on building scalable, data-driven logistics frameworks that keep complex clinical trials moving forward.



#### References

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