4FLOW
Your supply chain solution

Cost-optimized supply chain network design

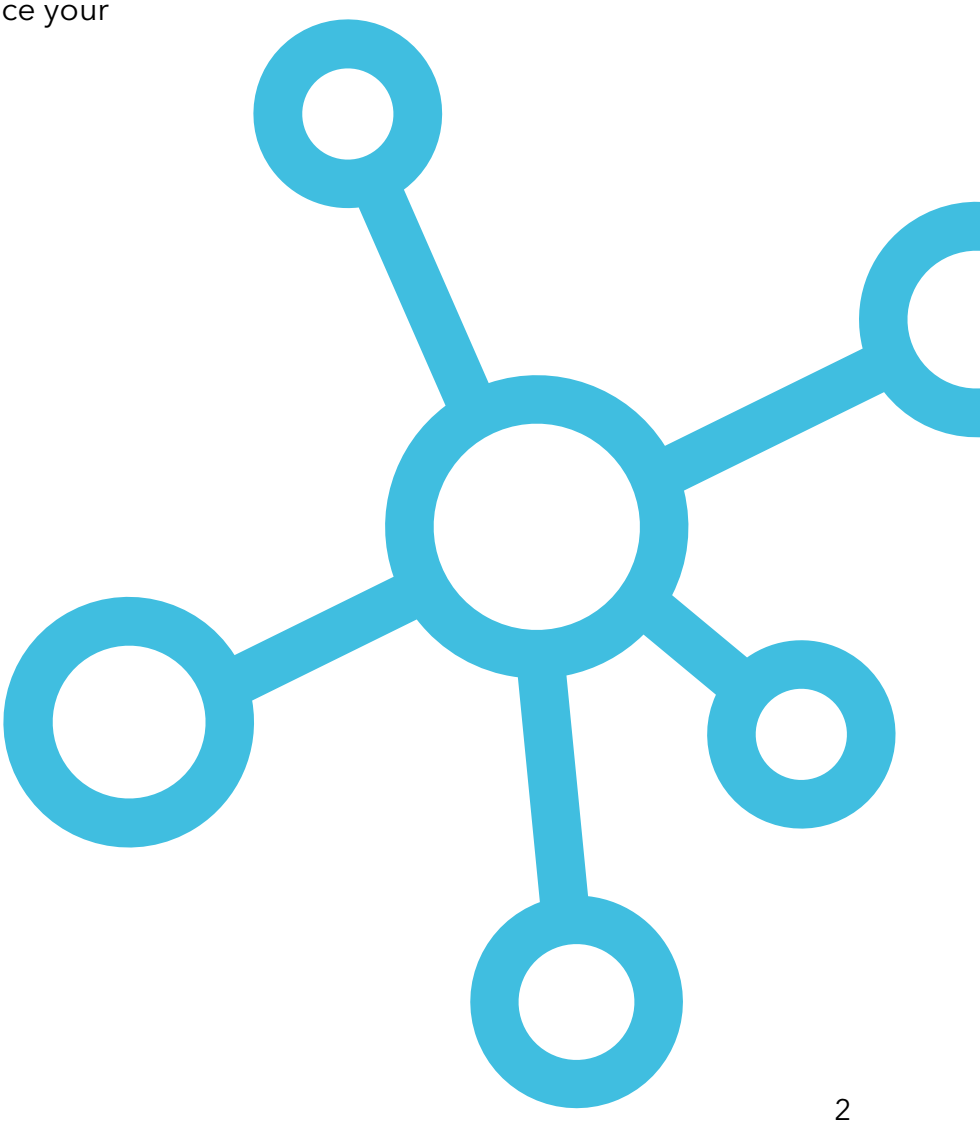
5 best practices for supply chain and logistics managers

The role of supply chain in competitive strategy

The cost imperative in network optimization

Supply chains are more than just how goods move from point A to point B – they're key to your bottom line. Every extra mile, overstocked warehouse, and hasty decision can drain your profits. Global disruptions are the new normal and the rules keep changing. Customers expect faster delivery. Carriers raise their prices. And disruptions happen without warning. To stay competitive, your network needs to be flexible and strategic.

This guide shows you why a well-designed supply chain network is essential to approach cost savings strategically. You'll learn to use data to find and eliminate inefficiencies, while still maintaining the level of service your customers expect.



How supply chain efficiency impacts market competitiveness

Supply chain efficiency is a critical driver of market competitiveness. In today's dynamic market, competition is shifting from individual companies to entire supply chains. Companies with efficient supply chains can outperform competitors by offering more value, whether that's lower prices, faster delivery, or superior service. Beyond reducing costs and improving operations, an efficient supply chain positions businesses for long-term success by ensuring they can adapt to external market forces.

An efficient supply chain enables businesses to:

Reduce lead times

Faster delivery to customers enhances satisfaction and loyalty

Lower operational costs

Streamlined processes and optimized resource allocation reduce waste and improve profitability

Improve responsiveness

Agile supply chains can quickly adapt to changes in demand, market conditions, or disruptions

Enhance product availability

Efficient inventory management ensures products are in stock when and where customers need them

By focusing on efficiency, businesses can differentiate themselves from competitors, improve service levels, and achieve sustainable growth.

The impact of network efficiency on costs

Hidden costs and the ripple effect of network inefficiency

Inefficiencies in the supply chain lead to hidden costs that can ripple through various areas of the business, amplifying their negative impact. Key network inefficiencies include:

Poorly located facilities

Inefficient facility placement leads to longer transportation distances, higher logistics costs, and delays in getting products to market.

Inventory mismanagement

These location challenges can compound inventory issues—either by causing overstock due to safety stock needs or understock when products can't be replenished quickly.

Transportation issues

The increased distances and associated delays heighten the risk of misrouted shipments and raise operational costs, making timely deliveries harder to achieve.

Distribution disruptions

As transportation falters, order fulfillment suffers, leading to late deliveries and errors that disrupt the distribution network.

Retail and customer impact

Ultimately, these cascading problems result in lost sales, dissatisfied customers, and a weakened brand reputation.

By addressing inefficiencies at their source, businesses can prevent these cascading effects, reducing both immediate and long-term costs while creating a more resilient supply chain.

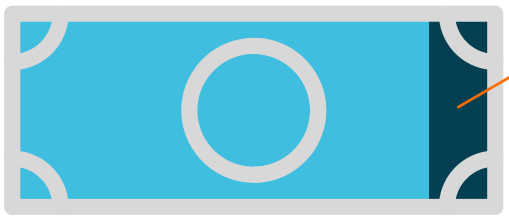
Key facts to consider

Since **2019** product delivery lead times have increased by **20**[1]

Only

60%

of businesses have extensive visibility over their direct suppliers[2]



Supply chain delays can cause businesses to lose up to

15%

of annual revenue[3]

By addressing these issues at their root, you can significantly reduce costs and build a more resilient supply chain for the future.

1 Supply chain resilience | Deloitte Insights
2 McKinsey Global Supply Chain Leader Survey 2024 | McKinsey
3 Turning Supply Chain Chaos into Supply Chain Strategy - Anvyl

The limitations of traditional cost-cutting

Traditional cost reduction methods have long been the go-to strategy for many organizations. These methods include:

$184 million (USD)
the average annual loss large companies incur due to supply chain disruptions. (Statista, 2021)

20%
the potential increase in operational expenses resulting from inefficient supply chains.

Negotiating lower prices
Squeezing supplier margins through aggressive price negotiations

Process cost cutting
Streamlining operations by reducing waste and cutting expenses

Inventory reduction
Cutting down on inventory levels to reduce holding costs

While these approaches can yield short-term savings, they come with notable limitations:

Short-term focus
They often deliver immediate cost cuts but may not build long-term resilience or competitive advantage

Quality and service risks
Overemphasis on cutting costs can lead to lower quality or diminished customer service, ultimately affecting brand reputation

Reduced flexibility
Tight cost controls may limit a company's ability to adapt to market changes, disruptions, or increased demand

Missed strategic opportunities
By focusing solely on cost-cutting, companies might overlook innovative strategies—such as network design optimization—that could drive sustainable, long-term savings

While traditional methods have their place, relying exclusively on them may hinder overall growth and competitiveness in a dynamic market environment.

How network design helps achieve cost reduction

While traditional methods focus on negotiating lower supplier prices, cutting inventory, or streamlining operations, these approaches often overlook the impact of supply chain network design on strategic, tactical and operational levels.

Optimized network design aligns every component of your supply chain to work together more efficiently and positively impact several cost structures. This not only delivers savings but also builds a resilient and agile supply chain in the long term, capable of managing demand fluctuations and responding quickly to market changes.

Long-term
Planning horizon of 3+ years

1

Strategic decisions
> Number and location of facilities
> Capacity expansions or reductions
> Sourcing strategy/contracted providers
> Network structure (centralized vs. decentralized)

Typical cost impacts
> Major capital investments (CAPEX)
> Long-term operational cost structure
> Fixed cost commitments (leases, infrastructure)

Mid-term
Planning horizon of 6-24 months

2

Tactical decisions
> Flow of products/returns/materials
> Inventory policies
> Transportation planning
> Procurement and supplier coordination
> Demand forecasting

Typical cost impacts
> Monthly/quarterly operating expenses (OPEX)
> Inventory carrying costs
> Logistics and transportation budgets
> Balancing cost vs. service trade-offs

Short-term
Daily or weekly planning horizon

3

Operational decisions
> Scheduling (production, shipments)
> Order quantities and reordering points
> Fulfillment priorities and service-level adjustments
> Routing
> Real-time capacity allocation
> Lead times and order cycles

Typical cost impacts
> Day-to-day labor and overtime costs
> Expedite/rush shipment fees
> Immediate overhead & handling expenses

Best practices to achieve cost savings

Best practice 1: Establish a data-driven foundation

Effective network optimization starts with a comprehensive and structured data collection process. Without accurate data, supply chain decisions are likely reactive rather than strategic. The goal is to develop a data-driven foundation that supports cost reduction, operational efficiency, and improved service levels.

1 Identify critical data points

> **Operational data**
Track shipment volumes, delivery routes, transit times, and facility performance

> **Financial data**
Record freight rates, labor expenses, and inventory carrying costs

> **Demand data**
Gather historical sales trends, customer order patterns, and forecasted demand fluctuations

2 Organize your data

> Centralize your information in a single database or dashboard for easy access

> Categorize data into operational, financial, and demand groups to quickly identify trends and issues

3 Analyze for actionable insights

> Identify bottlenecks, inefficiencies, and high-cost areas that can be targeted for improvement

Impact

Informed decision-making
A well-organized data set empowers you to make strategic, evidence-based decisions instead of relying on guesswork

Cost savings
Early detection of inefficiencies helps you target specific areas for cost reduction, leading to significant savings

Enhanced efficiency
Clear insights streamline operations, reduce delays, and improve overall service levels

By establishing a data-driven foundation, you ensure that your supply chain decisions are both accurate and impactful, setting the stage for long-term cost reduction and a competitive advantage.

Best practice 2: Build a cost baseline using as-is analysis

As-is analysis provides a clear understanding of the current supply chain network, identifying inefficiencies and cost drivers before making optimization decisions. It establishes a quantifiable baseline for comparison, ensuring that future improvements are measurable.

① Identify key cost areas

Focus on the primary components of your supply chain costs:

Transportation costs

Includes freight rates, route inefficiencies, empty miles, and fuel expenses

Warehousing costs

Covers facility rental, labor, utilities, and material handling

Inventory costs

Encompasses stock levels, carrying costs, obsolescence, and turnover rates

Service performance

Measures order fulfillment times, lead times, and cost per unit shipped

To better understand the impact of these areas, the table below shows their typical share of total supply chain costs.

Major cost drivers

Transportation **40-50%**	Inventory holding costs **20-30%**
Warehousing **15-20%**	Administrative costs **5-10%**

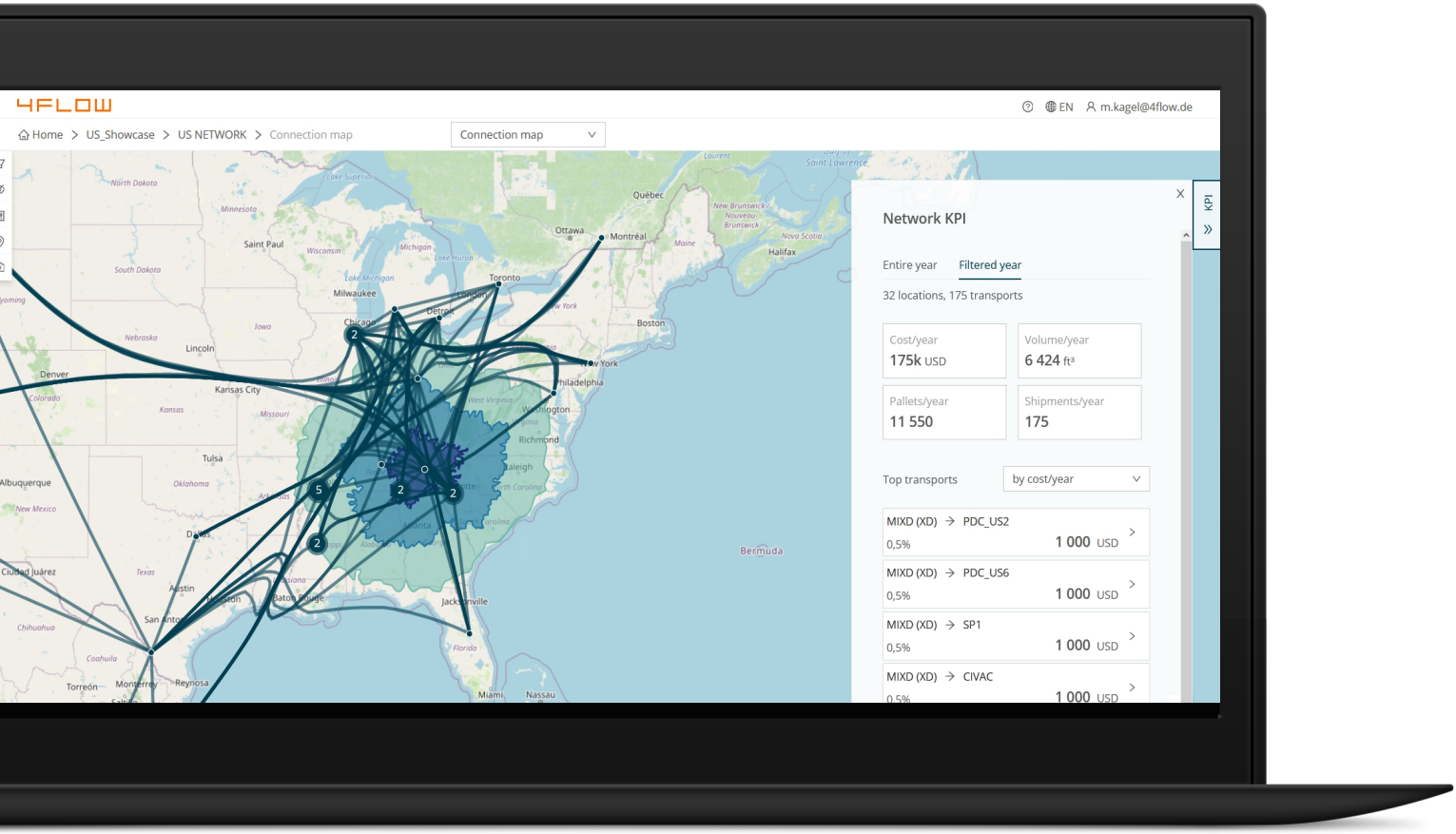
② Map your network

Visualize the layout
Map facility locations, transportation routes, and demand centers to see how costs are distributed

Identify bottlenecks
Look for redundant assets, high-cost nodes, and areas where inefficiencies occur

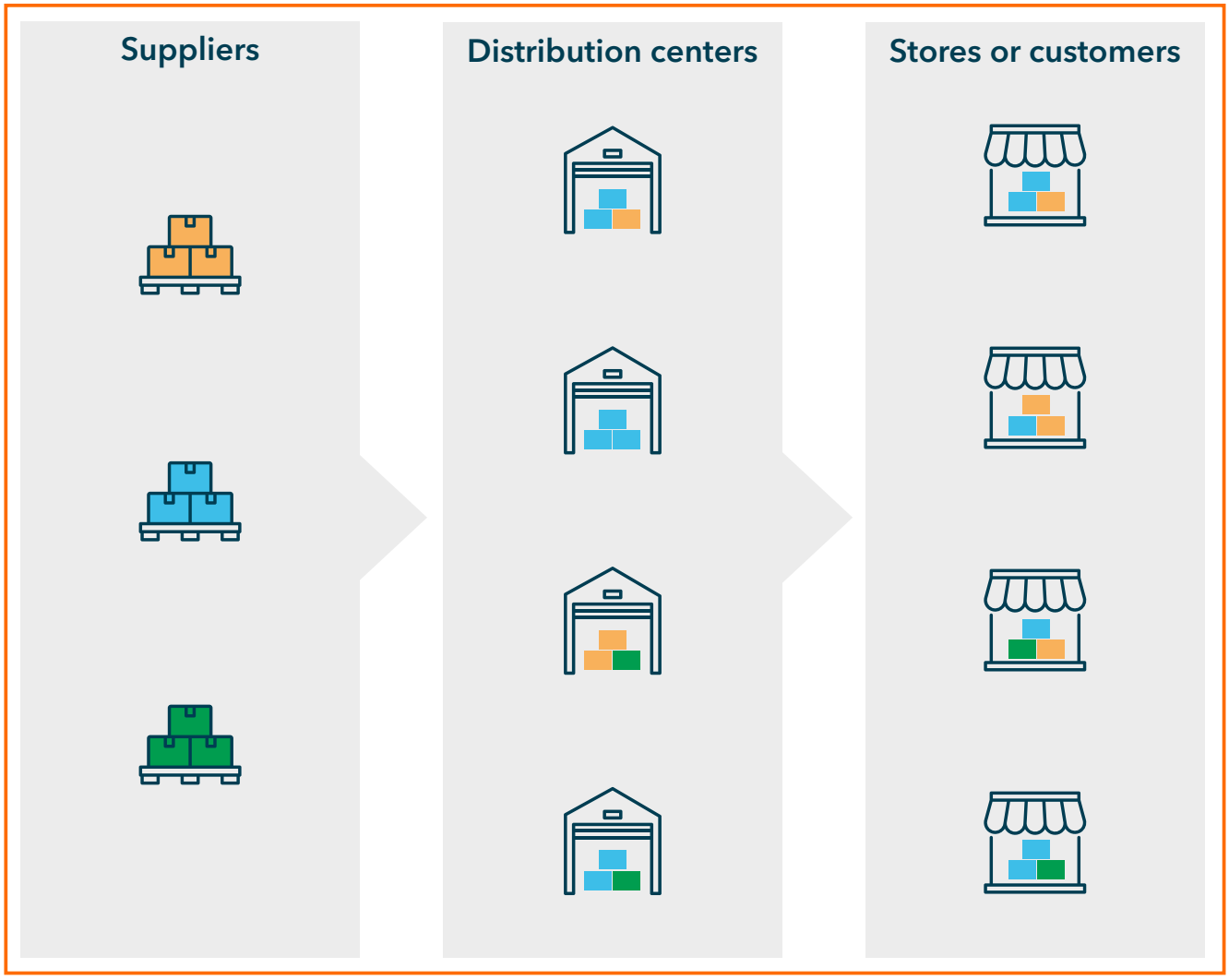
Benchmark performance
Compare your current performance against industry standards to pinpoint opportunities for improvement

An effective as-is analysis ensures that optimization efforts are data-driven, focused on high-impact areas, and aligned with measurable cost reduction goals.



Best practice 3: Optimize inventory allocation

Building on the data foundation and cost baseline established in earlier practices, optimizing inventory allocation focuses on smartly distributing your stock across your network. This innovative approach goes beyond simply managing inventory levels by ensuring that products are positioned where they can best meet demand while minimizing costs.



Inventory allocation optimization determines how much stock to assign to different locations or customers to meet demand while minimizing costs and optimizing service levels.

How to optimize inventory allocation:

1

Segment and prioritize

> Classify products based on demand variability, lead times, and cost impact
> Focus on high-impact items where optimal allocation drives the most benefit

2

Set service targets

> Define clear service levels for different product segments or customer groups
> Align these targets with overall business goals to balance customer satisfaction and cost efficiency

3

Apply optimization models

> Use proven models to calculate ideal order quantities, reorder points, and safety stocks for each segment
> Run scenario simulations to identify the most cost-effective allocation across suppliers, distribution centers, and stores

4

Monitor and adjust

> Track key performance indicators (KPIs) such as inventory turnover, fill rates, and stockout rates
> Regularly review and refine your allocation strategy to adapt to market trends and operational feedback

Why it matters

> **Cost efficiency:**
Better distribution reduces excess inventory and lowers carrying costs
> **Enhanced service:**
Accurate allocation improves product availability, leading to higher fill rates and improved customer satisfaction

By integrating inventory allocation with your overall inventory management strategy, you create a more agile, cost-effective supply chain that supports your competitive objectives.

Best practice 4: Optimize facility location and distribution centers

Optimizing your supply chain network requires aligning facility locations with cost efficiency, service levels, and long-term business goals. The strategic process moves through the following three key stages as you refine your decision to ensure an optimal, cost-effective supply chain structure.

1

Regional facility configuration: defining the network structure

This phase determines the ideal geographic distribution of production, storage, and distribution facilities. Key considerations include:

> **Production technologies:** Balance cost, scale, and operational flexibility
> **Competitive landscape:** Understand market positioning and regional cost advantages
> **Aggregate logistics costs:** Evaluate transportation, warehousing, and labor expenses
> **External factors:** Regional demand, tax incentives, and political risks influencing facility placement

By analyzing these elements, you can identify cost-optimal regions that balance proximity to demand centers with efficient logistics operations.

2

Desirable sites: refining the selection

Once regional locations are identified, the focus shifts to evaluating potential facility sites within those regions. This includes evaluating:

> **Production methods:** Ensure sites support operational efficiency and align with workforce requirements
> **Infrastructure availability:** Assess transportation access, utilities, and regulatory compliance

This stage narrows down your list of locations to those that offer the best mix of cost efficiency, infrastructure reliability, and scalability.

3

Location choices: finalizing the decision

At this stage, specific facility sites are selected based on:

> **Factor costs:** Labor availability, raw material access, and energy expenses
> **Logistics costs:** Transportation, inventory holding, and coordination expenses

By systematically refining the selection process, you'll reduce long-term operational costs, streamline logistics, and improve supply chain resilience.

Centralizing vs. decentralizing

A critical decision during facility planning is choosing between a centralized and a decentralized network. Use the table below to weigh the pros and cons:

Configuration	Advantages	Challenges
Centralized network	Lower fixed costs, simplified management	Longer lead times, higher transportation costs
Decentralized network	Shorter lead times, flexible fulfillment	Higher warehousing costs, complex management

Here is an example of how a network of distribution centers can be optimized using the factors outlined above:

Initial situation

Legacy network with 10 DCs, sub-optimal locations, capacities and customer allocation

Optimized situation

New network with 7 DCs, optimized locations, capacities and customer allocation

Best practice 5: Leverage technology and data for smarter supply chain decisions

Modern supply chain management harnesses advanced technology to transform raw data into strategic, cost-effective decisions. By integrating simulation tools with advanced optimization models, you can evaluate multiple network configurations and fine-tune your strategy to achieve significant savings and operational improvements. Below is a structured approach to enhancing your decisions using data-driven models:

Enhancing decisions with data-driven models

Beyond initial simulations that help visualize different network configurations and trade-offs, advanced optimization models allow you to quantify these trade-offs and pinpoint where savings can be made. Consider the following models:

Center of gravity model

Purpose

Identifies the optimal location for warehouses or distribution centers by analyzing customer demand and transportation costs

Benefit

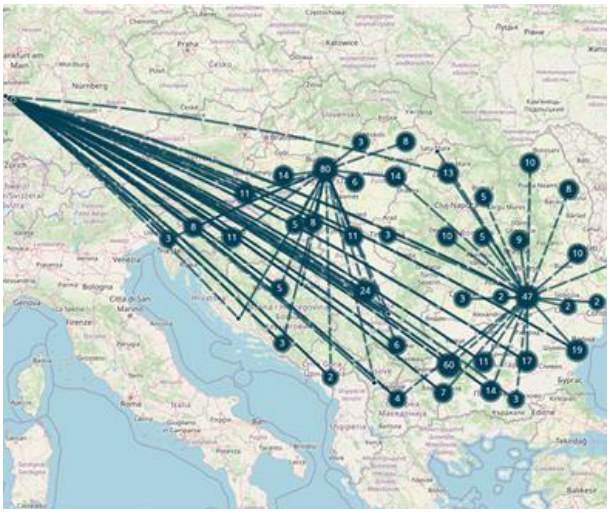
Minimizes travel distances, reducing transportation costs while maintaining service levels

Ideal use case

Deciding where to place warehouses

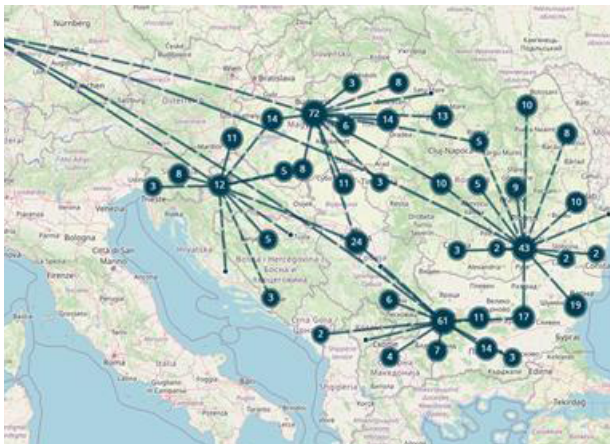
Center of gravity model in action

Baseline network: Evaluate the current facility locations and distribution patterns



Center of gravity applied

Reposition facilities based on demand hotspots to achieve lower overall transportation distances and enhanced efficiency



Network flow optimization

Purpose

Analyzes product flows across the supply chain to optimize routing, distribution, and capacity utilization

Benefit

Reduces bottlenecks and improves freight consolidation, lowering overall transportation expenses

Ideal use case

Enhancing freight and distribution planning

Mixed-integer linear programming (MILP)

Purpose

Uses mathematical algorithms to optimize facility locations and routing decisions, considering constraints like capacity, demand variability, and production costs

Benefit

Balances cost savings with service requirements in large-scale networks

Ideal use case

Strategic network planning across the entire supply chain

Adopting a holistic approach

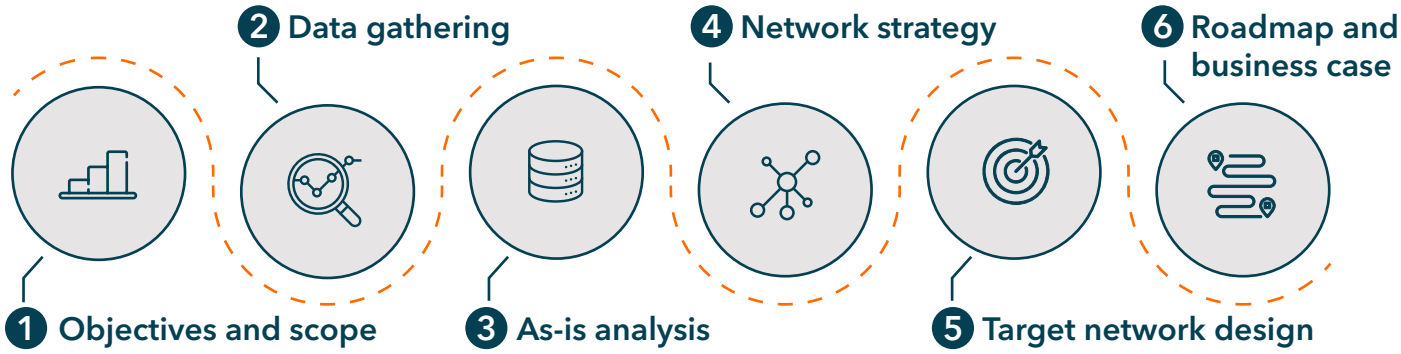
Strategic network design should consider the entire supply chain, from suppliers to manufacturers, distributors and customers. This holistic approach uncovers optimization opportunities and cost savings across the full value chain.

Implementing your optimization plan

Steps for implementation

Implementing supply chain network optimization requires a structured change management approach to ensure adoption across all levels of the organization. Resistance to change, misalignment between departments, and lack of stakeholder buy-in can hinder cost-saving initiatives.

Successful implementation follows these key steps:



1 Objectives and scope

Define the project goals, key challenges, and network elements to optimize

> Ensures alignment with business objectives, avoids scope creep, and focuses efforts on meaningful improvements

2 Data gathering

Collect and structure relevant data, ensuring completeness and accuracy

> Reliable data is critical for informed decision-making, avoiding costly mistakes and ensuring realistic optimization scenarios

3 As-is analysis

Assess the current network setup to identify inefficiencies and areas for improvement

> Pinpoints bottlenecks, excess costs, and operational gaps that need to be addressed to improve performance

4 Network strategy

Develop multiple network scenarios and evaluate their feasibility and impact

> Helps compare different approaches, balancing cost, service levels, and risk before making significant changes

5 Target network design

Select and refine the optimal design based on cost, efficiency, and strategic goals

> Provides a concrete, data-driven plan that delivers measurable benefits, such as cost savings and improved logistics efficiency

6 Roadmap and business case

Create an actionable implementation plan with a business case to support decision-making

> Ensures smooth execution, secures stakeholder buy-in, and justifies investment with projected ROI and long-term benefits

Interested in learning about the steps to implementation in more detail?
Check out the dedicated chapter in our ebook
"The ultimate guide to supply chain network optimization".

Case study: optimizing a supply chain over a 10+ year planning horizon with 4flow network design software

Overview

An international supermarket chain managing over **€5 billion in logistics costs**

> Aimed to ensure a **sustainable competitive advantage** by creating a **holistically optimized end-to-end network** as one of their primary strategic programs

> Focused on streamlining logistics through continuous optimization and adaptation to evolving market conditions

Initial situation

The grocery business had a complex logistics network spanning multiple regions. Key goals included:

> **International reach:** Managing significant global logistics costs

> **Sustainability:** Ensuring long-term competitive advantages through optimal network planning

> **Stakeholder involvement:** Network planning was crucial for stakeholders from both central and regional organizations

Approach and solution

To achieve these goals, 4flow network design software was used to address multiple facets of the supply chain, offering the following solutions:

Network visualization

The existing network, its volume, and associated costs were visualized to identify areas for improvement.

Comprehensive network analysis

Detailed analysis of aspects like pallet flows, location efficiency, transportation utilization, emissions, and transportation cost provided valuable insights into the network's current performance.

Network volatility analysis

The software identified potential risks and volatility factors to ensure the network remained robust in the face of market changes.

Identification of network vulnerabilities

The software found weaknesses in the network and highlighted opportunities for improvement in selected areas, facilitating targeted enhancements.

Results and benefits

The 4flow network design software solution empowered the grocery business to achieve significant strategic advantages by transforming complex analyses into actionable insights:

Improved network design efficiency
Over 50 scenarios were evaluated—achieving optimal supply chain configurations in a fraction of the time compared to manual assessments.

New logistics sites identified
More than 150 warehouse and distribution center locations were compared and assessed per scenario, uncovering strategic opportunities for new facility placements.

Optimized transportation lanes for efficiency
Over 400,000 transportation lanes were optimized across the network, streamlining operations and reducing costs.

Continuous adaptability
With the software, the network can be continuously updated—minimizing planning effort while adapting the structure and transportation to market changes.

Supply chain network optimization – a continuous process

Optimizing costs through network design is an ongoing process; the best possible result can only be achieved when supply chain performance is continuously monitored and adjusted over time, as market variables and demand are constantly changing. Continuous optimization may involve developing a set of key performance indicators (KPIs).

Depending on the timeframe, resources and expertise available, supply chain network optimization can be carried out by either an in-house team with suitable and efficient tools or a consulting agency with a wealth of expertise and experience in your industry.

4flow network design software:
Optimize your supply chain like never before

4flow provides advanced network design software that empowers businesses to optimize their supply chains for greater agility, resilience and cost efficiency. Our comprehensive portfolio provides end-to-end visibility and increases resilience with modeling software for strategic and tactical network design.

Contact us to learn more about 4flow's network design software

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About 4flow

4flow is a leading global provider of supply chain consulting, software and fourth-party logistics (4PL) services. Our end-to-end solutions help our customers optimize their supply chains to be prepared for the future.

For more than 20 years, we have been working with leading businesses to adapt their supply chain networks to ever-changing market requirements and ensure their competitiveness.