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Supply chain basics

How logistics differs from supply chain management, upstream and downstream, the SCOR model, push and pull, and the bullwhip effect

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SHORT ANSWER

A supply chain is the series of links through which goods, information and money flow from raw materials to the end customer. According to CSCMP, supply chain management is the planning and management of sourcing and procurement, conversion and all logistics activities, including coordination with suppliers, intermediaries, service providers and customers. Logistics management is part of it: it manages the forward and reverse flow and storage of goods, services and related information from the point of origin to the point of consumption.

What is a supply chain?

Before a product reaches the shelf it passes through many links: raw material supplier, manufacturer, warehouse and distribution, retailer and finally the customer. Three things flow between those links:

- **Goods:** flow from supplier to customer. With returns, the direction reverses.
- **Information:** orders, demand and sales data; mainly flow from customer back to supplier.
- **Money:** payments flow from customer to supplier.

The supplier side is called **upstream** and the end-consumer side **downstream**.



Link	Role
Supplier	Provides raw materials and parts. The most upstream link.

Link	Role
Manufacturer	Turns inputs into products; the production plan relies on the demand forecast.
Warehouse and distribution	Holds stock, picks orders and ships them. Logistics service providers (3PL) often work here.
Retailer	Offers the product to the end user; sales data flows back up the chain.
Customer	The source of demand. The most downstream link; returns flow back from here.

How logistics differs from supply chain management

A frequently cited source for definitions is the professional body CSCMP (Council of Supply Chain Management Professionals).

Supply chain management (CSCMP): the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. It also includes coordination and collaboration with channel partners such as suppliers, intermediaries, third-party service providers and customers. In essence, it integrates supply and demand management within and across companies.

Logistics management (CSCMP): the part of supply chain management that plans, implements and controls the efficient, effective **forward and reverse** flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

	Logistics management	Supply chain management
Scope	Flow and storage: transport, warehousing, inventory, order fulfilment, network design	Logistics plus procurement and manufacturing
Coordination	—	Also covers coordination with marketing, sales, product design, finance and IT
Relationship	A subset of supply chain management	The broader function that includes logistics

Logistics companies play different roles in this structure: a 3PL runs logistics operations, a 4PL manages several providers through a single interface. See **Warehousing and inventory management** for more.

The SCOR model: a common language for processes

SCOR is a reference model for describing and measuring supply chain processes. It is owned by ASCM (Association for Supply Chain Management). The current version is the **SCOR Digital Standard (SCOR DS)**; according to ASCM it is open access and emphasises a synchronous network rather than a linear chain. According to the trade press, SCOR DS was announced in September 2022.

Process	What it covers	Related topics in this guide
Orchestrate	Strategy, business rules, network design, data analytics, risk and sustainability	Carrier liability and cargo insurance (risk)

Process	What it covers	Related topics in this guide
Plan	Planning supply and demand	The container shipment timeline
Order	Customer purchasing, pricing, payment	Payment methods and letters of credit; Incoterms® 2020
Source	Buying inputs	Your first export or import: a step-by-step roadmap; How are import duties calculated in Türkiye?
Transform	Manufacturing, assembly, maintenance and repair	—
Fulfill	Delivery planning, shipping, installation, invoicing	FCL, LCL and freight calculation; Air cargo: the AWB and chargeable weight; Warehousing and inventory management
Return	Diagnosis, sorting and circular activities	Cargo damage and the claims process

How it differs from the earlier model: The earlier SCOR had six processes: Plan, Source, Make, Deliver, Return and Enable. SCOR DS added Orchestrate, split Deliver into Order and Fulfill and renamed Make as Transform. It also added resilience, economic and sustainability metrics.

The "Related topics" column is our own mapping and not part of SCOR.

Push and pull

	Push	Pull
Production and distribution follow	Forecast demand	Actual customer demand
Inventory	Often higher	Low inventory is the aim

The approach chosen has a direct effect on stock levels: a link working to a forecast builds up stock, while a link working to actual demand aims to run with less.

The bullwhip effect

Small fluctuations in end-customer demand grow larger in orders the further up the chain you go. The retailer's orders swing more than demand, the wholesaler's more than the retailer's, and the manufacturer's most of all. This is called the **bullwhip effect**.

Origins: The phenomenon was probably first documented in Forrester's 1958 *Harvard Business Review* article. Forrester did not use the term "bullwhip"; he showed how the interaction of information, material and money flows leads to delays, oscillation and amplification. Lee, Padmanabhan and Whang say they first heard the term from an executive during a visit to Procter & Gamble in the early 1990s.

Four causes: In two articles published in 1997 ("The Bullwhip Effect in Supply Chains", *Sloan Management Review*; "Information Distortion in a Supply Chain: The Bullwhip Effect", *Management Science*), Lee, Padmanabhan and Whang identified four causes:

1. **Demand forecast updating:** each link updates its forecast from the orders it sees and amplifies the swings.

2. **Order batching:** placing orders in batches and at intervals makes demand look more volatile than it is.
3. **Price fluctuations:** buyers forward-buy during promotions, and orders then drop.
4. **Rationing and shortage gaming:** when supply is tight, buyers order more than they need to increase their allocation.

The title of one of the articles describes the phenomenon as **information distortion**: a link further up the chain sees not actual demand but the orders of the link below it.

Supply chain risk and resilience

The bullwhip effect is a swing that the chain generates by itself. Chains are also shaken by disruptions from outside: a fire at a supplier's plant, a strike at a port, a security problem on a sea route. In Christopher and Peck's 2004 article, **resilience** is a system's capacity to recover after a disruption, either to its former state or to a better one.

Where does risk come from?

The same article divides supply chain risk into five sources. The logistics examples are our own:

Source	Where it arises	Logistics example
Process	In the firm's own activities, including the transport, communication and infrastructure that support them	A warehouse management system outage, a breakdown in the firm's own fleet
Control	In the rules and systems that govern processes	A badly set order quantity or safety stock rule
Demand	In the flow between the firm and its customers	A sudden surge in orders, a major customer unable to pay
Supply	In the flow between the firm and its suppliers	Production stopping for a single-sourced part
Environmental	Outside the supply network	Natural disaster, accident, war, embargo, socio-political change, closure of a sea route

Transport risk is not a separate heading in this classification: a breakdown in your own vehicles is a process risk, a delay in a supplier's transport is a supply risk, and the closure of a strait is an environmental risk. Political risks (sanctions, additional duties, border closures) fall under environmental.

Four principles of resilience

Christopher and Peck propose four principles for a resilient chain:

1. **Build resilience into the design:** resilience is set as a goal alongside cost and service when the network is designed, not added afterwards.
2. **Collaboration:** information is shared with suppliers, customers and service providers, and risk is managed as a problem of the network rather than of one firm.

3. **Agility:** being able to respond quickly to unexpected changes in demand or supply. Its two pillars are end-to-end **visibility** and short lead times.
4. **A risk management culture:** continuity is owned at board level, and risk is assessed in major decisions.

Redundancy or flexibility?

In their 2005 article in *MIT Sloan Management Review*, Sheffi and Rice distinguish two routes to resilience:

	Redundancy	Flexibility
What it means	Holding extra resources against disruption	Being able to keep goods moving another way when disruption hits
Logistics example	Safety stock, a second supplier, spare capacity	Plans prepared for more than one port and route, the ability to work with different carriers, standard packaging and equipment
Cost	Paid every day; pays back only if there is a disruption	Needs investment, but can also give a competitive edge in day-to-day work

There is a **trade-off** between efficiency and resilience here. A lean chain cuts cost by keeping stock and spare capacity to a minimum, but it also has less of a buffer when disruption comes. Sheffi and Rice's point is that redundancy is pure cost unless a disruption happens, while flexibility can pay for itself on normal days too. For how safety stock is calculated, see **Warehousing and inventory management**.

Reading a disruption: a route change

Ships sailing round the Cape of Good Hope instead of through Suez because of security problems in the Red Sea show how an environmental risk spreads through the chain. The freight and capacity side is covered in **Shipping markets and freight cycles**. On the supply chain side, the first effect is **stock in transit**.

Under Little's law, average inventory equals the flow rate multiplied by the time spent in the system. A hypothetical example: an importer brings in 10 containers a week, and the route change adds 10 days to the voyage. The number of extra containers sitting in transit is $(10 \div 7) \times 10 \approx$ **14 containers**. That stock has been or will be paid for but cannot be sold, so working capital is tied up. To keep the shelves stocked, safety stock also has to be recalculated for the longer and less predictable lead time.

Where to go next in the guide

- The physical journey of the goods: **The container shipment timeline**, **Intermodal and combined transport**
- Documents: **Transport documents compared: bill of lading, sea waybill, AWB, CMR and CIM**
- Parties and roles: **The parties in trade and logistics**
- Stock and warehousing: **Warehousing and inventory management**

Test yourself

1. According to CSCMP, how are logistics management and supply chain management related? *(Answer: Logistics management is part of supply chain management.)*
2. In SCOR DS, which two processes replaced the earlier Deliver process? *(Answer: Order and Fulfill.)*
3. A retailer orders far more than usual during a promotion and then stops ordering. Which cause of the bullwhip effect is this? *(Answer: Price fluctuations, i.e. forward buying.)*

Frequently asked questions

Are logistics and supply chain management the same thing?

No. According to CSCMP, logistics management is part of supply chain management. Logistics manages the flow and storage side: transport, warehousing, inventory, order fulfilment and network design. Supply chain management also covers procurement and manufacturing and coordination with marketing, sales, product design, finance and IT.

What are the processes of the SCOR model?

The current version from ASCM, the SCOR Digital Standard (SCOR DS), defines seven processes: Orchestrate, Plan, Order, Source, Transform, Fulfill and Return. The six processes of the earlier SCOR were Plan, Source, Make, Deliver, Return and Enable.

What is the bullwhip effect?

Small fluctuations in end-customer demand grow larger in orders the further up the chain you go. In their 1997 articles, Lee, Padmanabhan and Whang identified four causes: demand forecast updating, order batching, price fluctuations, and rationing and shortage gaming.

What is the difference between push and pull?

In a push system, production and distribution follow forecast demand, which often means higher inventory. In a pull system, production and distribution follow actual customer demand, with low inventory as the aim.

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