Supply Chain
Inventory Manangment

Risk Management in Global Supply Chain

Types of Supply Chain Risks

Supply Risks

when suppliers fail to deliver.
Causes: natural disasters, strikes, factory shutdowns.

Transportation Risks

delays or damage in transit.
Causes: port congestion, piracy, accidents, container shortages.
Ever Given ship blocking Suez Canal in 2021

Demand Risks

Sudden changes in customer demand.
Causes: economic downturn, consumer trends, pandemics.

Financial Risks

Cost and currency fluctuations.
Causes: foreign exchange volatility, tariffs, etc

Regulatory Risks

new laws

Mian Inventory Management Risks

Overstocking

Risk: High holding costs, wastage, obsolescence.
Example: H&M in 2018 had over $4.3 billion unsold clothes, which forced them into heavy discounting.

Stockouts

Risk: Lost sales, unhappy customers, prod. stoppage.
Example: During Toyota's SC disruption after 2011 Japan earthquake, factories stopped because critical parts were missing.

Demand Uncertainty

Risk: Not knowing how much customers will actually buy.
Example: Nintendo Wii (2006) faced shortages because demand was underestimated, leading to customer frustration and lost sales.

SC Disruptions

Risk: Delays due to strikes, natural disasters, or geopolitical issues.
Example: **Apple** faced iPhone delays in 2020 because of COVID-19 shutdowns in China.

Main Risk Response Strategies

Risk Avoidance

Change strategy to avoid risk.
Example: Zara produces clothes in smaller batches, reducing the risk of excess inventory.

Risk Mitigation

Reduce impact/likelihood
Example: Toyota uses a **JIT** + **dual sourcing strategy** to reduce supplier risk after the 2011 disaster.

Risk Transfer

Share the risk
Example: Many retailers use **vendor-managed inventory (VMI)**, where suppliers carry part of the risk. Walmart does this with its suppliers.

Risk Acceptance

Accepts a small % of lost/damaged packages and simply refunds customers.


400
35mm color print film
DXN
Kodak 400 • 36
PROCESS C-41
400 36exp.

Kodak's Failure

- Kodak was once the **global leader in photography** (film, cameras, and chemicals).
- In 1975, a Kodak engineer (Steven Sasson) developed the **first prototype digital camera**.
- Instead of investing, Kodak shelved it, fearing digital would cannibalize their **film inventory business**

Key Inventory & Risk Failures

Obsolescence Risk Ignored

- Film rolls , and printing paper became rapidly outdated as digital cameras grew.
- Kodak should have **mitigated obsolescence risk** by shifting to digital production early.
- Instead, they overstocked traditional film inventory, which became unsellable.

Failure to Diversify & Transfer Risk

Kodak was overly dependent on **film sales**, which accounted for most of their revenue.
Competitors like **Canon, Sony, and Nikon** partnered with electronics suppliers and quickly captured the market.

Inaccurate Forecasting & Market Response

Kodak forecasted that film would remain dominant.
But by the early 2000s, digital cameras and later smartphones wiped out demand almost completely.

Stockouts (Inventory Shortages)

Avoid: Improve demand forecasting accuracy with AI/ML tools.

Mitigate: Maintain safety stock, implement reorder point systems, and establish multiple suppliers.

Transfer: Use vendor-managed inventory (VMI), where suppliers hold responsibility for stock availability.

Accept: For non-critical, low-demand items, allow occasional stockouts.

Example: Procter & Gamble (P&G) uses VMI with Walmart to ensure shelves are always stocked.

Overstocking (Excess Inventory)

Avoid: Adopt lean inventory practices and just-in-time (JIT) models.

Mitigate: Apply ABC/XYZ analysis to prioritize what to stock heavily vs. lightly.

Transfer: Negotiate return-to-vendor agreements for unsold stock.

Accept: For strategic items with long lead times, accept some overstock.

Example: Zara mitigates risk by producing in small batches and replenishing frequently based on real-time sales data.

Supply Chain Disruptions

Avoid: Don't depend on single suppliers or regions.

Mitigate: Dual sourcing, nearshoring, safety stock, and supplier risk monitoring.

Transfer: Use contracts with penalty clauses or supply chain insurance.

Accept: For low-cost, low-impact items, accept occasional disruption.

Example: Apple started diversifying away from sole reliance on China by investing in India and Vietnam manufacturing.

Main Risk Response Strategies

Strategy	Definition	Walmart Example	Amazon Example
Acceptance	Acknowledging the risk and budgeting for it, instead of fixing it.	Accepts spoilage of perishable food (fruits/vegetables) as normal business waste.	Accepts a small % of lost/damaged packages and simply refunds customers.
Avoidance	Changing the process so the risk doesn't occur at all.	Limits seasonal stock purchases (e.g., Christmas goods) to avoid huge unsold surpluses.	Uses pre-order systems for new products (like Kindle or Echo devices) to avoid overproduction.
Mitigation	Reducing the likelihood or impact of the risk.	Keeps **safety stock** of high-demand consumer goods (toilet paper, cleaning supplies). Uses AI for demand forecasting.	Built **fulfillment centers near customers** + robotics to reduce stockouts and delivery delays.
Transfer	Shifting the risk to another party through contracts, insurance, or outsourcing.	Uses **Vendor-Managed Inventory (VMI)** with suppliers like P&G, so the supplier bears inventory risk.	Sellers on **Amazon FBA** transfer storage & logistics risk to Amazon, while Amazon insures shipments.

Inventory Turn

Inventory Turnover (Turn)

What is it

how many times a company sells and replaces its inventory during a given period (usually a year)

How to Calculate

Inventory Turnover=
Cost of Goods Sold (COGS) / Average Inventory

Why it is Important

Tells me **how efficiently a company manages inventory**.

- High turnover = Company sells products quickly (less money stuck in inventory).
- Low turnover = Products move slowly, risk of **overstock, obsolescence, or waste**.

How Management Use Inventory Turn

Efficiency

Are we moving stock too slowly

Benchmarking

Compare the Performance with Peers / Industry

Cash Flow

Fast Turn = Quicker Cash Flow

Decision Making

Adjust purchasing, pricing, or promotions

$ 1,000,000

Company sells goods in a year (COGS).

$ 200,000

Average Inventory

5

Inventory Turn

This **Company sold and replaced its inventory 5 times in a year**

.

- If the industry average = 8, Company A is **slower than competitors** (risk of too much stock).
- If the industry average = 3, Company A is **more efficient than competitors**.

Example of Effect of Slow / None Moving

Usage $ 500,000	**Usage $ 500,000**
Avg Inv. 1,000,000	**Avg Inv. 600,000**
Turn = 0.5	**Turn = 0.83**

$400,000 of that inventory is **obsolete spare parts**

By cleaning up non-moving stock, the turnover **improves**, giving a clearer picture of efficiency.

MRO Inventory

Low Turns Vs Retails

Spare Parts for Critical Equipment

Benchmarking

0.5 to 1.5 is average

Slow-moving items

Turbines Spares Stay up to 5 Years

From Previous Session

- Risk Management in Global Supply Chain
- Inventory Management Risk
- Main Risk Response Strategies
- Inventory Turn and its objectives

Purchasing / Procurement

Purchasing is not only a “buying” activity; it’s the foundation of supply chain **performance**.

Cascade Table

Level	Example
Vision	“Save people money so they can live better.”
Business Strategy	Cost leadership, operational excellence, customer focus
Supply Chain Strategy	Efficient supply chain, JIT inventory, global sourcing
Procurement Strategy	Category management, long-term supplier partnerships, total cost focus
Category Strategy	Fresh produce & packaged goods: volume, quality, pricing
Supplier Actions	Multi-year contracts, KPIs, sustainability programs, innovation collaboration

Cascade Table

Level	BP Example	Walmart Example	ExxonMobil Example
Business Strategy	Transition to integrated energy company by 2050	Everyday low prices, cost leadership	Remain low-cost producer, expand NG/petrochemicals
Supply Chain Strategy	Secure oil supply + renewable tech suppliers	Efficient, low-cost supply chain, JIT inventory	Scale efficiency + global leverage
Procurement Strategy	Sustainable procurement, long-term renewable partnerships	Bulk/global sourcing, category management	Category management, cost leadership
Category Strategy	Wind turbines – long-term contracts with Siemens/GE	Fresh produce, packaged foods, electronics	Drilling rigs/services – bulk contracts
Supplier Actions	Renewable project local partnerships	Multi-year contracts with P&G, supplier KPIs	Multi-year logistics & drilling agreements

Apple Case

Apple Strategic Supplier Relationships

Purchasing

Apple's success isn't only design, it's supply chain and procurement.

2011–2012, Apple prepaid **over $3.9 billion** to secure supply of flash memory chips from suppliers like Toshiba and Samsung.

By locking in supply early, Apple guaranteed low cost, avoided shortages, and ensured iPhones and iPads could launch on time while competitors faced bottlenecks.

Impact

Procurement strategy = market dominance. Apple didn't just buy parts; it secured the future of its products.

Purchasing Vs Procurement

Purchasing

- The transactional process of buying goods and services.
- Focuses on the operational tasks → issuing purchase orders, receiving goods, and making payments.
- Short-term in nature.

Procurement

- The broader, strategic process of acquiring goods and services.
- Includes supplier selection, negotiation, contracting, relationship management, risk management, and sustainability.
- Long-term and strategic.

Example Hospital MRI Machine:

Purchasing

- **Purchasing**: Buy one MRI machine based on doctor's request, process the order, pay the invoice.

Procurement

- **Procurement**: Analyze hospital's imaging needs, consult multiple vendors (GE, Siemens, Philips), compare performance, negotiate maintenance contracts, ensure regulatory compliance, and build long-term supplier partnership

Purchasing Vs Procurement

Aspect	Purchasing	Procurement
Definition	Transactional act of buying goods/services.	Strategic process of acquiring goods/services.
Focus	Short-term, cost & transactions.	Long-term, value, risk, and relationships.
Activities	Issuing POs, receiving goods, processing payments.	Sourcing, supplier selection, negotiation, contracts, SRM.
Nature	Operational.	Strategic.
Time Horizon	Immediate needs.	Future planning.
Example	Buying 50 laptops on request.	Negotiating a 3-year laptop supply contract with service.

Definition

Purchasing is the process of **acquiring** goods, services, and works from **external** sources to meet organizational needs.

Scope:

Involves supplier selection, price negotiation, delivery management, and ensuring right quality & quantity.

External Vs Internal

Aspect	Internal Purchasing	External Purchasing
Source	Within the organization (subsidiary, department, JV)	Outside third-party vendors
Pricing	Transfer pricing, cost-based	Market-driven, competitive bids
Process	Simplified, policy-driven	Full procurement cycle (RFI, RFP, RFQ, contracts)
Purpose	Resource optimization, synergy, compliance	Cost savings, innovation, broader supplier base
Example	Plant buys from group warehouse	Plant buys from independent supplier

Importance:

- 50–70% of a manufacturing firm's revenue is spent on purchased goods and services (CIPS, 2023).
- Even a **5% cost saving in purchasing** can equal a **30% increase in sales** in terms of profit impact.

Example:

Toyota spends billions annually on components from suppliers; purchasing efficiency directly affects car pricing and competitiveness.

Income Statement

Sales		$100
Cost of Goods Sold		
Purchases	$50	
Other Expenses	$40	$90
Profit		$10

Income Statement
(with Sales Increase)

Sales		$110
Cost of Goods Sold		
Purchases	$55	
Other Expenses	$44	$99
Profit		$11

To increase profits by $1, sales must increase by 10%

Income Statement
(with Reduced Purchase Cost)

Sales		$100
Cost of Goods Sold		
Purchases	$49	
Other Expenses	$40	$89
Profit		$11

To increase profits by $1, decrease costs by 2%

- **A 10% increase in sales has the same impact on profits as a 2% decrease in the purchase cost**

Purchasing Objectives

Continuous supply

Avoid stock outs & production delays.

Right quality

Meeting technical & safety standards

Cost efficiency

Lowest total cost of ownership, not just cheapest price

Supplier relationship

Collaboration & innovation

Sustainability

Supplier Relationships Supporting Purchasing Objectives

Purchasing Objective	Real-Life Example	How Supplier Relationship Helps	Result
Quality & Innovation	**Toyota & Denso** (Automotive)	Joint R&D, early supplier involvement in product design.	High-quality, reliable cars → strong brand reputation.
Cost Efficiency & Supply Continuity	**Walmart & P&G** (Retail)	Vendor Managed Inventory (VMI), shared sales/inventory data.	Reduced stockouts, lower inventory costs, consistent supply.

Procurement Strategies

Centralized Procurement

All purchasing decisions made at **headquarters**.

Decentralized Procurement

Each business unit/site manages its own purchasing.

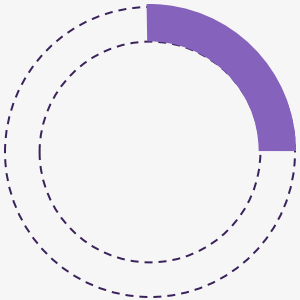
Strategic Sourcing

Continuous process of analyzing spend, suppliers, and markets to **choose the best sourcing strategy**.

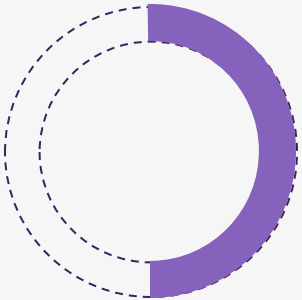
Category Management

Grouping purchases by category (e.g., IT, raw materials, logistics) and managing each as a “business unit.

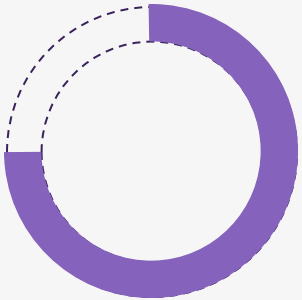
Centralized Procurement



All purchasing decisions made at **headquarters**.
Advantages: economies of scale, standardization, stronger supplier power.
Disadvantages: less flexibility for local units

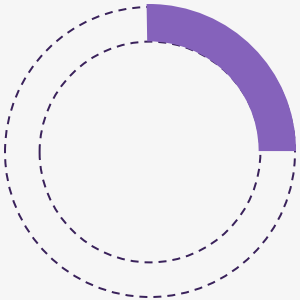


SABIC (Saudi Arabia) shifted to centralized procurement in the 2010s.

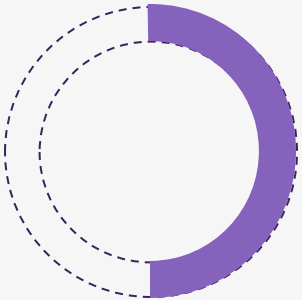


Impact: Stronger control over global supplier base, improved compliance.

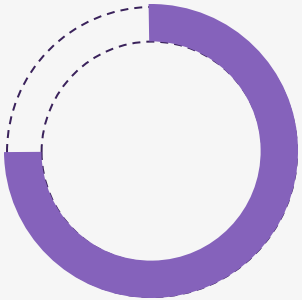
Decentralized Procurement



Each business unit/site manages its own purchasing.
Advantages: flexibility, faster response to local needs.
Disadvantages: higher costs, duplication of suppliers, less bargaining power.

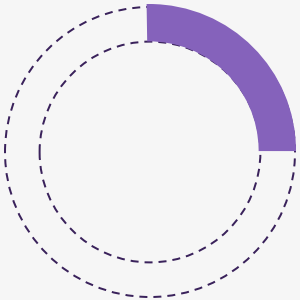


Boeing (USA) in the 2000s used decentralized/global outsourcing for the 787 Dreamliner.

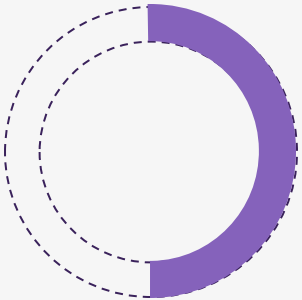


Lesson: decentralization works only if tightly controlled.

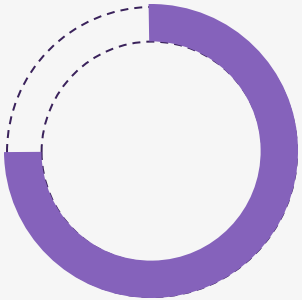
Strategic Sourcing



Continuous process of analyzing spend, suppliers, and markets to **choose the best sourcing strategy**. **Advantages**: cost reduction, innovation, long-term partnerships. **Disadvantages**: requires advanced data and skills.

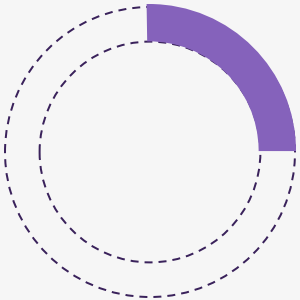


Procter & Gamble (USA) implemented strategic sourcing to consolidate global suppliers.

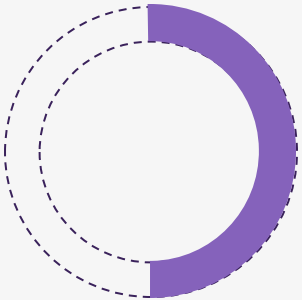


Saved **$1 billion+ over 3 years** by rationalizing suppliers and negotiating long-term contracts. **Impact**: stable supply + reduced costs + innovation from suppliers.

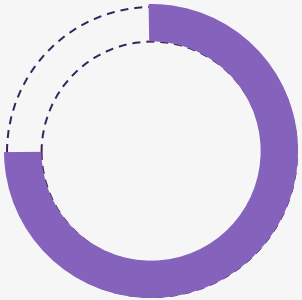
Category Management



Grouping purchases by category (e.g., IT, raw materials, logistics) and managing each as a “business unit.”
Advantages: focused expertise, tailored supplier strategies.
Disadvantages: needs skilled category managers.



Oil and Gas Companies apply category management to chemicals, drilling equipment, and logistics..



Category strategy in drilling saved **hundreds of millions USD annually** by standardizing specifications and pooling demand.

Procurment Strategies

Aspect	Normal Procurement	Strategic Sourcing	Category Management
Focus	Transactional — buying goods/services when needed	Strategic — optimizing sourcing decisions across spend categories	Holistic — managing each spend category as a "business unit"
Goal	Get the right product, at the right time, lowest price	Drive long-term value: cost, quality, risk, innovation	Maximize value across the **entire category** (cost, supply security, supplier innovation, demand mgmt.)
Timeframe	Short-term (per purchase)	Mid to long-term (1–5 years)	Continuous, ongoing lifecycle management
Approach	Reactive (respond to needs)	Proactive (structured sourcing projects)	Proactive & holistic (aligns sourcing with **business strategy** per category)
Process Example	**Apple** needs packaging → buys from available supplier offering lowest price	**Walmart** consolidates trucking spend into multi-year contracts with strategic logistics providers to cut costs and secure capacity	**Unilever** manages "chemicals" as a category globally: long-term supplier portfolio, sustainability targets, innovation partnerships, risk management

Procurement Top Risks

Top Risks

01

Supply Chain Disruption

02

Supplier Dependency & Concentration

03

Price Volatility

04

Quality Risk

05

Compliance & Regulatory

06

Cybersecurity & Data

Supply Chain Disruption

What :

Delays or stoppages in critical material/equipment delivery due to geopolitical events, disasters, or logistics bottlenecks.

ADNOC (UAE, COVID-19 2020)

- **Global logistics shutdowns delayed imports of drilling equipment and spare parts.**
- **ADNOC faced project delays and increased costs because key equipment was stuck overseas.**
- **How to Tackle: Diversify supplier regions. Build local supplier networks. Keep critical spares stockpiled near operations.**

Supplier Dependency

What :

Relying on a single supplier for critical safety or production equipment.

BP (Deepwater Horizon, 2010)

- Blowout preventer (BOP) was supplied by one vendor. When it failed, there was no redundancy.
- Disaster cost BP over $65B in fines, lawsuits, and cleanup.

How to Tackle:

Use dual sourcing for critical items. Establish backup frameworks with alternate suppliers. Conduct independent engineering validation of supplier designs

Price Volatility

What :

Extreme swings in raw material and equipment prices (steel, rigs, chemicals).

ExxonMobil (Global Projects, 2008)

During the oil boom, steel prices spiked by more than 70% in one year.
Gas and offshore projects saw costs balloon by billions USD, eroding margins

How to Tackle:

Negotiate long-term fixed contracts for steel, cement, and chemicals (CAP).
Use commodity price hedging (financial instruments).

Quality Risk

What :
Substandard parts can cause safety hazards and downtime.

Kuwait Oil Company (Fake Valves, 2014)
Discovered counterfeit valves supplied through subcontractors.
Result: safety hazards and millions of USD in downtime.

How to Tackle: Strict Supplier Quality Assurance (SQA). Only source from Approved Vendor Lists (AVL). Mandate API/ISO certifications and third-party inspection.

Compliance & Regulatory

What :
Failure to meet local content rules, environmental laws, or international sanctions.

Shell (Nigeria, Niger Delta)

- **Shell faced lawsuits and community tied to supplier and contractor environmental practices.**

How to Tackle: Embed compliance requirements in supplier contracts. Partner with local suppliers to meet local content rules.

Cybersecurity & Data Risk

What :
Procurement and supply chain systems are prime hacker targets.

ExxonMobil (2019 Cyber Attack Reports)
Exxon suppliers were targeted by cybercriminals attempting to breach procurement portals. While no major data leak occurred, it highlighted serious risks in vendor IT security.

How to Tackle: Cybersecurity audits of suppliers.Limit external vendor IT access.Include cybersecurity clauses in contracts.

Digital Procurement & Technology

What is Digital Procurement

Digital procurement means using technology, data, and automation to manage the end-to-end procurement process (from supplier selection to payment).
Instead of paper, phone calls, and Excel sheets → companies use AI, cloud platforms, robotics, and analytics.

Key Technologies in Digital Procurement

E-Procurement Platforms (Cloud-based /ERP)

Examples: SAP Ariba, Oracle Procurement Cloud.

What it does: Automates purchase requisitions, approvals, and supplier management in one platform.

(Shell): Shell uses SAP Ariba to handle thousands of suppliers globally. This allowed them to cut cycle time by 40% for supplier onboarding and increase compliance.

Robotic Process Automation (RPA)

Software robots that handle repetitive tasks (e.g., invoice checking, data entry).

Example (ExxonMobil): Exxon uses RPA to automatically match purchase orders with invoices, reducing manual work. This cut procure-to-pay errors by 60%

Artificial Intelligence (AI) & Predictive Analytics

Uses big data to forecast prices, supplier risks, and demand.

Example (BP): BP uses AI-driven analytics to forecast steel and energy market prices, helping procurement managers decide when to lock contracts. They reported savings in the hundreds of millions USD by avoiding peak prices

Supplier Portals & Marketplaces

Digital platforms where suppliers submit bids, documents, and compliance certifications.

Example (Kuwait Oil Company): Introduced an online supplier portal. Instead of paper bids, suppliers upload tenders digitally. Result: faster evaluation, fewer disputes, and better transparency

Data Analytics Dashboards

Combines spend analysis, supplier performance, and risk monitoring.

Example (TotalEnergies):

Total developed a procurement dashboard tracking $30B+ global spend. It shows which suppliers offer best prices, delivery times, and ESG scores. This enabled them to shift spend to more reliable suppliers, improving savings by 10–15% annually.

Risks / Challenges of Digital Procurement

- Cybersecurity risk → hackers may target procurement systems.
- High implementation cost → ERP systems can cost tens of millions.
- Data quality issues → “garbage in, garbage out.”