Supply Chain
Inventory Manangment

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.”

Outsourcing Vs Offshore

Outsourcing

Hiring an external service provider (a specialist company) to manage some or all of an organization's procurement activities — such as sourcing suppliers, negotiating contracts, purchasing goods/services, or managing supplier performance.

Definition

Instead of doing all purchasing activities in-house, a company contracts another expert organization to do it on their behalf.

All or Part of your activities

In House Vs Outside

Scope of Procurement

01

Direct Procurement

02

Indirect Procurement

03

Strategic Sourcing

04

Market intelligence

05

SRM

06

Expediting

Benefits of Procurement Outsourcing

Category	Benefit	Explanation
Cost Savings	Reduced operational costs	Outsourcing firms use economies of scale, better supplier deals, and process automation.
Access to Expertise	Specialized skills and tools	Outsourcing partners bring market intelligence, advanced systems (e.g., SAP Ariba), and experienced procurement teams.
Focus on Core Business	More time for strategic work	Internal teams can focus on innovation, production, and core competencies.
Global Reach	Better supplier networks	Outsourcing firms often have global supply databases and can negotiate better global contracts.

Risks or Challenges

Risk	Explanation
Loss of Control	The company may have less direct oversight over supplier relationships or purchasing decisions.
Data Security	Sharing sensitive procurement and financial data with third parties.
Quality Issues	The outsourcer's performance directly affects operational quality and delivery.
Cultural Misalignment	Different working styles or communication gaps can affect collaboration.

Factors to Consider Before Outsourcing Procurement

1. **Strategic Importance of the Category:**
   Don't outsource what gives you a competitive advantage (e.g., core materials in oil production).
   Focus outsourcing on non-core, repetitive procurement activities (e.g., office supplies).

1. **Cost-Benefit Analysis:**
   Evaluate the **total cost of outsourcing** vs. keeping it in-house, including transition and management costs.

2. **Vendor Capability:**
   Choose partners with strong **industry expertise**, **technology platforms**, and **proven client success**.

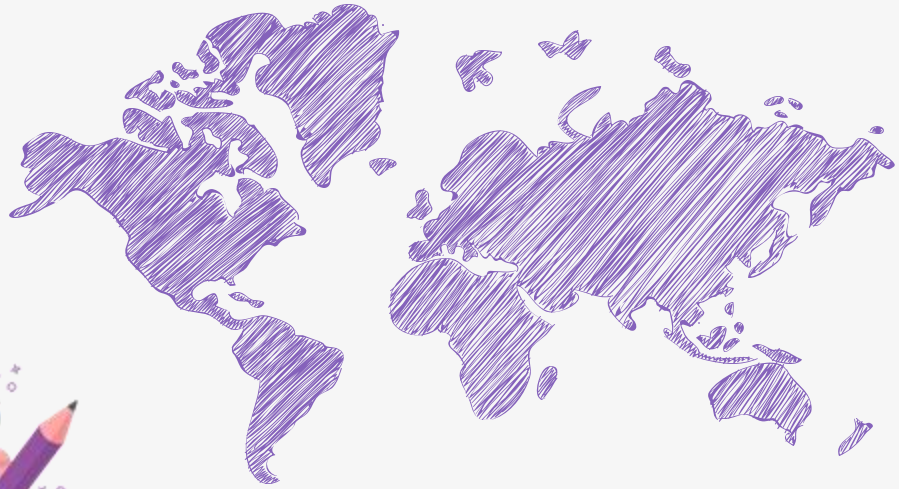
3. **Governance and Performance Metrics:**
   Define **clear KPIs** such as cost savings, on-time delivery, supplier quality, and compliance.

4. **Confidentiality and Compliance:**
   Ensure data protection, confidentiality, and compliance with local and international regulations.

Examples

BP – Oil & Gas Sector
Scope: Outsourced indirect procurement (IT, office supplies, facilities) to **Accenture** and **IBM**.

Results/Success:
15–20% cost reduction in indirect spend.
Streamlined procurement processes across multiple regions.
Internal teams could focus on strategic sourcing of critical oilfield equipment.



Group Discussion

Case Study

Background

GlobalTech, a fast-growing electronics manufacturer, faces rising procurement costs, long lead times, and limited visibility across its 400 suppliers. The internal procurement team is small and overwhelmed, leaving little time for strategic sourcing or supplier innovation.

The Proposal

A global firm, ProcureX Solutions, offers to handle GlobalTech's procurement activities — including sourcing, supplier management, and spend analytics — promising up to 20% cost savings through technology and global leverage.

The Dilemma

The CEO supports outsourcing to improve efficiency.
However, the Head of Procurement, Ms. Lina, fears:

- Losing control over supplier relationships
- Data confidentiality risks
- Negative team morale or job losses

Question for Group Discussion

- Which activities should be **kept in-house** vs. outsourced?
- How can GlobalTech **measure success** if outsourcing proceeds?

Question for Group Discussion

- **Keep In-House (Strategic/Core):**

Strategic supplier relationship management for critical components
Procurement strategy and policy development
Supplier risk management and innovation initiatives
Decision-making on supplier selection for key products

- **Outsource (Transactional/Non-Core):**

Purchase order processing and routine sourcing
Indirect procurement (office supplies, MRO, travel)
Spend analytics and reporting
Contract administration and invoice reconciliation

Question for Group Discussion

Key Performance Indicators (KPIs):

- **Cost Reduction:** % decrease in total procurement spend or cost per purchase order
- **Process Efficiency:** Cycle time reduction for purchase orders or sourcing events
- **Supplier Performance:** On-time delivery rate, defect rate, or supplier scorecards
- **Savings Realization:** Achieved vs. forecasted savings from ProcureX initiatives
- **Compliance and Risk:** % of spend under contract and policy compliance rate

Lean Production

What is Lean Production? (in simple terms)

Lean production is a way of organizing manufacturing (or other operations) so that you create **more value for the customer** using fewer resources. It focuses on **eliminating waste** (anything that does not add value from the customer's view) and doing things right the first time.

Main Principles of Lean

Identify Value

Determine what the **customer truly values and is willing to pay for**. Everything else is considered waste.

Map the Value Stream

From A – Z Value Mapping (Info +Materials)

Create Flow

Flow without Interruptions / waiting time

Establish Pull

Work is only done when there is a demand for it

Seek Perfection

Lean is never “done.” Continuously look for ways to **improve the process**, reduce waste, and deliver more value.

Lean Principle Summary

Principle	Description	Example in Practice
1. Define Value		
2. Map the Value Stream		
3. Create Flow		
4. Establish Pull		
5. Seek Perfection (Continuous Improvement)		

Lean Principle Summary

Principle	Description	Example in Practice
1. Define Value	Understand what the customer truly values and is willing to pay for — everything else is waste.	• **Toyota** defines value as reliable, defect-free vehicles with short lead times • **Nike** defines value as design and speed-to-market.

Value is **what the customer is willing to pay for** — not what the company thinks is valuable.

In Lean, we define value by asking:

1. Who is the customer?
2. What problem are we solving for them?
3. What features, functions, or services actually create satisfaction or usefulness?
4. What parts of our process don't add that value (i.e., are waste)?

Lean Principle Summary

Amazon "**Customer Obsession**" as the definition of value How Amazon defines value:
Fast, reliable delivery + wide selection + low prices + convenience.

How this shapes operations:

Prime Membership: "free (or faster) delivery." Amazon invests in automation, warehouses, and logistics to meet that value.

Recommendation algorithms: "personalized shopping experience," not random ads.

Customer reviews & transparency: value = "trust in purchase decisions."

Voice ordering (Alexa): value = "Convenience."

Lean Principle Summary

Principle	Description	Example in Practice
2. Map the Value Stream	Map all steps (information + material) that take a product from raw material to customer; eliminate non-value-adding steps.	**Intel** used value-stream mapping to cut chip assembly lead time by 65%.

Once value is defined, the next step is to **MAP all the activities required** to deliver that value from raw material to customer.

This includes both:

- **Value-adding activities** (those that create something the customer wants), and
- **Non-value-adding activities (waste)** (those that consume time, space, or money but don't increase customer satisfaction).

A **Value Stream Map (VSM)** visualizes the **flow of materials, information, and work** showing where delays, inventory, or bottlenecks exist.

Lean Principle Summary

Amazon **Mapping the order-to-delivery process**

Value Stream focus:

The entire journey from customer click → order → warehouse picking → delivery.

How Amazon applies VSM:

Amazon tracks every step using data: order processing, warehouse location, packing, and shipping.
Major wastes like waiting, unbalanced workloads, and unnecessary travel in fulfillment centers.
Optimized layout (robots + algorithms) to reduce picker walking distance and eliminate idle time.
Real-time inventory visibility connects the information flow (orders) to material flow (products).

Result: Reduced lead time from several days to same-day or next-day delivery, cutting waste across the value stream.

Lean Principle Summary

Principle	Description	Example in Practice
3. Create Flow	Ensure the remaining steps occur in tight sequence so products move smoothly toward the customer without interruption.	**Toyota's** production lines are designed so components flow continuously through stations, minimizing waiting and inventory.

Once you've defined what customers truly **value** and **mapped** the entire process (the value stream), the next step is to make that **value flow continuously** without delays, rework, or waiting.

In Lean terms, flow means that:
- Each step happens just when it's needed, and
- There are no bottlenecks, no idle inventory, and no waiting.

Lean Principle Summary

Amazon's business model is built on making **information and materials flow seamlessly** from click to doorstep

Step 1: Streamlined Order Flow (Information Flow)

- As soon as customer places an order, **data flows instantly** to the nearest fulfillment center (FC) where the item is stored.
- System automatically selects the **optimal FC and delivery route** based on proximity, inventory, and workload.
- This replaces old batch-order processing — a classic flow improvement that eliminates waiting and manual scheduling.

Step 2: Flow Inside the Fulfillment Center (Material Flow)

- Robotics (Kiva systems) carry shelves to workers instead of workers walking miles daily.
- Each item's path through picking → packing → shipping is digitally coordinated to minimize motion and waiting.
- Stations are designed for one-piece flow: each worker completes a value-adding task quickly before the item moves to the next step.

Lean Principle Summary

Principle	Description	Example in Practice
4. Establish Pull	Nothing is produced until the customer "pulls" it — prevents overproduction and excess inventory.	**Dell and Zara** use pull-based systems: they only assemble or produce items after customer demand is known.

Once you've created continuous flow, the next Lean principle is to let customer demand pull the product or service through the process, instead of pushing work based on forecasts or schedules.

In **a push system**, production is based on prediction — you make goods in advance and hope customers will buy them.

In **a pull system**, every activity happens in response to actual demand — nothing is made, moved, or ordered until it's needed.

Lean Principle Summary

Amazon is one of the most advanced examples of a **global pull-based system**, both digitally and physically.

Step 1: The Customer Click — The Ultimate Pull Signal

- The customer's **"Buy Now" click** acts as the pull signal.
- That single digital action triggers the entire chain — from fulfillment center allocation to packaging to shipping.
- Nothing is picked, packed, or shipped **until** the customer demand exists.

Step 2: Inventory Replenishment (Pull between Suppliers and Amazon)

Amazon's automated systems track every SKU's stock level.

When a product reaches its reorder point, **the system automatically sends a replenishment signal** to suppliers pulling inventory just in time to meet actual demand. This prevents excess stock and obsolete items.

Pull Vs Forecast

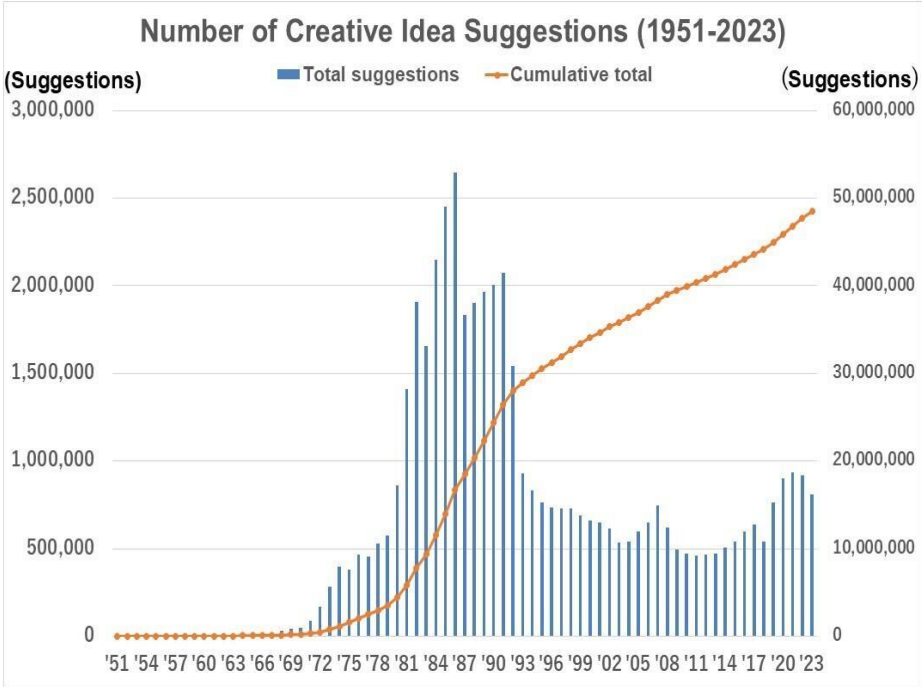
Concept	Pull System (Lean)	Forecasting (Traditional Push)
Trigger for production	Actual customer demand	Predicted (forecasted) demand
Goal	Eliminate waste by producing only what is needed, when needed	Ensure availability by predicting future needs
Material Flow	"Just in Time" (JIT) – demand pulls materials through the system	"Push" – production pushes materials into inventory
Inventory Level	Minimal (to avoid waste)	Higher (to protect against uncertainty)
Risk	Stockouts if supply fails	Overproduction and excess inventory

Lean Principle Summary

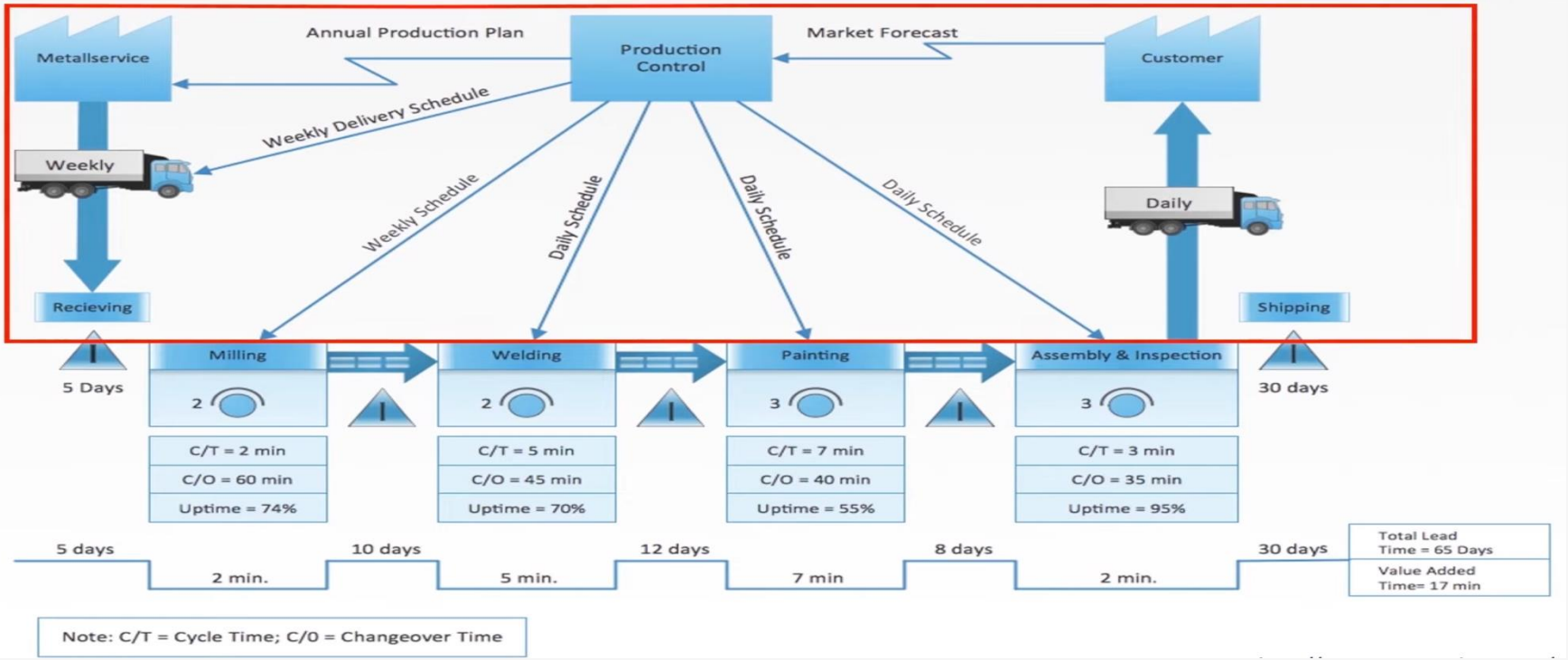
Principle	Description	Example in Practice
5. Seek Perfection (Continuous Improvement)	Lean is never "done" continuous pursuit of waste elimination, improved flow, and better quality through **kaizen**.	Toyota encourages daily small improvements; Amazon uses continuous data-driven process reviews to keep optimizing delivery times.

Step 1: The "Day 1" Philosophy — Never Stop Improving
Step 2: Data-Driven Problem Solving
Step 3: Experimentation and Innovation
Step 4: Employee Empowerment and Learning Culture
Step 5: Learning from Failures

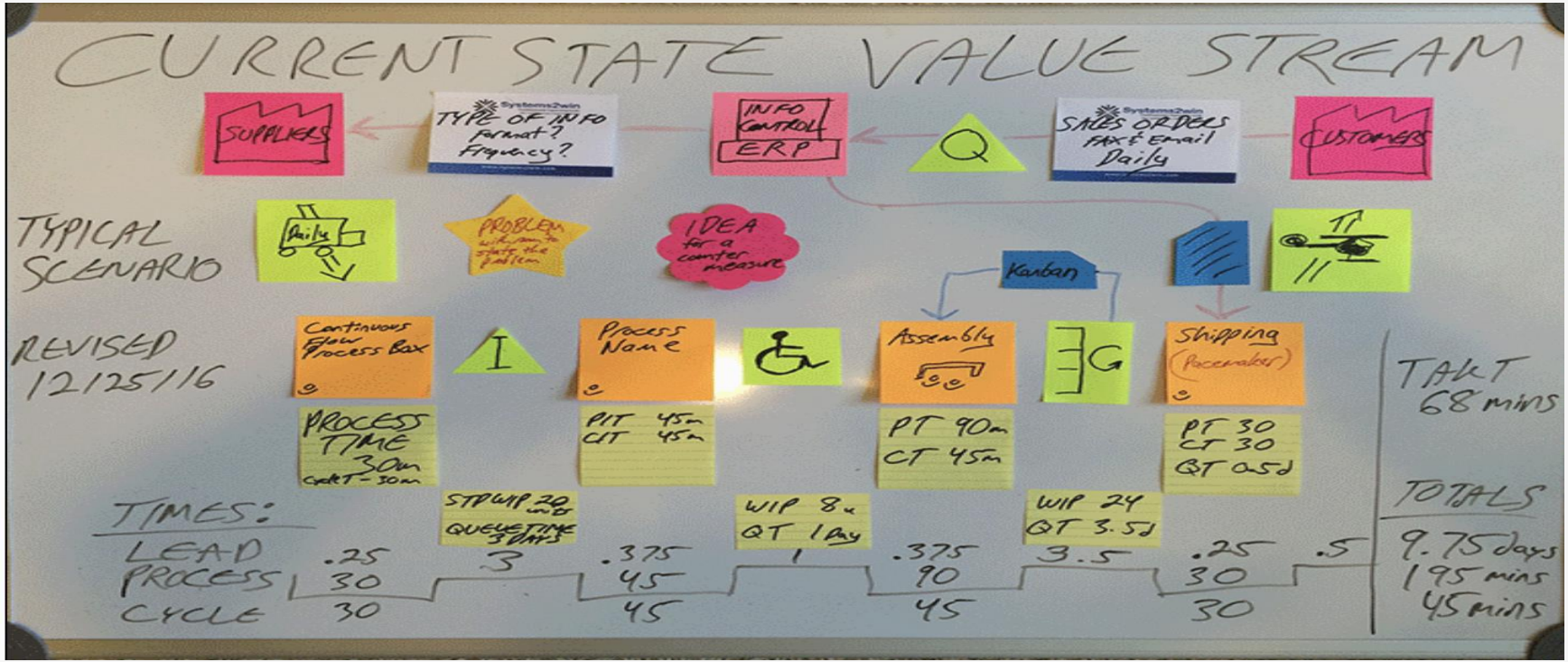
Lean Principle Summary



Valu Stream Mapping



Valu Stream Mapping



Valu Stream Mapping

What is Kaizen

Kaizen is a Japanese term that means "continuous improvement." It's a philosophy and approach focused on constantly improving processes, products, or practices through **small**, **incremental changes**.

Kaizen = small, continuous improvements by everyone, everywhere.

Breakdown of the Word:

Kai (改) = Change
Zen (善) = Good

So literally, Kaizen = good change.

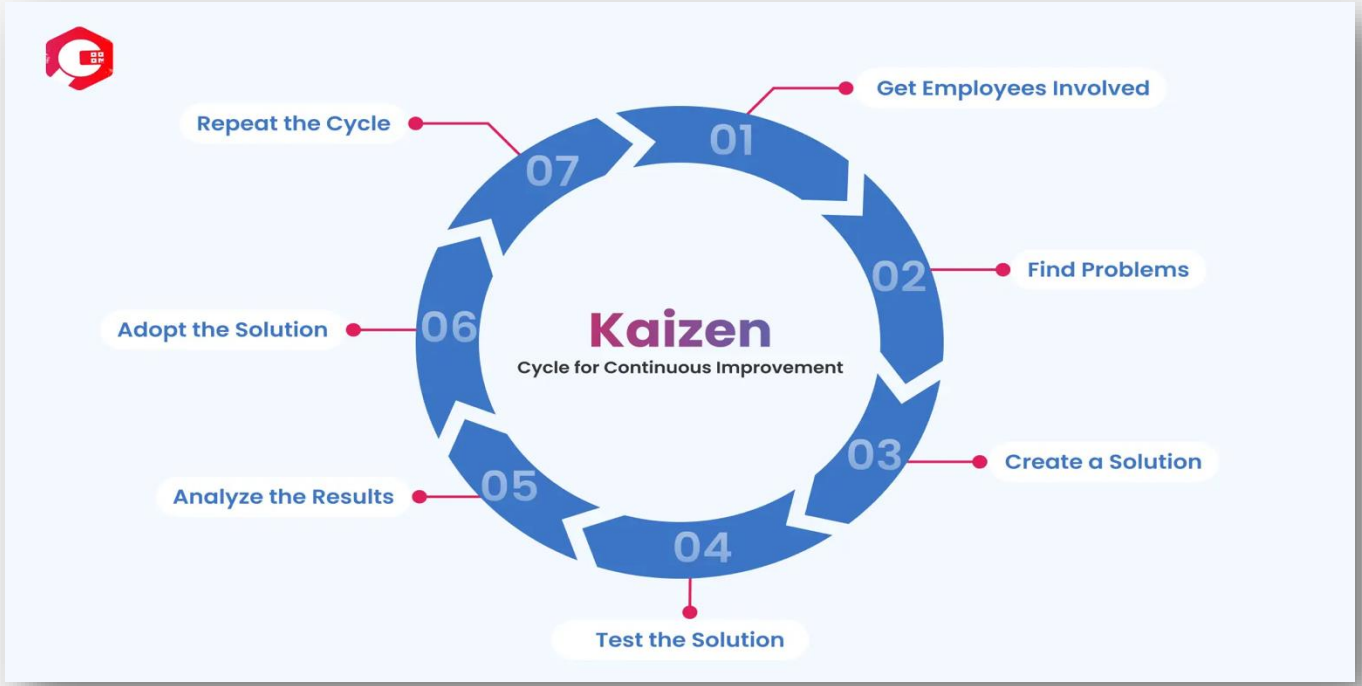
What is Kaizen

The Kaizen Philosophy

Kaizen is not a one-time project — it's a daily mindset:

- Improve a little **every day**.
- Involve **everyone**, not just managers.
- Focus on process, not **blame**.
- Use data and observation to find the root cause.
- Celebrate **small** wins and learn from mistakes.

What is Kaizen



What is Kaizen

Type	Description	Example
Daily Kaizen	Small, ongoing improvements suggested by employees.	A worker moves label printer closer to reduce motion.
Kaizen Event	Short, focused project (2–5 days) to fix a specific issue.	A team reduces order picking time in a warehouse.
Cross-functional Kaizen	Teams from different departments solve a shared problem.	HR + Production + Safety team redesign shift change process.

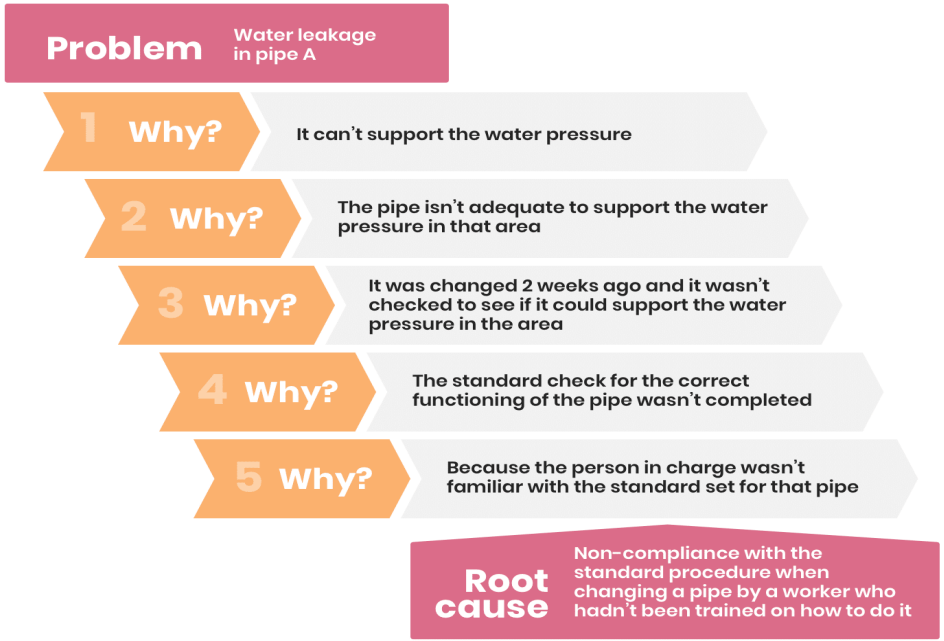
Tools Used in Kaizen

Tools Used in Kaizen

Tool	Purpose	Simple Explanation
5 Whys	Find root cause	Keep asking "Why?" until you reach the real issue.
PDCA Cycle	Continuous improvement loop	Plan → Do → Check → Act, then repeat.
Gemba Walk	Observe where work happens	Go to the "real place" to see the real problem.
Visual Management	Make problems visible	Charts, labels, colors, or boards show performance.

5 Whys

5 Whys



The **5 Whys** is a simple problem-solving method where you keep asking "**Why?**" until you find the **root cause** of a problem not just the surface symptom.

Fix the real cause, not the visible effect.

How It Works:

1. Write down the problem.
2. Ask **"Why did this happen?"**
3. Write the answer.
4. Ask "Why?" again about that answer.
5. Continue 5 times (or until you find the root cause).
6. Identify and fix the root cause.

5 Whys

At an Amazon fulfillment center, customer complaints about late deliveries have increased over the past two months.

Step 1: Define the Problem
Customers are receiving their packages later than the promised delivery date.

Step 3: Identify the Root Cause
The root cause is the lack of an automated inventory monitoring and reordering system for packaging materials.

Step	Question	Answer
1	Why are deliveries reaching customers late?	Because **orders are leaving the warehouse later than scheduled**.
2	Why are orders leaving the warehouse late?	Because **the packaging process is taking longer than usual**.
3	Why is the packaging process taking longer?	Because **there are frequent shortages of packaging materials (boxes and tape)**.
4	Why are packaging materials often out of stock?	Because **the inventory team did not reorder materials on time**.
5	Why did the inventory team fail to reorder on time?	Because **there is no automated system to track and alert low stock levels — the team relies on manual checks**.

Group Discussion

5 Whys

Background:

The university noticed that a large number of students are submitting assignments after the deadline in several subjects. This has caused delays in grading and affects overall class performance. The professors want to understand why this keeps happening and how to fix it.

Your group's task is to use the **5 Whys technique** to find the **root cause** and suggest **practical solutions**.

Expected Output:

Each group should prepare a short summary that includes:

- ✅ Defined problem
- ✅ Five "Why" questions and answers
- ✅ Root cause
- ✅ Recommended solutions

5 Whys

Background:

A small factory that produces metal parts has noticed that one of its cutting machines breaks down almost every week. Each breakdown causes delays in production and extra repair costs.

Your group's task is to use the **5 Whys technique** to find the **root cause** and suggest **practical solutions**.

Expected Output:

Each group should prepare a short summary that includes:

- ✅ Defined problem
- ✅ Five "Why" questions and answers
- ✅ Root cause
- ✅ Recommended solutions

5 Whys

Background:

A local online store has received many complaints from customers saying their orders arrive late. The manager wants to understand why this keeps happening and how to fix it.

Your group's task is to use the **5 Whys technique** to find the **root cause** and suggest **practical solutions**.

Expected Output:

Each group should prepare a short summary that includes:

- ✅ Defined problem
- ✅ Five "Why" questions and answers
- ✅ Root cause
- ✅ Recommended solutions

PDCA Cycle (Plan–Do–Check–Act)

PDCA Tool

Deming Cycle

Know as Deming Cycle

Learning by Doing

CI

Small change, trying it out, studying the results, and acting based on what's learned

Process Optimization

SMART

Letter	Meaning	Description	Example (PDCA Context)
S	**Specific**	The goal must be clear and well-defined what exactly needs to be achieved?	"Reduce unplanned maintenance downtime on Pump A."
M	**Measurable**	You must be able to measure progress or success with data.	"Reduce downtime by **20%**."
A	**Achievable**	The goal should be realistic given available time, resources, and skills.	"Achieve this using existing maintenance staff and predictive tools."
R	**Relevant**	The goal must align with broader company objectives or priorities.	"Supports the company's goal of improving production reliability."
T	**Time-bound**	There must be a clear deadline or timeframe to reach the goal.	"Achieve target within **3 months**."

Problem Statement

Problem Statement	Analysis
“We need to reduce equipment downtime.”	

Problem Statement

Type	Problem Statement	Analysis
❌ **Bad (Non-SMART)**	“We need to reduce equipment downtime.”	
✅ **Good (SMART)**	“Reduce compressor downtime at Unit 3 by **20% within 3 months** through predictive maintenance and operator training.”	

Problem Statement

Type	Problem Statement	Analysis
❌ **Bad (Non-SMART)**	“We need to reduce equipment downtime.”	❌ **Not Specific:** Which equipment? ❌ **Not Measurable:** How much reduction? ❌ **Not Time-bound:** No timeline. ❌ **Not Actionable or Relevant:** No link to business goal.
✅ **Good (SMART)**	“Reduce compressor downtime at Unit 3 by **20% within 3 months** through predictive maintenance and operator training.”	✅ **Specific:** Compressor at Unit 3. ✅ **Measurable:** 20% reduction. ✅ **Achievable:** Based on available tools. ✅ **Relevant:** Tied to production efficiency. ✅ **Time-bound:** 3 months.

Problem Statement

Type	Problem Statement	Analysis
❌ **Bad (Non-SMART)**	“We should improve safety.”	❌ Vague what aspect of safety? No data, timeline, or method.
✅ **Good (SMART)**	“Reduce recordable safety incidents at the offshore platform by **15% over the next 6 months** through safety refresher training and improved hazard reporting.”	✅ Specific & measurable safety target with timeframe and method.

The Four Stages of PDCA

Plan

Identify a problem or opportunity for improvement. Analyze the current situation, gather relevant data, and develop a comprehensive strategy. Set clear, measurable objectives and create a detailed action plan with timelines and resources.

Do

Implement the plan on a small scale to test its effectiveness. Execute your strategy in a controlled environment, whether on a single production line, with one team, or in a pilot location. Document everything during this trial phase.

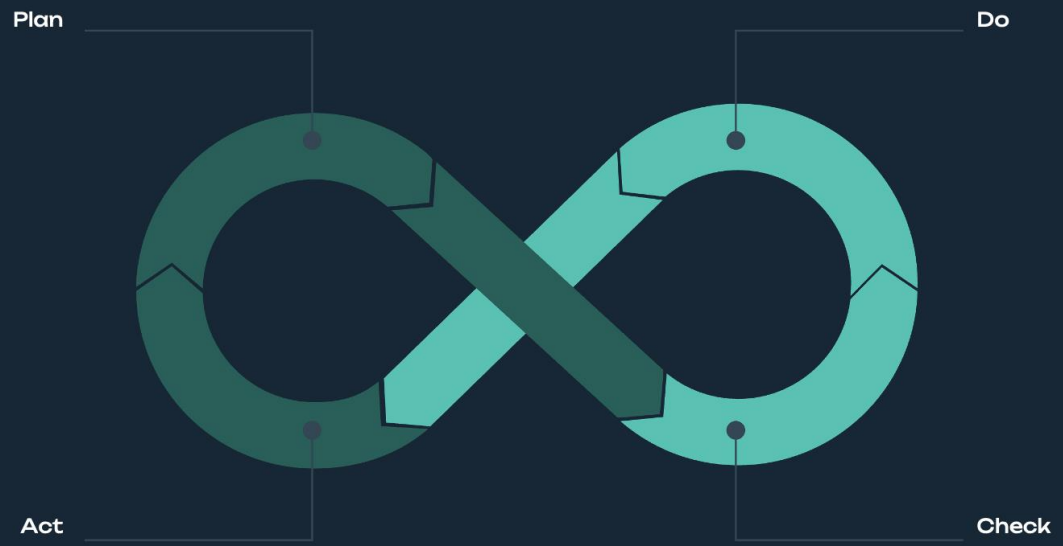
Check

Measure and analyze the results against your original objectives. Collect performance data, compare outcomes to targets, and identify gaps or unexpected results. Use both quantitative metrics and qualitative feedback to evaluate success.

Act

Based on your analysis, adjust and standardize the improvement across the organization. If successful, implement broadly and update standard procedures. If unsuccessful, identify lessons learned and start a new cycle with refined approaches.

Visualizing the PDCA Cycle



"A never-ending loop of improvement—each rotation brings you closer to operational excellence and organizational mastery."

Shell Refinery Process Improvement

Result: **Improved reliability and saved millions in avoided production losses.**

Plan: Identified frequent compressor ABC failures as a bottleneck.

Do: Introduced predictive maintenance and revised operating parameters.

Check: Monitored downtime and vibration data over several months.

Act: Standardized maintenance procedures after achieving a 25% reduction in equipment downtime.

PDCA

Problem: Amazon Workers spend too much time finding the next order bin.

Plan: Introduce color-coded bins for faster visual identification.

Do: Test in one warehouse section for 1 week.

Check: Picking speed improved by 15%.

Act: Roll out across all warehouses.

Common Pitfalls to Avoid

Warning: These mistakes can derail even the best-intentioned PDCA initiatives

1

Skipping the Check Phase

Acting without evidence is guesswork, not improvement. Organizations often rush to implement solutions without properly measuring results. This leads to wasted resources and potentially making problems worse instead of better.

2

Vague Planning

Planning without clear, measurable objectives makes success impossible to evaluate. Set SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound) to ensure everyone understands what success looks like and can track progress effectively.

3

Poor Documentation

Rushing through cycles without proper documentation means losing valuable insights and repeating mistakes. Future teams won't benefit from your learning, and you'll struggle to replicate successes or avoid past failures.

4

One-and-Done Mentality

Treating PDCA as a one-time event instead of a continuous loop defeats its purpose. The real power comes from repeated cycles, with each iteration building on previous learning to drive exponential improvement over time.

Gemba Walk

Gemba Walk

Gemba means “the real place” in Japanese where the actual work happens.

A Gemba Walk means managers and leaders go to the workplace to observe, ask, and learn rather than blame or control.

“Go and see, ask why, and show respect.”

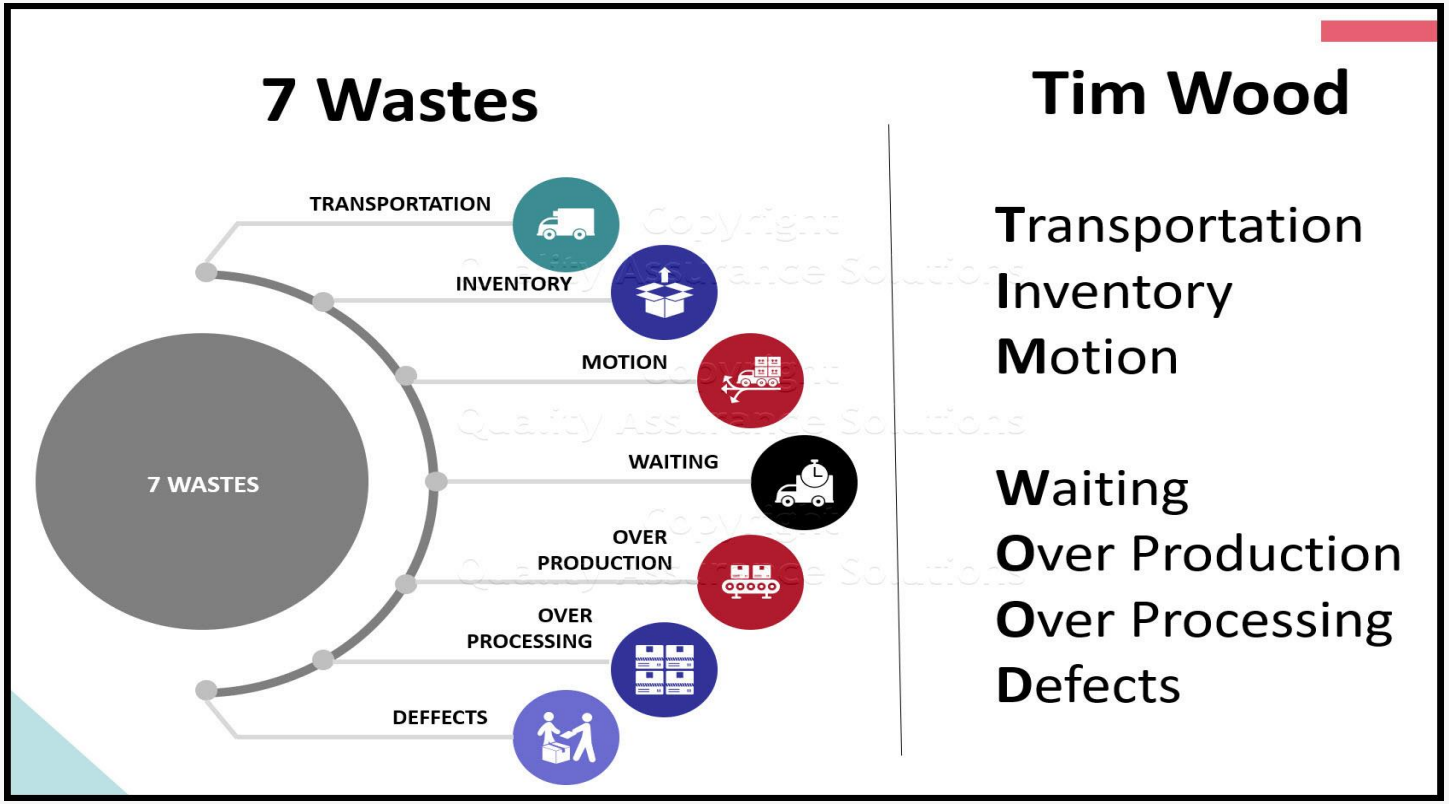
Gemba Walk

How It Works:

1. Go to the real place (factory floor, warehouse, office).
2. Observe processes firsthand.
3. Ask employees about what's working and what's not.
4. Identify waste, safety issues, or improvement ideas.
5. Record and follow up with small improvements.

Waste (Muda)

Waste (Muda)


7 Wastes
TRANSPORTATION
INVENTORY
MOTION
WAITING
OVER PRODUCTION
OVER PROCESSING
DEFFECTS
7 WASTES
Tim Wood
Transportation
Inventory
Motion
Waiting
Over Production
Over Processing
Defects

Waste (Muda)

#	Type of Waste	Description
1. Overproduction	Producing more than needed or earlier than required.	A factory produces 10,000 parts while the customer only needs 5,000 resulting in excess inventory and storage cost.
2. Waiting	Idle time when resources (people, machines, or materials) are not in use.	Workers waiting for raw materials due to delayed delivery or for a machine to finish a cycle.
3. Transportation	Unnecessary movement of materials or products.	Moving components back and forth between distant workstations in a large warehouse without value being added.
4. Overprocessing	Doing more work or using more resources than necessary to meet customer requirements.	Polishing a surface to mirror-finish when the customer only needs a matte finish.
5. Inventory	Excess raw materials, work-in-progress (WIP), or finished goods that tie up capital.	Keeping months of spare parts "just in case," increasing storage cost and risk of obsolescence.
6. Motion	Unnecessary movement by people that does not add value.	An operator walking across the workshop frequently to fetch tools due to poor workstation layout.
7. Defects	Efforts involved in inspecting, reworking, or scrapping faulty products.	Producing car parts with wrong dimensions requiring rework or scrapping.

Waste (Muda)

#	Type	Example
1	**Overproduction**	Making 500 desks when 300 are needed
2	**Waiting**	Workers idle waiting for parts
3	**Transportation**	Moving raw food between buildings
4	**Overprocessing**	More features than needed
5	**Inventory**	Overstocking phones
6	**Motion**	Nurses walking for supplies
7	**Defects**	Mislabelled water bottles

8th Waste

8th Waste: Unused Employee Talent (or Underutilized People)

Definition:

The failure to make full use of employees' skills, knowledge, creativity, and experience.
This waste happens when workers are treated as "hands" instead of "minds" when management doesn't listen to their improvement ideas or fails to give them responsibility for problem-solving.

What is KPI?

A Key Performance Indicator (KPI) in inventory management is a quantifiable, measurable metric that shows how well a company is managing its stock levels, inventory flow, and service performance.

It answers: "**Is our inventory doing what it's supposed to do**?"

In practical terms, inventory KPIs measure:

- How fast stock moves
- How accurately stock is tracked
- How well customer demand is met
- How much inventory costs the business
- How efficiently warehouse & replenishment operations work

What is KPI?

A KPI **must** be:

- Measurable
- Linked to a goal
- Comparable (over time or against benchmarks)
- Actionable (drives decisions)
- Owned (clear responsibility)

Why Are Inventory KPIs Important?

Inventory affects **cash, cost, service, and competitiveness**. Without KPIs, companies run blind.

1

Provide visibility and control

see problems early, track patterns, understand root causes, take corrective action

2

Link decisions to financial performance

Capital tied up in stock, carrying cost, impact of slow-moving, cash conversion cycle

3

Balance cost vs service

Too much stock = high cost, obsolescence
Too little stock = stockouts, lost sales

3

KPIs enable benchmarking and CI

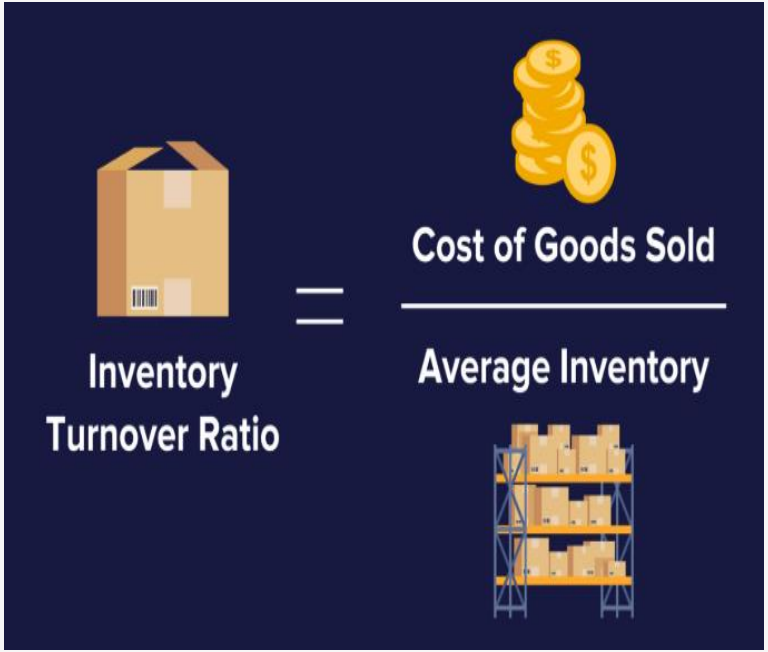
4

KPIs drive OE

5

Enable data-driven inventory strategy

Inventory Turnover Ratio



Inventory Turnover Ratio

Item	Description
Definition	Measures how many times inventory is sold and replaced in a period.
Why Important	Indicates inventory efficiency. Low turnover = overstocking.
Formula	**COGS ÷ Average Inventory**
Example	Amazon COGS = $300M; Avg Inventory = $50M → **300/50 = 6 turns/year**

Days of Inventory Outstanding (DIO)

Days of Inventory Outstanding (DIO)

Item	Description
Definition	Average number of days items remain in stock before sold.
Why Important	Shows speed of inventory movement.
Formula	**365 ÷ Inventory Turnover**
Example	Turnover = 6 **365/6 = 60.8 days**

Stockout Rate

Causes of Stockouts

- 01 Inadequate Inventory Control
- 02 Disruptions to the Supply Chain
- 03 Unexpected Rise in Demand
- 04 Inaccurate Demand Forecasting
- 05 Quality Control Concerns
- 06 Too Much or Too Little Inventory

Stockout Rate

Item	Description
Definition	Percentage of times inventory is unavailable when demanded.
Why Important	High rates = lost sales and unhappy customers.
Formula	**(Stockout Events ÷ Total Demand Events) × 100**
Example	20 stockouts / 500 demand events = **4%**

Inventory Accuracy (Cycle Count Accuracy)

Inventory Accuracy (Cycle Count Accuracy)

Item	Description
Definition	How closely system inventory matches physical inventory.
Why Important	Low accuracy causes operational disruptions.
Formula	**(Counted Units ÷ System Units) × 100**
Example	System shows 10,000 units; physical count = 9,800 = **98% accuracy**

Carrying Cost of Inventory

Holding (Carrying) Costs

What:
Costs associated with storing unsold inventory. This includes warehousing rent, utilities, insurance, security, depreciation, and obsolescence risk

Impact:

Higher inventory levels increase holding costs, so companies like Apple strive to keep inventory lean but sufficient to meet demand.

Carrying Cost of Inventory

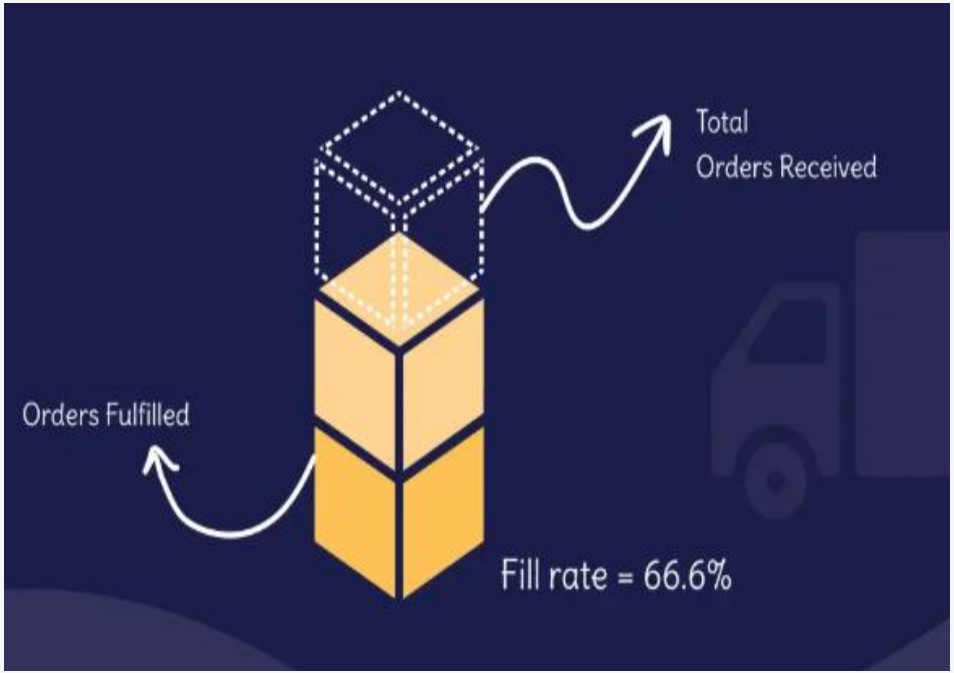
Item	Description
Definition	Total cost of holding inventory annually.
Why Important	Helps optimize inventory levels and reduce overhead costs.
Formula	**Carrying Cost % × Average Inventory Value**
Example	Carrying cost rate = 25%, inventory = $10M → **$2.5M/year**

Order Picking Accuracy

Order Picking Accuracy

Item	Description
Definition	Percentage of orders picked without errors.
Why Important	Directly affects customer satisfaction.
Formula	**(Accurate Picks ÷ Total Picks) × 100**
Example	9,950 accurate picks / 10,000 total = **99.5%**

Fill Rate (Order Fill Rate)



Fill Rate (Order Fill Rate)

Item	Description
Definition	Percentage of customer demand fulfilled from available stock.
Why Important	Measures service level performance.
Formula	**(Orders Filled Completely ÷ Total Orders) × 100**
Example	950 orders filled / 1,000 = **95% fill rate**

Dead Stock Percentage

sellercloud

What Are the Causes of Dead Stock?

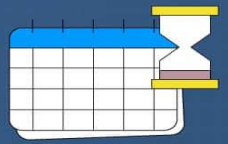
Overstocking

Too many similar products

Poor inventory management

Seasonal or trend changes

Defective products



Expiration or obsolescence

Inaccurate demand forecasting

Dead Stock Percentage

Dead Stock Percentage

Item	Description
Definition	Inventory that cannot be sold.
Why Important	Ties up capital, increases carrying cost.
Formula	**(Dead Stock ÷ Total Inventory) × 100**
Example	Dead stock = $200k; inventory = $5M = **4%**

Inventory Quality Ratio (IQR)

Inventory Quality Ratio (IQR)

KPI	Definition	Why It's Important	Formula	Example
IQR	Measures the percentage of healthy (active) inventory versus unhealthy (slow, excess, obsolete) inventory.	Helps identify excess stock, improve working capital, reduce carrying costs, increase service levels, and optimize SKU portfolio.	IQR = (Value of Active Inventory ÷ Total Inventory Value) × 100 Where "Active Inventory" usually = Fast movers (A-class) + Medium movers (B-class).	A company's inventory mix: A: $500K B: $300K C: $150K D: $50K Active Inventory = 500K + 300K = $800K Total Inventory = $1,000K IQR = (800K ÷ 1,000K) × 100 = 80% This means 80% of inventory is "healthy," 20% is "unhealthy."