

# Introduction to Lean Operations

# Introduction to Lean Operations

## Key concepts, principles, tools, and benefits for organizations

## 1. What Is Lean Operations?

| Aspect     | Description                                                                                                                                  |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Definition | A systematic approach to creating value for customers by eliminating waste, improving flow, and continuously enhancing processes.            |
| Origin     | Developed from the Toyota Production System (TPS) in the 1940s-80s; later adapted across manufacturing, services, and knowledge work.        |
| Goal       | Deliver the right product/service, at the right time, in the right quantity, with the highest possible quality and the lowest possible cost. |

## 2. Core Lean Principles (The “5?P” Framework)

| # | Principle    | What It Means                                                                                                     |
|---|--------------|-------------------------------------------------------------------------------------------------------------------|
| 1 | Value        | Identify what the customer is willing to pay for. Anything that does not add to this is waste.                    |
| 2 | Value Stream | Map all steps required to deliver the product/service. Separate value-adding steps from non-value-adding (waste). |
| 3 | Flow         | Arrange value-adding steps so the product moves smoothly without interruptions, delays, or bottlenecks.           |
| 4 | Pull         | Produce only what is needed, when it is needed, based on actual demand (instead of forecasting).                  |
| 5 | Perfection   | Pursue continuous improvement (Kaizen) to eliminate remaining waste and raise performance.                        |

### 3. Types of Waste (Muda)

| Category | Typical Examples |
|----------|------------------|
|----------|------------------|

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|                                                  |                                                                |
|--------------------------------------------------|----------------------------------------------------------------|
| <b>Transport</b>                                 | Unnecessary movement of materials, people, or information.     |
| <b>Inventory</b>                                 | Excess raw material, work-in-process, or finished goods.       |
| <b>Motion</b>                                    | Extra motions by workers (reaching, walking).                  |
| <b>Waiting</b>                                   | Delays caused by lack of materials, information, or equipment. |
| <b>Over-production</b>                           | Making more than needed or before it is needed.                |
| <b>Over-processing</b>                           | Adding features or steps that the customer does not value.     |
| <b>Defects</b>                                   | Errors that require rework or scrap.                           |
| <b>Unused Talent</b>                             | Not leveraging employee skills, ideas, and creativity.         |
| <i>(Often remembered as “TIMWOOD + Talent”).</i> |                                                                |

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## 4. Key Lean Tools & Techniques

| Tool                                                        | Purpose                                                                     | Typical Use                                          |
|-------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------|
| <b>Value Stream Mapping (VSM)</b>                           | Visualize the entire process, quantify waste, identify improvement targets. | Manufacturing line, order-to-cash cycle.             |
| <b>5S (Sort, Set in order, Shine, Standardize, Sustain)</b> | Organize workplace for safety, efficiency, and visual control.              | Shop floor, office desks, digital file systems.      |
| <b>Kanban</b>                                               | Visual pull system to signal demand and trigger production/replenishment.   | Inventory control, software development task boards. |
| <b>Kaizen (Continuous Improvement)</b>                      | Small, incremental changes involving frontline employees.                   | Daily Gemba walks, suggestion programs.              |
| <b>Standard Work</b>                                        | Document the best known method to perform a task; baseline for improvement. | Assembly stations, service SOPs.                     |
| <b>Poka-Yoke (Error Proofing)</b>                           | Design processes that prevent mistakes or make them immediately detectable. | Assembly fixtures, software validation checks.       |

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| Tool                                 | Purpose                                                                        | Typical Use                      |
|--------------------------------------|--------------------------------------------------------------------------------|----------------------------------|
| Cellular Manufacturing               | Arrange machines/workstations in a flow? cell to reduce transport and waiting. | Production of families of parts. |
| SMED (Single Minute Exchange of Die) | Reduce setup/changeover time to enable smaller batch sizes.                    | Press tooling,                   |