

AI-04587 Seven Waste and Kanban

What is the concept of Seven Waste? How is it related to Kanban? List BKM.

Concept of the Seven Wastes (Muda)

In Lean manufacturing and the Toyota Production System (TPS), **Muda** (Japanese for "waste" or "uselessness") refers to any activity that consumes resources, time, or capital without adding value from the customer's perspective. Taiichi Ohno identified seven core operational wastes, commonly summarized by the acronym **TIMWOOD**:

1. **Transportation:** Unnecessary relocation of raw materials, parts, or tools between processes.
2. **Inventory:** Excessive raw materials, Work-in-Progress (WIP), or finished goods sitting idle, occupying footprint and tying up capital.
3. **Motion:** Unnecessary physical movement of operators or equipment (e.g., bending, reaching, or searching for tools).
4. **Waiting:** Idle delay time caused by upstream bottlenecks, machine downtime, uncoordinated handoffs, or pending approvals.
5. **Overproduction:** Producing items faster or in larger quantities than current downstream demand requires. In TPS, this is considered the **worst waste** because it triggers all other forms of waste.
6. **Overprocessing:** Performing extra steps, using higher-precision tools, or adding features beyond what the specification or customer requires.
7. **Defects:** Non-conforming output that requires scrap, inspection, or rework, consuming additional labor and resources.

(Note: Modern Lean extensions often add an 8th waste—**Unutilized Talent/Skills**).

How the Seven Wastes Relate to Kanban

While the **Seven Wastes** define *what* non-value-added conditions exist, **Kanban** provides the visual, execution-level *control mechanism* to expose and eliminate them.

Kanban converts operations from a push system (forecast-driven) to a **pull system** (demand-driven). It directly targets waste through explicit operational rules:

Waste Targeted	How Kanban Controls & Eliminates It
Overproduction	Authorizes work <i>only</i> when a downstream workstation signals demand via a visual signal or card return.
Inventory	Enforces strict WIP (Work In Progress) limits, placing a hard cap on buffer stock between workstations.
Waiting	Visual board states make starving queues and line bottlenecks immediately apparent, allowing rapid labor reallocation.
Defects	Isolates non-conforming items instantly; WIP limits prevent defect propagation across large production runs.
Motion & Transport	Standardizes transfer batch sizes and container signals, eliminating haphazard floor movement.

Best Known Methods (BKMs)

To maximize waste reduction when implementing Kanban, apply these industry-standard **BKMs (Best Known Methods)**:

1. Enforce Strict WIP Limits

- **Rule:** Establish hard caps on total active units in each column or queue stage of the workflow.
- **Outcome:** Prevents teams from starting new tasks before finishing current ones, cutting **Overproduction** and **Inventory** at the source.

2. Pace Execution to Takt Time

- **Rule:** Align Kanban replenishment frequency with customer demand pace ($\text{Takt Time} = \frac{\text{Available Production Time}}{\text{Customer Demand}}$).
- **Outcome:** Prevents upstream operations from over-running downstream capacity.

3. Implement Visual Management & Andon Controls

- **Rule:** Use color-coded signals (e.g., buffer status cards, red flag tags) to highlight blocked lanes or defect holds immediately.
- **Outcome:** Minimizes **Waiting** and **Defects** by triggering immediate escalation rather than letting idle time accumulate silently.

4. Standardize Lot and Transfer Batch Sizes

- **Rule:** Design physical or virtual Kanban triggers around uniform, optimal lot sizes rather than variable mass runs.
- **Outcome:** Eliminates excess **Transportation** and **Motion** associated with irregular material movement.

5. Establish First-In, First-Out (FIFO) Buffers

- **Rule:** Maintain strict FIFO lanes for all work buffers between sequential operations.
- **Outcome:** Prevents aging stock, degradation, and unnecessary re-sorting (**Overprocessing**).

6. Continuously Audit Flow Metrics

- **Rule:** Monitor **Cycle Time**, **Lead Time**, and **Throughput** regularly using Cumulative Flow Diagrams (CFD).
- **Outcome:** Identifies subtle systemic delays and process drift to fuel continuous improvement (*Kaizen*).