



# Continuous Improvement Toolkit

## World-Class Performance Tools for Business and

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## Waste Analysis

In a Lean culture, **Waste** is anything that doesn't add value from the customer's perspective. It includes activities and resources beyond what is needed to meet customer requirements. **Waste Analysis** involves identifying, quantifying, eliminating and preventing waste in manufacturing, service and office environments. Many Lean tools and techniques focus on continually identifying and eliminating these wastes to bring efficiency and effectiveness to existing processes, and this is one of the core principles of Lean thinking.



Waste takes many forms and can be found at any time and in any place. There are many classifications of waste, and one of the most basic and widely used is the **Seven Wastes**. The seven wastes are: transportation, inventory, motion, waiting, overproduction, over processing and defects. Categorizing wastes into seven forms makes them easier to identify and helps identify priorities for action. Many lean practitioners

have added an extra waste to the original seven wastes, which is the untapped human potential or the waste of human skills.

Waste analysis is one of the main principles of Lean and one of the easiest ways an organization can improve its operations. Examples of the benefits of waste analysis include: improved productivity, increased flexibility, reduced costs and lead times, improved quality and safety, improved morale and pride in workplace, and as a result, products and services that meet customer expectations. All forms of waste can be present in service environments and offices as well as in production areas.

### Unnecessary

**Transportation** is the unnecessary movement of products, materials or supplies from one place to another. It is normally the result of a poor system design or layout. Moving things costs money and

Transport	Inventory
Motion	Waiting
Over-Production	Over-Processing
Defects	Skills

time, causes production delays, and may include the risk of loss or damage. Unnecessary transportation is clearly visible in old-fashioned production lines, where work-in-process and finished products are pushed from one area of a factory to another. Examples of unnecessary transportation include:

- Storing raw materials far away from production lines.
- Building a storage area and a loading area at opposite ends.

**Excess of Inventory** leads to waste. It creates the need for more manpower and equipment, and takes up valuable working space. It ties up money that could be used for other things and have a significant impact on working capital and operational costs. It slows down the speed of production and

may hide problems such as line imbalance and quality defects. Some inventory is necessary, but most processes can be managed differently to minimize inventory. Examples of excess of inventory include:

- Storing raw materials ahead of requirements.
- Archiving documents that are not required or will never be used in the future.
- Computer programs stored on hard drives which will never be used in the future.
- Clothes brought back at the end of vacation not worn.

While moving materials or products from one location to another is a transportation waste, the unnecessary movement of people and tools is a waste of motion. **Wasted Motion** refers to the movement performed by people that is not required and will not add value to the product or service. It describes the situation when we have to physically move more to perform our jobs, or when we are not efficient in using our hands to do our jobs. Not only it consumes time and uses up energy, but it may also increase health and safety issues and can affect the reliability of operations. Examples of wasted motion include:

- Moving too much or travelling farther than necessary to accomplish tasks.
- Walking between work stations to get tools (especially when they are heavy).
- Having to bend or twist because of poor ergonomic design.
- Placing the refrigerator outside the kitchen.

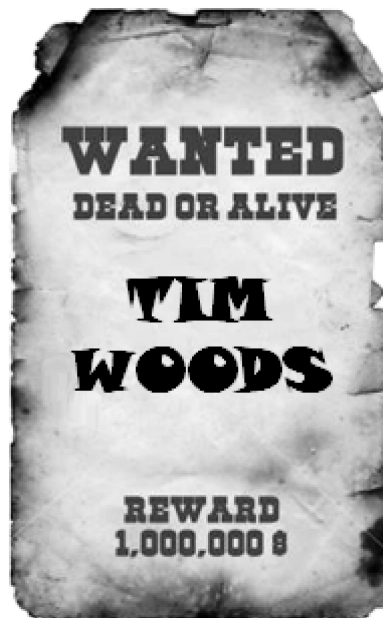
**Waiting** refers to the idle time that occurs when there are unnecessary delays within the process. Waiting occurs when a product is not in transport or being processed, or when a person is waiting for a work to get completed. Any time a person or a product is waiting, there is no value being added, lead times are increased, and wasted time is transferred to the

customer through increased costs. Examples of waiting include:

- Waiting for the maintenance department to repair a line breakdown.
- Waiting for the size changeover to be completed.
- Experiencing poor computer system performance.
- Waiting for a meeting to start, or arriving an hour early for a meeting.
- Waiting in line at the grocery store.

**Overproduction** is making more of something than is required by the customer. It occurs when a process produces more than the next process can use right away. It also occurs when making things before they are required (early production), or producing greater quantities than what customers demand. Overproduction is a waste because it increases lead times, consumes more materials, promotes a batch and queue system, hides quality problems, and may prevent other activities from taking place. Examples of overproduction include:

- Producing faster than customer demand.
- Printing multiple versions of the same publication hoping that you will distribute all.



An easy way to remember these eight types of waste is with the acronym TIMWOODS (each letter denotes one of the eight wastes).

- Buying vegetables for one month on your weekly shopping trip.

**Over Processing** is processing beyond what the customer specifies and providing more value than what he is paying for. It is generally unnecessary steps that do not add value to the end product or service. It is often a result of poor product or service design, and may result from internal standards that do not reflect true customer requirements. Examples of over processing include:

- Duplication of work.
- Using tools that are more precise.
- Completing reports in a level of detail not required.
- Stirring a mixed cup of coffee.

A **Defect** occurs when a process or service does not serve the purpose it was created for. It is failure to meet the “do it right the first time” expectation. Whenever defects occur during a production process, extra costs are incurred reworking or scrapping the parts. And if they passed on to the customer, the poor quality can reduce profit in the form of lost sales and negative reputation. Examples of defects include:

- A manufacturing faulty parts that require rework or need to be scrapped.
- Dealing with guest complaints in hotels.
- Spelling mistakes in an office memo.
- Missing information or incorrectly completing an application.

The **eighth waste** can be described in several ways: unused creativity, wasted ideas and talent, wasted human potential or unused human skills. Not using the potential and creativity of employees is a waste. Many companies now realize that their biggest assets are their employees. It is only by capitalizing on employees’ ideas and skills that companies can reduce the other waste forms and improve their performance.

## How to Reduce or Eliminate the Eight Wastes:

Below are some simple ideas which can be used to reduce or eliminate each of the eight wastes:

- **Unnecessary transportation** – find ways to reduce the distance between work areas, relocate items to be closer to where the work is performed, and introduce standard sequences for transportation.
- **Excess of inventory** – keep track of your inventory levels, reduce unnecessary comfort stocks, and don't buy in bulk unless you are sure you will use all of it.
- **Wasted motion** – evaluate the flow and layout to identify chances to streamline the processes, relocate the required tools at the point of use, and implement time and motion principles.
- **Waiting** – observe what keeps your people waiting, measure waiting and make waiting visible, allocate more resources at the bottleneck areas to increase their capacities, and rebalance activities so that time can be filled productively.
- **Overproduction** – produce only what customers want and when they want it, and produce as close to the schedule as possible.
- **Over processing** – challenge yourself to find ways to do less and to use less, with every document try to just “touch it once”, and provide clear standards for every process.
- **Defects** – find where the errors occur, analyze root causes, solve the problem as early as possible (the 1-10-100 rule), and avoid multitasking.
- **Unused human skills** – be creative, ask questions, challenge the status quo, implement an idea system, and ensure that the ideas are well heard.

## Other Types of Waste:

There are other forms of waste beyond the eight wastes:

- **Wasted space** – a waste as the customer will not pay for.
- **Wasted energy** – a hidden shared cost to all of us.
- **Pollution** – the producer is increasingly being made to pay for it.
- **Excessive resources** – whether they are people, equipment, materials or facilities, they only increase costs and add no value.
- **Capital waste (or wasted money)** – throwing money at problems instead of addressing the real root causes (such as building a warehouse to store extra inventory).

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