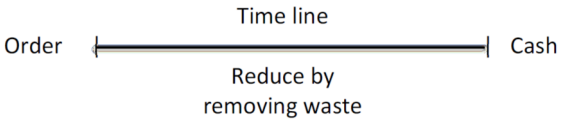
(Written by Tomas HULDT, MSc in Mechanical Engineering, with 20+ years of project management and engineering experience of which 12+ years in the Offshore Oil and Gas Industry, with a keen interest in Lean solutions)

In the 80's when asked what Toyota was doing in terms of improvements, Mr. Taiichi Ohno answered very simply: "All we are doing is looking at the time line from the moment the customer gives us an order to the point when we collect cash. And we are reducing that time line by removing the non-value-added wastes."

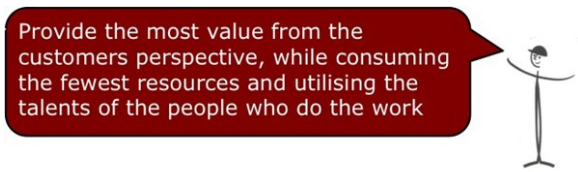


This exquisitely simple answer of Mr. Taiichi Ohno pretty much provides the essence of Lean and what this concept is striving for.

Part of the beauty with the Lean concept resides in its simplicity, but as with all matters involving humans, even a simple concept is not straight forward when it comes to its application (note: the author believes that the complexity of the human mind is amazingly beautiful).

What is Lean

Lean is a customer-centric concept which is rooted in the purpose of the company, its processes and in the respect of the people. Lean's core idea is to maximize customer value while minimizing waste (resources, time, energy and effort).



Source: LEA

The fundamentals of Lean

To understand how to apply Lean in any organization, knowledge of the basics is required: the principles, the definitions of value and waste, how to lead effectively, and how to define and improve the value stream.

The main principles:

There are five main principles in the Lean methodology:

1. Specify value from the end customer's point of view for each family of product.
2. Identify all the steps in the value stream of each product (typically by doing a value stream mapping) and remove all the steps that you can remove which do not add value.
3. Link the value creating steps in close sequence in order to create a flow of the product towards the customer.
4. Once the process flow has been established, let the customer (external and internal) pull the product when he needs it. This creates the demand in the process.
5. Once the pull has been introduced it is time to start anew with the analysis in order to improve process and seek perfection.

How to specify value

He who pays really is the person who should know best what he perceives as valuable and the same holds true for Lean: it is the customer who defines value. It might, however, be a bit difficult to in-

volve the customer in the definition of all the processes of a company, so to overcome this hurdle, it is assumed that for an activity or step of a process to be defined as added value it must meet the following three conditions:

1. It must transform the product or service.
2. The customer must be willing to "pay" for it.
3. It must be done correctly the first time.

If an activity or step does not meet all three of these criteria, then it is a non-value-added activity or step.

Value stream mapping

The value stream includes all of the activities, materials, people, and information that must flow and come together to provide the customer the value they want, when they want it and how they want it. By mapping the value stream on a value stream map you obtain a visual overview of the process required for your product to reach your customer. It is a very important step because it is one where you are able to quickly identify some rapid improvements to the product's process. It is also an important step as it provides a record of how the process was organized prior to it being changed to which you can compare the new process (this is always important when budgets are discussed).

Identifying wastes

Wastes are basically activities or steps in the process that does not bring value to the customer. From a typical Lean approach, the following wastes are usually identified:

- **Transportation:** Is there unnecessary (non-value-added) movement of parts, materials, or information between processes?
- **Waiting:** Are people or parts, systems or facilities idle — waiting for a work cycle to be completed?
- **Overproduction:** Are you producing sooner, faster, or in greater quantities than the customer is demanding?
- **Defects:** Does the process result in anything that the customer would deem unacceptable?
- **Inventory:** Do you have any raw materials, work-in-progress (WIP), or finished goods that are not having value added to them?
- **Movement:** How much do you move materials, people, equipment, and goods within a processing step?
- **Extra Processing:** How much extra work is performed beyond the standard required by the customer?

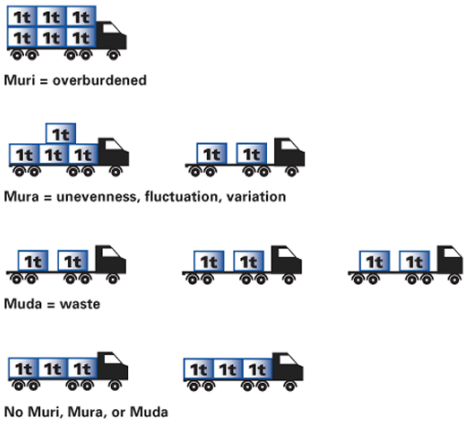
Once the wastes have been identified it is important to classify these into one of two types:

- Non-value added, but necessary for the system to function. Minimize this until it can be eliminated.
- Non-value added and unnecessary. Eliminate this first!

In addition to these seven wastes there are two additional main other categories of waste:

- waste due to variation
- waste due to overburdening or stressing the people, equipment or system

In the Lean jargon the waste categories carry Japanese names, muri, mura, muda (because they were most probably first categorized this way at Toyota).



Source: LEI

Important note: The disengagement of employees should be considered as a waste because it has a direct impact on the last step of the Lean methodology (i.e. seeking perfection and starting the process again).

Lean Enterprise

Purpose, Process, People

When embarking on a Lean transformation there are three fundamental business issues that should guide the transformation of the whole organization:

- **Purpose**: What are the customer problems which the enterprise solves and thereby can achieve its own purpose of prospering?
- **Process**: How does the organization assess each major value stream in order to ensure each step is valuable, capable, available, adequate, flexible, and that all the steps are linked by flow, pull, and leveling?
- **People**: How can the organization ensure that every important process has someone responsible for continually evaluating that value stream in terms of business purpose and lean process? How can everyone touching the value stream be actively engaged in operating it correctly and continually improving it?

Leading a Lean Organization

Lean leaders effectively exhibit the following traits every day.

They know how their business serves the customer by:

- Understanding what customers want, need, and value, or what will thrill them
- Knowing how their business satisfies the customer
- Improving the effectiveness of how their business satisfies the customer

They demonstrate an understanding of the value stream at a macro and micro level through:

- Knowing what the customer requires and how the value stream satisfies them
- Having knowledge of the overall value stream, including tributaries
- Asking questions when changes are made at the local level to ensure that the team understands how the change will impact the customer and the rest of the value stream

They focus on process and results by:

- Obtaining results
- Ensuring that how the results are achieved is the most effective utilization of all resources, in the direction of the ideal state
- Improving how the organization accomplishes results

They build ability in the people through:

- Guiding problem solving — root cause, right problem, right resources
- Leading from *gemba*; applying 3Gen (actual place, actual product, actual facts)
- Asking open-ended, probing questions

They create a culture to sustain improvement by:

- Identifying, modeling, and encouraging Lean behaviors
- Finding the lessons in every “failure” — blame does not foster improvement or innovation

- Respecting and improving standards — questions when the organization is deviating from the standard

They show a continuous improvement mind-set by:

- Continually challenging the status quo
- Knowing that there is always room for improvement
- Understanding that the customer changes — what delights today is a necessity tomorrow

Improve the Value Stream

The value stream is improved by following the Plan-Do-Check-Act process, so eliminating waste in the value stream really is the goal of Kaizen (kai – change, zen – continuous improvement):

1. Plan: Create a plan for change, identifying specifically what you want to change. Define the steps you need to make the change, and predict the results of the change.
2. Do: Carry out the plan in a trial or test environment, on a small scale, under controlled conditions.
3. Check (or study): Examine the results of your trial. Verify that you've improved the process. If you have, consider implementing it on a broader scale. If you haven't improved the process, go back and try again.
4. Act: Implement the changes you've verified on a broader scale. Update the standard operating procedures.