

THE LEAN PHILOSOPHY¹

INTRODUCTION

“Lean Manufacturing” is a philosophy or way of understanding value-oriented production that seeks to eliminate any activity that does not add value to a process or product. It is therefore called “Lean” because it refers to production that uses a minimum amount of resources.

The Lean² methodology has been credited to the Japanese Taiichi Ohno, a Toyota manager who was assigned the task of improving the company's production process after World War II. Ohno visited the United States to study the production systems of what was then the world's leading automobile manufacturer and noticed that mass production was based on a lot system, which facilitated mass production but penalised variability.

However, Ohno found the inspiration he needed at a supermarket in the US. He noted that customers did most of the work and the entire establishment focused on catering for their needs and actions, managing small and highly variable inventories efficiently.

Previously, Sakichi Toyoda had founded an automatic loom company and his son, Kiichiro Toyoda, founded the automobile company Toyota. In 1894, Sakichi Toyoda invented a revolutionary loom for the time: the loom would automatically stop when it detected a broken thread. This prevented defective material from being manufactured without the need for staff continually having to monitor the machine.

Lean was first used in the field of automobile production, hence its better known name of “Lean Manufacturing”. However, Lean can be applied in other industries, service companies, or even everyday tasks that have nothing to do with the production, so it is not uncommon to come across terms such as “Lean Services”, “Lean Engineering”, “Lean Management” or even “Lean Thinking”.

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² Taiichi Ohno initially called this methodology the TPS (Toyota Production System). The term "Lean" began to be used later when the methodology became popular and more concepts were gradually added, as described in this paper.

This paper aims to introduce readers to the Lean philosophy and has therefore been written with non-expert reader in mind. After this historical introduction, the paper will continue to explain the concepts of value and waste. This will be followed by a detailed description of the stages required for the implementation of a Lean methodology and an explanation of the tools necessary to keep it in place. The paper ends with a description of the five basic principles of the Lean philosophy together with an overview of other concepts supporting that support it.

WHY LEAN?

Lean is a methodology based on continuous improvement³ that seeks perfection in processes through incremental improvements. Therefore, although the actual implementation of Lean in a business may entail radical changes, once implemented step-by-step improvements can be expected.

The most tangible effects of the implementation of Lean are normally:

- The reduction of stocks and, therefore, their associated costs and the need to finance them. There have been experiences of implementing Lean that have resulted in stock reductions in the order of 70 and 80%.
- Increased resource efficiency, resulting in greater production capacity (maintaining resources) and cost reductions (maintaining production).
- As a result of the two previous points, there is a reduction in the investment needed to finance both working capital and production and storage facilities.
- Increased quality of output leading indirectly to a potential increase in revenues.

The combination of the above-mentioned effects helps the company become more competitive and, therefore, more profitable.

VALUE ADDED

The underlying principle of Lean is based on the existence of three types of task for any activity:

- Tasks that add value, i.e. those that after completion result in a more complete and finished product or process in line, of course, with the customer's expectations.
- Tasks that do not add value but are absolutely necessary. In other words, tasks which have to be carried out because otherwise it would be impossible

³ In Japanese, the concept of "continuous improvement" is expressed by the word Kaizen. Within the Lean methodology, Kaizen events normally refer to actions that foster continuous improvement.

to complete the process, even though they do not actually add any value, at least from the customer's perspective.

- Tasks that do not add value and are not necessary, referred to as waste⁴. Not performing these tasks would save time and resources that could be dedicated to other tasks that do add value.

The concept can be visualised using a simple example. An operator has to mount a part on a base. The part is always larger at one end and the supplier delivers it to the workshop warehouse, which is located twenty metres from the place where it has to be assembled. The part also comes with plastic coating to protect it during transport from the supplier to the warehouse.

The operator must go to the warehouse, bring the part, remove the coating, shape the end that is too large and mount the part. Transfer from the warehouse and reworking the piece are operations that do not add value and could be eliminated (they are waste) by slightly modifying the process and warehouse location. Removing the protective plastic from the part may be considered an operation that does not add value despite being necessary and the assembly process itself is the only task that truly adds value.

The Lean methodology classifies waste into seven categories, which include almost all the non-value adding activities in most company processes and activities:

1. *Transportation*: the transportation of elements from one place to another unnecessarily or in a non-optimized manner. This may include other activities such as the sending of duplicate information.
2. *Inventory*: this refers to excess inventory, i.e. waste because it normally increases the need for warehouses and their management, and because inventories conceal other inefficiencies.
3. *Motion*: the unnecessary movement of persons from one place to another, or in a non-optimized manner.
4. *Waiting*: machines or people that are not working because they are waiting for the result of the previous person or process. This can also refer to the time a customer has to wait because operations are not optimised in the provision of a service, or the links in the supply chain or service that have to wait unnecessarily for the results of the previous step before they can start working.
5. *Over-production*: producing more than is required by customers.
6. *Over-processing*: working longer or dedicating more resources to a task than is required. It is also identified with doing the same work more times than necessary.
7. *Defects*: everything that has to be corrected is waste; Lean pursues a philosophy of doing things right the first time round.

⁴ Literature on Lean often uses the Japanese term "*muda*" to refer to waste or non-value adding activities.