



**A Book Review:**  
***Lean Thinking* by Womack and Jones**

Assignment for ESD.83:  
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“We can lick gravity, but sometimes the paperwork is overwhelming.”

– Werner von Braun

## Summary of *Lean Thinking*

*Lean Thinking: Banish Waste and Create Wealth in Your Corporation* by James P. Womack and Daniel T. Jones was published in 1996 by Simon & Schuster, New York. This book follows a previous highly successful book by Womack, Jones and Roos entitled *The Machine That Changed the World*. Both books address the revolution in manufacturing represented by the Toyota Production System of the Toyota Corporation of Japan. This type of manufacturing system is called a “lean system” and is contrasted throughout the book with the traditional “mass production” system of manufacturing epitomized by batch-and-queue methods.

The authors argue that a lean way of thinking allows companies to “specify value, line up value-creating actions in the best sequence, conduct these activities without interruption whenever someone requests them, and perform them more and more effectively.<sup>1</sup>” This statement leads to the five principles of lean thinking: Value, Value Stream, Flow, Pull and Perfection.

Value is defined by the authors as a “capability provided to customer at the right time at an appropriate price, as defined in each case by the customer.<sup>2</sup>” Value is the critical starting point for lean thinking, and can only be defined by the ultimate end customer. The ultimate end customer, or the user of the product, is contrasted with interim customers, such sales, marketing, distribution, suppliers, etc. Value also is product-specific, and the authors argue it is only meaningful when expressed in terms of a specific product.

The value stream is defined in *Lean Thinking* as the set of all the “specific activities required to design, order, and provide a specific product, from concept to launch, order to delivery, and raw materials into the hands of the customer.<sup>3</sup>” To create a value stream, describe what happens to a product at each step in its production, from design to order to raw material to delivery. There are three types of activities in the value stream – one kind adds value, and the other two are “muda” (the Japanese word for waste)<sup>4</sup>:

- *Value-Added*: Those activities that unambiguously create value.
- *Type One Muda*: Activities that create no value but seem to be unavoidable with current technologies or production assets.
- *Type Two Muda*: Activities that create no value and are immediately avoidable.

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<sup>1</sup> Womack & Jones. *Lean Thinking*. New York: Simon & Schuster, 1996. p. 15.

<sup>2</sup> Womack & Jones, p. 311.

<sup>3</sup> Womack & Jones, p. 311.

<sup>4</sup> All three definitions from Womack & Jones, p. 20.

Some examples of muda are mistakes which require rectification, groups of people in a downstream activity waiting on an upstream activity, or goods which don't meet the needs of the customer.

The lean principle of flow is defined as the “progressive achievement of tasks along the value stream so that a product proceeds from design to launch, order to delivery and raw materials into the hands of the customer with no stoppages, scrap or backflows.<sup>5</sup>” This translates as a directive to abandon the traditional batch-and-queue mode of thinking that seems commonsense to most. Ways to foster flow include enabling quick changes of tools in manufacturing, as well as right-sizing machines and locating sequential steps adjacent to one another.

The fourth lean principle of pull is defined by the authors as a “system of cascading production and delivery instructions from downstream to upstream in which nothing is produced by the upstream supplier until the downstream customer signals a need.<sup>6</sup>” This is in contrast with pushing products through a system, which is unresponsive to the customer and results in unnecessary inventory buildup.

The fifth and final lean principle is perfection, defined again by the authors as the “complete elimination of muda so that all activities along a value stream create value.<sup>7</sup>” This fifth principle makes the pursuit of lean a never-ending process, as there will always be activities that are considered muda in the value stream and the complete elimination of muda is more of a desired end-state than a truly achievable goal.

After describing their concept of the five lean principles in the Part I of *Lean Thinking*, the authors then present five case studies in Part II of applying lean thinking concepts to companies that were in trouble. The case studies cover a pallet stretch-wrapping company, the Wiremold Company, Pratt & Whitney jet engines, the specialty automobile manufacturer Porsche, and a Japanese radiator and boiler manufacturing company. Each of the case studies meets with different types and level of success in implementing a lean system and deriving benefits from it.

The authors then conclude their book with an outline for an “action plan” a company could use to begin their lean transformation (a summary chart is given on page 270), a brief discussion of integrating multiple firms into a trust-based lean enterprise, and a quick look at applying lean to traditional non-manufacturing sectors of the economy.

## **Putting *Lean Thinking* in the Context of the Manufacturing Discipline**

*Lean Thinking* represents one of the newer schools of thought in manufacturing. Early manufacturing began as craft production, where a single person made an entire single product. With the advent of industrial production technology, mass manufacturing came into being. Lean is in direct contrast with the mass system of production that stressed economies of scale that

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<sup>5</sup> Womack & Jones, p. 306.

<sup>6</sup> Womack & Jones, p. 309.

<sup>7</sup> Womack & Jones, p. 308.

came from making large quantities of items in a batch-and-queue mode. The mass production way of thinking can be illustrated by looking at automotive painting factories. These factories would typically have large paint color change-over times, which resulted in painting white cars one week, blue cars the next week, black cars in another week, and so on. This meant that there would be only one time every month or two when a customer could obtain the specific color they needed. Recently, some factories have upgraded and right-sized their painting equipment so that color change-over times are very fast, enabling rapid response to the customer. This rapid response to the customer, and the customer's ability to pull the product, are very representative of a lean system.

Other manufacturing management concepts that have received attention over the past few decades are not incongruent with lean principles, and many fit nicely in the framework of lean thinking and complement it. 'Six sigma' methods are a way to bring production processes under control to result in a reduction in defect rate. This offers a way to eliminate muda (waste) in the value stream and make the value stream flow. Continuous improvement (CI) describes how an organization is constantly evaluating itself and learning from its mistakes, much in the way the lean concept of perfection encourages continuous reexamination of the value stream for ways to eliminate waste. Total quality management (TQM) and quality circles are techniques to involve employees in management decisions and problem solving. Employees are typically the ones closest to the manufacturing process and have valuable insights into ways to eliminate waste in their groups. Thus, as ways to reduce waste, TQM and quality circles help foster the lean goal of flow in the value stream.

To conclude on the context of lean in the manufacturing discipline and what distinguishes it from past thrusts, Womack and Jones offer their own opinion on how their lean principles are different from previous cuts on the subject of manufacturing management.

“We are putting the entire value stream for specific products relentlessly in the foreground and rethinking every aspect of jobs, careers, functions, and firms in order to correctly specify value and make it flow continuously along the whole length of the stream as pulled by the customer in pursuit of perfection.”<sup>8</sup>

## **Success of *Lean Thinking***

To take a first cut on success and examine the Amazon.com sales rank of *Lean Thinking*, it is found to be 9,708 out of over hundreds of thousands of books. This puts it comfortably in the top few percent of titles sold by the online warehouse over the course of its existence, albeit brief.

But more critically, if the success of *Lean Thinking* is defined as how much attention major American manufacturing companies are paying to lean principles, then it can be considered mostly successful as many companies in different markets are trying to adopt lean methods. In

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<sup>8</sup> Womack & Jones, p. 275.

addition, people are trying to apply lean principles outside the strict manufacturing domain in which Womack and Jones examined it. For example, Cusumano and Nobeoka in their book *Thinking Beyond Lean* look at applying lean principles to product development processes.

However, Womack and Jones have left many of the details of overcoming institutional barriers to lean out of their discussion. Certainly the five major cases presented in their work deal with these issues somewhat, but critics say these are clear-cut cases and thus not representative of what exists for most other companies. Many practitioners would like to see more work in the following areas:<sup>9</sup>

- Creating senior leadership commitment to a lean transformation
- Overcoming policy and legal constraints to implementing lean principles
- Effectively dealing with culture and social systems in implementing lean
- Reinventing business systems (eg. accounting, resource planning) to work in harmony with lean concepts
- Determining appropriate performance incentives and metrics in a lean environment

But perhaps this omission was intentional, as Womack runs a consulting organization whose goal is to help companies implement lean practices. If the book gave away all the secrets, there would be no money to be made in consulting.

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<sup>9</sup> Cutcher-Gershenfeld, Joel. "Barriers to Lean," Presentation to Plenary Conference, Lean Aerospace Initiative. 1999.