

# More Innovation, Less Waste – The Secret of Efficient Development Processes (Part 1)

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Lean and customer-oriented production processes lead to a significant increase in the efficiency of production. That is no news to people familiar with the concept. After the success of Toyota's production system became well known through Jim Womack's and Dan Jones' books in the 1990's, bits and pieces of the lean production philosophy are now found in almost all industry sectors. Today, the lean production philosophy is increasingly adopted in administrative areas as a measure to improve efficiency. Even research and development departments have lately taken to its teachings. This transfer does not come as a surprise. The R&D capabilities of a company determine its future and its ability to apply the lean principles in the production phases. They also create future products, and their marketability and manufacturability in terms of design to fit customer needs, quality, cost, manufacturing, etc.

Over the past years, Schuh & Company together with the University of Aachen, Germany, devoted an extensive amount of time to translate the lean principles to fit the innovation and development process. Several studies, work groups and research projects were performed as part of this process. Over the past months, the results have been successfully implemented in projects with companies from different industries. The effectiveness of the developed "Lean Innovation Principles" has proven successful. The current and upcoming issue of the Complexity Management Journal will discuss these principles (Fig. 1) in detail.

Apple and Southwest Airlines are good examples to show the importance Lean Innovation has for business success. In today's dynamic and global competitive environment, these companies have significantly increased their attractiveness for customers and investors. They rely on innovation and thus are able to sustainably distinguish themselves from the competition.

Southwest Airlines utilizes innovative business processes and models. Examples are new internal relationship managements that minimize ground time of their airplanes drastically and thus, improve their cost base. This brought about the so-called "low-cost airlines", which are focused on quality and offerings that are honored by the customer.

Increases in efficiency have been achieved many times with lean production methods. An additional focus for lean in R&D lies with increasing the output of truly successful and innovative developments. In order to achieve this goal, the lean principles have to be transferred to fit the creative processes that are so typical for R&D work, and so different from other areas where these principles have been applied in the past.

This R&D specific application of the Lean Philosophy should be referred to as "Lean Innovation". This article will further discuss current research and development trends of this area of Lean.

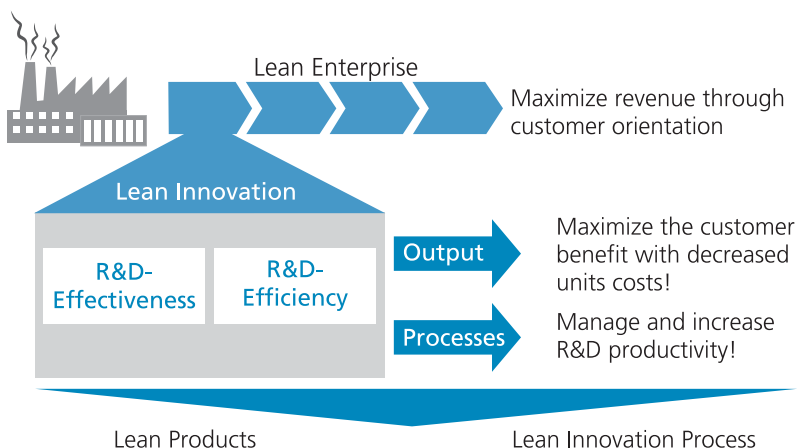


Figure 1: Lean Innovation is a Central Success Factor of a "Lean Enterprise"



### The Lean Production Philosophy – A Starting Point

The wording “Lean Management” was first coined in the mid 1990’s by Womack and Jones as part of the well-known MIT study. The comparison of the performance of Japanese and Western companies as well as the correlation to the respective corporate structures, processes, strategies and activities build the basis for the development of those management philosophies.

While Lean Management has in the past often been misunderstood, the term has a much broader interpretation today. The past understanding of Lean was associated with slimming the company down and job losses, yet today’s interpretation stands much more for “adding value without waste”. It aims to preserve jobs and even create new ones. The approach goes beyond a pure efficiency increase in production areas and really aims for a new performance culture within the company.

The Lean Thinking philosophy, which we are familiar with from Lean Production, can be outlined in five core principles:

- **Customer orientation:** Align the value of products and services with customer needs
- **Identification of the value stream:** Eliminate waste and optimize activities that create value for the customer
- **Flow principle:** Perform all production steps smoothly and without delays until the final product or service is delivered

- **Pull principle:** Run a demand-driven production without surpluses or rejects
- **Strive for perfection:** Constantly question your achievements and strive for continuous improvements with regard to the first four steps.

According to the original definition of the Lean Management philosophy, the organizational structure has to be “lean” in the first place. Lean organizations are defined by short decision making processes, flat hierarchies and a constant focus on how products and services can create value for the customer. Customer demand triggers all activities (pull-principle).

Process steps and activities, which do not directly increase the customer value, are considered waste. They are eliminated unless other reasons such as laws, security, etc. prohibit their elimination. Seven types of waste (muda in Japanese) are generally identified in production processes: over-production, unnecessary inventory, inappropriate technology, unnecessary motion, defects, wait time and transportation.

Several methods and tools are available for the implementation of the Lean Management philosophy in production and administrative areas. They build a well recognized framework. A selection of some methods is described below (Fig. 2).

- **Empowerment:** Employees have the authority to make decisions for their department without prior coordination with superiors, and can perform improvements. An employee can, for example, halt production

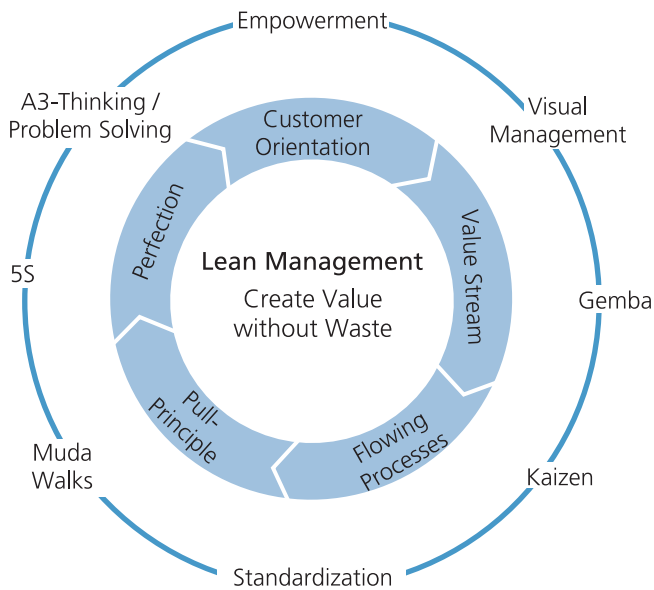


Figure 2: The Five Basic Principles of Lean Management: To Implement these Principles, Proven Methods Are Available

if problems occur – or a customer service representative can send a replacement product to the customer in case of complaint.

- **Visual Management:** Allocation of information at the workplace to allow for easy, self-organized and goal-oriented management of tasks. Tools address and display readily available information about goals, work progress, quality level, work place logistics through Kanban cards, and create transparency to optimize tasks.
- **GEMBA (Japanese: the real/actual place):** Gemba represents the location where the true processes take place and problems that occur need to be solved. This means that in order to identify the problem or solve it, it is necessary to go to where this problem actually occurs. Problems cannot be solved from the conference room.
- **KAIZEN (Japanese: Change for the better):** In business life, Kaizen stands for continuous improvement that involves everyone at little or no cost. A

Kaizen culture follows three basic principles: processes and results, systematic thinking and acting, no assessment and finger-pointing.

- **Standardization:** The advancement and implementation of standards within the organization.
- **Muda Walk:** Short and focused tour of the work place (Gemba), to experience / show where potential for improvement or waste in process and structure exist when examined right. This includes a skilled approach with corresponding questions that avoids finger-pointing or scolding.
- **Five S (5S):** An approach to systematically organize workspaces and keep them clean and orderly. 5S campaigns are often performed as part of Total Productive Maintenance efforts in production. 5S is derived from five Japanese words:
  - Seiri: Sorting
  - Seiton: Create order
  - Seiso: Cleanliness
  - Seiketsu: Standardizing
  - Shitsuke: Discipline
- **A3 Thinking / Problem Solving:** Toyota utilizes so-called A3 reports to implement standardized procedures and as a formalized depiction of several activities such as solutions to problems, status reports for projects, changes of guidelines, etc. This tool serves as an effective form to communicate knowledge to all involved employees and ensures efficient teamwork. The A3 problem solving approach encompasses the following steps:
  - Identify a problem or need
  - Analyze and understand the current status
  - Perform a root-cause analysis
  - Develop measures to eradicate the causes of the problems

- Develop a target state
- Develop an implementation plan including a check of the desired results
- Discuss the plan with all parties involved
- Get approval for the implementation plan
- Implement the plan
- Evaluate the results

nate waste in administrative departments and to increase efficiency.

- Organizational analysis
- Order structure analysis
- Value stream analysis
- Activity and information structure analysis

### Lean Administration Follows Similar Principles as Lean Production

In comparison to production processes, which generally handle physical products, administrative processes often comprise additional informational aspects. Administrative processes are invisible, immaterial, immeasurable, can be interpreted differently, hard to define and of different value. As a result, the lean principles and tools have to be adapted accordingly. Table 1 shows the relationship between waste in production and waste in administrative processes.

In addition to the previously described lean methods for production, additional tools can be relied upon to elimi-

### Lean Innovation: A Holistic Approach that Embraces Innovation and Development Management

Lean Innovation is a holistic approach. It focuses on the one hand on the design of development processes and new products without waste. At the same time it integrates an increase of efficiency into the processes. The other goal of Lean Innovation is to augment the impact of R&D by increasing the output of truly successful and innovative developments. In a collective fashion it follows the three guidelines of Lean Thinking (Fig. 3):

- Eliminate waste
- Reduce non-value adding activities
- Optimize value adding activities

	Production	Administration
1.	Over production	Busy work
2.	Large inventory	High work backlog / reserves
3.	Unnecessary transport	Unnecessary information flow
4.	Wait time / Idle time	Wait time / Idle time
5.	Inappropriate use of technology or inappropriate work processes	Inappropriate use of technology or inappropriate work processes
6.	Unnecessary motion	Unnecessary motion
7.	Reject and rework	Quality problems and inquiries

Table 1: The Seven Types of Waste in Production and Administration

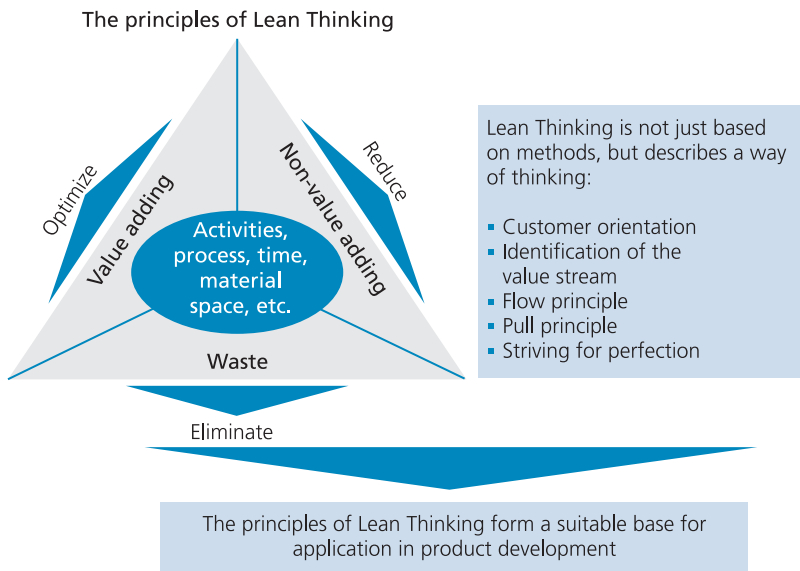


Figure 3: The principles of Lean Thinking

Waste is defined as all human activities, which utilize resources but do not create value. For Lean Innovation waste can consist of unnecessary process steps, as well as product features that the customer does not need. Non-value adding activities, in contrast to value adding activities, do not contribute directly to the reduction of product costs. For Lean Innovation however, non-value adding activities may be necessary if they create preconditions for value generation or are necessary for other reasons, such as risk minimization or legal requirements. The concurrent development of alternative concepts can act as an example here, that does not add direct value, because essentially only one concept is realized. Indirectly alternative concepts increase the probability that because of a broader information basis, a better concept is chosen in the end.

The respective work steps in product development are based on the creative results of the previous development stage. Development processes therefore cannot be planned and managed as consecutive processes like it is possible for production processes. While the production process benefits from a reduction in variation, product development relies on this variability in many situations. This fact has to be incorporated when planning and controlling development processes.

The goal of innovation and development without waste is to live up to product development as a creative process, while at the same time increase the development efficiency along the entire lifecycle of the new product.

To implement Lean in the areas of innovation and development, twelve principles should be relied on. They allow for a long-term and sustainable increase in the company's ability to innovate for the company (Fig. 4). These twelve principles are arranged into four groups:

- Position strategically
- Structure early
- Synchronize easily
- Adapt securely

**Position strategically:** A continuous check and adjustment of corporate strategies is necessary to ensure the competitiveness of a company in the ever changing market environment. According to Lean Thinking, the sub-strategies of innovation and development have to be built upon each other in order to support the corporate strategy in a goal-oriented and holistic manner. Clear communication across all departments ensures that the employees are familiar with and pursue the same goals. This enhances the motivation of the employees and ensures a strategic implementation.

**Structure early:** This is the basis for successful complexity management in R&D. An important focus for innovation and R&D departments lies in mastering the complexity of different projects and activities. By structuring early, processes are aligned in the most efficient manner and consistently deliver value. The application of this principle relies on a motivated project team and the inclusion of precise, transparent and prioritized requirements and values. It also builds the basis for an efficient and straightforward execution of the consolidated project and product.

**Synchronize easily:** Tact and alignment are the basis of the value stream orientation of R&D.

Smooth processes that maximize project internal and inter-project effects of scale require continuous and

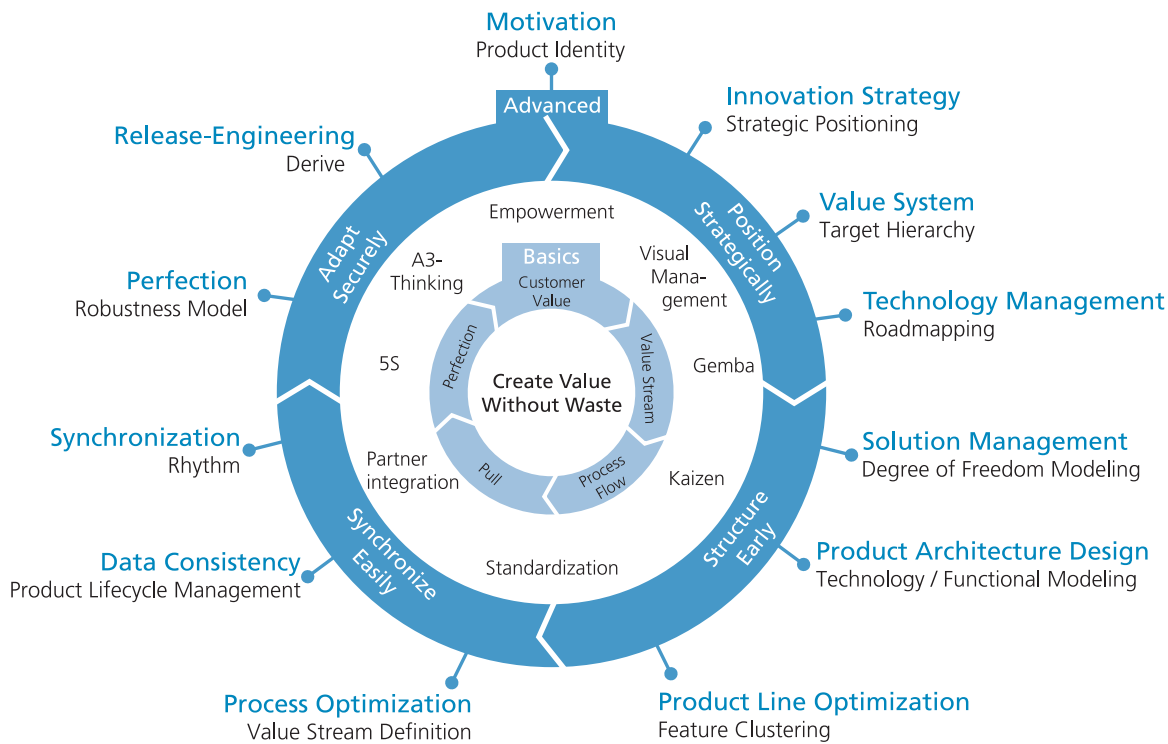


Figure 4: 12 Principles of Lean Innovation

consistent synchronization of all activities. Easy synchronization calls for a value stream definition, capacity planning and synchronization.

**Adapt securely:** Adapting securely serves to ensure the constant accommodation of robust products to evolving requirements. An adapted release management guarantees the constant fine-tuning of the product functions.

## Conclusion

A systematic implementation of the Lean Innovation method leads to an increase in effectiveness and efficiency in the areas of innovation and R&D. In other words, the output of product and process innovations is increased while the resource consumption stays constant. Customers, investors and potential employees also perceive this excess in innovation outside of the company.

Lean Innovation is thus a substantial success factor for competitiveness and business success in the global market.

The next issue of the Complexity Management Journal will offer the opportunity to get a deeper look at the topic of Lean Innovation. The 12 Lean Innovation Principles will be discussed in greater detail.

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