

# LEAN MANAGEMENT AS AN APPROACH SUPPORTING INNOVATIVENESS

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**Summary:** The changing conditions in world economies require the implementation of management approaches that support adaptability of companies. Lean Management is one of those approaches. Originating from manufacturing it is often being understood through a prism of standardizing every piece of work and reducing costs via waste elimination and therefore as an approach negatively affecting company's ability to innovate. The author shows Lean Management approach as one that facilitate innovation. Elements of this management philosophy are being presented with emphasis on how they may be utilized to support companies in creating and implementing innovations.

**Keywords:** innovation, lean management, competitive advantage

## 1. Introduction

The primary aim of companies is to make money for their owners. They of course fulfil several other goals like: benefiting the community in which they operate, making the lives of their customers easier or developing cutting edge solutions for the most urgent problems of contemporary societies. Nevertheless their main goal is to make profit. Without it, in an open market they will not be able to sustain their existence and survive for a longer time. In order to make those profits companies need to be managed in a way that they are competitive. The future is unpredictable, the customers have an increasing amount of choice and the pace of changes is constantly growing. Commitment to innovations can be helpful for companies in achieving competitive advantage [1, 2]. Innovation has a bottom-up, decentralized and unpredictable character but nevertheless it can be managed. It just requires new paradigms of management [3] and so do companies in the modern economies because a lot of tools that the general management theories comprise of have not been created to function in the conditions of extreme uncertainty.

As the world is changing at a rapid pace management systems need to adapt and support organizations in this variable environment. One of the first management systems that meets those conditions was the one at Toyota – the one that was the cornerstone of what we today know as Lean Management system. It focuses on two main aspects: continuous improvement and respect for people [4]. The first aspect enables the development of the organization in relation to changing conditions. The latter aspect enables the engagement of employees in delivering the value to company's customers.

## 2. Innovativeness

An innovation “is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. [5]” Innovativeness is the ability to create and implement innovations. According to the above mentioned definition

in order to be called innovations products, processes, organizational and marketing methods must be new, at least for the entity itself, and do not have to be new to the market in which the entity operates. They can also be produced by any other company or entity of a different nature, and do not need to be developed by the same company that introduced the innovation in their business. When developed within a company innovation is usually a task of research and development department or a similar one. Amongst basic factors that are required to create or implement innovation are: resources (like time of employees) and knowledge (about the customers and about the technologies).

### 3. Lean Management

Lean Management is a way of managing people, processes and products with a focus on customer value. The roots of Lean Management date back to Eliah Whitney, Henry Ford, Sakichi and Kiichiro Toyoda and Taichi Ohno [6]. They are strictly related to manufacturing. E. Whitney being the first one to implement the idea of mass production instead of producing a set of elements that only match each other and don't match parts from other production lots. H. Ford introducing assembly lines and parts of a continuous flow with cars moving across the shop floor instead of working groups moving from one car to another. The Japanese have introduced amongst other solutions the tools supporting built-in-quality (poka-yoke, jidoka, etc.) instead of traditional quality control processes and production scheduling system based on real demand instead of producing for the pre-set targets that led to the waste of overproduction. Apart from that Visual Management, Standard Work and Training Within Industry are close connected with Lean Management. Lean is a common sense approach [6] therefore even though it originated from manufacturing industry the ideas behind Lean can be translated to other kinds of work [7].

#### 3.1. Customer Value and Waste

Customers are the ones who have money or other resources that the entrepreneurs willing to make profit want to obtain. Satisfying customers is the way to make them pay and under a few other conditions a way to make profit. Customer value can be defined as any action, feature or process that the customer is willing to pay for [8]. Waste is any type of activity that does not add value to the product from the perspective of customer. When looking at value from this perspective two ways of creating value can be distinguished. First one is adding features to the product that are valued by the customer. Second one is the reduction of waste. Waste has been classified in eight categories Tab. 1 presents the eight types of waste with examples from both the manufacturing and office backgrounds.

Tab. 1. Eight types of waste in Lean Management from the perspective of manufacturing and office background [9, 10]

Type of waste	Example from Manufacturing background	Example from Office background
Overproduction	Producing more than the customer wants to buy	Creating too much information or providing it too early (so it may become obsolete)
Inventory	Maintaining more work-in-progress and final products inventory than needed	Having more information than needed; batch processing transactions and reports

Defective outputs	Poor quality outputs that require rework or scrap	Insufficient quality of information (incomplete, ambiguous, inaccurate) that needs to be redone to correct the problem
Over processing	Working more than necessary to manufacture the desired output, e.g. a joint with 5 screws when only 2 would be enough	Working more than necessary to produce the desired output, e.g. using complicated simulation tools when a spread sheet would be sufficient
Transportation	Transporting material across from each process to the storage space and to the next process instead of directly from one process to the next one	Inefficient transmission of information, e.g. wrong format, incompatibility of information; excessive information distribution; multiple approvals
Unnecessary movement	Worker walking 3 meters and back to collect an element when he can have it moved closer to his workplace with no need to walk to collect it	Moving people to gain, access or process information, e.g. to other office to receive an approval, to/from a copier or fax machine
Waiting	Waiting of a product to be processed; waiting of a worker for first part after changeover to be inspected; waiting of an operator for raw material to be provided	System downtime; waiting for approvals from others; waiting for data from a test result; system response time
Lost creativity	Employees with no chance to improve their workplace	Limited employee authority and responsibility for basic tasks

### 3.2. Visual Management

Visual Management is a set of techniques that enable quick and easy to understand display of work method, status of activities currently conducted and control of state and localization of workplace equipment. Visual Management should enable all those things without a need for asking any questions. Therefore it assists every person involved in seeing and fully understanding different aspects of the process and its status at any time. This tool is an element of a broader system – the 5S system [11].

### 3.3. Continuous Flow

Continuous Flow or One-Piece Flow is a method of work organization where material or information is processed and transferred to the next process not in batches but one by one [12]. This type of work organization enables the processed item to pass quickly through all the processes without waiting in batches or queues between process and to reach the customer in a much shorter time than when compared to batch processing.

### 3.4. Standard Work

Standard Work is the best know way to execute specific work. It should be known to all workers involved so that the work can be done repetitively and the process can be

stabilized. It allows quick assessment on whether the work in process is conducted correctly. A standard work in place also serves as a reference point for further improvements [13].

#### 4. Barriers of implementing innovations

Innovation is not a thing that will create and implement itself. This processes have to be managed. As they are always connected with some radical changes they encounter a lot of barriers. Research conducted by Popławski and Szymczak [14] indicates four main groups of innovation barriers. First one identified are barriers related to finance and costs. Companies are not creating nor implementing innovations because they lack their own funds for development and they have difficulties with gaining external funding like bank loans due to their high interest rates. What limits the amount of funds that could be dedicated to development activities are growing production costs (raw material costs, labour costs, etc.) Second main group of barriers identified are conditions inside the company and in its environment. These include: too short production lots, organizational and legal forms of organizations that make change management difficult or decreasing market size. Third group of barriers is related to technology transfer. It consists of difficulties with obtaining knowledge about technologies available or lack of qualifications required for innovation diffusion. Fourth and last group specified are government related factors like the lack of support mechanisms for promoting innovativeness amongst companies. Also other sources shown in Tab. 2 indicate similar conclusions.

It is worth noticing that barriers indicated by the scientists in their research from 2002 and 2006 [14, 15] are consistent with what the representatives of industry put focus on more recently in 2011-2012 [16, 17]. The industry representatives come from the minority of Polish companies that are creating or implementing innovations.

Tab. 2. Barriers of creation and implementation of innovations in companies according to scientific and industrial sources

Barrier categories	Source of information				
	Popławski and Szymczak [14]	Łyżwa [15]	CEO of Hydromega [16]	CEO of OPEGIEKA [17]	Director from an automotive OEM first tier supplier*
Finance and cost related barriers	Lack of own funds for research and development Difficulties with gaining external funding (like bank loans) Growing costs of raw material,	Lack of funds or access to sources of financing	Large financial expenditures required	Lack of sources of funding for research and development activities	

	labour, etc.				
Conditions (inside the company and in its environment) related barriers	Too short production lots	Lack of partners helpful with implementing innovations	Long time required to start the production of innovative products Long time required to launch mass production of a product	Necessity to compete with others with price and quality of products	Lack of interest in technical knowledge from the employees
	Organizational and legal forms of organizations that make change management difficult				Fear of new technologies among employees
	Decreasing market size				Time pressure from the customer
Technology transfer related barriers	Difficulties with obtaining knowledge about technologies available	Lack of qualified personnel		Lack of highly-skilled experts	Lack of technical knowledge
	Lack of qualifications required for innovation diffusion	Limited access to research and development centres			Lack of knowledge of the manufacturing technologies
Government related barriers	Lack of support mechanisms for promoting innovativeness amongst companies	Large amount of legislation and administration			

\* - based on an interview conducted by the author in 2012.

## 5. Lean Management and Innovation

Lean Management as an approach to manage the whole enterprise has to influence the capability of a company to innovate. Different research and different researchers provide

both support and negation of the hypothesis that Lean Management supports innovation [18, 19, 20, 21]. It indicates how complex the topic is and how difficult it may be to clearly prove or negate the above mentioned hypothesis.

Lean has been a cornerstone of success of several firms with Toyota being only one of them. Those companies have adopted the common sense principles of Lean not only in their manufacturing departments but across all the company's structures. It is important to note that the specific tools that have been working at the shop floor cannot be just copied to the offices or other departments. It is the idea behind those tools that has to be understood and transferred and not the exact lean tools and solutions [7]. This advice is often omitted or forgotten when companies try to implement Lean Management approach. This leads to no improvements and often even deterioration of company's results including innovativeness. Focusing too much on work standardization instead of on delivering value to the customer can also be a threat to a company in becoming more innovative [18]. Eliminating waste by reducing slack, risk or variability is also expected to be an element of Lean that has negative impact on innovation [19]. Examples of such misunderstood usage of Lean Management elements has been shown in Tab. 3.

Tab. 3. Wrong usage or understanding of Lean Management elements that influences innovativeness negatively [18, 19].

<b>Lean Management element</b>	<b>Example of how can the element be wrongly used or understood</b>
Waste elimination	Making waste elimination the main goal of an enterprise and forgetting about the common sense. Targeting all that has been categorized in books as waste and eliminating it. Keeping slack, risk or variability in the design process because they positively influence innovation.
Visual Management	Visual Management only used as a tool for direct control of employees.
Standard work	Standardizing every piece of everyone's work. Standardizing work in too big detail. Standardizing to standardize and not to focus on value delivery to the customer.

On the other hand Lean Management can be seen as an approach directly facilitating innovativeness of an organization [20]. Also implementing it will be an organizational innovation. Research has found that there is a positive impact of organizational innovation on product and process innovation [21]. Applying Lean Management philosophy enhances the knowledge diffusion for example in research and development departments [22] and hence facilitates innovations.

Also research on certain elements of Lean Management provides arguments to the discussion and indicates how the management approach discussed addresses the barriers of creating and implementing innovations.

### **5.1. Customer Value and Waste**

Waste elimination should never be the main goal of an enterprise. Its goal should be to make money. In Lean Management approach the customer is the one who defines value

because he is the one who has the money the companies would like to get. And only from the perspective of a customer should we look at waste and eliminate in first place this kind of waste that is feasible to eliminate and that will benefit customers and by that also the company the most. Some amount of waste will always be there but the important thing is to know where is the satisfactory level for the moment.

Research conducted in the United States [23] has indicated that engineers spend only around 31% of their time on activities that are of value to the customer. The rest of their time is divided: 29% is spent on activities that are necessary but non value adding and the other 40% is waste. Several other researches provide similar results: that at least 30-40% of engineering effort is typically wasted [24, 25]. This can provide a huge reserve to the process of creating and implementing innovations. Eliminating waste from the engineers' jobs could free up around 30% of their time that could be dedicated to innovation.

Keeping slack, risk or variability in the design process may lead to innovations but these will rather be incidental innovations than ones that are managed and have been planned for, included in the long term strategy, etc. Eliminating slack, risk or variability from the design process can be conducive in terms of company's innovativeness. The Second Toyota Paradox [26] is related to product development therefore it is connected to innovativeness. It is about developing several engineering solutions of a problem simultaneously and delaying the decision about which one to choose for further development when there is enough information or when there is as much information as possible. It may seem like a waste of human resources but in reality it enables the company to manage the innovation process and by front-loading it save resources in later stages. And the solutions that have been rejected are archived and revised when a need occurs.

The Lean Management principle of customer value creation and waste elimination addresses several barriers mentioned in Tab. 2.

By eliminating waste cost reduction is feasible and funds are being released and can be dedicated to innovation activities. Applying Lean Management can help to lower the cost (and price) and increase the quality of products supporting the company's competitive advantage.

## **5.2. Visual Management**

The Visual Management tools bring process discipline by providing transparency and aid with resource allocation and scheduling [11]. It is important because an effective product development organisation can be characterised not only by creative designs and innovation but also by discipline and control in scheduling, resource use and product quality [27] all of which are supported by Visual Management. By providing direct information at a glimpse of an eye it makes process management easier. It is not a tool for direct control of employees but for the control of a processes supporting its correct execution.

Visual Management also assists with the elimination of time wasted on non-value adding activities. A research has shown that daily at least half an hour of time at work is wasted by each single employee on searching for work-related things (work equipment, information, etc.) [28], mainly due to lack of order and lack of what is the principle of 5S: a place for everything and everything in its place.

### **5.3. Continuous Flow**

Main benefit of applying continuous flow and abandoning batch processing is lead time shortening. Shorter lead time means quicker response to rising market opportunity in the form of introducing a new product or service. As the environment that we live in is rapidly changing so are the customer trends. Products are being designed with the knowledge available at the moment. Time passes by and before they get to the market and to the customers there is a risk that they will already be obsolete from the point of view of changing trends, expectations, etc. Shortening the lead time of introducing a product to a market enables the product to be as close to customer expectations as possible. Continuous Flow helps to address the issue of long time to market that has been classified as a barrier to innovation. It is a tool that facilitates elimination of wastes related to waiting, overproduction, transportation, inventory, motion, errors and rework and process variability [29].

### **5.4. Standard Work**

Standard Work is probably the most often indicated tool when the negative influence of Lean Management on innovation is discussed. Nevertheless when used with common sense it can create facilitate learning and process improvements [30]. Standardizing every piece of everyone's work usually is not necessary. Different work can be standardized to different level of detail. Standard work is a tool that facilitates elimination of wastes related to waiting, overproduction, over processing, inventory, motion, errors and rework and variability of both work practices and processes [29].

## **6. Conclusion**

Only a selected Lean Management tools and their relation to innovativeness has been presented. Nevertheless arguments provided indicate potential deriving from Lean Management implementation to increase the innovativeness of a company in the form of both eliminating innovation barriers and facilitating the innovation activities. This management approach by focusing on activities of value to the customer enhances the elimination of waste. By eliminating activities that are waste from the employees duties management can free up resources and dedicate them to innovation. The primary assumption behind this is the common sense utilization of Lean Management approach and not copying the exact solutions from the shop floor but understanding the logic behind those tools and applying this logic to research and development departments of organizations. Consequently the increase of human resources and funds available for innovation creation and implementation activities should be available and innovation barriers should be minimized.

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