



## APPROACH TO DEVELOPMENT OF THE LEAN CONCEPT PROJECT

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**Abstract:** We are on the threshold of joining the European Union (EU) and our business environment is experiencing a severe economic and financial crisis, which is a part of the global crisis. Based on the fact that mental and technological creativity grows just in times of crisis, the Lean concept is gaining recognition and becoming a challenge to future scientists, researchers and entrepreneurs in our country. Inspired by the Japanese automotive industry, it is synonymous with a good way to get out of the crisis. The time of crisis in giving us the best time to develop the strategies of work process improvement and the application of Lean concept. The crisis facilitates the use of new paradigms with completely new mental models in the business of organizational systems. This concept provides a focus on people, their training in work processes, teamwork and continuous improvement. They are crucial for the efficiency level in the use of key resources: people, techniques, property or capital invested in human labour performance.

**Keywords:** Lean concept, principles, methods, tools, effectiveness, efficiency, project of lean concept

### INTRODUCTION

We live in a time of crisis and economic recession when all companies, of all sizes and shapes, from industrial giants, medium and small enterprises, to the micro-organization of companies, are faced with challenges to their own survival. In these difficult and complex times of recession and financial crisis, the usual actions of management in leading a company are to reduce costs and waste in all its forms. Therefore, company managers do not usually choose new business programs nor accelerate programs that are under development.

Major changes in the management have resulted from the crisis, affected by large and developed countries, modern scientific and technological progress in the field of computer science, new technologies, new materials, energy development, and communication development, directly influencing each company. Thus, we can no longer talk about running business under stable conditions for a long period of time, but the business in terms of constant changes.

Today's management structure and managers should first know how the company generates profit and then redesign those activities. Toyota's struggle for survival has resulted in the discovery of appropriate programs, principles, methods and tools for the implementation of the Lean concept. Recently, during the crisis, the Lean concept has become the philosophy of efficient business and has increased the interest of businessmen and scientists in the processes of its introduction and implementation. Through systematic and continuous Lean programs and establishment of business under the Lean environment conditions, we achieve: flexibility and willingness to start production to the demands of

customers – the market; better utilization of space resources – layout; better utilization of human resources; continuous increase of knowledge and understanding; the change of the organizational culture and faster identification of workers with work processes and the company and so on [3,4,6,14].

In times of crisis, Lean implies abandoning the reactive management style in which time is spent dealing with emergencies and it totally accepts the proactive management style in which all available time is devoted to solving the root causes of the inefficiency of systems and processes. It takes a lot of effort for an enterprise to become Lean – long-term, flexible and vital in providing the customer with the full value of products or services. The customer wants the product or service with the highest efficiency, lowest cost of procurement and maintenance during exploitation. It is necessary to establish a continuous process of constant systemic identification and elimination of unnecessary work processes and business waste, everything that does not represent a value from the customer's perspective. The constant systemic elimination of activities that do not create new or additional value to a product or service is a challenge to the survival of any organizational system. Because of all this, it is becoming a challenge for human resource management studies, and the Lean concept holds all the answers.

### LEAN CONCEPT

Over the last few decades of the 20th century, Lean production as a source of improvement of effectiveness in work processes was getting more and more importance day by day. Lean production has initiated the development of this kind of approach and has generally

been a breakthrough into more significant process analyses towards the improvement of production and factory layout in which products are being manufactured. It has changed the way the participants in the work process think and behave and created a state (environment) where the work management is done: the work process, waste elimination in the process of work, constant training of employees at all levels and functions in order to achieve shorter delivery times and cheaper products. In this way, the companies create an environment that represents the Lean concept or doctrine in the way of organizing and managing businesses.

In the late 1980's, the Massachusetts Technology Institute (MIT) studied the International Program on motor vehicles. In this research, it analysed automakers comparing the United States, Europe and Japan. The book "The Machine that Changed the World" [11] was based on this project. It practically presented the term 'Lean manufacturing' in America. The authors concluded that in Japan, streamline processes and ways of organizing production systems were credited for its success. They found that a mixed system based on keeping minimum stocks and maintaining high quality was the basis for the success of Japanese manufacturers, particularly Toyota. Babson [1] noted that there are similarities with TQM, although many analysts had already pointed to it. Even though they popularized the term "Lean" to describe the Toyota production system, authors of the MIT study initially presented many of these ideas to the West. In fact, many books written before Womack's represented different characteristics of the concept. For example, Ohno, Japanese architect of the Toyota production system, wrote "Toyota Production System: Beyond Large-Scale Production" [9]; Shingoe's Study of Toyota production system from the perspective of industrial engineering [8]; Goldrat and Cox published the first edition of "The Goal" (1984); Schonberger wrote "World Class Manufacturing" [7] and so on. However, the book "The Machine that Changed the World" was very popular with executives and highly sought after document for Lean production systems. Another book written by authors Womack and Jones, "Lean thinking" [12], offered an alternative way of applying Lean production. It deals with companies outside the automotive sector which have successfully implemented this principle.

Lean Manufacturing: Tools, Techniques, and How to Use Them [10] is based mainly on designing efficient and effective operation of manufacturing processes that are applicable, flexible, consistent and sustainable in time and space. The labour force was foreseeable and entrepreneurial. Lean production creates a system based on real customer's needs and continuous improvements

in all work processes. In this way, the labour force is being developed and trained in the use of Lean tools and methods necessary for the achievement of the objective function of the production system and its rise to the world class level.

Womack argues that the Lean concept must be a meaningful concept adopted in the enterprise, in all functions, to see improvement and maintain a system of designed objective functions. A segment or organizational-functional understanding of the application of Lean concepts, principles and its actions lead only to a small improvement compared to the effects of comprehensive application.

#### **THE PRINCIPLES AND TOOLS OF LEAN CONCEPT**

In their book "Lean Thinking" [12], move further from the specific functional approach in the design of production systems and establish the five principles of Lean manufacturing:

- Value - focus on customers (the ability or possibility to meet customer's requirements at the right time and for a reasonable price)
- Value stream - effective and efficient work processes (the specific activities necessary for designing, commissioning and provision of certain products from concept to production, from order to delivery, from raw materials to the customer's hands. It is, in fact, the flow encumbrance profile, i.e. process from an idea to finished product to buyers in the market),
- Flow - continuous flow (the full realization of tasks during the "value stream" work process, so that the product passes the process from design to its launch on the market, from order to delivery, from raw materials to customer's hands, without stopping, without scrap, poor quality and without overloading the work process)
- Pull - starting the production to customer's request (production and delivery of products to customer's request, in which case there will not be any production without their previous request,
- Perfection - perfection in work (complete elimination of waste where high values are achieved during the "value stream"). Today, many companies include these principles, but usually only in some of the functions, and less frequently in all functions. These five principles lead the companies to the understanding of the Lean approach because their common use of all production system functions can significantly increase production.

To enable the implementation of the whole Lean concept, there is a set of tools (Figure 1) which have to be used within the company. Besides the tools shown in the figure, it is possible to create and design other tools that for certain conditions provide better results (with tools and methods, for a more detailed description of lean tools

and methods see [2] and [13]). If we represent the tools used in the procedures of Lean concept design as a house – a firm creation of human work, and if we should explain the Lean concept as parts of the house, then the supporting pillars would be Just-In-Time and Jidoka (or making quality at source).

The foundations of such a house would be Lean philosophy, visual system control, stable and standardized processes, and balanced production. The house would be held by teams through teamwork with the aim of continuous business improvement.

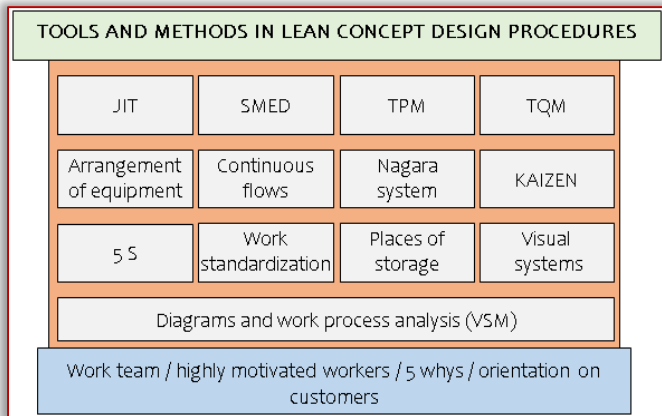


Figure 1. Tools in Lean concept design

#### FROM AN IDEA TO PROJECT LEAN CONCEPT

Design of a Lean concept starts after the management's decision that work processes within systems must be changed in order to achieve greater competitiveness in the market. Its design is a complex process of state analysis and synthesis of those elements into a whole that will bring the greatest benefit to the industrial system. The design procedure consists of the following stages:

— **The first stage:** preparation for designing. This is the stage where as a result of sets of activities we make certain proposals, conclusions and decisions:

- identification of key losses, errors, problems and guidelines for their solving,
- defining the terms of reference and their goals,
- time framework for the completion of all activities,
- the appointment of a team to implement the whole project,
- the decision of management to introduce the Lean concept.

In fact, it is the process of assessing the need to switch to the Lean concept and determining the current state of the industrial system. States and views on the necessity and importance of the changes must be critically represented. After the changes had been introduced, the next step is to publically present the expected results.

They motivate (drive) employees to put in greater effort. Motivation, persistence and management of change-inducing processes play a key role in the successful development of the Lean concept. If individuals or most

employees are not motivated to change, if there are no signs for the next steps after the changes and if, above all, there is no persistence to endure the great challenges in the way of building the Lean concept, it is better not to start at all.

— **The second stage:** diagnosis of the current state. This is the stage in which output documents of the previous stage are used as input, and concrete suggestions and conclusions compiled in a diagnostic study of the current state are considered outputs. This study should include:

- the diagnosis of the application degree of Lean principles, methods and tools,
- the possibility of the Lean concept implementation,
- the strategy of the Lean concept implementation: terms of reference with all proposals and activities and a detailed timetable.

The terms of reference need to define the objectives and results, while the timetable should identify the main stages of the project, the planned deadline for their execution, and many other details related to the realization of the defined framework. The team also need to skilfully use modern information technologies and application software that support the planning and scheduling of the individual stages of the project. Thus, individual project stages or segments can be entrusted to one part of the formed team.

The terms of reference and the timetable should also be accompanied by the following supporting documents (they are considered to be an essential part of good project practice):

- the framework chart of the required steps and work procedures with objective deadlines for implementing the Lean concept,
- project protocol (timetable for team meetings, place, duration),
- organization and project team members,
- established rules and responsibilities,
- ways to identify and address potential risks,
- teamwork rules,
- terms of reference (efficiency indicators, list of financial costs),
- table of results (catalogue of project results, actions, deadlines),
- the team register.

Terms of reference and the timetable created by the team are the first documents of the plan for the Lean concept introduction. These documents should be approved and signed by the top management to minimize the risk of failing to carry out the implementation process of such a project. Therefore, the announcement should be represented at all meetings of the industrial system functions.

— **The third stage:** design of the Lean concept model. This is the stage where the team from a set of activities creates a study that includes specific variants of the model and financial costs of its implementation. The study should include:

- general assessment of the future economic conditions,
- deficiencies in the existing activities and concepts of loss reduction,
- application of the principles, methods and tools across the Lean concept elements (procedures and instructions),
- economic analysis assessments of the application effects of principles, methods and tools, the financial plan for the implementation of the whole project.

This stage is the most complex part of the project. Here, the state assessment and observing are done in a more detailed way in order to shape certain models of the Lean concept.

— **The first step:** state assessment for Lean concept introduction (Figure 2). It is a process of state identification by individual work processes and one by one production program from the standpoint of the Lean concept. At this stage, the team should try to identify where the suitable areas and business focal points are. They start by writing a plan that includes methods and contents of work in all elements of the Lean concept that improve business.

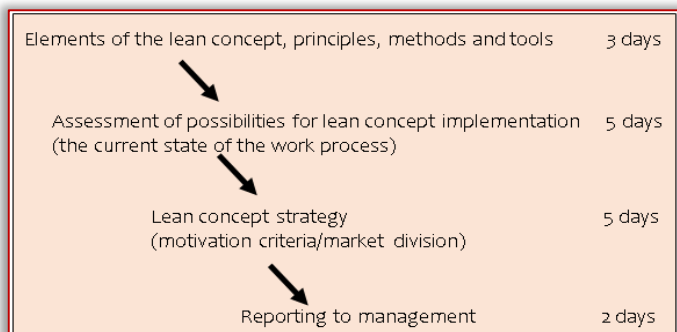


Figure 2. The first step: The assessment of possibilities for Lean concept introduction. The team must have the strength to use all five principles of the Lean concept in all five of its elements: flows, organization, control, measurements and logistics. In each element, Lean principles are analyzed: identifying the value that the customer considers to be important (value), identifying the section of flow loads (value stream), homogeneous flows of materials, information and energy (flow) and process perfection (perfection).

— **The second step: system state recording** (Figure 3). The recording provides a basic assessment of where the system is currently.

At this step, the team:

- conduct the analysis of the process value,
- analyze the process linking through flows of materials, information and energy,

- make charts of the work process,
- assess where there are opportunities to eliminate wasted time,
- shape the planning criteria to market requirements,
- create a sketch of the supply chain (supplier-input-process-output-customer - SIPOC), charts of all major work processes to understand the relationship customer/supplier and required inputs and outputs that activate these processes,
- analyze the levels of current losses and errors and perceive opportunities to eliminate what is unnecessary,
- develop a list of quick actions for short-term progress and demonstrate activities that will provide rationalization.

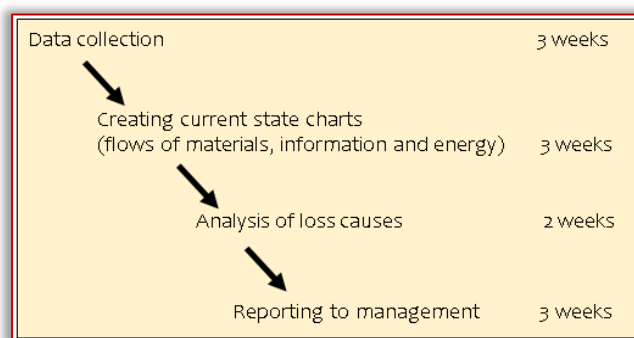


Figure 3. The second step: State recording

— **The third step:** shaping the future state. This project step begins after the acceptance of the management report on step 2. It is based on shaping the future state that gives greater effects (Figure 4). This process usually takes two to three weeks and includes:

- identifying the groups of products that are profitable and competitive on the market,
- harmonization of system conditions with the project,
- analyzing the range of product requirements and the flow of materials and information,
- team training of employees in the use of tools and methods of the Lean concept,
- process development of the new management requirements for the performance of other functions of industrial system in terms of logistics for the Lean production.

When the proposal of one part of the project relating to the future state is approved, the team focuses on the other part of this step for another three to four weeks, i.e. the formation of Lean concept details. The formation of details includes the following:

- staff plans in all functions across the industrial system,
- presentation of work units in the schedule,
- actions to be performed during the transitional period,
- the implementation plan of activities with short-term and long-term effects of the planned improvements,

- the role of layout reconfiguration and accountability for its consistent implementation,
- charts and tables of the effects on notice-boards,
- a plan for training employees to implement the work process,
- a plan of communications in the industrial system.

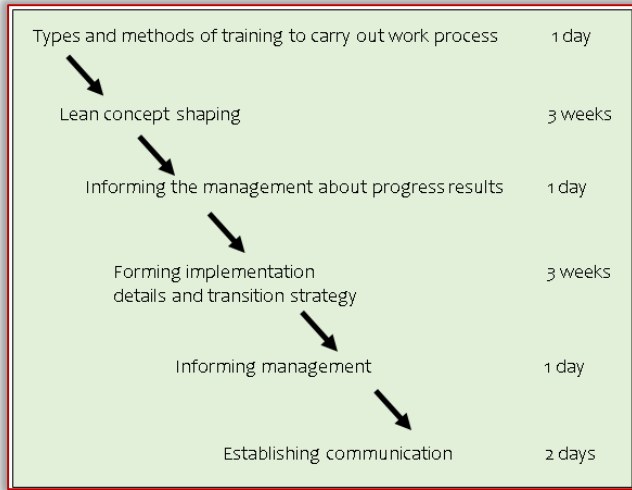


Figure 4. The third step: Shaping the future state

This plan of the future state is presented to the management for approval. The conversation in terms of plan implementation has to be done with all employees, explaining what was observed, who is involved, what was decided, what the aims of the organization are and what all employees involved in are. At this point the project team reach the fourth step.

— **The fourth stage:** application of the designed model.

This is the stage related to the introduction of the Lean concept project into the system. It contains the following activities:

- financing the activities defined in the study,
- direct application and the establishment of work process standards to eliminate losses through the principles, methods and tools,
- establishing communication and training of employees,
- measurements and monitoring procedures for the selected characteristics,
- shaping the final work process standards.

## CONCLUSIONS

The Lean concept represents a group of efficient and rational procedures in the systematic use of principles, methods and tools in industrial systems on finding and eliminating wasteful activities (losses and errors) in the working processes, thereby creating the necessary conditions for harmonious activities of functions in a company in the given time and in the existing conditions of the environment. Its implementation leads to efficient and effective procedures in working processes which have to be improved, standardized and accepted as models in performing working processes leading to the achievement of high competitiveness and business excellence in work.

This contributes to the TQM system by establishing and integrating standard management systems, as well as applying adequate tools for increasing efficiency.

To implement the Lean concept in industrial systems, a number of evaluations provided by the management are required. Its implementation depends on people, i.e. the team selected by the management. To make any team successful in its task of developing and introducing the Lean concept, the management must answer the following questions:

- Is it possible to hire three to eight people for the period of six to nine months?
- Is it possible to handle failures and mistakes before achieving success and complete the implementation of improved production through the Lean concept?
- Is it possible to maintain work team members' participation even when they do not see significant results after two months?
- Is it possible to maintain the engagement of employees in work teams to the final implementation of the project?
- Is it possible to stabilize production in one, two or three weeks?

Additionally, the management should ensure: the time required for project implementation, funds for the project, personnel, full-time project team (team focused on the task), full performance control of certain stages and steps of the project and approving the following activities of the team.

By establishing the Lean concept, the very principles, methods and tools which contribute to efficiency and effectiveness of working processes are being affirmed. It creates a productive climate in industrial systems and a good foundation for further improvements of TQM. The final result is overall satisfaction of employees, users of products or services and society in general.

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