CONTINUOUS IMPROVEMENTS THROUGH WORKSHOPS

Milan Fekete¹ - Jaroslav Hulvej²

Abstract

Lean six sigma concept is often applied in companies in product and process improvement. However, when improving processes or solving problems that require thorough procedure, companies often grasp mostly for DMAIC methodology from this concept, and what is left from lean management concept, is only waste elimination through improvement ideas. However, DMAIC methodology usually requires applying statistics for analyzing product and process data, which is not always easy for everybody to understand. Instead of DMAIC methodology, process improvement through workshop procedure taken from lean management can be equally well applied. The aim of the article is, therefore, to introduce the continuous improvement through moderated kaizen workshops, which are used for identifying and analyzing the causes of a problem and for waste elimination in different processes. As the scientific methodology, a conceptual approach is used to demonstrate the importance of applying workshops for process improvement.

Keywords: process improvement, workshops, lean management, waste elimination, kaizen ideas.

Introduction

The current competitive environment means that enterprises intensively address the efficiency of its own activities. Thanks to investments in new technology and information systems, and the design of new products when having own design department, companies prepare a suitable ground for future results, but as such, they are not enough. Equally important is the effort for continuous improvement for achieving higher effectiveness, quality, and lower cost. The new center of attention has become the concepts such as added value, value-added activities, waste, and customer orientation.

Implementation of lean system is currently a hot topic and many important organizations not only in the world, but also in Slovakia, work under this system. A large number of authors pay attention to the topic of lean thinking, which is proof that this concept has its justification and its use contributes significantly to improve processes in an organization. The aim is to eliminate various forms of waste, and, thus, to use resources efficiently and focus on the real added value for the customers. By means of a lean system,

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the organization becomes more flexible, can respond more flexibly to changes through elimination of waste.

The aim of the article is to present the reader a continuous improvement in the lean enterprise through moderated kaizen workshops, which use methods and tools to identify, analyze causes and waste elimination in any process. So that a company does not stagnate, it is necessary to continuously improve processes and for this purpose also to confer the relevant degree of responsibility to the operators themselves for improving their workplace. Workshops here are a substantial part of the continuous improvement process in the company.

First, a comprehensive literature review of empirical research work in the areas of Lean Management and Lean Production or Lean Manufacturing and search for academic journals, articles and books primarily in the ABI Inform Complete (Proquest), ISI Web of Knowledge, Scopus, and Google Scholar databases was performed using as main keywords: production system, lean production, problem solving, continuous improvement, kaizen, and workshop. This literature review considered a number of constraining criteria. The first one was the time span of the journals or articles, which was set from 2010 to today. This constraint was not considered for books. The second one was that journals should be only from the scientific areas and industries of: machinery, engineering, automobil industry.

The aim of the practical part is to develop a 12-step workshop procedure is to show the procedure for organizing continuous improvement workshops with the objective of reaching better efficiency of the production system in any company. The procedure is designed based on the authors’ practical experience taken from visiting several manufacturing companies, discussions with respective managers and studying company documentation.

1 Literature review

Lean management has become on of the leading methods to pursue process improvement in both manufacturing and service systems. This movement has led to a number of useful information about Lean implementation methods and success stories available in different bibliography sources. One of the most used methods is a workshop.

When in a need to improve a process or to address some problems, to hold an interactive workshop can help. The “interactive workshop” is defined as a structured set of facilitated activities for groups of participants who work together to explore a problem and its solutions, over a specific period of time, in one location (Pavelin, et all., 2014). The authors also propose an interesting 10 rules for running effectively this interactive workshop.

Workshops can be also organized as a Kaizen Event – an effective tool to create relevant, measurable, and sustainable process improvements. The Kaizen Event is a two-to five-day focused improvement activity during which a sequestered, cross-functional team designs and fully implements improvements to a defined process or work area (Martin, Osterling, 2007).

Workshops are only a part of larger process improvement, even though important part. In some companies, this effort can fail despite success examples in other companies and despite having the same tools and techniques for process improvement, like lean management,
TQM, six sigma, CAD, and customer service systems. This problem has its roots not in these techniques alone, but in how the introduction of a new improvement effort interacts with the physical, economic, social, and psychological structures in which implementation takes place (Repenning, Stermann, 2001). The authors then present a framework to understand how these failures arise and illustrate strategies for overcoming this behavior.

Workshop participants usually need required information for successful conducting which, especially in large companies, can be dispersed in many locations or retrieval systems. Werrmann (Werrmann, 2013) introduces a new method and support system that makes latent semantic links between information elements kept in different databases explicit in the form of an ontology whose links are used in subsequent retrieval processes – an ontology-based integrated retrieval system.

2 Workshop procedures

2.1 Types of workshops

Workshops are an effective way for solving and standardizing solutions and for rapid deployment of measures. They can be used in the three different situations:

1. SOP workshop that is focused on the production process before starting the full-scale production (Start of Production Workshop).
2. CI workshop that is focused on general improvement and avoiding potential errors through the implementation of lean manufacturing by waste elimination (Continuous Improvement Workshop).
3. PS workshop aimed at addressing issues to eliminate known problems (Problem Solving Workshop).

In general, the benefits of workshops are:

- improvement of ergonomics
- saving of space, cost, and energy
- productivity increase
- reduction of production and logistics time
- implementation of low-cost solutions
- environment protection.

Workshops are mostly focused on incremental improvement in small steps. In Table 1, the differences in incremental improvement and improvement in big steps are presented. Differences in improvement in big steps cannot be viewed as only a drawback, they are simply the characteristics of big improvements which have their own benefits.
Table 1 Differences of improvement activities

<table>
<thead>
<tr>
<th>Improvements in big steps</th>
<th>Improvements in small steps</th>
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<tbody>
<tr>
<td>1. Long time for planning</td>
<td>1. Short time for planning</td>
</tr>
<tr>
<td>2. Long time for enforcement</td>
<td>2. Fast promotion and enforcement</td>
</tr>
<tr>
<td>3. High investments</td>
<td>3. Low investments</td>
</tr>
<tr>
<td>4. Frequent errors in setting goals</td>
<td>4. Continuing process in setting goals, their sustainability</td>
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<tr>
<td>5. Lack of flexibility</td>
<td>5. Flexibility, customization option</td>
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Source: Own processing

Standardized work serves as a basis from which processes are improved via workshops in order to better adapt to customer demand and working environment. Elaborating on standards requires a structured approach:

1. Topic
2. Description of the existing situation
3. Description of the future state
4. The development of options and solutions
5. Enforcement / actions
6. Defining the new standards

Lean management system can be implemented in the companies through the so called lean house, which is always developing throughout the time. In manufacturing companies, the goal vision is to promote lean manufacturing without wasting resources. To be converted to a lean enterprise, it is necessary to gradually introduce the basics of lean management system by kaizen workshops. These can be implemented in five company areas. In each area, ongoing workshops can be organized that focus on process optimization with the elements of lean house.

The first area focuses on the direct production system where the products are actually produced and delivered to the customer. The second area includes an administrative area, which every company has and typically 5S workshops are applied to better organize the workplace. The third area includes pre-production phase before starting the full-scale production. More particularly, this phase is divided into four sub-levels: concept, product design, process design, and launch of production. The fourth area focuses on supplier relationship management and respective logistics chain. The fifth area focuses on providing service for the customer.

2.2 Selection of the workshop cases

How the cases for workshops can be selected. There are several possibilities. Cases can be selected according to key performance indicators KPI, evaluated on a regular basis. Another source for the case selection can be the internal audit or quality audits, in which if there is a gap, identifying cases will receive the highest priority, and their implementation is mandatory. Another source of cases for the CI team can be Customer Satisfaction Surveys, where customers are expressing what to improve and for the employees, there can be an Online Form in which they can express their ideas for improvement over an intranet.
The cases can originate from the company's strategy, therefore, an important source of ideas for cases can be regular "Brainstorming sessions" for management. These "Brainstorming sessions" are led by members of the continuous improvement team, which leads the discussion and focus on the issues: managers, where they want to be from today onwards for a year and want to get there. These meetings help to conclude, what is necessary for achieving the desired goal of improvement. On the basis of the outcome of the session, the mentor from continuous improvement team will be assigned to the case, who will lead the workshop.

2.3 Workshop procedure

The possible course of the workshop is as follows:

1. Workshop planning
2. Workshop preparation
3. Introduction to the workshop
4. Visualization and understanding of the process - Value Stream Map
5. Analysis of the current state and the definition of indicators
6. Brainstorming "wasting"
7. Brainstorming "improving"
8. Development of improvement proposals
9. Creating a catalog of measures
10. Simulation and deployment of countermeasures
11. Presentation
12. Monitoring of the countermeasures and follow-up.

When planning the workshop, department for organizing workshops makes an agreement with the target department where the workshop is to be carried out, when, where, and what is the intention of the workshop. In the preparation step, workshop moderators get familiar with the department where they will conduct the workshop. In the introduction to the workshop, the moderator presents the course of the workshop to workshop participants, moderators inform the participants about the wastage and the methods that can be used during the workshop. In step 4, the large brown paper is used to visualize the process with lead time using a Value Stream Map method.

In the next step, the current situation is analyzed and the waste is identified. Once the waste is identified, the brainstorming about potential improvement takes place. Participants look for opportunities that could improve the process and write them on the flipchart as suggestions for improvement. A catalog of countermeasures is created out of these rationalization proposals together with the specific date of deployment and responsible person for the using this countermeasure. In a further step, these countermeasures are deployed and the subsequent presentation to the head of department in which the workshop was conducted and also to the head of department responsible for organizing workshops. In the final step, applied countermeasures are monitored and in case of some deviations, other countermeasures are set.
Control after 100 days

So called "Checking after 100 days" is used to test the solutions, to which participants arrived at the end of the workshop. In practice, often the situation occurs that most of the improvements are not fully implemented and deployed permanently. They are lost in daily routine activities. It is therefore necessary to ensure improvement through review, process control, audits and monitoring of indicators. The aim of the 100-day control is to find out, whether countermeasures were deployed and whether there has been an improvement of the process. If the process did not improve, other actions are set.

Audit

Audit is an effective tool to find out if we achieved goals from the workshops. Shortcomings found with the help of an audit are removed by deploying of the effective remedy countermeasures. The aim of the audit process is the detection of effectiveness of deployed corrective actions. Audit step-by-step evaluates not only the various levels of deployment of countermeasures, but also the functioning of the individual elements of the whole production system.

2.4 The general procedure of the CI workshop (Continuous Improvement Workshop)

This type of workshop is focused on continuous improvement of the processes primarily at the shopfloor. The objective of this workshop is to select a process in which workers see the waste and consequently improve the process by removing that waste.

Process selection

The workshop starts with selection of the process. At the beginning of the workshop, moderators will meet with a team of operators and their supervisor in order to select an appropriate process to which they will focus on their attention with the aim to improve it. Firstly, the team staff should inform itself about the cornerstones of the production system and see what all can be a waste. Then, brainstorming follows where the processes with potential problems are collected in which team see the potential for improvement. After collecting, these problematic processes are specifically described when, where, and how often a problem occurs. Furthermore, for each process, it is described the impact of this problem on the quality, time, cost, employee and customer satisfaction. All that is written on a large paper called "Description of the process".

Process mapping

Once the process with the highest potential for improvement is selected, a process mapping follows, which consists of 12 steps which can be divided into two days:

Agenda Day 1
Introduction "Processes and Process Mapping"
1. Process limitation
2. Process definition
3. Gathering information about the process
4. Establishing the target
5. Capturing the process current state  
6. Establishing duration times of the process steps (lead times and processing times)  
7. Identification of the trouble spots (marked by lightning = potential value)

**Agenda Day 2**

8. Defining problem solutions  
9. Collecting proposals for improvement  
10. Creating process future state (process target)  
11. Making a list of countermeasures  
   - presentation of results  
   - decision on the target process  
   - populate the list of countermeasures  
12. Setting deadlines and indicators for verification of the solutions

In the first day as an introduction, moderators acquaint participants with the methods and tools of process mapping. It is necessary to limit the process, that is, identification of the process name and output from that process which can be a machine being able to operate again. Once the process has been defined, it is necessary to define the start and end of the process, as well as participants in the process. The selected process begins with some fault message – what is wrong with that machine – and ends up with replacing damaged spare part and restoring operational ability. Replacement of damaged spare part requires a certain number of participants or team members that must be assigned.

The next task is to gather information about the process. It is necessary to ascertain the frequency of fault, for what time the faulty part is removed and replaced and other process parameters which the team notices and are important.

After collecting basic information about the process, targets are set, for example, repair costs of the machine must be reduced by 30%. Currently, preventive maintenance with fixed intervals is not set, and, thus, another target is to set up preventive maintenance and to seek preventing machine failure. The aim is also to minimalize downtime by 30% due to a machine malfunction. And lastly, other target can be to develop a unified standardized workflow, because currently is lacking and operators repair machine each with different way.

**Capture the current process**

The next step is mapping the current process. On the large brown paper by using adhesive papers, process current state is displayed. One of the main basic methods being used in the workshop is process mapping. It is a method for process visualization and assessment. It is transparent, simple, easily understandable and intuitively applicable. The aim is to understand the processes, to on improve and create transparent processes.

In the sixth step, time duration of process steps is calculated, which are the course and processing times that should be written in some process times table. In the seventh step, trouble spots are identified that are labeled as the flash. These identified trouble spots represent possible potential for improvement.
Possible trouble spots can be:

1. It is not guaranteed the accuracy of setting the machine’s starting position.
2. There are no set rules for preventive replacement of gear.
3. Spare part is not in stock - long delivery times.
4. There is no routine preventive maintenance, preventive maintenance is carried out at the time the line is outage.

During the second day, the solution for troublesome situations is defined. It is necessary to improve quality and customer satisfaction, reduce costs and associated downtime. In step 9, improvement proposals are collected through brainwriting. Every participant wrote the paper their suggestions for improvement, which are then read out loud, so participants are not all affected by each other.

The following ideas can be selected as relevant:

1. To draw up working procedures for tolerance measurements of the gear position sensor
2. To ensure one set of spare parts for repair the sensor driver
3. To set a fixed time-window for regular preventive maintenance in 4 shift work and carrying out regular preventive maintenance on weekends.

In the 10th step, the target process is created that is then showed on the large brown paper using adhesives. Target process consists of 5 steps. It begins with reporting fault that comes from the production. Based on this report, a maintenance worker comes on line where the fault has occurred. Then, an analysis of the fault follows. After that, preparation of spare parts follows and mechanic moves to the line. He then mechanically set basic position of the machine. If the basic position is correctly set, so the fault is corrected and the process ends.

If the setting is not effective, the procedure of work activities in the second set follows, where the supervisor is informed about the failure. This is then followed by exchange of coupling and by confirmation of the basic machine position. If the setting is effective, so the fault is corrected and the process ends.

In step 12, timing and indicators for verification of solutions are set. For example, 100 day inspection is planned in the 29th calendar week where the number of failures is evaluated to compare downtimes. The progress of control measurements of tolerances during preventive maintenance is also evaluated. Next, the cost of new parts and the cost of repairs is compared. Checking of preventive maintenance is scheduled and in calendar week 28, the presentation of the workshop is elaborated on.

**Evaluation of the workshop**

Through the workshop, shorter time to remove the fault of the machine was achieved and, thus, it saved the of maintenance people. Also, a truly regular preventive maintenance was introduce, which previously we had no time left. The benefit is the standardization of the work procedure for tolerance measurements of the gear position sensor, which has been not developed, yet. Identification of waste was carried out through physical inspection of offices and warehouses.
2.5 Evaluation of continuous improvement

Company should continuously improve its processes through moderated workshops that can be of three types – process improvement workshop, problem solving workshop, and pre-production workshop. Process improvement workshop is to continuously improve processes in various areas, which are organized regularly. Problem solving workshops are aimed at addressing already existing problems. Pre-production workshops are aimed at potentially existing problems to avoid them in the future during actual production and are used in the launch of new products and serve as a simulation, for example the future assembly line. The main aim of these workshops is elimination or reduction of wastage. Issue or variation requires careful analysis to determine the cause. Once this cause is removed by the action, a new process is monitored and ultimately assessed.

Workshops set to address the problems are used most often at work in practice and sometimes go beyond to the supplier. Suppliers can deliver the whole pre-assembly product components like engines and sometimes to find the cause of the problem, it is necessary to analyze the process even at the supplier. It’s not a good practice when management lays an emphasis on fast and cheap solutions in the workshops. This pressure can negatively affect the course of the workshop in a way that workers devote more time to quick solutions, and not seek the real cause of the problem. This may result in the determination of several measures that does not solve the real problem.

When improving processes through the respective workshops, an MTM can be used to define work pieces and their time duration. In this way, we can organize work on the line without physical presence on the workplace. Not always the process time can be specified by using stopwatches, operators can, for example, upset or certain rule or guideline does not allow it. For each workflow, the occupancy percentage of the operator is marked and also ergonomic strenuousness. Time and money saving at the end of the workshop is not always seen as the highest priority. During the workshops, operators can be trained on how to identify waste and solve problems. By visualization, the process simplifies and they suddenly see wastes, which formerly they were not aware of. So the target is also to have trained personnel who are able to identify waste and know how to proceed in dealing with problems. At the beginning of the workshop, it is important to explain to operators the purpose of a workshop, what role they have in it, what is expected of them and what is the aim of the workshop.

When it comes to workshop focused on operators on the shopfloor and not managers, it can be that operators do not see the importance of the workshop which is why it is important to explain to them that the aim of the workshop is to help them and to improve their working procedures. Operators usually do not even want to talk about problems, they even try to hide them. The moderator’s role is then to guide operators to talk openly about their problems and to speak about it with their manager, because he or she can influence the situation. Brainstorming is a method of how to get ideas from the workshop participants. This method is more suitable for people who are on the same level. Managers, on the other hand, are not ashamed of saying loudly their opinion or idea. Brainstorming has a synergistic effect and drives the debate of participants. On the contrary, brainwriting requires the views of operators being written on paper without having been influenced by this discussion. Operators
are less afraid to express their opinions here. Brainwriting comes as suitable solution for fearful participants.

Two moderators are responsible for conducting the workshop who guide it to be held successfully. To be able to lead a workshop by moderator in the production area, it is necessary to know the processes in the manufacturing halls, but it is not required to know them fully in detail. What is mostly required from facilitators is the methodological knowledge of various tools and techniques to lead a workshop. After creating a list of measures, the workshop will be presented to the Heads of the Departments and to company management who have the authority for supporting and approving various measures.

The workshop also serves as a foundation, for example, for negotiating the required investment into improvements. Every employee and department is obliged to improve processes and eliminate waste. Based on documentation from the workshop, where problem areas are clearly visualized, there is a higher probability that management will approve the proposed countermeasures. Workshop combines direct employees and supervisors to their management and offers space for their communication. The purpose of the workshop is the temporary breaking from the operational routine of the staff and focus on improving their processes. Indeed, in standard working hours usually operational problems are solved and to improve the process, time is not much left. Workshop allows team members to actively contribute to forming processes and, thus, their own workplace. Team members can during the workshop look into the philosophy and methods of continuous improvement and have a chance to better understand their own process as well as the wishes and needs of other colleagues.

It is necessary that these workshops occur continuously, because if one workshop completes and the other does not continue further, the organization cannot get closer to perfection. Inaction means lagging. Given that conditions are constantly changing and bad habits can soon come back, it is important to ensure a sufficient number of workshops to be held in the workplace. It happens that one shift is part of the workshop and the other is not, which may result in insufficient deployment of measures deduced from the workshop. Workers should be constantly encouraged to the continued contribution of ideas for improvement, because they are the ones who know their workplace best.

Suggestions for improvement:

- Workshop amendment by the target group. Operators on the production line have different needs than administrative staff. It is necessary to shorten the length of the workshop and focus only on the most important tools and methods that can be used everyday.
- Clarify stronger the importance of the workshop for workers and their work. At the beginning of the workshop, it should be explained to operators how specific workshop will help them and motivate them to work together.
- Insitute regular training of the staff about lean philosophy so that the operators even after the workshop would use methods and tools to solve problems in their daily work.
- Ensure participation of every operator in the workshop. Each shift must take part in the workshop in order to preserve the principles of continuous improvement.
• Focus more on revealing cause of the problem than to find rapid solutions to problems that are only symptoms. Finding quick solutions may result in determination of several measures that the real problems do not solve.

2.6 Assurance of continuous improvement

The introduction of lean management workshops application should not only be short-term, but rather the long-term process staring with process mapping, analysis, and follow-up processes after the introduction of delivered improvement solutions. It is necessary to properly train the company staff to become familiar with the tools and the improvement of processes, so that they can effectively use in their daily work.

Lean is a never ending process. To sustain and continuously improve the process, you need to create a team of LEAN specialists (selected by the staff of the various departments of the organization), who would have gone through the training and the training process. Trained staff should attend workshops analyzing relevant processes (manufacturing, administrative, etc.) with the aim of identifying all kinds of waste. This qualified staff should be tasked with charting processes in the respective departments on a regular basis to detect losses and wastage, to suggest ways of dealing with problematic processes and constantly to adhere to the standards of work. Finally, on an ongoing basis, they would provide consultations, and spread the philosophy of Lean throughout the whole organization.

Conclusion

With workshops and continuous improvement on the whole, we have to be aware of the thing that the success rate of Lean implementation either through workshops or other methods is not as good as might be expected. From a survey done by the Lean Enterprise Institute (Marchwinski, 2008) the top 3 reasons for failure were found to be: Resistance by Middle Management (36%), Lack of implementation know-how (27%) and Resistance by employees (21%). Hines (Hines, 2012) states that "the reasons why so many companies fail to achieve the full Lean potential is due to management issues, such as lack of Strategy alignment, Leadership and Engagement".

Continuous improvement department and production system should be responsible for the process improvement. With these workshops, the department can monitor processes and subsequently improve them. Workshops are an effective way of dealing with various problems and elimination of waste. Potential for improvement can be found everywhere. In the kaizen workshops, operators can be trained in methods and tools for data collection and problem solving, can be involved with the support of their superiors in solving problems and eliminating waste in the targeted processes. These workshops focus on improving the whole process, which is responsible for creating the product or service – value flow – using a method of value stream mapping. The fastest way of how to start improving is that improvement needs to become a part of everyone's job.
References


