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## The Methodology of Implementation of Kaizen in Selected Polish Industrial Plants

### I. Introduction to Kaizen

Word KAIZEN comes from Japanese words KAI (change) and ZEN (good). Kaizen is the most important conception of Japanese management and the key of Japanese companies success. It means improvement in every level of the company [Masaaki 2007].

Masaaki Imai explains Kaizen as: “The essence of Kaizen is simple and straight forward: Kaizen means improvement involving everyone, including both managers and workers. The Kaizen philosophy assumes that our way of life - be it our working life, our social life, or our home life, deserves to be constantly improved.” [Masaaki 2008]

The reason for this sustained success is that everybody in the company, starting from top management down to the workers, is committed. Masaaki Imai advise that Kaizen, when applied under firm top management commitment, can be turned into a corporate strategy to make an organization far more competitive and profitable, given today’s global business environment [Masaaki 2008].

When we think about Kaizen, we think about the company as the institution with problems. Nowadays managers try very often to implement complicated tools and technologies to solve companies’ problems, but in fact it would be much easier to solve by using simple and low costs methods [Masaaki 2006].

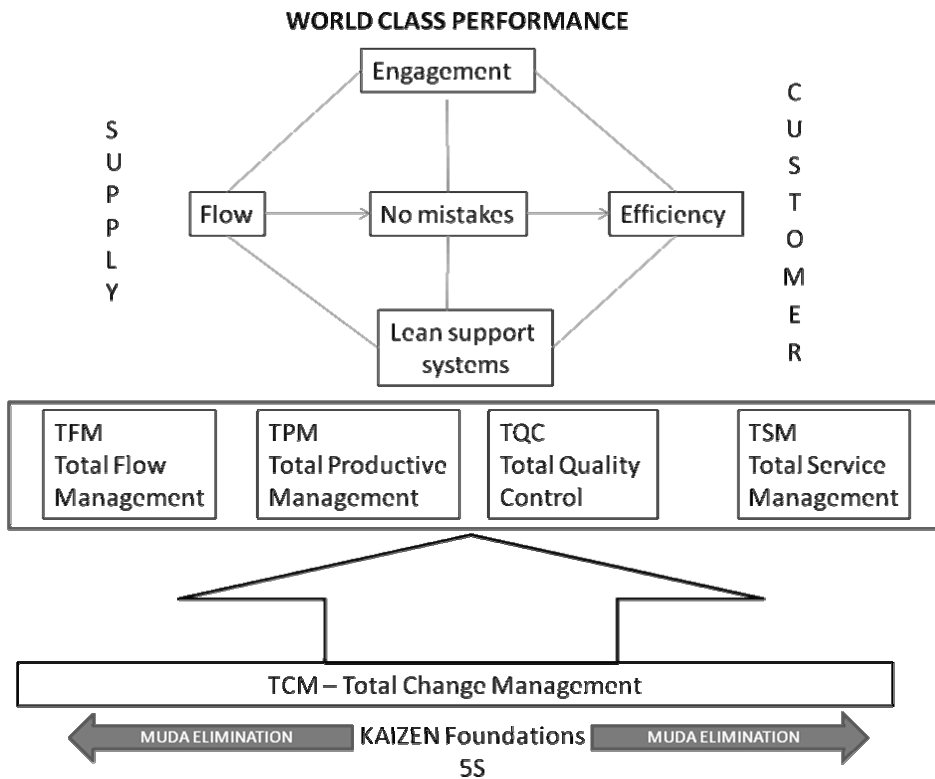
In the management context Kaizen has three main roles: creativeness, maintenance and improvement of management standards. Maintenance is understood as having current level of technology, management and operational

standards, and acting according to proper standard operational procedures [Masaaki 2006].

Most ways of improvement, which manager consider to implement in the companies, are expensive and connected with high technology. In contrary Kaizen emphasis human resources, trainings, communication, team work, engagement and self-discipline – it is approach based on common sense and low cost.

Kaizen supports process thinking. The futures of Kaizen thinking have been explained on figure 1.1.

**Figure 1.1** Kaizen Management System



Source: Training materials "Kaizen Basic", Kaizen Institute <sup>6</sup>

Kaizen Management System - that is comprehensive program to implement Kaizen philosophy aimed at long-term efficiency improvements in all areas of business activities. There are plenty of improvement and rationalization methods. To reach long-term success, you have to consider all factors which could influence the situation. Kaizen Management System concentrates on all

areas which make up the company. Those factors are: quality, costs, logistic, team motivation, safety, technology and environment. The whole process – starting by supplier through internal customer till final customer is taking into consideration [Training materials "Kaizen Basic" 2009].

It means that the company should never be enough satisfied with its improvements. In every company workers prefer the current situation and are against the changes, that is why it is so important to show them the benefits of changes. Kaizen philosophy means management involvement, without managers support improvements will never be successful.

To summarize it is important to remember, that in Kaizen philosophy:

1. Quality is in the first place
2. It is very important to act, basing on the data
3. Each process is the customer of previous one
4. Without MANAGERS involvement acting according the Kaizen philosophy will never work out.

But if Kaizen has so many advantages, why there is a resistance to Kaizen implementation in polish companies? Why employees do not want this improvements?

Why the manager who are looking for savings do not give expected support for the implementation process? Why does it happen very often that after the first phase of companies stop it's next stages of implementation? Is it the fault of philosophy or the wrong way of implementation? Is it possible to avoid this problems?

Next part of the paper will show the methodology of implementation Kaizen in polish companies, its validation and main application barriers. It shows the way for successful implementation.

## **II. Implementation of Kaizen in polish companies.**

Traditional methodology of implementing Kaizen begins with 5 S. The main goals of 5 S is the establishment and maintenance of order and discipline in the workplace. Practices of 5 S are one of fundamentals of creating the work environment which stimulates pro quality acting, harmonious work and continuous improvement of human relations, what changes into the effectiveness of the organization.

How does the 5 S work?

There are 5 steps on which 5 S practices bases:

1. Seri – Selection - is the separation and removal of all tools, instructions, materials, which are unnecessary in the workplace from those, which are necessary
2. Seiton – Systematic - is to label parts, tools, and to design a place for them where they will be available

3. Seiso – Cleaning – is cleaning, drafting, remove waste products, renovation of the workplace and its environment.
4. Seiketsu – Standardization - continuous maintenance of order, cleanliness and neatness in the workplace and its environment
5. Shitsuke – Self-discipline – is to form the habit to respect those principles.

In Polish companies conditions this traditional approach to the implementation very often does not bring expected results, moreover it generates barriers, which has a great influence on companies and they often resign from the Kaizen application.

There are such reasons of this situation:

1. Managers point of view:
  - separation of workers from their duties to devote time for training, workshops and practical implementation of the 5 S
  - very long period of waiting for the results because of the fact that 5S is based on changing worker's way of thinking, habits and hierarchy of acting by workers and managers.

Typical hierarchy of acting is:

- reduction of delay of delivery time for the customer – so manufacture, manufacture and manufacture
- “extinguish” occurring “fires” as soon as possible - remove the distortions

According to such way of thinking it does not surprise that it is hard to find time for systematic, cleaning, and self – discipline, so the most important elements of 5S. The is one more problem in 5 S implementation – quantification of its implementation results.

It is hard to show the numerical results of it, for example:

- cost reduction
- reducing downtime
- Workers point of view – adverse events:
  - possibility of reduction in earnings, if their wage depends on production of defined number of units in a given time
  - necessity of devoting additional time for trainings and pilot implementation
  - discourage for the participation in the long process, which does not give clear, easy to define results
  - luck of incentive and help from the managers during the process of implementation

Both workers and managers very rarely give real reasons of their resistance for 5 S. The most common answer negating of project goals are:

- it is not compatible with the specific of the company

- the company has currently very important customer order, what unable setting up the implementation
- there is an order in the company, so there is no reason for implementing 5S or moreover Kaizen itself

Those answers are the most common one, when the idea of traditional implementation of Kaizen is the idea chosen by the board and the managers, and workers try to convince the board of the company that they are wrong. Such arguments are used mostly during the meeting of the workers and managers with external consultant. And it happens this way:

1. The board makes a decision about implementing Kaizen
2. Board asks the external consultant for a help by the implementation process
3. There is a meeting of external consultant with workers, managers and Board
4. Workers use very often the arguments which were mentioned above, they signalize their resistance for Kaizen implementation, especially for 5 S
5. Consultants are usually asked to convince workers about project goals.

To convince employees and managers to purposefulness of the Kaizen implementation it is necessary to start implementation with more effective “marketing” tool than 5 S. Such tool should provide:

1. Elimination of important ineffectiveness in production process
2. Short training time and pilot implementation time (counted in days)
3. Gaining relevant result, which will be easy to quantify.

Such method in the Polish companies condition is commonly SMED (Single Minute Exchange of Dies). Authors describe one, chosen example of implementation. Chosen example can be perceived as the typical one, because such method of implementation is commonly used in Poland by authors [Bednarek 2007].

### III. SMED Implementation – beginning of the Kaizen implementation

Publications on the topic of changeovers time and its reduction differ not only in ideas for improvements to achieve best results, but also in the terminology. Many authors used incoherent meaning of changeover, and its scope. That is why there are some questions:

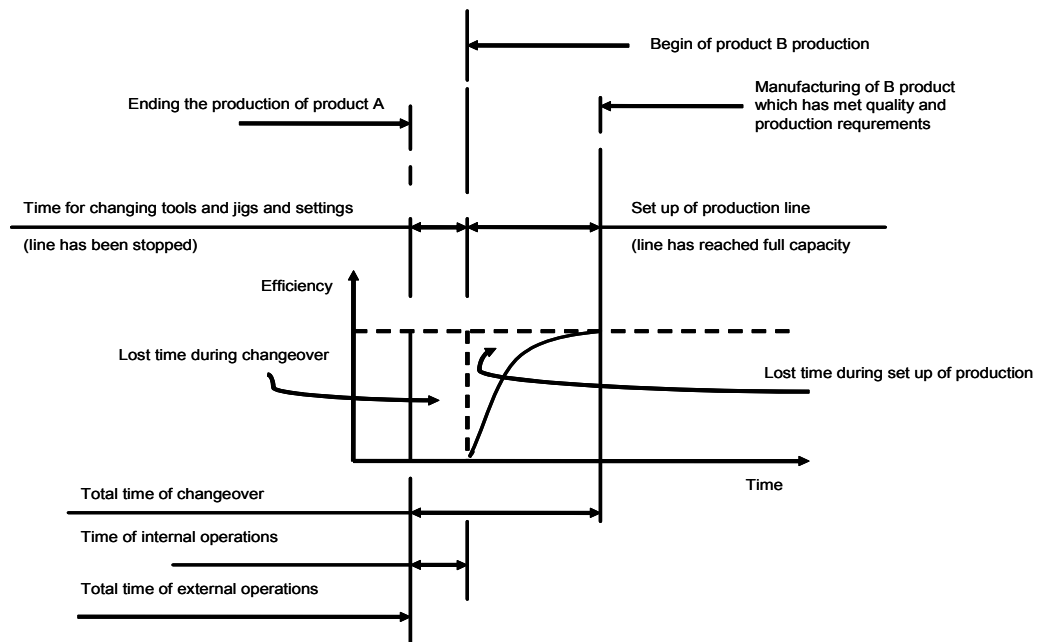
- If changeover ends on the activities related to exchanges of jigs and tools and calibration of the machine?
- If changeover also includes all the operations needed to start stable production - after an appropriate setting machines and made a batch of trial workpieces?

There exist a need of defining what the changeover is:

Changeover means a process between ending the production of one product till

beginning of the production of the second one, so until it has met all production and quality requirements [McIntosh et al. 1996] The whole changeover time is shown on the figure 3.1 and is equal to the sum of setting time and start up time.

**Figure 3.1.** Components of changeover



Source: Van Goubergen, D.; Van Landeghemb, H., 2002. *Rules for integrating fast changeover capabilities into new equipment design*. P&M Productivity Improvement gcv; Vosselaar; Belgium.

For the project implementation the authors have chosen the furniture producer, one of the few which have in 2009 full load meaning production on 3 shifts. There were 2 main goals for the project defined:

1. The theory of SMED was presented to the participants as a basic tool to reduce the changeovers time
2. Proving during the workshop the basic assumptions of SMED through the launching of its pilot implementation in selected production cells

Preparation of the project consist of:

1. Selection of 3 workplaces (machine tools), in which pilot implementation of SMED took place
2. Choice of group of people who has participate in one-day theoretical SMED training

- managers of various levels and departments (production, logistics, tool, production setting)
  - machine operators selected from all shifts
3. Choice of group of people who has participate in two pilot implementations (5 people for one workplace – 3 groups) Duration – 4 days
- machine operators
  - managers at various levels and departments (production, transportation, tool, production setting)

Project was conducted according to the following sequence of events:

1. Observation and analysis of typical changeover
2. First improvement of changeover procedure
  - division of changeover time between the internal and external activities
  - preparation of the list of tools which will be used during changeover
3. Pilot implementation in the same workplaces (machine tools)
  - 3.1. Pilot implementation nr 1 - the operator realizes changeover according to the first version of implementation procedure
  - 3.2. Observation of workplaces (9 different types of changeovers):
    - Timing
    - Video recording
4. Second analysis of the collected data – increase of the time external activities, decrease of the time internal activities
5. Presentation of analysis results
6. Second improvement changeover procedure ( for 9 cases separately)
7. Second pilot implementation in the same workplaces
  - 7.1. Pilot implementation nr 2 - the operator realizes changeover according to the second version of improvement of procedure
  - 7.2. Observation of workplaces (n 9 different changeovers)
    - Timing
    - Video recording
8. Analysis of the collected data – possible improvements in the second improvement of changeover
9. Presentation of analysis results. Acceptation of the final version of changeover procedure.

Obtained results:

Five – day project brought following results:

1. As an indicator of the correctness of the methodology the total changeover time was chosen (Figure 3.1)
2. As a result the time of changeover was reduced
3. After first pilot implementation the time of changeover has been reduced to the range between 27% - 62% depending on machine tools in relation to the changeover without application of the SMED methodology
4. After second pilot implementation the time of changeover has been reduced to the range between 13,6% - 30% depending on machine tools in relation to the changeover after first pilot implementation

How did it influenced the opinion of managers and operators about implementation of SMED and Kaizen tools?

The benefits achieved during the workshops:

Developmental:

1. Engagement of workers and management in activities which eliminate loses during changeover
2. Possibility of independent implementation of SMED methodology in other areas
3. Better understanding of changeover process by the operators who has taken part in the workshops
4. Conviction of employees about the necessity of continuation of implementation of Kaizen through 5 S implementation

Consciousness:

1. Increase in awareness and knowledge of workers about the methodology of changeover time reduction
2. Engagement of employees in Kaizen activities, working out routines and habits of Kaizen
3. Understanding the types of loses and the methodology of SMED

Technical:

1. Possibility of changeover time reduction
2. Improvement in changeover process
3. Better use of machine working time

#### IV. Conclusions

Kaizen philosophy and tools are well known all over the world, and it is considered as one of the best way of continuous improvement, but we have to remember that during implementation in chosen country and organizational culture we should consider:

1. That it is not always compatible in each organizational culture. It has been developed in Japan, where the organizational culture is different than in Europe.



2. The implementation, according to Japanese way, can cause the resistance of employees in other countries.
3. It is necessary to adopt the way of implementation of Kaizen according to the organizational culture in local industry.

### Abstract

*The paper presents the results of the validation of the methodology of Kaizen implementation. The methodology has been designed for polish selected industrial plants, in order to validate the methodology the following elements have been developed:*

- Selection of a representative manufacturing plant.
- Steps for Kaizen methodology implementation.
- Training required for managers and operative employees in the company
- Definition of the indicators for measurement of the results of the implementation
- Validation of the methodology through its implementation in a workshop conditions in the industrial plant.
- Adjustment and continuous improvement required in the methodology.

*The findings of this research are the following:*

1. Validation of the methodology in real conditions
2. Improving changes and adjustments in the methodology according to the observations through the process of validation
3. Several indicators of the industrial plant performance improvement

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