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KAIZEN - NEW INSTRUMENT FOR PROCESSES OF MAINTENANCE IN AIR FORCE

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Abstract: Article is orientated to the cost decreasing during process of maintenance by Kaizen method. It provides information about process of system Kaizen installment and about results that it had achieved after installing of such access. Article provides in certain measure also guidance for managers how to process during implementation of Kaizen access. In air force are processes of maintenance very important and very financial demanding and Kaizen is one of instruments, that it allow to decrease costs in maintenance. This instrument bring technical, economical and personal gains for maintenance in air force and for each firm.

Key words: Kaizen, cost, maintenance, wastage, permanent improving

1. INTRODUCTION

Reason for solving of cost decreasing is their broadly using, since firm's costs create quantitative index of economical efficiency and they are determinant for cost management. Cost is rising in every branch of national economy and necessity to decrease them is reflecting not only at the macro but also at the micro level that means in the firms. Prof. Kassay in his book „World class firm“ defines three basic factors for world class firm success. **Cost, quality and time** belong to such factors. And Massaki Imai in his book „Gemba Kaizen“ defines improving through **QCD** access, that means orientation to the **quality, cost and supplies** in sense of client's needs satisfying. [6] Due to these facts we can state that basic assumption for building of world class firm is already cost decreasing.

2. KAIZEN METHODOLOGY

Whole level of cost in the firm influences financial situation in the sense of two accesses mainly efficiency and profitability. These indexes are reflected in cost saving and in the effectiveness of production factors using in the sense of production volume maximization and efficiency by profit maximization. Both elements are directly intervening to the cost management. Various methods are using for cost decreasing that bring certain contributions in the sense of cost decreasing. Kaizen method is one of the accesses that is used in the practice and that achieved considerate success mainly in Japan.

Best known method of permanent improving is based on the creative thinking of employees and it is naturalized in Japanese firms and it starts to be applied and used also in the world.

Whole process Access of this methodology results from PDCA cycle (plan, do, control,

and act). Every activity that is used during Kaizen method for removing of wastage must be integrated in PDCA cycle. [6] At the same time every activity must lead to the permanent improving. Total effectiveness of such access is reflecting in productivity increasing, in wastage removing, in increasing of employees' performance and finally in creation of value added.

Philosophy Kaizen is based on the using of various tools that lead to the wastage decreasing. Basic tool of Kaizen access is so called „Five S“(5S). 5S je control list of good economy with aim of achieving of better order, effectiveness and discipline at the working post. It is directed from Japanese words seiri, seiton, seiso, seiketsu and shituke that are translated as to sort, to arrange, to clear, to systemize and to standardize. [6]

Through (5S) we can remove „Three M – (3M)“, that is muda, mura and muri. Goal of this method is to remove shortages, that Japan managers marks as „3U“. It is interpretation of three Japan words that symbolize such activities, that firm must unconditionally remove, when it wants to achieve better solution and higher effectiveness during the problem solving. Their importance is as follows:

„3MU“:

MURI – excesses, overloading;

MUDA – losses, wastages;

MURA – inequality, deviations.

Wastage in the firm can be over production, product mistakes, lost times and waiting, excess stocks, excess work, excess movement in the production process, excess transport, etc. [Kassay, 2001].

Gemba Kaizen or Kaizen House is expressing basic philosophy of such access, where at the top of pyramid are processes for achieving of management effectiveness and efficiency and in the House there are also methodology and processes by which effectiveness and effectiveness of management can be secured. Such Kaizen House is totally expressing whole strategy of Kaizen access.

3. APPLYING OF KAIZEN SYSTEM DURING MAINTENANCE

Goal of the research have been increasing of maintenance effectiveness in the air force through Kaizen application. In first step we have analyzed reasons of inefficiency of such process that have reflected in high cost for maintenance in air force. (Table1)

Results of analyses

According performed analysis we have found out discrepancies that resulted in following:

1. Low using of disposal time for maintenance employees.
2. High rate of operation during corrective maintenance in area of machinery maintenance – removing of defects.
3. Shortage of employees for preventive maintenance.
4. Technical shortages on the equipments during preventive maintenance.
5. Not sufficient coordination of work during maintenance.
6. Impossibility to improve term of preventive maintenance during the year in the system due to the objective reasons.

Such basic shortages lead to the fact, that we have suggested system of corrective measurements and we have quantified goal values that should be achieved after Kaizen installment.

In second step we have stated goal values that we want to achieve and we have compare them with present values and values that we achieved after installment of Kaizen activities. (Table 2)

Due to the target values we have suggested further corrective measurements:

1. Increasing of evidence efficiency in case of employees absence at the maintenance working place by regular control of attendance.
2. Securing of maintenance coordination by working position – coordinator of maintenance.
3. Operative division of maintenance employees for preventive maintenance.



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| <ol style="list-style-type: none"> 4. Adaptation of terms for preventive maintenance in the system due to the objective reasons. 5. Improving of working environment at the Maintenance Department, that means arranging of activities, material and working tools.[8] 6. Installment of employees remuneration according performance due to the decreasing of loss time at the working post. 7. Change of the supplier for service parts. | <ol style="list-style-type: none"> 2. Capacity planning for maintenance according technical place. 3. Following of material accessibility at the stocks. 4. Following of capacity for maintenance working places. [7] 5. Accurate cost calculation for maintenance. 6. Accurate following of annual plan filling for preventive maintenance. 7. Following of the rate between preventive and corrective maintenance. 8. Following of effective time fund for maintenance employees. 9. Remuneration of employees according performance. |
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After corrective measurements in the air force maintenance we have followed improvements after one year of Maintenance service. (Figure 1)

In third year we have compared target values with values achieved after Kaizen installment and we have followed up retroactively improvements also against values that have been marked before measurements installment. Values after Kaizen installment describe present value of cost from 2007, we have stated target values for 2008, we have followed up process till 2009, when there have been performed every corrective measurement. According graphically expressed contributions we can state improvement against basic situation, but also there was not achieved level of target values for individual cost categories in Maintenance service. Total improvement occurred, but during conclusions of percentage improvement we have not succeed to achieve 49 % - cost decreasing for individual categories.

Despite of the fact, that target values have not been achieved, we have marked during maintenance such improvements:

1. Specification of events at the concrete technical place.

Results of financial

We can induct total economical evaluation by the way of cost reduction during Kaizen system using. Results in the form of cost decreasing for maintenance presented **3510 thousand €**, that means savings of financial means for the firm. Figure 2 illustrates direct expression of individual cost in maintenance.

Massaki Imai said that Kaizen is basic key to the Japan economical success. [6] Indeed using of Kaizen brings improvement for firms mainly in area of quality increasing, productivity improving, stocks decreasing, production line shortening, loss time shortening, production period shortening. When Kaizen start to be implemented broadly to the production firms, it could bring improvement during processes management and lead to the cost decreasing for such processes. Kaizen is system, that should prevent losses, that considerably decrease value added and it helps to lead to perfect production, for example JIT.

Every innovative company, firms and business are orientated to its strategy, to the

innovation, that have various and diametric different character. It is possible to make innovation for processes, products, working conditions, organization of work, technologies and production processes, but this must lead to the permanent improvement. Kaizen philosophy is accommodating to the innovation, but at the same time in several areas of evaluation it is against innovation process

Table 1 Reasons of high cost for maintenance

Problem	Reason	Corrective measurement
Cost for repair	High failure rate of elements	Change of maintenance system
Cost for service parts	High price	New supplier for service parts
Cost for energy	High consumption of energy	Alternative of sources, savings
Cost for maintenance	Not sufficient preventive maintenance Bad organization of work	Installing of preventive maintenance
Cost for wages	High lost time, not using of effective time fund	Coordination of activities, evaluation according output

Table 2 Target values and achieved values for Kaizen application

Indicator in thousand €	Present value 2007	Target value 2008	Improving	Achieved value 2009	Improving
Cost for service parts	2350	1500	36%	1560	34%
Cost for energy	1120	500	55%	700	38%
Cost for maintenance	1560	1320	15%	1450	7%
Cost for wages	1532	980	36%	1002	35%
Cost for repair	5260	2500	52%	3600	31%



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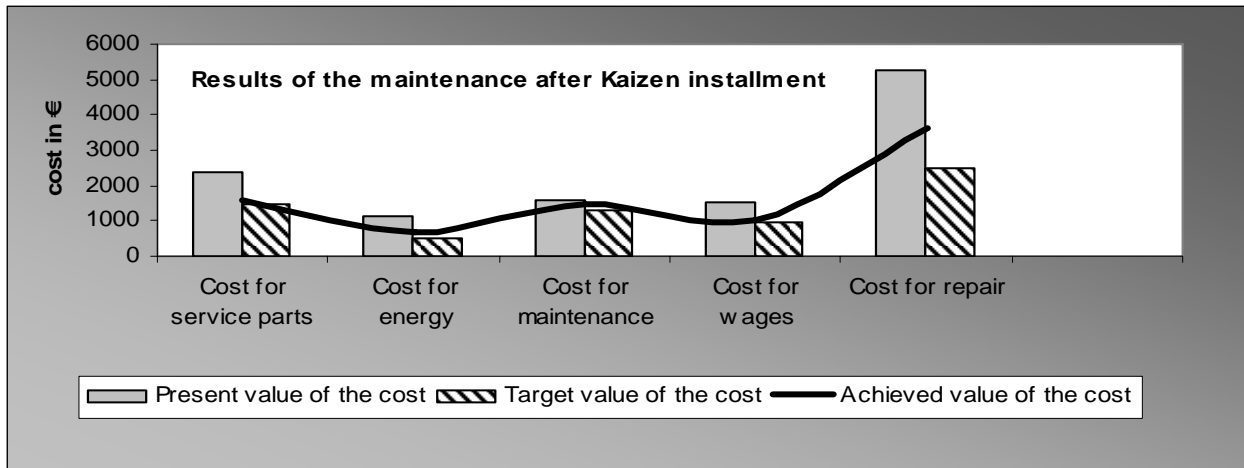


Figure 1 Contribution of Kaizen installment in the firm

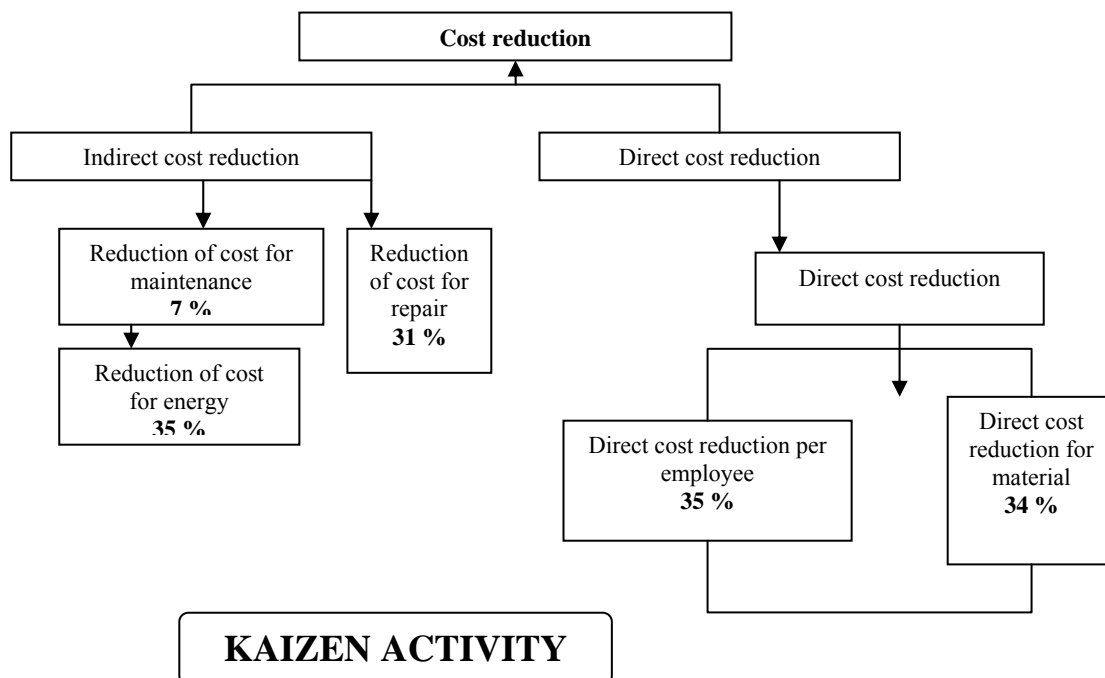


Figure 2 Model for cost reduction in the maintenance in air force

4. CONCLUSION

Kaizen method is proper and good used tool for identification and analyzing of any problem in companies practice. In present time

it starts to be applied also in Slovak firms, that solve their problems connected with low productivity, unsystematic management and low work efficiency through Kaizen system, that improve and make perfect work and it

bears value added in complex measuring of values. It is necessary to use such modern tool of management, since it helps to find out shortages in individual levels of management in companies processes.

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