KAIZEN CONCEPT IN THE PROCESS OF A QUALITY IMPROVEMENT IN THE COMPANY

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Abstract

Following article concerns a topic of quality improvement realized by a concept of continuous improvement – Kaizen. The main goal of the article is to analyze of practical usage of Kaizen, in terms of elimination all waste and continuous improvement. The article is divided into two parts: theoretical and cognitive ones. In the first part of it, the authors described lean philosophy and continuous improvement concept (Kaizen), which are signs to overall company improvement.

The cognitive part of the article concerns presentation of practical usage of Kaizen concept rules in chosen automotive sector company. This is a worldwide company with its subsidiary in Poland in Bielsko-Biała. Its main specialization are casts. The company specializes in casting of high complex aluminum components such as: cylinder heads, engine blocks, transmission parts and structural components. The authors used case study method and formulated following research problems: features of Kaizen team, basic rules of Kaizen team, plan of Kaizen action and tools used during Kaizen action. Kaizen actions in analyzed company are realized during so-called "Kaizen week". There is a team built from the company's employees. As their effect (Kaizen actions) exact solutions of quality problems are formulated. The company leads also so-called "after Kaizen" actions, which are used in a case of problems which require longer time for their elimination. According to the Kaizen philosophy all activities realized in the company in quality area have continuous character.

Key words: Kaizen, quality improvement, 5S.

1. Introduction

Present environment of companies is very dynamic and changeable. Orientation for customers and competition by quality are standards on the market.

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Improvement of quality (in wide meaning, quality of processes, products, work and so on) is a duty, not additional action taken by managers. Improvement must have continuous character. In a set of tools used to manage a quality, lean approach with its key part Kaizen are useful instruments leading a company towards quality company.

Following article concerns a topic of quality improvement realized by mentioned instruments: lean approach and Kaizen. The main goal of the article is to analyze of practical usage of Kaizen, in terms of elimination problems and continuous improvement. The article is divided into two parts: theoretical and cognitive ones. In the first part of it, the authors described lean philosophy and continuous improvement concept (Kaizen), which are signs to overall company improvement. The cognitive part of the article concerns presentation of practical usage of Kaizen concept rules in chosen automotive sector company. The authors used Case study method and formulated following research problems: features of Kaizen team, basic rules of Kaizen team, plan of Kaizen action and tools used during Kaizen action. Kaizen actions in analyzed company are realized during so-called "Kaizen week". As their effect exact solutions of quality problems are formulated.

2. Improvement of quality management systems in a company – lean philosophy

More than sixty years ago first institutional systems of quality improvement in the sphere of organization management were implemented. The literature of the subject (quality improvement) distinguishes levels of improvement which organization can achieve on the trajectory of improvement. Aiming to being an intelligent organization, implementing solutions of management continuous improvement, can be achieved by different levels (figure 1) (Lisiecka, 2009, pp. 24–25).

Way to perfect organization goes through implementation of management systems according to ISO norm 9000, next implementation of TQM rules and preparing self-assessment report for quality awards. Next levels of improvement embrace Lean Management concept, Reengineering, to intelligent and perfect organization. Continuous improvement of organization happens by every day effort and giving of proofs of hiking on perfection tip, but also by effort connected with breakthrough in business about strategic character (Lisiecka, 2009, pp. 25–26).

One of a way of organization improvement is a lean approach and its key part Kaizen concept. Almost thirty years ago the lean approach was relatively radical, even for large and sophisticated companies. Now the lean is being adopted outside it traditional automotive, high-volume and manufacturing roots. But wherever it is applied, the principles remain the same. The key principle of lean operations means moving towards the elimination all waste in order to develop an operation that is faster, more dependable, produces higher-quality products and services and, above all, operates at low cost.

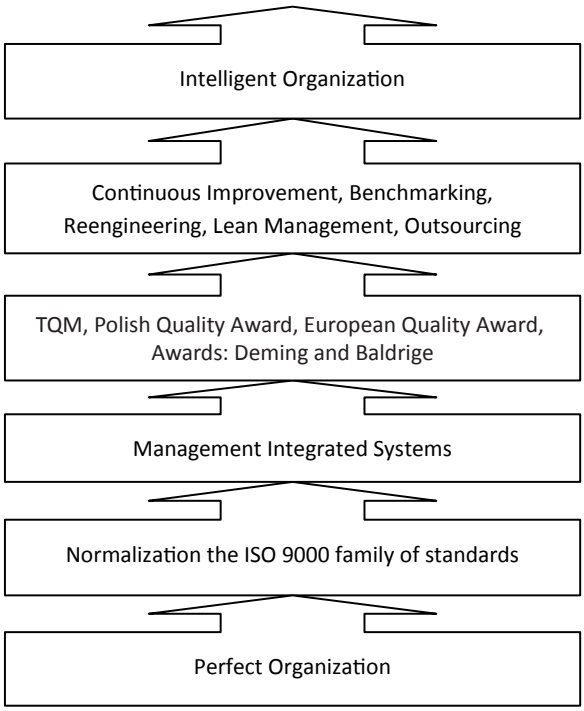

Fig. 1. Levels of organization improvement
Source: K. Lisiecka (2009, p. 27).

The lean approach to managing operations is founded on doing the simple things well, on gradually doing them better and, above all, on squeezing out waste every step of the way. Often seen as the practitioner of the lean approach in Japan, the Toyota Motor Company has developed a set of practices which has shaped what we call lean. Three key issues define the lean philosophy: the elimination of waste, the involvement of staff in the operation and drive for continuous improvement – Kaizen (figure 2) (Slack et al., 2007, pp. 466–469).

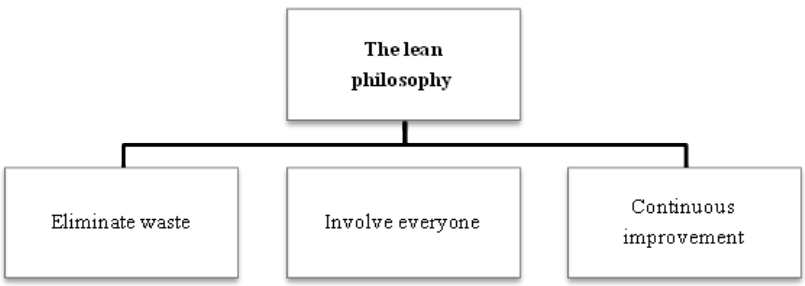

Fig. 2. The lean philosophy of operations
Source: N. Slack, S. Chambers, R. Johnston (2007, p. 469).

The most significant part of the lean philosophy is focused on the elimination all forms of waste. Waste can be defined as any activity which does not add value. Two simple devices are commonly used in lean improvement (Slack et al., 2007, p. 470):

1. One "the seven forms of waste" is concerned with identifying waste as the first step towards eliminating it.
   Toyota has identified seven types of waste (Japanese Muda), which have been found to apply in many different types of operations (service and production) and which form the core of lean philosophy: over-production, waiting time, transport, process, inventory, motion and defectives (table 1).

Table 1. Types of Muda

Waste	Description
Over-production	producing more than client needs (frozen capital, used energy, warehousing expenses); also too much information
Inventory	they are result of overproduction, accumulate space, create necessity of transportation
Motion	walking, bending, taking, etc.; unnecessary moves make longer production process and negatively affect on safety and health of employees
Transport	transport of products in the progress, semi-products, finished products (trolleys) — causes costs and longer processes
Process	planning of production process in such a way, that it imposes additional unnecessary activities, what causes extra costs and longer processes
Defectives	production and making of deficiencies, organizing post for deficiencies repairing
Waiting time	waiting of operator for machine, employee for instruction, employee for decision, machine for repairing, etc.

Source: K. Kobyłecka (2007, pp. 47–49).

2. "The 5S's" is a simple set of principles for reducing waste":
   - sort – eliminate what is not needed and keep what is needed;
   - straighten – position things in such a way that they can be easily reached whenever they are needed;
   - shine – keep things clean and tidy; no refuse or dirt in work area;
   - standardize – maintain cleanliness and order;
   - sustain – develop a commitment and pride in keeping to standards.

   The 5S's can be thought of as a simple housekeeping methodology to organize work areas that focuses on visual order, organization, cleanliness and standardization. It helps to eliminate all types of waste relating to uncertainty, waiting, searching for relevant information, creating variation and so on. By eliminating what

is unnecessary and making everything clear and predictable, clutter is reduced, needed items are always in the same place and work is made easier and faster.

The most typical and relevant features of lean management are (Grudzewski, Hejduk, 2004, p. 201):

— integration of all strategic and operational actions taken by a company (organizational, economic, technical, social, and so on);
— decentralization of management on all basic levels of a company;
— optimization of manufacturing, supporting and service processes;
— implementation of restructured, modernized and developing activities;
— usage of total quality management system;
— stimulation of employees' motivation to good and free of waste work;
— free from bureaucracy of management activity;
— direct contacts of a company with suppliers, cooperators, customers and so on.

Lean management is one of a few ways which a company could go towards improvement of quality.

3. Kaizen – a way to improvement of quality

Kaizen means continuous process of improvement which engages top management of a company, management staff and all employees. It requires relevant changes in people's behavior and authority based on experience, authority of leader. Kaizen is based on assumption that all employees possess skills which can be used in a better way (Frąś, 2013, p. 264).

A word of "kaizen" is a combination of two Japanese words: kai – "change" and zen – "good". In this translation Kaizen means a change for a good. According to a literature Kaizen is defined as:

— step-by-step, ordered and continuous improvement, improvement of value (Pieczonka, Tabor, 2003, p. 86);
— it means improvement. Moreover, it means continuous improvement in personal life, on social and work platform. In a company Kaizen is permanent improvement of all – managers and employees (Imai, 2007, p. 18).

A big meaning for growth of this philosophy has had enlargement of Total Quality Management concept, in which originally Kaizen was an element of improvement characteristic for Japanese techniques of quality management, e.g. zero defects, Deming Cycle, quality circles, prevention system, Just-in-Time and so on. This approach meant that everything could be done better, that thanks to small steps planned effects could be achieved. Improvement concerns everything, it should be realized every day, by everybody, from small improvements to big strategic changes. Kaizen induces employees to improve their work stand, to bigger independence and self-control. Fundamental goals of Kaizen concern improvement of: quality, cost and

time of delivery. It means change of products' quality, processes, lower costs and shorter time of order realization (Skrzypek, 2014, pp. 90–91).

Improvements can be divided into two groups: innovation and Kaizen. Innovation, which is a domain of western companies, is perceived as a change caused by breakthrough in technique discipline, implementation of the newest management concepts and manufacturing techniques. It has rather revolution character. Sometimes, innovation is defined as an idea, behavior quality different thing from so far existing, and its typical feature is this, that after its implementation time of discipline collapse happens, positive effects of innovation have a tendency to disappear.

Kaizen is small improvement, but permanent, with determination and consequence. Improvements have gentle character. A characteristic feature of this approach is this, that it does not need complicated techniques or the newest technologies. This what is needed it is conventional techniques (e.g. Pareto diagram, Ishikawa diagram, control cards) and common sense. Table 2 shows differences between Kaizen and innovation.

Table 2. Kaizen versus innovation

Criteria	Kaizen	Innovation
Effect	Long-term, not breakthrough	Short-term, breakthrough
Steps	Small steps	Big steps
Time framework	Permanent action with gradually rising effects	Incidental action with immediate effect
Change	Gradual and permanent	Sudden and single
Engagement	All	Chosen "leaders"
Approach	Team effort, process approach	Individual ideas and actions
Work method	Maintenance and improvement	"Extinguishing" and rebuild
Ideas	Conventional know-how and traditional technology	Usage of technological breakthrough, new inventions and theories
Practical requirements	Small investments, big effort	Big investments, small effort
Orientation	For people	For technology
Assessment criteria	Process and engagement in achieving of better results	Results directly affect on profits
Usage	It exists well in stable developing economy	It exists better in quickly developing economy

Source: M. Imai (2007, p. 54).

The best solution is a combination of Kaizen and innovation. Maintenance of innovation results requires effort, without it results of innovation disappear. Kaizen protects from degradation, but also slowly rises standard, treating it as a base to improving process (figures 3) (Frąś, 2013, p. 266).

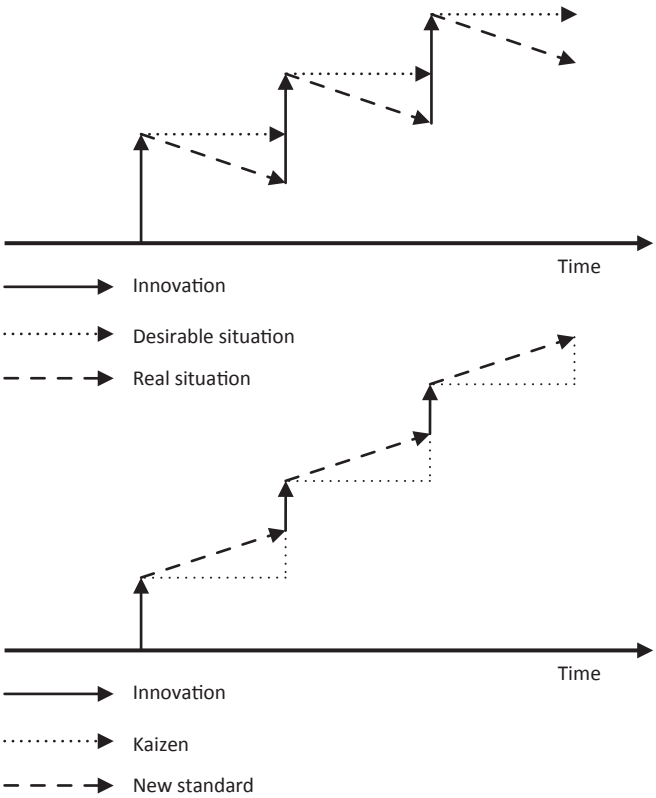

Fig. 3. Implementation of innovation without (a) and with (b) Kaizen
Source: J. Frąś (2013, p. 266).

Fundamental rules of Kaizen are as follows (Frąś, 2013, p. 267):
— philosophy – prevention instead of detection,
— procedure – total quality management,
— scale – everybody is responsible for quality,
— measure – quality costs,
— norm – properly for the first time,
— scope – a whole organization,
— topic – continuous improvement.

Kaizen is a continuous process, including all people in organization, every manager and every employee is engaged in its aspects. Kaizen requires a mission,

changes in people's behavior, dialogue between managers and employees and orientation on quality process. In assessment of Kaizen important is not only effect of every action, by effort taken for its realization, every employee tries to work as good as possible.

4. Kaizen in practice – analysis of quality improvement based on chosen automotive company

In this part of the article use of Kaizen in practice (its rules) was presented. The analysis is based on case study method, made in chosen automotive sector company. Other details of analysis presents table 3.

Table 3. Characteristic of made analysis

Assumptions	Description
Purpose of research	analysis of practical usage of Kaizen, in terms of elimination of problems and continuous improvement
Research problems	– features of Kaizen team, – basic rules of Kaizen team, – plan of Kaizen action, – tools used during Kaizen action
Research method	case study method
Analyzed company	company from automotive sector, specialized in casting of different parts of cars

Source: Personal elaboration.

The analyzed company, as it was mentioned, represents automotive sector. This is the worldwide company with its subsidiary in Poland in Bielsko-Biała. Its main specialization are casts. The company specializes in casting of high complex aluminum components such as: cylinder heads, engine blocks, transmission parts and structural components. In company following managements systems: ISO/TS 16949, ISO 14001, OHSAS 18001 are implemented.

The company uses in every day practice Kaizen concept and its rules and tools. According to representatives of management of the company Kaizen is: "low-costs, common sense and creative approach to improvement. Kaizen essence are small changes which could minimize losses. The biggest amount of such ideas are created on the lowest level of organization structure".

In analyzed company in the framework of Kaizen are organized so called "weeks with Kaizen".

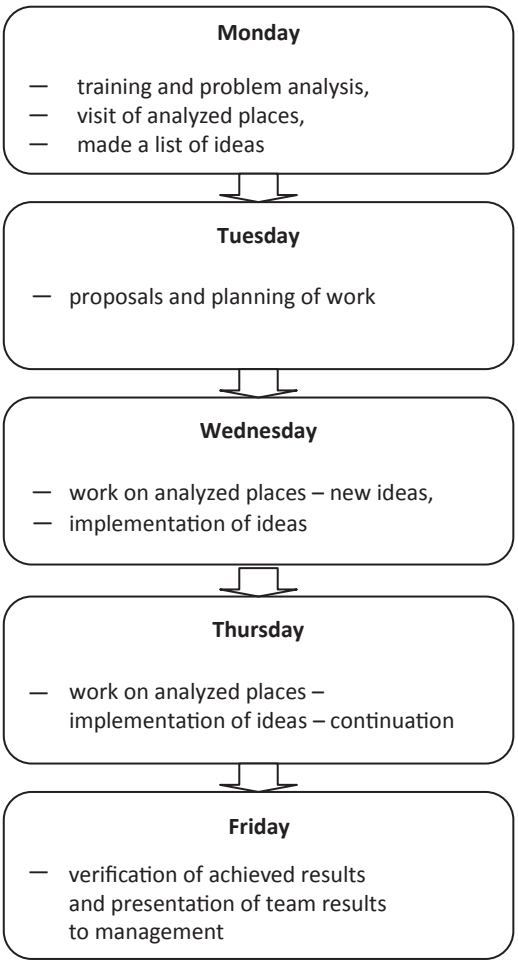

Fig. 4. Plan of "Kaizen week"

Source: Personal elaboration based on information of analyzed company.

These are groups of employees (8–12 persons) delegated to exact actions, excluded from daily duties. During such workshop employees work over solutions of selected problems, with use of Kaizen tools. For example: brain storm, Ishikawa diagram or 5S tool. The purpose of "week with Kaizen" is to create and implement visible improvements in exact area of a company (often in exact processes).

Features of Kaizen team are as follows:

— members of different departments,
— excluded from daily duties,
— persons out of workshop cannot interfere in project preparation.

During Kaizen action members of a team obey following rules:
— open for changes and new ideas,
— positive attitude,
— fight with stereotypes,
— conviction to right of work,
— respect of team members,
— one person, one voice,
— searching for solutions not problems,
— searching for simple solutions.

In the second quarter of 2014 team of Kaizen worked over implementation of 4S tool in exact places of analyzed company: weld room, warehouse of parts to cranes and ironworks. In workshop took part eight employees who constituted mentioned goal about implementation. Plan of week presents figure 4.

During the first day of work the team started observation in analyzed places. The amount of suggested ideas was 128. After strong discussion and classification of ideas stayed 76 ideas, some of them were repeated, a few members perceived similar problems. The team decided to implement 53 ideas. The main criterion to choose ideas was reality of implementation. For them matrix of influences and difficulties was prepared (figure 5).

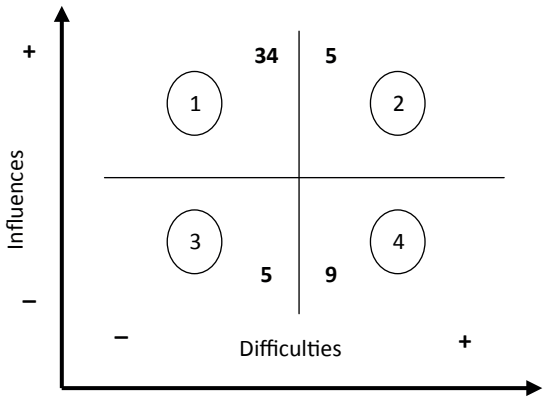

Fig. 5. Matrix of influences and difficulties
Source: Personal elaboration based on information of analyzed company.

The table 4 shows perceived chosen problems and ways of their improvement. Examples of problems mentioned in the table 4 perceived and repaired during Kaizen process are only small percent of total amount of malfunctions defined by Kaizen team. Only in this selected places of analysis the team was able to perceive more than fifty problems chosen to improvement. It shows that scale of areas and problems to improvement in companies and organizations is really big.

Table 4. Problems identified during Kaizen process

Problems	Improvements
lack of descriptions on containers	realized proper descriptions
old door to warehouse of cranes	restored door
old switching station	restored substation
lack of marking of doorstep of entering door to warehouse of cranes	painted doorstep
lack of space for spare parts	made stand
lack of space for welders	designated and described proper space for welders
lack of designated space for used parts	designated place and prepared descriptions
old and dusted instructions	prepared new ones
poor light in weld room	realized new, better light
old burnt sheet metals on a desk to gas cutting	realized new sheet metals

Source: Personal elaboration based on information of analyzed company.

At the end of Kaizen action the team prepares a presentation showing a whole week of work, amount of problems and ideas (solutions) identified by the team. The team presents implemented solutions and first results of improvements. In analyzed company after Kaizen action is realized so called "after Kaizen" period. Some of identified problems could be solved immediately, during Kaizen week, but some of them requires longer action. This is "after Kaizen" time. Designated person (usually a member of Kaizen team) is responsible for implementation of defined solutions and prepares at the end of all actions a report documenting achieved results.

5. Conclusions

There is no better way than Kaizen to reflect organization culture geared towards improvement realizes by minor steps, step by step, every day, within the framework of all processes. Kaizen derives from Japan and means gradual, systematic and continuous improvement. This concept pulls in all employees in improvement process. Kaizen concentrates on elimination of all defects, losses in all systems and processes. Every employee is obliged to improve his/her individual skills in order to be able to achieve high quality, low costs and deliveries on time. Kaizen is not based on modern technologies, revolutionary and expensive investments, but on success achieving by steady minor changes. Thanks to Kaizen changes and success-

es come out not from total company reorganization or crucial investments, but from synergy effect — minor transformations. Kaizen means permanent improvement implementing by small changes without critical interference, different to innovation, which radically changes status quo (Łuczak, Flejszman-Matuszak, 2007, p. 375). It means also improvement in personal life, home life, social life and work life. When applied to the work place, Kaizen means continuing improvement involving everyone – managers and workers alike (Slack et al., 2007, p. 595).

The example analyzed in the cognitive part of the article confirms a big meaning of Kaizen in the process of continuous improvement. A set of tools attributed to this concept, such as: brain storm, Ishikawa diagram, matrix diagram, 5S tool, and others, help to identify problems (causes of problems) and suggest possible ways of their elimination. Continuous improvement means also permanent prevention. Actions taken by a company to prevent before similar problems in the future. J. W. Goethe said: "A perfection is a measure of the sky, an aspiration to a perfection is a measure of a men". In a company, a success in the field of continuous improvement is dependent on employees, because they create a quality culture.

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ZASTOSOWANIE KONCEPCJI KAIZEN W PROCESIE DOSKONALENIA JAKOŚCI W PRZEDSIĘBIORSTWIE

Streszczenie

Artykuł dotyczy tematyki doskonalenia jakości, które może być realizowane w przedsiębiorstwie za pomocą koncepcji ciągłego doskonalenia Kaizen. Główny cel artykułu kon-

centruje się na analizie praktycznego zastosowania koncepcji Kaizen w celu eliminacji marnotrawstwa i ciągłego doskonalenia obszarów działalności przedsiębiorstwa. Rozdział został podzielony na dwie części: teoretyczną i poznawczą. W pierwszej, teoretycznej części, autorzy opisali filozofię *lean* z jej kluczową częścią – koncepcją ciągłego doskonalenia Kaizen, będących znakami do doskonalenia przedsiębiorstwa.

Poznawcza część artykułu dotyczy przedstawienia praktycznego zastosowania zasad koncepcji Kaizen w wybranym przedsiębiorstwie branży motoryzacyjnej. Jest to międzynarodowe przedsiębiorstwo z zakładem produkcyjnym w Polsce, w Bielsku-Białej. Przedsiębiorstwo to specjalizuje się w odlewach aluminiowych części silników, jak: cylindry, bloki silnika oraz części skrzyń biegów, dla światowych producentów samochodów. Jako metodę badawczą, autorzy zastosowali metodę analizy przypadku (*case study*) oraz sformułowali obszary badawcze, tj.: cechy zespołu Kaizen, zasady zespołu Kaizen, plan działań Kaizen oraz narzędzia stosowane w ramach tych działań. Działania Kaizen w analizowanym przedsiębiorstwie mają charakter tzw. „tygodnia z Kaizen" i są realizowane przez zespół pracowników, wyłączonych na ten czas ze swoich codziennych obowiązków. Efektem ich pracy są propozycje usprawnień w analizowanych obszarach. Działania Kaizen obejmują także tzw. czas „after Kaizen", kiedy dane rozwiązanie wymaga dłuższego czasu implementacji. Zgodnie z filozofią Kaizen wszystkie działania podejmowane w przedsiębiorstwie mają charakter ciągły.

Słowa kluczowe: Kaizen, doskonalenie jakości, 5S.