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RESEARCH ON KAIZEN IMPLEMENTATION IN INDUSTRIAL COMPANIES

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Abstract. This article examines the opportunities of Kaizen implementation in the Lithuanian industry-based enterprises. The conducted analysis of Kaizen literature has generated key success factors for Kaizen implementation. The industry in Lithuania is reviewed and its relationship with the key success factors is analyzed. The conducted survey-questionnaire characterizes the empirical research base for this study. The paper presents the results of the surveyed companies related to key success factors on which companies should be focused and which are the most important for successful Kaizen implementation. Based on the results of the research a model for successful Kaizen implementation in industrial companies is prepared and provided, as well as conclusions and recommendations.

Keywords: Kaizen, continuous improvement, factor analysis, implementation opportunities, industry, key success factors.

Introduction

Over time of the XX century's 5–8 decade located in Japan the automobile manufacturing company Toyota developed a system of a management philosophy that led the world cardinally to change its approach to production. They implemented Kaizen, Just in Time production, Kanban, Heijunka, Jidoka, and other techniques and tools that provided an edge over their competitors. Thanks to its strong competitive edge, Toyota's management system has gained interest in other parts of the world, and organizations have specialized in operational training to provide knowledge to improve manufacturing and business processes.

One of the engines of successful business and competitive production is Kaizen's philosophy of continuous improvement, which became popular in 1986 when Masaaki Imai published a book: Kaizen: The Key to Japan's Competitive Success. The system then pushed the United States and Western European manufacturing philosophy, when it was believed that a radical innovation will help achieve better product quality, product cost decrease.

Today, companies in developing countries have to meet quality standards in order to compete in a complex market, to maintain their position. Therefore, they should strive for continuous improvement, customer satisfaction, and implement process control and standardization. In this case, it is important to identify those activities that are important for gaining a competitive advantage and for continuous improvement. Taking into account the quantitative impact of Kaizen, Howell (2011) posits that companies can obtain the following benefits in implementing their philosophy:

- Inventory reduction: 30–70%;
- Operating space: approximately 50%;
- Process time reduction: 40–80%;
- Productivity improvement: 20–60%;
- Delivery times reduction: 70–90%;
- Walking distance reduction: 40–90% (Howell, 2011).

Without benefits García-Alcaraz et al. (2017) points out the following reasons why companies implement Kaizen:

- Waste reduction: inventory, waiting times, transport, and motion;
- Employee skills improvement;
- Increased productivity and improved quality;
- Space utilization improvement;
- Increased and improved communication among administrative departments in companies.

At any given moment, a company can improve by various measures. You can improve your production efficiency, goods flow, financial management or any other activity areas related to your business using Kaizen's philosophy. Practically, with no exception, managers of all growing businesses would say that there are many things

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they want to do for their business. One of the main reasons why there is no change is because the change seems too big or too complicated. Changing an entire business at once sounds like a daunting task and can prevent managers from making changes. Here, a Kaizen's philosophy which helps managers achieve continuous improvement, delivering the results they want without compromising their motivation through gradual changes would support the managers.

1. Methodology

In order to determine the feasibility of implementing Kaizen in Lithuanian industrial enterprises, it is necessary to use the success factors required for the implementation of the continuous improvement system in enterprises that indicate the level of feasibility of the method. The survey uses a short interview-type survey or online resources, an expanded questionnaire type survey.

The study consists of a set of related actions:

1. Preparation of the questionnaire

Based on the literature analysis a questionnaire is developed. The questionnaire attracts attention to the factors cited in the literature for the successful implementation of Kaizen).

The main task of this phase is to create a questionnaire that would be small enough that does not discourage the respondents and effective enough to analyze 20 of the success factors for successful Kaizen implementation. To do so it is decided that the questionnaire consists of 30 questions or statements which are selected by the help of experts. Expertise is used to reduce the number of questions or statements and select the most appropriate.

Before the expertise questions and statements from the literature are converted into a less complex form of statements and reduced to 5 statements per success factor. Those success factors which have the number of questions and statements lower than 5 are filled with created ones by the author. Questions are merged into 10 blocks of 2 success factors per block. So, in the final, the expertise questionnaire 100 statements are used and the final list consists of 30.

The experts' task is to rate statements from each block to select the most important statements to detect key success factors. The rating system is to assign a score to each statement from 1 (not important) to 10 (important). Submitted answers from each expert are compared to select 4 highest rating statements per block. The author selects 3 statements out of 4 which fulfill the final questionnaire of the study. The answers for the questions are linear scale type so the respondent chooses the answer according to the strength of the statement in a 6-point system, where 0 point does not agree, 5 points fully agree.

2. Search of respondents

The main goal of this phase is to find as much as possible respondents from industry-based business and to reach the employees in the company. According to Official Statistics Portal at the beginning of the 2020 year number of economic entities in operation by manufacturing economic activity is 8 054. It is decided to don't count companies with 9 and a lower number of employees (see Table 3). Those categories could be found from the list of economic activity is at the Official Statistics Portal.

Table 1. Number of enterprises according to economic activity and number of employees in the year 2020 (source: prepared by the author based on Official Statistics Portal, 2020a, 2020b; Rekvizitai, n.d.).

		10–19	50–99	100–149	150–249	250–499	500–999	>1 000	Total
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	172 (–)	56 (–)	18 (3)	8 (–)	2 (–)	2 (2)	–	258 (5)
C17	Manufacture of paper and paper products	23 (–)	10 (–)	2 (–)	6 (–)	5 (1)	–	–	46 (1)
C19	Manufacture of coke and refined petroleum products	1 (–)	1 (–)	–	1 (–)	–	–	1 (1)	4 (1)
C22	Manufacture of rubber and plastic products	54 (–)	31 (–)	13 (–)	8 (1)	2 (1)	1 (–)	–	109 (2)
C25	Manufacture of fabricated metal products, except machinery and equipment	136 (–)	53 (–)	11 (–)	10 (1)	5 (–)	1 (–)	–	216 (1)
C26	Manufacture of computer, electronic and optical products	15 (1)	12 (–)	4 (–)	6 (1)	1 (–)	1 (1)	–	39 (2)
C28	Manufacture of machinery and equipment N.E.C.	20 (–)	10 (–)	6 (–)	3 (–)	4 (1)	2 (–)	–	45 (2)
C29	Manufacture of motor vehicles, trailers and semi-trailers	8 (–)	6 (1)	1 (–)	1 (1)	–	3 (–)	2 (–)	21 (2)
C31	Manufacture of furniture	147 (1)	37 (–)	20 (–)	19 (2)	10 (1)	14 (–)	1 (1)	248 (5)
	Total	576 (2)	216 (1)	75 (3)	62 (6)	29 (4)	24 (3)	4 (2)	986 (21)

Note: where (x) – number of companies participated.

In the year 2020, the total number of companies was 986 (see Table 1) from which 21 of them have participated in the survey. Involved enterprises reflect almost all sizes of companies according to the number of employees except 1–9 and 20–49 size categories and also reflect almost all types of manufacturing categories. However, a sample size of 21 companies does not achieve the minimum magnitude of the sample.

3. Data collection

This phase consists of gathering information of companies and selection of appropriate companies according to requirements. It involves asking questions to company representatives or finding information from the company website or other internet sources like Rekvizitai.lt that generate general information about:

– Economic activity.
– Quantity of employees.

– Existence of Kaizen philosophy in the industry.
– Data will be used to compare results based on different factors. To gather such data e-mail, phone calls, website browsing, and social media are used.

The results will reveal how many industrial companies use continuous improvement tools.

4. Conduction of the survey

After the data collection representatives of all companies are invited to respond to the questionnaire and share the survey with colleagues. Questionnaires are sent by e-mail.

5. Analyze of survey responses

In this phase, analyze of the questionnaire responses is made and the relationship between variables is found. It shows what conditions and circumstances must be met in order to integrate and implement Kaizen philosophy. Summarizing the results, a list of the key success factors needed to implement Kaizen's continuous improvement system for companies in the industry-based business is compiled and model how to increase opportunities to implement Kaizen is made.

2. Expertise

Seven experts from companies or universities (four from Estonia and three from Lithuania) have answered the questionnaire (see Table 3) which is intended to determine the best statements for the final questionnaire. They had to rate statements from 1 to 10 in 10 different blocks of Kaizen success factor groups. 3 statements from the best 4 are being selected by the author for the final questionnaire.

Table 2. Results of the first statement block

No.	Statement	Avg. grade
1	I know what is expected of me at work	6.29
2	Policies, objectives and structure are established in the company	5.29
3	Company's strategic path is understandable to me	5.14
4	Company's decisions are understandable to me	6.29
5	I am introduced to company's short-term and long-term objectives and plans	6.29
6	Our management takes responsibility and do best to build mutual trust	5.71
7	I believe that our employees are good people	5.57
8	I believe we have confidence in new product development	4.00
9	I believe that improvement is possible	5.00
10	I trust to decisions of my coworkers and managers	5.14

From the first block (see Table 2) you can see that the highest rate has No. 1, No. 4, No. 5 statements which have 6.29 average grade and No. 6 which has 5.71 of maximum 10. However, for the final questionnaire No. 4, No. 5 and No. 6 have been selected. No. 6 statement has been selected because 1 block hides 2 key success factors which in this case are clarity (first 5 statements) and trust (from sixth to tenth statement) and for the final questionnaire, it is needed to check all factors.

Analogous operations were made with the rest of the blocks. So, in total there are 30 statements. However, for the final questionnaire, it is needed to add additional questions for statistics and put it in the front. It is decided that it is important to know the respondent's nature of work which is hard or even impossible to determine from other sources. Other questions are linear scale type so the respondent chooses the answer according to the strength of the statement in a 6-point system, where 0 point does not agree, 5 points fully agree (see Table 3).

Table 3. Questions of the final questionnaire

No.	Question / Statement
1	Nature of work in the company
Respondent selects one option of available answers: – Top-level manager – Middle-level manager – Lower level manager – An employee without subordinates	
Linear type questions	
Respondent chooses the answer according to the strength of the statement in a 6-point system, where 0 point does not agree, 5 points fully agree	
2	Company's decisions are understandable to me
3	I am introduced to company's short-term and long-term objectives and plans
4	Employees raise their qualifications within the company
5	Company does comprehensive education and training
6	Company involves every individual in the improvement process
7	Management gives all needed resources (time, money and spaces) to do the job right
8	I take responsibility and do best to build mutual trust and mutual responsibility, sincere, effective communication
9	There is good communication between the top management and employees
10	This organization really inspires the best in me in the way of job performance
11	I can clearly see a path to the future development of my career at this company
12	Our company applies goal-oriented thinking
13	I think our company understands of target markets and users
14	I feel the support from our company's senior management
15	I don't mind if there are changes in the company
16	Our company applies open minded culture
17	Our company actively uses statistical quality control
18	Proposed improvements in the company are monitored
19	Management in this company has good skills and experience
20	I would state that there are people who has an experience how to make continuous improvement
21	Company is always improving quality of work
22	At company exists standardization and process measurement
23	In my opinion leadership in the company is effective
24	Not only the top-level managers, but all managers of the company are taking a leadership role to achieve better results
25	Our management takes responsibility and do best to build mutual trust
26	In the company workplace safety is at high level
27	In my opinion there is good working environment in the company
28	At work I can use my creativity to realize the dreams
29	There is something in the company that encourages employee creativity
30	Our managers stimulate personal and professional growth, share the opportunities of development and maximize individual and team performance
31	I am taking the initiative to improve working conditions

3. Respondents and data

This section analyzes and compares information about respondents and companies. 21 companies have participated in the survey from which total respondents are 32. The picture below shows how enterprises are distributed by economic categories (see Figure 1) where:

C16 – manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials;

C17 – manufacture of paper and paper products;

C19 – manufacture of coke and refined petroleum products;

C22 – manufacture of rubber and plastic products;

C25 – manufacture of fabricated metal products, except machinery and equipment;

C26 – manufacture of computer, electronic and optical products;

C28 – manufacture of machinery and equipment N.E.C.;

C29 – manufacture of motor vehicles, trailers and semi-trailers;

C31 – manufacture of furniture (Number of enterprises…, 2020b).

Companies of C16 and C31 make up a large part of the entirety. Each of the categories makes up 24% part. The lowest quantity of categories are C17, C19 and C25 (5% each from total quantity).

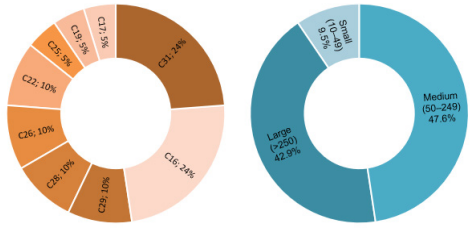

Figure 1. Companies distribution by economic categories and number of employees

In terms of the distribution of the number of employees the picture (see Figure 1) shows that responded to the questionnaire are most medium and large companies. The largest share consists of 50–249 employees' companies (47.6%). The lowest share consists of small companies which are 10–49 employees per company (9.5%).

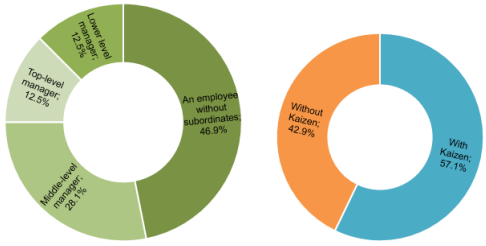

Figure 2. Companies distribution by nature of work and Kaizen status in the company

Also, to show how companies distributed by Kaizen status and nature of work in the company the picture is made (see Figure 2). Talking about the nature of work an employee without subordinates were the most frequent of respondents (46.9%) and the least frequent were lower level managers and top-level managers (12.5% each). The most important thing that is shown in the same picture (see Figure 2) that a larger share of companies has already implemented Kaizen into the organization (57.1%).

4. Research results

This section analyzes and compares survey results from respondents and companies. The main objective is to compare responses between companies that have implemented Kaizen into their organization and those companies which don't have and don't use Kaizen philosophy. Looking at the picture below (see Figure 3) which shows overall distribution according to the nature of work. It can be seen that in total middle-level and top-level managers responds with higher Likert scale grades (3.93 each). Top-level managers from companies with Kaizen capture the highest results (4.43) and the picture shows that an employee without subordinates transmits the lowest results (2.55). From the picture it visible that the most problematic place is with employees without subordinates where the biggest difference (1.41) of results stands out. The average value of all companies that don't have Kaizen responses is 3.36 which is 0.67 less than from companies with Kaizen. This indicates that the overall situation of the possibility to implement Kaizen in industry-based enterprises is high.

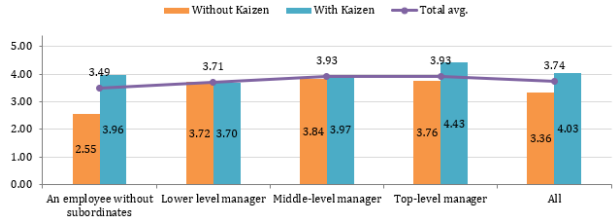

Figure 3. Overall results distribution according to the nature of work in the company

To specify which statements have the biggest impact to raise the opportunity to implement Kaizen response charts are being analyzed. Figures (see Figures 4 and 5) show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of clarity. Data from Figure 4 present that company's decisions are more understandable for respondents from companies which have Kaizen (4.11) that are 0.56 points higher than the rest of the respondents. By looking at the next chart (see Figure 5) data present that respondents from companies that have Kaizen are more introduced to the company's short-term and long-term objectives and plans (4.17) that are 1.17 points higher than the rest of the respondents.

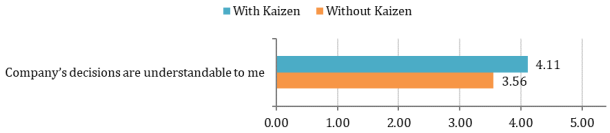

Figure 4. Overall results distribution of 1st statement among companies

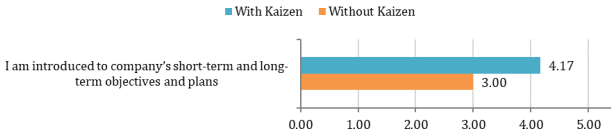

Figure 5. Overall results distribution of 2nd statement among companies

The next charts (see Figures 6 and 7) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of education and training. Data from Figure 6 present that employees from companies which have Kaizen are raising their qualification (4.03) more than the rest of the respondents by 0.92 points.

By looking at the chart (see Figure 7) data present that respondents from companies that have Kaizen agree more that the company does comprehensive education and training (4.03) than the rest of the respondents by 0.60 points.

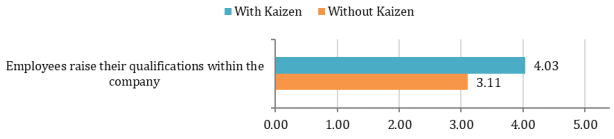

Figure 6. Overall results distribution of 3rd statement among companies

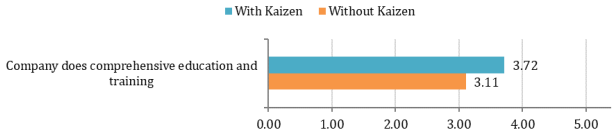

Figure 7. Overall results distribution of 4th statement among companies

A figure (see Figure 8) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of employee involvement. Data present that the company involves respondents from companies that have Kaizen in the improvement process (3.62) more than the rest of the respondents by 0.40 points.

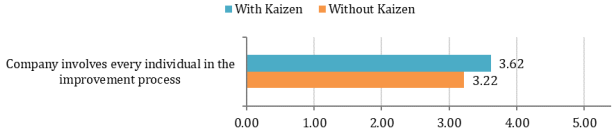

Figure 8. Overall results distribution of 5th statement among companies

The next figure (see Figure 9) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of resources. Data present that respondents from companies that have Kaizen agree more that management gives all needed resources like time, money and spaces to do the job right (4.12) than the rest of the respondents by 0.23 points.

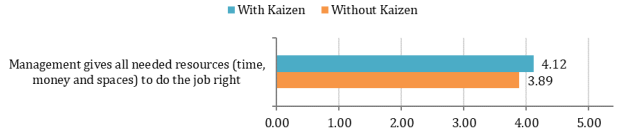

Figure 9. Overall results distribution of 6th statement among companies

The next charts (see Figures 10 and 11) show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of communication and cooperation. Data from Figure 10 presents that employees from companies that don't have Kaizen are more likely to take responsibility and do best to build mutual trust and mutual responsibility, sincere, effective communication (4.56) than the rest of the respondents from companies which have implemented Kaizen by 0.28 points. It is the first case when responses from companies without Kaizen show higher results. It means that at this point all companies are prepared to implement Kaizen by the view of the 6th statement. By looking at the chart (see Figure 11) a slight difference is visible between responses. Data present that respondents from companies that have Kaizen agree more that there is good communication between the top management and employees (3.72) than the rest of the respondents by 0.11 points.

Figure 10. Overall results distribution of 7th statement among companies

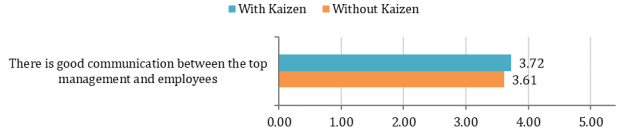

Figure 11. Overall results distribution of 8th statement among companies

Looking at charts (see Figures 12 and 13) that show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of motivation and recognition.

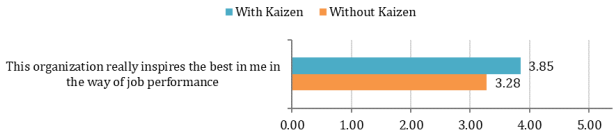

Figure 12. Overall results distribution of 9th statement among companies

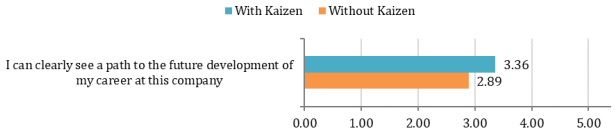

Figure 13. Overall results distribution of 10th statement among companies

Data from Figure 12 present that respondents from companies which have Kaizen agree more that their organization inspires them in the way of job performance (3.85) by 0.57 points than the rest of the respondents. Taking a view to Figure 13 it can be seen that respondents from companies that have Kaizen see a path to the future development of their career clearer (3.36) than the rest of the respondents by 0.47 points.

The next charts (see Figures 14 and 15) show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of mindset and learning from mistakes.

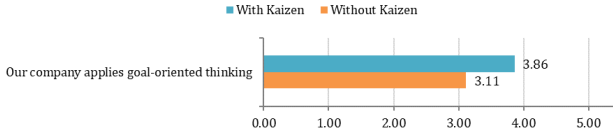

Figure 14. Overall results distribution of 11th statement among companies

Figure 15. Overall results distribution of 12th statement among companies

Data from Figure 14 present that companies which have Kaizen apply more goal-oriented thinking (3.86) than the rest of the respondents by 0.75 points. By looking at the next chart (see Figure 15) a slight difference is visible that respondents from companies that have Kaizen agree more their company understands of target markets and users (4.31) than the rest of the respondents by 0.31 points.

Looking at the chart (see Figure 16) that shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of support and commitment. Data present that respondents from companies that have Kaizen agree more that they feel support from their senior management (4.06) by 0.67 points than the rest of the respondents.

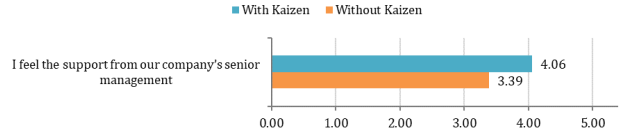

Figure 16. Overall results distribution of 13th statement among companies

By looking at the next chart (see Figure 17) that shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of desire to change.

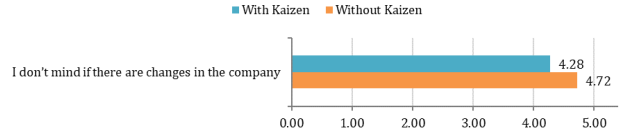

Figure 17. Overall results distribution of 14th statement among companies

Data from the chart presents that respondents from companies that don't have Kaizen would resist less if the company makes changes (4.72) than the rest of the respondents by 0.44 points. This means that the staff of companies without Kaizen are psychologically ready to implement Kaizen and change their existing philosophy.

The next chart (see Figure 18) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of culture.

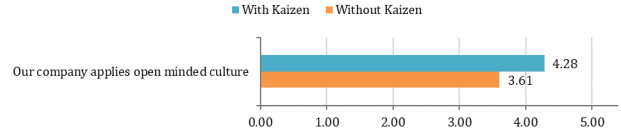

Figure 18. Overall results distribution of 15th statement among companies

Data present that respondents from companies that have Kaizen are more likely to think that their company applies open minded culture (4.28) which is higher by 0.67 points than the rest of the respondents.

Figure 19. Overall results distribution of 16th statement among companies

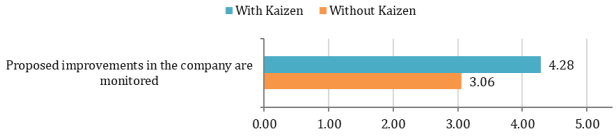

Figure 20. Overall results distribution of 17th statement among companies

Looking at charts (see Figures 19 and 20) that show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of the use of appropriate methods. In the first picture (see Figure 19) data present that companies that have implemented Kaizen use statistical quality control more often (4.06) than the rest of the enterprises by 1.95. In this case, the difference in response distribution is the highest of all statements. In the next picture (see Figure 20) data show that according to respondents the proposed improvements in the companies are monitored more often at enterprises with Kaizen (4.28) where the result is 1.23 points better than from the rest of companies.

Looking at charts (see Figures 21 and 22) that show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of management competencies and experience.

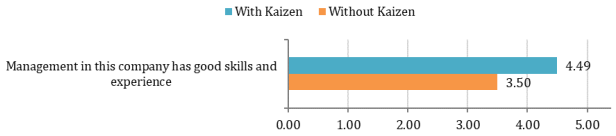

Figure 21. Overall results distribution of 18th statement among companies

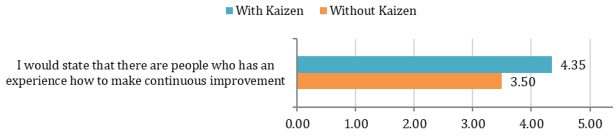

Figure 22. Overall results distribution of 19th statement among companies

Data from Figure 21 present that respondents from companies which have Kaizen agree more that their management in the company has good skills and experience (4.49) by 0.99 points than the rest of the respondents. Taking a view to Figure 22 it can be seen that respondents from companies that have Kaizen would state that there are people who have experience of how to make a continuous improvement (3.36) that is a better score than the rest of the respondents by 0.85 points.

The next chart (see Figure 23) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of quality. Data present that respondents from companies that have Kaizen are more likely to think that their company is always improving the quality of work (4.29) which is higher by 0.96 points than the rest of the respondents.

Figure 23. Overall results distribution of 20th statement among companies

Looking at the next chart (see Figure 24) that shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of standardization.

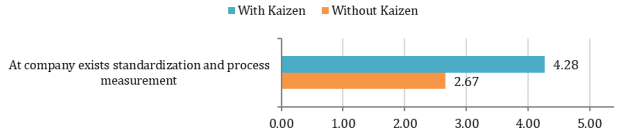

Figure 24. Overall results distribution of 21st statement among companies

Data present that respondents from companies that have Kaizen agree more that standardization and process measurement exists at their company (4.28) by the rest of the respondents 1.61 points.

The next charts (see Figures 25 and 26) show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of leadership.

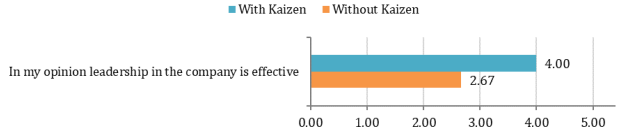

Figure 25. Overall results distribution of 22nd statement among companies

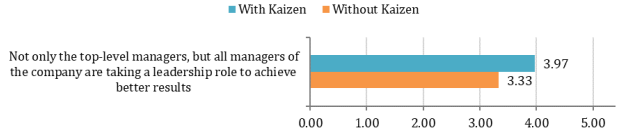

Figure 26. Overall results distribution of 23rd statement among companies

Data from Figure 25 present that respondents from companies which have Kaizen agree more that leadership in their company is effective (4.00) than the rest of the respondents by 1.33 points. By looking at the next chart (see Figure 26) data present that respondents from companies which have Kaizen more likely to think that not only their top-level managers but all of the managers of the company are taking a leadership role to achieve better results (3.97) what shows that effectiveness of leadership in companies with Kaizen is better than the rest of the companies by 0.64 points.

Looking at the next chart (see Figure 27) that shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of trust. Data present that respondents from companies which have Kaizen agree more that their management takes responsibility and do best to build mutual trust (3.69) by 0.41 points than the rest of the respondents.

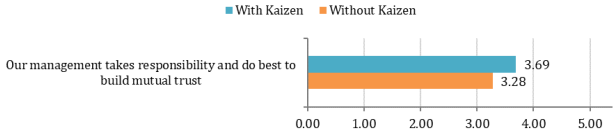

Figure 27. Overall results distribution of 24th statement among companies

The next charts (see Figures 28 and 29) show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of the work environment. A data from Figure 28 present the difference of responses that companies which have implemented Kaizen has better and higher-level workplace safety (4.18) than the rest of the companies by 1.29 points. By looking at the next chart (see Figure 29) a difference is visible that respondents from companies that have Kaizen agree more that there is a good working environment in their company (4.27) which is 0.66 points more than the rest of the respondents from companies without Kaizen.

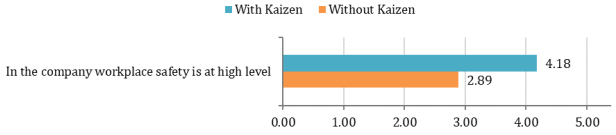

Figure 28. Overall results distribution of 25th statement among companies

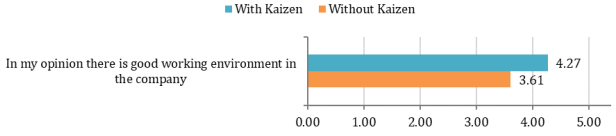

Figure 29. Overall results distribution of 26th statement among companies

Looking at charts (see Figures 30 and 31) that show the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of creativity.

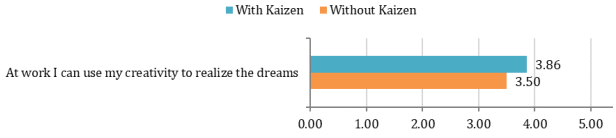

Figure 30. Overall results distribution of 27th statement among companies

Data from Figure 30 present that respondents from companies which have Kaizen agree more that they can use their creativity to realize the dreams (3.86) by 0.36 points than the rest of the respondents. Taking a view to Figure 31 it can be seen that respondents from companies that have Kaizen would state that there is something in the company that encourages employee creativity (3.30) which is a better score than the rest of the respondents by 0.35 points.

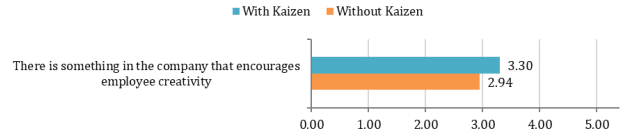

Figure 31. Overall results distribution of 28th statement among companies

The next chart (see Figure 32) shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of teamwork. Data present that respondents from companies that have Kaizen are agreed more that managers from their industry stimulate personal and professional growth, share the opportunities of development and maximize individual and team performance (3.85) which is higher by 0.90 points than the rest of the respondents.

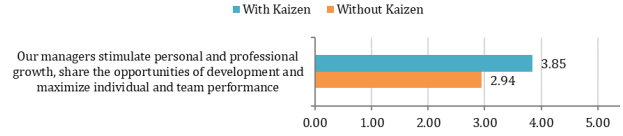

Figure 32. Overall results distribution of 29th statement among companies

Looking at the next chart (see Figure 33) that shows the difference between enterprise responses that have implemented Kaizen and those which don't have Kaizen according to the statement from the key success factor of the initiative. Data present that respondents from companies that have Kaizen more likely think that they are taking the initiative to improve working conditions (4.30) which is better than the rest of the respondents by 0.02 points.

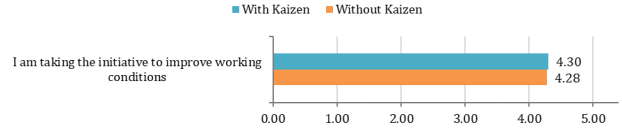

Figure 33. Overall results distribution of 30th statement among companies

To see a better view of the distribution of responses between respondents from companies that have implemented Kaizen and those which don't have this philosophy a two-part chart has been created (see Figures 34 and 35). In the final stage, it's clear that not everyone's responses from the companies with Kaizen have reached higher

Likert scale. By looking at Figure 34 it can be seen that 2 of the statements: 7th (I take responsibility and do best to build mutual trust and mutual responsibility, sincere, effective communication) and 14th (I don't mind if there are changes in the company) had better scores.

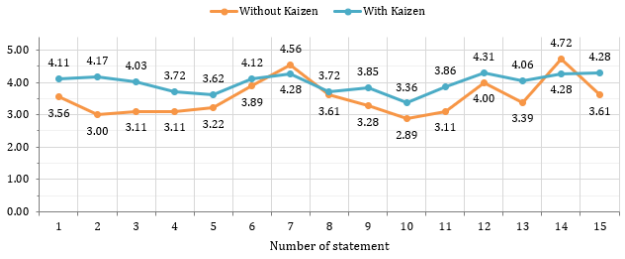

Figure 34. Overall distribution according to statements among companies part 1

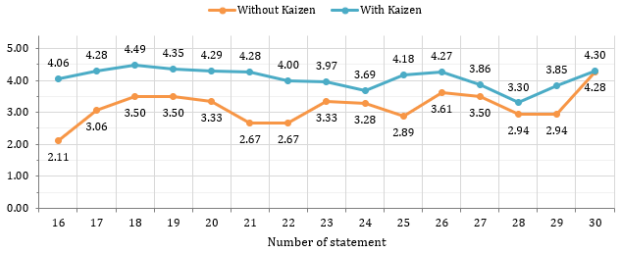

Figure 35. Overall distribution according to statements among companies part 2

From the charts, it is seen that:

- The lowest score (2.11) was detected in the 16th statement (our company actively uses statistical quality control) by companies without Kaizen;
- The highest score (4.72) was detected in the 14th statement (I don't mind if there are changes in the company) by companies without Kaizen;
- The biggest difference between responses (1.95) was detected in the 16th statement (our company actively uses statistical quality control);
- The lowest difference between responses (0.02) was detected in the 30th statement (I am taking the initiative to improve working conditions).

To look at the results more detail Table 4 shows how do the results distribute among companies according to their size. By talking about small-size companies, none of the enterprises with Kaizen participated in the survey. Moreover, small size companies without Kaizen show the lowest scores the most frequently comparing to other enterprises. However, a desire to change in small companies is the most visible (5 points out of 6).

By looking at the medium-sized companies there is nothing exceptional. It can be seen that only the results of communication (4.83 against 4.50 points and 3.50 against 3.38 points) and a clear path of career (3.17 against 3.00 points) is slightly higher for companies without Kaizen. In a large size company category, it is an even bigger dominance of results for companies with Kaizen. Enterprises with Kaizen only score lower on building mutual trust (3.75 against 4.00 points). Overall, it can be seen that companies without Kaizen are more desiring to change. The tendency is visible of all statements between companies without Kaizen.

Table 4. Overall distribution of statements according to company size

	With Kaizen			Without Kaizen			All		
	Small (10–49)	Medium (50–249)	Large (>250)	Small (10–49)	Medium (50–249)	Large (>250)	Small (10–49)	Medium (50–249)	Large (>250)
Understandable decisions	–	4.25	4.04	2.50	3.83	4.00	2.50	4.00	4.06
Introducing objectives and plans	–	4.13	4.19	2.00	3.17	4.00	2.00	3.55	3.88
Qualification raise	–	3.69	4.21	2.00	3.33	4.00	2.00	3.48	3.91
Comprehensive training	–	3.44	3.85	2.00	3.33	4.00	2.00	3.38	3.97
Involvement of everyone	–	3.69	3.58	3.00	3.17	4.00	3.00	3.38	3.53
Given resources	–	3.94	4.21	3.50	4.00	4.00	3.50	3.98	4.22
Effective communication	–	4.50	4.17	4.00	4.83	4.00	4.00	4.70	3.94
Responsibility for communication	–	3.38	3.90	3.50	3.75	3.00	3.50	3.60	3.69
Inspiration from organization	–	3.88	3.83	3.50	3.25	3.00	3.50	3.50	3.44
Clear path of career	–	3.00	3.54	2.00	3.17	3.00	2.00	3.10	2.88
Goal-oriented thinking	–	3.63	3.98	2.50	3.33	3.00	2.50	3.45	3.44
Understanding target markets	–	3.88	4.52	4.50	3.83	4.00	4.50	3.85	4.31
Management support	–	4.19	4.00	2.50	3.75	3.00	2.50	3.93	3.34
Desire to change	–	4.63	4.10	5.00	4.75	4.00	5.00	4.70	4.13
Open minded culture	–	4.06	4.40	3.00	3.75	4.00	3.00	3.88	3.97
Statistical quality control	–	4.06	4.06	0.50	2.33	4.00	0.50	3.03	3.28
Monitored improvements	–	4.19	4.33	2.50	3.08	4.00	2.50	3.53	4.09
Management skills and experience	–	3.94	4.77	2.50	3.75	4.00	2.50	3.83	4.28
Experience to make CI	–	3.94	4.56	2.50	3.75	4.00	2.50	3.83	4.28
Improving quality of work	–	4.00	4.44	3.00	3.50	3.00	3.00	3.70	3.63
Standardization	–	4.25	4.29	0.50	3.17	4.00	0.50	3.60	3.50
Effective leadership	–	3.50	4.25	1.00	3.00	4.00	1.00	3.20	3.50
Taking a leadership role	–	3.25	4.33	3.50	3.17	4.00	3.50	3.20	3.88
Building mutual trust	–	3.56	3.75	3.00	3.25	4.00	3.00	3.38	3.41
Workplace safety	–	3.88	4.33	1.50	3.17	4.00	1.50	3.45	3.94
Working environment	–	3.81	4.50	3.00	3.75	4.00	3.00	3.78	4.28
Using creativity	–	3.75	3.92	4.00	3.42	3.00	4.00	3.55	3.31
Encouraging employee creativity	–	2.94	3.48	2.50	3.08	3.00	2.50	3.03	3.41
Stimulating team performance	–	3.50	4.02	2.00	3.08	4.00	2.00	3.25	3.63
Taking initiative	–	4.06	4.42	4.50	4.25	4.00	4.50	4.18	4.03
Total average	–	3.83	4.13	2.73	3.50	3.73	2.73	3.63	3.77

The table shows that the bigger a company is the better results are. However, some exceptions still exist, i.e. for the statement of using creativity a small companies' score (4.00) is better than medium (3.42) and large (3.00). Also, in medium companies the communication is more effective (4.83). The average situation of different sizes companies according to results is that large companies achieve better results (3.77 total average) and medium companies are close enough with 3.63 total average points.

5. Relationship between the variables

In this section, a relationship between the individual factors is analyzed by using a correlation matrix.

According to dr. Zaid (2015) a correlation quantifies the degree and direction to which two variables are related. Correlation does not fit a line through the data points. But simply is computing a correlation coefficient that tells how much one variable tends to change when the other one does. When *r* is 0.0, there is no relationship. When *r* is positive, there is a trend that one variable goes up as the other one goes up. When *r* is negative, there is a trend that one variable goes up as the other one goes down (Zaid, 2015).

In short, a correlation matrix is a table that shows correlation coefficients between variables. Each cell in the table shows the correlation between the two variables. A correlation matrix is used in statistics to summarize data and measure how a strong relationship is between two variables. Table 4 shows how the correlation can be classified according to its size:

Table 5. Interpretation according to the size of a correlation coefficient (Hinkle et al., 2003)

Size of correlation	Interpretation
0.9 to 1.0 (–0.9 to –1.0)	Very high positive (negative) correlation
0.7 to 0.9 (–0.7 to –0.9)	High positive (negative) correlation
0.5 to 0.7 (–0.5 to –0.7)	Moderate positive (negative) correlation
0.3 to 0.5 (–0.3 to –0.5)	Low positive (negative) correlation
0.0 to 0.3 (0.0 to –0.3)	Negligible correlation

According to Table 5 interpretations from the correlation matrix (see Tables 6 and 7) it can be seen that 26 variables correlate and 4 don't correlate by calculating values equal and higher than 0.70 that describes high positive correlation. Those are effective communication, desire to change, workplace safety and taking initiative. Others have at least one relationship with one of the variables. The highest quantity of correlations was with goal oriented thinking (21), improving quality of work (17) and experience to make CI (15) variables.

The variable of goal-oriented thinking which is a shortcut of the statement "Our company applies goal-oriented thinking" relates to the success factor of mindset and learning from mistakes. This variable correlates with 21 statements. The best correlation according to the correlation coefficient is with improving quality of work (0.85), using creativity (0.84), open minded culture (0.83), understanding target markets (0.82), inspiration from the organization (0.82) and other 16 variables which achieve high positive correlation. Goal-oriented thinking leads to improved quality of work and increased usage of creativity. Improved quality of work could be caused by setting short-term and long-term goals to achieve better results. Increased usage of creativity might be caused by the reward assessment in order to achieve the same goal faster or cheaper. Also, goal-oriented thinking encourages the growth of open minded culture, understanding target markets and inspiration from the organization. Growth of an open minded culture could be caused by setting the objectives in agreement with employees. Improved understanding of target markets might be caused by throwing out all fixed ideas about how to do things. Increased inspiration from the organization could be caused by simply talking to employees about their progression when they achieve goals.

The variable quality of work which is a shortcut to the statement "Company is always improving quality of work" relates to the success factor of quality. This variable correlates with 17 statements. The best correlation according to the correlation coefficient is with building mutual trust (0.85), improving goal-oriented thinking (0.85), open minded culture (0.83), experience to make CI (0.81), working environment (0.80) and other 12 variables which achieve high positive correlation. Improved quality of work leads to increased mutual trust and improved goal-oriented thinking. An improved mutual trust could be caused by employees complying with the quality requirements. Increased goal-oriented thinking could be caused by occurred problems that give a chance to use the brain. Also, by improving the quality of work an open minded culture, experience to make CI and working environment feel the growth. Growth of an open minded culture and improved working environment could be caused by employees' commitment to do quality work. Increased experience to make continuous improvement might be caused by increased quality consciousness and problem consciousness.

The variable experience to make CI which is a shortcut of the statement "I would state that there are people who have an experience how to make continuous improvement" relates to the success factor of management competence and experience. This variable correlates with 15 statements. The best correlation according to the correlation coefficient is with improving quality of work (0.81), taking a leadership role (0.78), building mutual trust (0.77), open minded culture (0.77), goal-oriented thinking (0.77) and other 10 variables which achieve high positive correlation. Experience to make continuous improvement leads to increased quality of work and improved leadership roles. Increased quality of work could be caused by solving problems according to Kaizen philosophy. Improved leadership roles might be caused by standardizing the processes of management and by increased knowledge of how

Table 6. Correlation matrix of relationship between variables part 1

	Understandable decisions	Introducing objectives and plans	Qualification raise	Comprehensive training	Involvement of everyone	Given resources	Effective communication	Responsibility for communication	Inspiration from organization	Clear path of career	Goal-oriented thinking	Understanding target markets	Management support	Desire to change	Open minded culture
Understandable decisions	1														
Introducing objectives and plans	0.81	1													
Qualification raise	0.59	0.57	1												
Comprehensive training	0.56	0.67	0.83	1											
Involvement of everyone	0.57	0.58	0.78	0.79	1										
Given resources	0.69	0.71	0.38	0.49	0.55	1									
Effective communication	0.31	0.33	0.27	0.25	0.48	0.26	1								
Responsibility for communication	0.51	0.54	0.68	0.61	0.58	0.43	0.27	1							
Inspiration from organization	0.64	0.66	0.56	0.61	0.71	0.52	0.43	0.59	1						
Clear path of career	0.66	0.64	0.62	0.54	0.53	0.43	0.34	0.69	0.77	1					
Goal-oriented thinking	0.71	0.69	0.73	0.72	0.80	0.55	0.40	0.75	0.82	0.78	1				
Understanding target markets	0.58	0.50	0.61	0.58	0.64	0.50	0.04	0.69	0.71	0.58	0.82	1			
Management support	0.79	0.62	0.72	0.53	0.67	0.45	0.54	0.58	0.64	0.71	0.74	0.50	1		
Desire to change	0.38	0.17	–0.10	–0.05	0.14	0.21	0.44	0.04	0.30	0.17	0.29	0.29	0.27	1	
Open minded culture	0.62	0.62	0.72	0.56	0.62	0.36	0.25	0.70	0.65	0.78	0.83	0.72	0.75	0.12	1
Statistical quality control	0.46	0.60	0.68	0.62	0.59	0.28	0.21	0.42	0.57	0.61	0.69	0.38	0.55	–0.17	0.64
Monitored improvements	0.65	0.63	0.67	0.63	0.62	0.59	0.00	0.61	0.63	0.49	0.76	0.79	0.50	0.06	0.65
Management skills and experience	0.63	0.72	0.78	0.78	0.66	0.63	0.19	0.62	0.64	0.57	0.76	0.70	0.54	–0.02	0.62
Experience to make CI	0.49	0.57	0.74	0.76	0.74	0.40	0.35	0.60	0.71	0.55	0.77	0.62	0.64	–0.08	0.70
Improving quality of work	0.61	0.63	0.79	0.73	0.79	0.47	0.36	0.68	0.74	0.63	0.85	0.71	0.74	0.09	0.83
Standardization	0.57	0.61	0.82	0.69	0.64	0.30	0.24	0.50	0.50	0.64	0.70	0.45	0.66	–0.12	0.73
Effective leadership	0.63	0.67	0.78	0.68	0.63	0.44	0.27	0.62	0.64	0.68	0.79	0.64	0.66	0.00	0.75
Taking a leadership role	0.39	0.38	0.50	0.51	0.58	0.37	0.12	0.53	0.62	0.48	0.69	0.68	0.51	–0.06	0.68
Building mutual trust	0.54	0.55	0.70	0.59	0.74	0.41	0.47	0.65	0.81	0.73	0.80	0.64	0.74	0.14	0.75
Workplace safety	0.23	0.34	0.36	0.34	0.11	0.23	–0.11	0.08	0.12	0.18	0.17	0.04	0.13	–0.23	0.06
Working environment	0.52	0.61	0.72	0.73	0.65	0.45	0.26	0.57	0.63	0.52	0.71	0.67	0.57	0.07	0.69
Using creativity	0.56	0.54	0.50	0.53	0.75	0.47	0.52	0.56	0.79	0.54	0.84	0.76	0.63	0.46	0.67
Encouraging employee creativity	0.67	0.70	0.56	0.64	0.68	0.58	0.45	0.56	0.73	0.54	0.77	0.69	0.65	0.28	0.65
Stimulating team performance	0.53	0.61	0.73	0.65	0.65	0.37	0.45	0.58	0.68	0.62	0.71	0.57	0.68	0.07	0.72
Taking initiative	0.37	0.47	0.37	0.42	0.54	0.52	0.55	0.31	0.45	0.44	0.50	0.28	0.53	0.27	0.45

Table 7. Correlation matrix of relationship between variables part 2

	Statistical quality control	Monitored improvements	Management skills and experience	Experience to make CI	Improving quality of work	Standardization	Effective leadership	Taking a leadership role	Building mutual trust	Workplace safety	Working environment	Using creativity	Encouraging employee creativity	Stimulating team performance	Taking initiative
Understandable decisions															
Introducing objectives and plans															
Qualification raise															
Comprehensive training															
Involvement of everyone															
Given resources															
Effective communication															
Responsibility for communication															
Inspiration from organization															
Clear path of career															
Goal-oriented thinking															
Understanding target markets															
Management support															
Desire to change															
Open minded culture															
Statistical quality control	1														
Monitored improvements	0.62	1													
Management skills and experience	0.64	0.78	1												
Experience to make CI	0.64	0.61	0.75	1											
Improving quality of work	0.67	0.68	0.77	0.81	1										
Standardization	0.84	0.62	0.70	0.59	0.77	1									
Effective leadership	0.83	0.80	0.82	0.73	0.76	0.82	1								
Taking a leadership role	0.54	0.57	0.63	0.78	0.79	0.46	0.66	1							
Building mutual trust	0.68	0.59	0.67	0.77	0.85	0.65	0.77	0.76	1						
Workplace safety	0.53	0.43	0.37	0.20	0.15	0.42	0.53	0.05	0.18	1					
Working environment	0.54	0.56	0.69	0.78	0.80	0.57	0.65	0.66	0.67	0.33	1				
Using creativity	0.40	0.56	0.57	0.70	0.78	0.42	0.52	0.67	0.74	–0.15	0.66	1			
Encouraging employee creativity	0.38	0.64	0.64	0.72	0.67	0.42	0.56	0.56	0.61	0.09	0.68	0.82	1		
Stimulating team performance	0.64	0.62	0.77	0.77	0.74	0.63	0.81	0.64	0.78	0.25	0.63	0.61	0.71	1	
Taking initiative	0.38	0.22	0.35	0.47	0.56	0.32	0.42	0.47	0.55	0.16	0.52	0.47	0.40	0.40	1

everything works. Also, experience to make continuous improvement encourages the growth of mutual trust, open minded culture and goal-oriented thinking. An increased mutual trust could be caused by simply seeing continuous improvements. Growth of an open minded culture might be caused by developing the dynamics of national culture. Improved goal-oriented thinking could be caused by monitoring the proposed improvements.

6. Analysis of Kaizen implementation opportunities

This section analyzes the results obtained from the questionnaire by assigning statements to their key success factors. Gotten results from overall distribution among companies generate the practical model of Kaizen key success factors.

A little earlier it was said that most literature points out certain factors that a company must have in order to successfully implement a continuous improvement Kaizen system which was taken from the 24 different sources. According to a list of the key success factors statements from survey results (see Figures 34 and 35) has been assigned to each factor in the same category. The chart was created to show final results (see Figure 36).

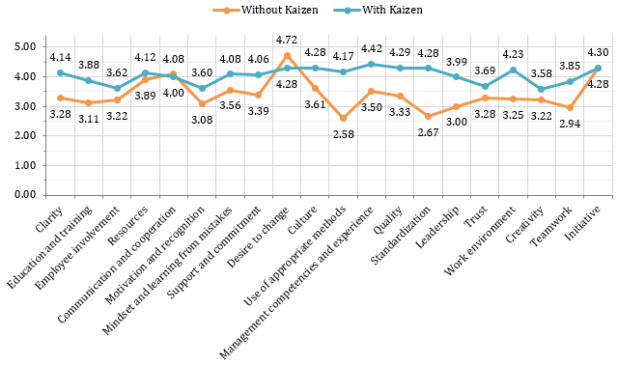

Figure 36. Overall distribution according to KSF among companies

From the chart, it is seen that the lowest and the highest scores are detected from companies without Kaizen. The lowest score (2.58) was detected in the key success factor of the use of appropriate methods and the highest score (4.72) was detected in the key success factor of desire to change. In the case of companies with Kaizen much less pronounced fluctuations between KSF are observed. The lowest seen value is 3.58 in key success factor of creativity and the highest seen value is 4.42 in the key success factor of management competencies and experience.

According to the chart a list of factors in descending order of importance according to a difference from companies with Kaizen results are such:

1. Standardization (1.61).
2. Use of appropriate methods (1.59).
3. Leadership (0.99).
4. Work environment (0.98).
5. Quality (0.96).
6. Management competences and experience (0.92).
7. Teamwork (0.90).
8. Clarity (0.86).
9. Education and training (0.76).
10. Support and commitment (0.67).
11. Culture (0.67).
12. Mindset and learning from mistakes (0.53).
13. Motivation and recognition (0.52).
14. Trust (0.41).
15. Employee involvement (0.40).
16. Creativity (0.36).
17. Resources (0.23).
18. Initiative (0.02).
19. Communication and cooperation (–0.08).
20. Desire to change (–0.44).

In general, the list consists of a practical model according to the results of the companies that participated in the questionnaire. The list shows the weakest points of companies that don't have implemented Kaizen into their organization.

7. Model of Kaizen successful implementation

In this section comparison between theoretical and practical models is made and the most appropriate model to increase opportunities of Kaizen implementation is created according to survey results and literature analysis.

The Table 8 shows the comparison of the theoretical and practical model.

Table 8. Theoretical and practical model comparison

Theoretical model		Key success factor	Practical model	
Quotation	Place		Place	Difference value
14	1–3	Clarity	8	0.86
14	1–3	Education and training	9	0.76
14	1–3	Employee involvement	15	0.40
12	4	Resources	17	0.23
11	5–6	Communication and cooperation	19	–0.08
11	5–6	Motivation and recognition	13	0.52
10	7–8	Mindset and learning from mistakes	12	0.53
10	7–8	Support and commitment	10	0.67
9	9	Desire to change	20	–0.44
7	10–11	Culture	11	0.67
7	10–11	Use of appropriate methods	2	1.59
6	12–14	Management competencies and experience	6	0.92
6	12–14	Quality	5	0.96
6	12–14	Standardization	1	1.61
5	15–17	Leadership	3	0.99
5	15–17	Trust	14	0.41
5	15–17	Work environment	4	0.98
4	18–19	Creativity	16	0.36
4	18–19	Teamwork	7	0.90
3	20	Initiative	18	0.02

Before starting the research, a theoretical model was created by several quotations from literature sources on the list. In the theoretical model, the most important key success factors were those which were the most often used in literature sources. While in the practical model the most important key success factors were those which had the biggest difference.

A comparison shows that the most important key success factors in theoretical and practical models are different. A practical model shows that companies that don't have Kaizen is has a strong base for at least the top 10 factors from the theoretical model. For example, employee involvement which is ranked the 1st-3rd in the theoretical model according to importance in the practical model it is ranked only 15th. It means that companies have achieved an adequate level on this success factor and they need to concentrate on different ones like standardization which is ranked 1st in the practical model but 12th-14th in the theoretical model.

Table 9. The influence of factors on increasing opportunities to implement Kaizen

Key success factor	Difference	Expressed difference, %
Standardization	1.61	12.52
Use of appropriate methods	1.59	12.36
Leadership	0.99	7.70
Work environment	0.98	7.62
Quality	0.96	7.47
Management competencies and experience	0.92	7.15
Teamwork	0.90	7.00
Clarity	0.86	6.69
Education and training	0.76	5.91
Support and commitment	0.67	5.21
Culture	0.67	5.21
Mindset and learning from mistakes	0.53	4.12
Motivation and recognition	0.52	4.04
Trust	0.41	3.19
Employee involvement	0.40	3.11
Creativity	0.36	2.80
Resources	0.23	1.79
Initiative	0.02	0.16
Communication and cooperation	–0.08	–0.62
Desire to change	–0.44	–3.42
Total	12.86	100.00

According to literature analysis and analysis of the questionnaire results, the model of recommendations is made to create the best opportunities for implementing Kaizen at analyzed companies. Calculations are made for the influence of factors in increasing opportunities to implement Kaizen (see Table 9). It is assumed that all key success factors are required to implement Kaizen. The expression of difference is computed to percentage values which makes easier to understand how much the relevant key success factor influence has.

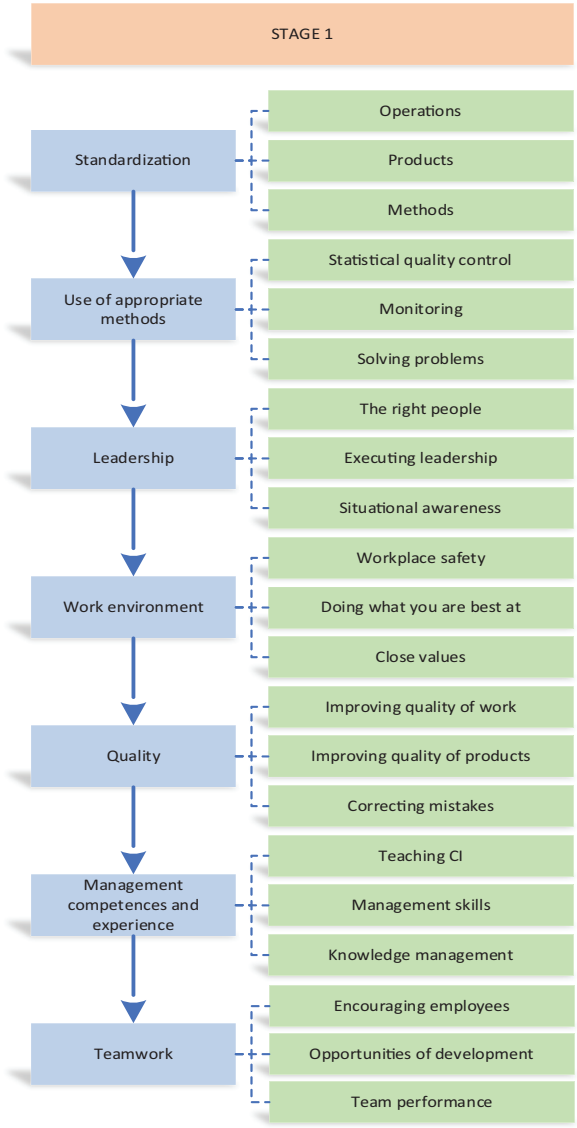

Figure 37. First stage – Mandatory improvements

According to the importance of key success factors, the final model is created and it consists of 2 stages of categories and assigned actions (see Figures 37 and 38). The diagram below (see Figure 37) shows the first stage of a model which consists of mandatory improvements to increase opportunities to implement continuous improvement philosophy. Suggested actions to achieve progress are assigned to specific categories that were analyzed in the literature and questionnaire. The first stage consists of key success factors that have the biggest calculated impact (from 7.00% to 12.52%).

It is recommended to start the process from the top (standardization) because it has the biggest impact to increase opportunities and succeed, and finish the stage by improving teamwork. Each category has 3 the most important actions according to literature and surveys analysis. To achieve standardization, it is necessary to concentrate on the most important operations, products and methods. Keeping track of what tools need to be used in

the process, what products have similar constructions or design and put everything in the paper it is a must. To achieve key success factors of the use of appropriate methods it is needed to use statistical quality control to provide close up views of what is happening to process at a specific moment. In the beginning, creating a formal process on how to solve problems and monitoring those improvements would help.

To increase leadership, it is recommended to find people in the company who could lead to the goals and execute leadership within the company but not only by the top management. To improve the work environment the most important is to increase workplace safety and allow doing what employees do the best where they have greater skills or experience. Trying to bring organization values closer to employees' values ensures a good understanding between management and shop floor. To achieve better quality, it is recommended to measure products more often, discuss with employees each quality issue that occurred and get into the root cause and correct mistakes the moment they're found. To improve management competences and experience the most important to teach managers how to manage continuous improvement to increase knowledge and prepare for Kaizen implementation. New challenges arise every day that require new knowledge to solve. To achieve better teamwork the recommendations are that the company has to encourage employees to work together and collaborate when problems occur. Maximize team performance by sharing opportunities for development.

The next diagram (see Figure 38) shows the second stage of a model which consists of recommended improvements to increase opportunities on implementing continuous improvement philosophy. Suggested actions to achieve progress are assigned to specific categories that were analyzed in the literature and questionnaire. The second stage consists of key success factors that have the biggest calculated impact (from 1.79% to 6.69%). It is recommended to start stage 2 by concentrating on clarity first and finish actions with resources.

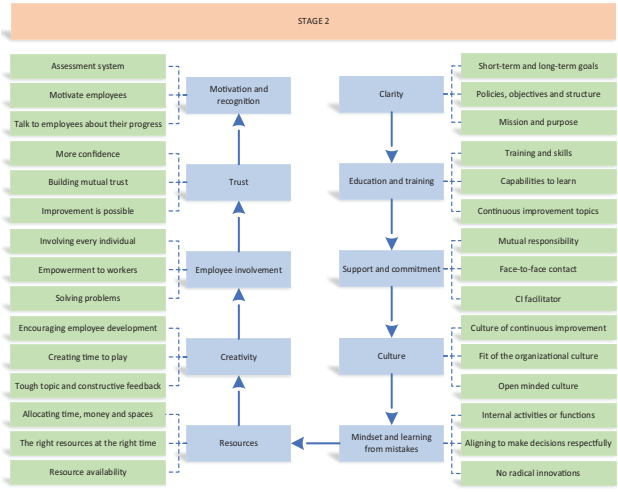

Figure 38. The second stage – Recommended improvements

To achieve clarity, it is significant to form short-term and long-term goals, establish policies, objectives, and structure. The company's decisions and strategic path must be understandable to everyone in the workplace. Education and training are also important pieces of stage 2. Adequate training must be provided and the capabilities to learn and improve the activities indecently must be developed. It is highly recommended to train on continuous improvement topics. By talking about support and commitment take the responsibility and do best to build mutual trust and mutual responsibility, use a lot of face-to-face contact with shop floor employees. It is necessary to find the facilitator to support the continuous improvement program. Another important key success factor is a culture that can be achieved by developing a culture of continuous improvement that is open minded. To succeed it is a must to fit the organizational culture to the Kaizen culture. Mindset and learning from mistakes can be achieved by focusing on internal activities, functions or operations. It is necessary to align every employee to make decisions respectfully. The most important is to forget the ideas of radical innovation contracts to the philosophy of continuous improvement. Motivation and recognition can be achieved by implementing the assessment system, motivating employees to participate in the events or simply talking to the employees about their progress. A trust can be achieved by taking responsibility and doing the best to build mutual trust. To use a continuous improvement system, it is important to be more confident in new product development and have more sureness that improvement is possible. Another factor that is employee involvement can be achieved by involving every individual in the improvement process and giving empowerment to workers to identify or solve problems in the workplace. It is necessary to solve problems by involving people. Creativity can be achieved by encouraging employees' development, tackling difficult topics and giving constructive feedback. It is also important to create time to play to stimulate creativity. The last one is a resource that can be achieved by allocating resources (time, money and spaces) to the right practices at the right time and increased resource availability.

In total, the model consists of 17 key success factors from which 7 is mandatory and 10 is recommended to achieve. According to the influence of factors on increasing opportunities to implement Kaizen 3 key success factors aren't included. The reason is that analyzed companies already had adequate results in the initiation, communication and cooperation, and desire to change.

Conclusions and recommendations

Kaizen is a systematic and long-term action aimed at accumulating improvements and savings in order to beat the competition in terms of quality, productivity, costs, and delivery times which has simply meaning of changing to reach the right state.

Main benefits what companies can achieve from continuous improvement system are reduced waste by 30–90%, improved utilization of operating space by approximately 50%, reduced process time by 40–80%, increased productivity by 20–60%, improved employee skills, and communication between departments.

Analysis of the literature from 24 references generated 20 Kaizen key success factors each of which consisted of 5 statements therefore with the help of the expertise the most suitable 30 statements were selected to detect key success factors.

The research revealed that the larger part (57%) of the surveyed companies already have implemented the Kaizen system which shows a satisfactory result of the overall picture of the industrial field.

Analysis of the study results was performed according to a comparison between companies with or without continuous improvement philosophy implemented which showed that companies which have Kaizen bigger difference (from 0.52 to 1.61 points) were in 13 key success factors than rest of the enterprises, in 5 slightly bigger (from 0.02 to 0.41 points), and 2 – lower (from 0.08 to 0.44 points).

The most correlative variables were goal-oriented thinking (21 correlations), improving quality of work (17 correlations) and experience to make a continuous improvement (15 correlations) which shows a strong relationship between mindset and learning from mistakes, quality, and management competencies and experience key success factors.

Overall distribution according to key success factors among companies showed that generally all investigated organizations have already achieved the level of desire to change and initiative success factors to implement continuous improvement philosophy because the respondents from companies without Kaizen were likely agreed more than companies with Kaizen that they take initiative to improve working conditions and don't mind if there are changes in the company which means that the entire concentration should mature into the rest of key success factors.

Results showed the difference between overall distribution that companies without Kaizen were often lacking standardization (1.61), use of appropriate methods (1.59), leadership (0.99), good work environment (0.98) and quality (0.96).

By comparing the results between different size companies, the tendency is seen that the bigger company is the better results it shows where small companies in total achieve 2.73 total average score, medium companies – 3.63, and large companies – 3.77.

According to survey results, the model was created on increasing opportunities to implement Kaizen in which most notable key success factors and recommended actions to achieve them have shown that it is needed to prioritize to key success factors of standardization (12.52% impact), use of appropriate methods (12.36% impact), leadership (7.70% impact), work environment (7.62% impact), quality (7.47% impact), management competences and experience (7.15% impact), and teamwork (7.00% impact):

- To achieve standardization in the beginning concentrate on the most important operations, products and methods. Keep track of what tools need to be used in the process, what products have similar constructions or design and put everything in the paper to have the start of standardization.
- To achieve key success factor of the use of appropriate methods try to use statistical quality control to provide close up views of what is happening to process at a specific moment. In the beginning, creating a formal process on how to solve problems and monitoring those improvements would help.
- To increase leadership, it is recommended to find people in the company who could lead to the goals and execute leadership within the company but not only by the top management.
- To improve the work environment the most important to increase workplace safety and allow doing what employees do the best where they have greater skills or experience. Try to bring organization values closer to employees values to ensure good understanding between management and shop floor.
- To achieve better quality it is recommended to measure product more often, discuss with employees each quality issue that occurred and get into the root cause and correct mistakes the moment they're found.
- To improve management competences and experience the most important to teach managers how to manage continuous improvement to increase knowledge and prepare for Kaizen implementation. New challenges arise every day that require new knowledge to solve.
- To achieve better teamwork the recommendations are that the company has to encourage employees to work together and collaborate when problems occur. Maximize team performance by sharing opportunities for development.

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„KAIZEN“ DIEGIMO PRAMONĖS ĮMONĖSE GALIMYBIŲ TYRIMAS

D. Verbickas

Santrauka

Straipsnyje nagrinėjamos „Kaizen“ diegimo galimybės Lietuvos pramonės įmonėse. Atlikta „Kaizen“ mokslinės literatūros analizė sugeneravo pagrindinius sėkmės veiksnius, siekiant įdiegti „Kaizen“ metodologiją. Apžvelgta Lietuvos pramonė ir išanalizuotas jos ryšys su pagrindiniais sėkmės veiksniais, atlikta anketinė apklausa, kuri sudaro empirinio tyrimo pagrindą. Darbe pateikti apklaustų įmonių rezultatai atskleidžia, kokiems pagrindiniams sėkmės veiksniams reikia skirti daugiau dėmesio, kurie yra svarbiausi norint padidinti „Kaizen“ diegimo galimybes. Remiantis tyrimo rezultatais parengtas ir pateiktas modelis sėkmingam „Kaizen“ diegimui pramonės įmonėse, pateiktos išvados ir pasiūlymai.

Reikšminiai žodžiai: „Kaizen“, nuolatinis tobulinimas, veiksnių analizė, diegimo galimybės, pramonė, pagrindiniai sėkmės rodikliai.