

**Czech University of Life Sciences in Prague**  
**Faculty of Economics and Management**  
**Department of Management**



**Bachelor Thesis**

**Theory of Kaizen Philosophy and its application in a Construction  
Business**

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**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**  
Department of Management  
Faculty of Economics and Management

**BACHELOR THESIS ASSIGNMENT**

Kabduyeva Gulden

Agricultural Economics and Management

Thesis title

**Theory of Kaizen Philosophy and its application in a Construction Business**

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**Objectives of thesis**

- to understand the Japanese system of continuous improvement such as Kaizen concept;
- to explore how continuous improvement tools can be transferred from manufacturing sector to a construction company through a comparison between Japanese transnational company "Toyota" and Highwill Astana (Dongil Construction);
- to establish a blueprint for the strategic implementation of continuous improvement in construction organizations, in particular, Highwill Astana;
- to assess and evaluate the knowledge and perceptions of managers at different levels to the strategic needs and success of continuous improvement tools in the construction industry.

**Methodology**

Empirical data will be obtained through the self-completed questionnaires that will be distributed to the target population. This method will allow respondents to maintain complete anonymity. This investigation has the following features:

- The sample comprises various levels of managers from organisations
- The questionnaire will be based on information gained during the literature study.
- The questionnaire ascertains respondents' understanding of the current continuous improvement tools.
- The questionnaire will be statistically evaluated in order to ascertain the degree of acceptance for each statement.
- Conclusions and recommendations will be made as to the appropriateness of continuous improvement principles to organisation.

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- Literature review to be completed by November 2012
- Questionnaire to be distributed and returned by mid December 2012
- Questionnaire to be analysed and deductions made by January 4th 2013
- Practical part to be completed by end January 2013
- Remainder of thesis to be completed by end February 2013
- Thesis to be handed in by 15th March 2013

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Kaizen, change, construction company, quality control, process-oriented management.

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Imai, M. 1986. Kaizen. The key to Japan's Competitive Success. 1st edition. USA: McGraw-Hill.

Handy, C. 1999. Understanding Organisations. 4th edition. England: Clays Ltd, St Ives plc.

Chang, H. J. 2008. Bad Samaritans. The guilty secrets of rich nations and threat to global prosperity. London: Random House Business books.

The Productivity Press Development Team, a division of the Kraus Organisation. 2002. Kaizen for the shopfloor. New York: Productivity Press.

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#### DECLARATION

I hereby declare that I have worked on my Bachelor thesis titled “THEORY OF KAIZEN PHILOSOPHY AND ITS APPLICATION IN A CONSTRUCTION BUSINESS” solely and completely on my own and that I have marked all quotations in the text. And I have used only the sources mentioned at the end of the thesis.

In Prague on 15<sup>th</sup> of March 2013

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Gulden Kabduyeva

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# Teorie Filosofie Kaizen a její Využití ve Stavebnictví

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## Theory of Kaizen Philosophy and its Application in a Construction Business

### Summary

This paper aims to show that Kaizen can be applied to any type of business, particularly in Construction Company. Also it shows how decisions made in business are enforced and made depending on Kaizen-oriented management. This study assesses and evaluates the knowledge and perceptions of managers at different levels of an organization to the strategic needs and success of continuous improvement tools. The analysis is based on Kaizen activities in “Toyota” car manufacturing company. This helps to establish a blueprint for the strategic implementation of this concept.

The Methodology of this thesis is based on “Snowball” sampling, which includes both qualitative and quantitative designs. The empirical data is obtained through the self-completed questionnaires and telephonic call.

The use of case study of Korean-Kazakh Construction Company “Highvill” puts into place the actual outcome of how Kaizen philosophy can be implemented and managed. Based on findings from a research done and my knowledge, the recommendations and conclusion of this thesis are formulated.

**Key words:** construction business, Five S, Gemba, Kaizen, Kazakhstan, Muda, process-oriented management, quality management, strategic planning.

## Souhrn

Tato bakalářská práce si klade za cíl, že filosofie Kaizen může být využita pro všechny oblasti podnikání, zejména ve stavební společnosti. Také se zaměřuje na to, jak jsou daná rozhodnutí uplatňována při aplikaci Kaizen filosofie v rámci řízení společnosti. Posuzuje a hodnotí znalosti a vnímání manažerů na různých úrovních v organizaci ke strategickým potřebám a úspěšnosti trvalého zlepšování nástrojů. Analýza je založena na činnostech využívající Kaizen filosofii v automobilové společnosti Toyota. Následně je vytvořen plán strategické implementace tohoto konceptu.

Metodologie bakalářské práce využívá metodu tzv. nabalování sněhové koule (Snowball sampling). Empirická data jsou získána jak kvalitativním výzkumem pomocí telefonického rozhovoru, tak kvantitativním výzkumem pomocí dotazníkového šetření.

Použití případové studie korejsko-kazašské stavební společnosti Highvill staví namísto aktuálního výsledku to, jak může být filosofie Kaizen řízena a implementována. Na základě teoretických znalostí a zjištěných poznatků z provedeného výzkumu je formulováno doporučení a závěr této práce.

**Klíčová slova:** Klíčová slova: Gemba, Kaizen, Kazachstán, Muda, pět S, procesně orientované řízení, řízení kvality, stavebnictví, strategické plánování.

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# 1 INTRODUCTION

The economic “miracle” in Japan was like a wake-up call for other developing countries. The change of national policy for the development of transport and communication technologies was made. The international trade and investment increased dramatically. For this reason it would be appropriate to give an example cited by Ha-Joon Chang in his book “Bad Samaritans”<sup>1</sup>. This example will explain the uniqueness of Japanese management system Kaizen as a whole.

Once a car manufacturing company of developing country exported its cars to the United States of America. The company was small and it only made shoddy products. The car from that developing country was not successful in the United States. Everyone said that there was no future for the company. The year was 1958 and the country was Japan. The company’s name was “Toyota”. This company moved to car production in 1933 but before they have been producing textile machinery. Now, Toyota is one of the well-known organizations in the World.

How did the company achieve this success? The first reason was, of course, Japanese Government financial support. The second reason was the most well-known practical application of Kaizen concept had been developed for the Japanese Corporation “Toyota”. It lies at the basis of quality management and includes measures to prevent waste, supports innovation and work with the new standards. The father of Kaizen philosophy, Masaaki Imai, said in his lectures that “Toyota” is the first company, which have started to use continuous improvement tools and achieved success not only in Japan but also in the rest of the World. There is a main inference; Kaizen philosophy and fast-growing economy of Japan are closely interrelated with each other. Imai also emphasized that many companies in the country implemented this method after the “Toyota” Company’s success. He started a research concerning Japanese economic “miracle”. Mr. Imai picked the companies in the United States for better understanding and analyzing, because “cognition comes through comparison”. There were the following findings and results: almost all Japanese companies use

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<sup>1</sup>Chang, H., J., Bad Samaritans: The guilty secrets of rich nations and threat to globalprosperity, London, Random House, 2008, ISBN: 9781905211371, page 23

similar management tools, which are different from Western organizations. He used Japanese term Kaizen to describe those tools and make a distinction from Western approaches. Hence, the author proved that Kaizen is one of the key instruments of fast industrialization of Japan.

Kaizen is a Japanese word and stands for “Continuous Improvement” and should be not get confused with the word “Change”. This paperwork will introduce with this unique philosophy and explain the main difference between those two terms, which were mentioned above, in more detail. Kaizen includes very important approaches such as, Quality Management, Five S, Gemba and it is a part of strategic planning in any type of organization. All of these tools will be introduced in this work.

Nowadays, Kaizen is used or implemented in many countries after recognizing its positive results. Hence, it would be appropriate to analyze how it works in a company outside Japan and test. For this reason, a construction organization “Highvill” in Kazakhstan was selected. It would be interesting how Kaizen and its tools work in construction business and it will give some incentives for further study of how the construction sector in Kazakhstan can be improved using this philosophy. A headquarter of selected company is situated in South Korea but the branch was opened in Astana, the capital of Kazakhstan. The main research of this work was conducted in that branch of the organization. The company operates successfully many years on construction market in Kazakhstan. This business uses some tools of Kaizen, which makes the research easier and appropriate to conduct it.

This paperwork will go through explanation of Kaizen concept and other tools of continuous improvement. After the theoretical overview of important key instruments, the research will be presented. The analyzing of the research will be made according to the literature overview of this work. The “Snowball sampling” of questionnaire was chosen for this type of research, which was distributed to targeted demographic group.

The last chapter will present the findings, which will be also discussed later on. As the result, the strategic implementation and recommendations will be proposed for generating the level of corporate culture and company’s internal and external environments.

## **2 OBJECTIVES AND METHODOLOGY**

This chapter will introduce the main goals of the study and the methods used for a research conducted.

### **2.1. OBJECTIVES OF STUDY**

The main objectives of this bachelor thesis are:

-to understand the Japanese system of continuous improvement such as Kaizen concept;

-to explore how continuous improvement tools can be transferred from manufacturing sector to a construction company through a comparison between Japanese Transnational Company “Toyota” and “Highwill Astana” (Dongil Construction);

-to establish a blueprint for the strategic implementation of continuous improvement in construction organizations, in particular, “Highwill Astana”;

-to assess and evaluate the knowledge and perceptions of managers at different levels to the strategic needs and success of continuous improvement tools in the construction industry.

### **2.2. RESEARCH QUESTION**

Companies in Kazakhstan companies have started to implement it 10 years ago and now it has good results. The primary question is: Which techniques of Continuous Improvement are used in construction company Highwill Astana? The secondary question is: How effectively the Kaizen concept can be implemented to such company? And the last question: Is it possible to transfer methods, which used in car manufacturing companies to that company?

### **2.3. THE IMPORTANCE OF STUDY**

Kaizen process - it is not only the study of new methods and tools, but also some form of cooperation. There are more self-organization in place with talent, more personal responsibility of all participants, the more potential for innovation in the enterprise.

Along with professional and methodological competence, success depends on social competence of managers. The process of changing attitudes is a "top-down" and the best guarantee of success through continuous improvement is a leading management model.

### **2.4. METHODOLOGY**

Empirical data will be obtained through the self-completed questionnaires that will be distributed to the target population. This method will allow respondents to maintain complete anonymity. This investigation has the following features:

- a. The sample comprises various levels of managers from organizations as detailed in the delimitations of the research.
- b. The questionnaire is based on information gained during the literature study.
- c. The questionnaire comprises three sections. The first part ascertains respondents' understanding of the continuous improvement tools that are currently available. The second part consisted of close-ended questions using 5-point Likert-scale options. The final section helps to ascertain the demographics of the respondents and their managerial level in the organization.
- d. The questionnaire will be statistically evaluated in order to ascertain the degree of acceptance for each statement.
- e. Conclusions and recommendations will be made as to the appropriateness of continuous improvement principles to organization.

## **3 LITERATURE REVIEW**

### **3.1. INTRODUCTION**

For the first time Kaizen philosophy had been applied in a number of Japanese companies in the recovery period after the Second World War and since had been spread around the World. In Japanese language, the word "Kai" means "Change" and "Zen" means "Good", which both stand for "Continuous Improvement." On the basis of this strategy, everything is involved in the process of improving - from managers to workers, and its implementation requires relatively small expenditure.

This chapter is the overview of the main definitions, issues and concepts of the continuous improvement that were brought by the different authors. It provides theoretical basis, which will help for transferring it from "Toyota" Company and implementing the concept of Kaizen to the Construction Company "Highwill". Also, this chapter brings the theoretical overview of Kaizen philosophy and two approaches of understanding the word "Change", such as Western and Japanese.

### **3.2. KAIZEN AND ITS DEVELOPMENT**

Every company desires to maximize their profit and to be successful. For such goals, the management should develop and implement its own strategic tools. There are different aspects for creating such instruments. We can divide cultural approach into traditional, Western and Eastern or it can be, even, a company's own style for developing and using strategic planning. One of those techniques is Kaizen. It could be said - Kaizen method or, even, Kaizen philosophy, which is successfully used as a quality management approach. The term Kaizen, first, was developed and introduced to the world by Masaaki Imai, the consultant in a field of quality management, and that

term means “ongoing improvement involving everyone - top management, managers, and workers”.<sup>2</sup>

In his book, “KAIZEN. The key to Japan’s Competitive Success”, he describes how Japanese companies had a fast development using that method over the years. The author mentions five phases of adaptation before Japan became a world economic power. Those phases are listed in his book:<sup>3</sup>

-Large-scale absorption of technology imported from the United States and Europe;

-A productivity drive of hitherto unseen dimensions;

-A country-wide quality improvement program inspired by the ideas of Dr. Deming and Dr. Juran of the United States;

-A great degree of manufacturing flexibility;

-Multinationality.

After overcoming all these phases, or even it can be said “barriers”, Japanese industries are now mostly interested in flexible manufacturing technologies, which are expanding to other branches of human life.

“Successful Japanese companies have been up until now, the real challenge they continue to face lies in becoming truly multinational. There is a problem in doing business in a sense of global scale. However, Japanese top management has to understand that one of the yardsticks used to measure their managerial qualities will be the degree to which they consider the world, including their home country”.<sup>4</sup> The main problem is that it is coming from history and still they are isolated from the rest of the World. But Kaizen tools can be implemented to any business and in any country. Let us, at first, deeply understand the difference between a management, which uses Kaizen system and the traditional one. The Table 1 shows the main approaches of different aspects in these two management systems.

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<sup>2</sup>Imai, M., Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN:0-07-554332-X, p. xxix

<sup>3</sup> Imai, M., Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN:0-07-554332-X, p. xxix

<sup>4</sup>Imai, M., Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN:0-07-554332-X, pp. xxvii-xxviii

*Table 1. Approaches to Traditional and Kaizen Management Concepts*

| Approach to         | Traditional Management | Kaizen Management |
|---------------------|------------------------|-------------------|
| Employees           | Cost                   | Asset             |
| Managerial belief   | Routine                | Change            |
| Management function | Control                | Supportive        |
| Information         | Restricted             | Shared            |

(Source: Imai, M., *Kaizen: The Key to Japan's Competitive Success*, 1<sup>st</sup>ed, NY, McGraw, 1986. Own illustration)

The Table above shows the both systems' concern to internal environment. Traditional management works as the relationship of boss and subordinate. The work in such system is more individualistic and the person is restricted in many aspects. The result for Kaizen-oriented management is more collectivistic. They always support their employees and everyone in the organization plays important role. The company is always improving and information is shared. Such company is more process-oriented. Once, there were showed the clear boundaries between Kaizen-oriented and traditional management approaches, it is important to understand the nature of Kaizen.

**a. The Concept of Kaizen.**

Kaizen strategy is very important management system and it is used for successful development of Japanese companies. "In Japan, many systems have been developed to make management and workers KAIZEN-conscious".<sup>5</sup> Also it helps to understand differences between Western and Japanese approaches of management. So, there is a main difference between process-oriented Kaizen and the West, which is more oriented on results and innovation.

Kaizen stands behind Japan's postwar "economic miracle" and it got together "uniquely Japanese" management practices.<sup>6</sup>

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<sup>5</sup>Imai, M., *Kaizen: The Key to Japan's Competitive Success*, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN: 0-07-554332-X, p. xxix

<sup>6</sup>KJC News, Masaaki Imai, Almaty, Spring, 2010. <http://www.kjc.kz/papers/kjcnews>. pp. 3-4



Hence, Kaizen became an “umbrella” concept for such practices. The Figure 1 below shows the most important tools in Kaizen.

*Figure 1. Kaizen instruments*



(Source: Imai, M., *Kaizen: The Key to Japan's Competitive Success*, 1st ed, NY, McGraw-Hill, 1986. Own illustration)

Kaizen and its techniques support the philosophy of everyday improvement in any organization. It directly connected to Japanese mentality. But there were some additional inserts in 1950s-1960s by the Western experts, such as W.E. Deming and J. M. Juran.

### **b. Kaizen and Management.**

Japanese management has two main components: improvement and maintenance. Imai explains this two terms as follow: “Maintenance refers to activities directed toward maintaining current technological, managerial, and operating standards;

improvement refers to those directed toward improving current standards”.<sup>7</sup> For this reason, management has to establish those standards and see how everybody in organization will follow it. In case if people in an organization cannot fulfill the tasks, then management has to revise the standards and provide with trainings for the employees.

*Table 2: Japanese Perceptions of Job function*

|                   |  |
|-------------------|--|
| Top Management    |  |
| Middle Management |  |
| Supervisors       |  |
| Workers           |  |

(Source: Imai, M., Kaizen: The Key to Japan's Competitive Success, 1st ed, NY, McGraw-Hill, 1986, page 5)

The higher levels of Management are more concerned with improvement. However, the bottom level workers with the experience begin to think about improvement as well. Employees start to contribute to improvements, either through individual or group suggestions. Hence, everybody in organization has to think about maintenance and improvement.

### **3.3. OVERVIEW OF KAIZEN TOOLS**

In this section, the philosophies and concepts are reviewed, and the information was derived from different sources. Some authors stick with the same school of thought with respect to their concepts, but in a number of cases, authors differ with respect to their interpretations of the concepts and express different approaches.

All of these concepts and tools, which were mentioned in this chapter, are very important for building Kaizen-conscious system in any type of business.

<sup>7</sup>Imai, M., Kaizen: The Key to Japan's Competitive Success, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN: 0-07-554332-X, p. 5

### 3.3.1 TOTAL QUALITY MANAGEMENT

“TQM is about a doing the things right.”<sup>8</sup> The outcome of TQM should be effective and efficient. Many companies pursue the philosophy under their own brand name. In the book “Toyota way” the author gives another definition of total quality management: “TQM is a beautiful philosophy that puts customers first and strives to perfect process to deliver what the customers need when they want it....”<sup>9</sup>

TQM is a part of strategic planning and it focuses on the needs of its customers. It accepts only the excellence. TQM is strategic approach for achieving long-term quality, which meets the wants and needs of the customers.

Masaaki Imai gives his own definition of Total Quality Management and emphasizes the term TQC (Total Quality Control): “Organized Kaizen activities involving everyone in a company-managers and workers- in a totally integrated effort toward improving performance at every level. It assumed these activities lead to increased customer satisfaction”<sup>10</sup>

The TQM was, also, identified by W. Edwards Deming (1950) and he concentrates on TQM as a culture of management in organization, which uses quality control. Deming considers 14 points that are very important for TQM:

1. Create consistency of purpose.
2. Adopt new philosophy.
3. Cease dependence on inspection.
4. End awarding business on price.
5. Improve consistently in the system of production and service.
6. Institute training on the job.
7. Institute leadership.
8. Drive out fear.

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<sup>8</sup>Sallis, E., Total Quality Management in Education, 3<sup>rd</sup> ed, London, Kogan Page, 2005, ISBN: 0-203-44325-X, pp. 2-3

<sup>9</sup>Liker, J., K., The Toyota way: 14 Management Principles from the World’s Greatest Manufacturer, NY, McGraw-Hill, 2004, ISBN: 0071392319, p. 18

<sup>10</sup>Imai, M., Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw, 1986, ISBN:0-07-554332-X, p. xxv

9. Breakdown barriers between departments.
10. Eliminate slogans and exhortations.
11. Eliminate quotas or work standards.
12. Give people pride in their jobs.
13. Institute education and self-improvement program.
14. Put everyone to work to accomplish it.<sup>11</sup>

Japanese quality control is different comparing with western approaches because it deals with quality of people. There is a need in training to become Kaizen-conscious. For that reason, they must be aware in problem-solving. Once the problem has been solved, the result must be standardized to prevent duplication. As the result, Kaizen can be achieved by continuous cycle where people become Kaizen-conscious in their work.

Imai (1986) and Liker (2003) also introduce with certain key phrases that was developed and quoted among TQC practitioners in Japan. There are some of them:

1). Speak with data. TQC pays attention to facts and data. It also includes the system of data collection and evaluation.

2). Quality first, not profit first. It means that if you care about the quality, there will be no additional problems with profit. The important elements are safety, quality, employee morale, quantity, delivery and cost.

3). Manage the previous process- the finding the real cause of the problem. The real cause of the problem can be solved by asking “why” not once but five times.

4). The next process is the customer. The customers are not only those in marketplace who purchase the final product but also the people in the next process who receive work from them.

5). Customer-oriented TQC, not manufacturer-oriented TQC. TQC is customer-oriented activity and it emphasize on building quality into the product by developing and designing products that meet customer requirements.

6). TQC starts with training and ends with training. The TQC concept of building quality into people results in all-our efforts for training managers and workers.

7). Cross-functional management to facilitate Kaizen. Strengthening the horizontal and vertical relations among different organizational levels.

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<sup>11</sup> The Deming System of Profound Knowledge. <http://deming.org/index.cfm?content=66>

8). Follow the PDCA Cycle. PDCA cycle stands for Plan, Do, Check, Action. The best Japanese companies use this technique. The concept was introduced by Walter Shewhart in his book about quality control in 1939. In Japan, it was firstly thought to “Toyota” by Dr. W. Edwards Deming.<sup>12</sup> According to Imai (1986): “To arrive at better quality that satisfies customers, the four stages are needed to be rotated constantly and the quality as the top priority”. Later, this concept was extended to all phases of management. Japanese executives slightly changed the Deming wheel and called it the PDCA cycle. As the result, revised PDCA cycle became a series of activities needed for the improvement. The Figure 2 shows how this cycle works in Management system.

*Figure 2. PDCA Cycle*



(Source: Imai, M., Kaizen: The Key to Japan's Competitive Success, 1st ed, NY, McGraw-Hill, 1986, page 61)

The Figure 2 above shows that four stages of Deming wheel are connected with specific managerial actions. In the first stage it is very important to design the product. The second stage “Do” corresponds to production itself. Sales volume is becoming a good indicator for “Check” and if there is some complaints the company has to take it into “Action” of improvement.

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<sup>12</sup>Liker, J., K., The Toyota way: 14 Management Principles from the World’s Greatest Manufacturer, NY, McGraw-Hill, 2004, ISBN: 0071392319, pp. 19-20

9). Standardize the results. There are must be a precise standard for everything in an organization. The work should be standardized and all standards in the company connected to discipline.

### **3.3.2 GEMBA, STANDARDIZATION, Five S AND MUDA**

Gemba is Japanese word and it means “the real place” where an action takes place. In the business world, Gemba is the activity, which brings profit to a company and customer satisfaction, and it takes in working place.<sup>13</sup> All types of business activities use the three important issues related to earning the profit. These are development, manufacturing and sales. Gemba is connected with those terms and it means the place where the products and services are evolved. It seems that managers emphasize and consider the working place as a tool for making a profit. If we talk about Gemba in administration process, it can be distinguished between upper and lower structure of organization. The first one places Gemba in upper level and shows its importance in a company. Other levels of administration – management and workers exist for providing necessary support for working place. Hence, Gemba is the place of all improvements and source of information. The main components of upper Gemba are the cooperative work among the employees, respect and proudness of their job.

The second approach is controversial. The working place Gemba is the source of problems and claims of customers. It was the place, which managers tried to avoid but now it is common for the presidents of big companies to have experience on the working place and support it. Gemba and administration are equal- it takes care about development of product or service and administration sets a strategy. Generally, the two approaches should be used in equal basis. Below the two approaches are graphically represented.

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<sup>13</sup> Imai, M., Gemba Kaizen: A Commonsense, Low-Cost Approach to Management, NY, McGraw-Hill, 1997, ISBN: 5-9614-0127-8 [rus. ver.], p. 21

Figure 3. Gemba and Management support



(Source: Imai, M., Gemba Kaizen, NY, McGraw-Hill, 1997, [Electronic version], page 22. Own illustration)

Figure 4. Gemba and Management control



(Source: Imai, M., Gemba Kaizen, NY, McGraw-Hill, 1997, [Electronic version], page 23. Own illustration)

There is another approach of gemba, which shows the management of resources. There are two main activities on the working place in everyday operations- support and system of problem solving Kaizen. The first one supports existing standards and status quo of the organization. The second one supports the continuous improvement of those standards. The Figure 5 shows the activities for quality control development.<sup>14</sup> So the company, which is producing quality products or services with a right price and also in time, satisfies the customers' demand and they stay loyal. It helps to build a good image for the organization.

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<sup>14</sup>Imai, M., Gemba Kaizen: A Commonsense, Low-Cost Approach to Management, NY, McGraw-Hill, 1997, [ Electronic version], ISBN: 5-9614-0127-8, [rus], pp. 22-24.

Figure 5. “House” of Gemba-Management

|                               |  |                     |            |
|-------------------------------|--|---------------------|------------|
| Profit Management             |  |                     |            |
| Safety and Quality Management |  | Cost Management     |            |
| Operations                    |  | Information         | Facilities |
|                               |  | Goods and Materials |            |
| Standardization               |  |                     |            |
| 5S: Sustainable Economy       |  |                     |            |
| Muda: Defect Prevention       |  |                     |            |
| Team work                     |  | Self- Discipline    |            |
|                               |  | Moral Improvement   |            |

(Source: Imai, M., Gemba Kaizen, McGraw-Hill, 1997, [electronic form], page 26. Own illustration)

This “House” supports standardization. The effective everyday management of resources requires establishing standards. Every time when problems arise, a manager has to find out the main cause and reexamine the existing standards or introduce with the new one for prevention of repetition of that problem. Standards become the components of Kaizen problem solving on the working place Gemba and makes a fundament for everyday improvement. Kaizen can increase the quality and reduce the cost, and also satisfy the customers without any additional investments and implementation of new technologies.

The main techniques of Kaizen problem-solving are standardization, which was mentioned above, Five S and Muda. These three techniques are quite comprehensible and implementable. Standardization means the transfer of technological and engineering requirements to everyday working standards.<sup>15</sup>

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<sup>15</sup>Imai, M., Gemba Kaizen: A Commonsense, Low-Cost Approach to Management, NY, McGraw-Hill, 1997,[Electronic version], ISBN: 5-9614-0127-8, [rus], pp. 25-27



The Five S takes its name from the initials of five Japanese words that starts with “S”: seiri, seiton, seiso, seiketsu, and shitsuke. The Table 3 below introduces with those 5 movements.<sup>16</sup> These movements are presented in the Table below:

*Table 3. Five S*

|   |
|---|
| <p><b>Step 1. Seiri (straighten up):</b></p> <ul style="list-style-type: none"> <li>- Work-in-process</li> <li>- Unnecessary tools</li> <li>- Unused machinery</li> <li>- Defective products</li> <li>- Papers and documents</li> </ul> <p>Differentiate between the necessary and the unnecessary and discard the unnecessary.</p> |
| <p><b>Step 2. Seiton (put things in order):</b></p> <p>Things must be kept in order so that they are ready for use when needed.</p>   |
| <p><b>Step 3. Seiso (cleanup):</b></p> <p>Keep the workplace clean.</p>   |
| <p><b>Step 4. Seiketsu (personal cleanliness):</b></p> <p>Make it a habit to be clean and tidy, starting with your own person.</p>  |
| <p><b>Step 5. Shitsuke (discipline):</b></p> <p>Follow the procedures in the workshop.</p>  |

(Source: Imai, M., Kaizen: The Key to Japan's Competitive Success, 1st ed, NY, McGraw-Hill, 1986, pages 233-234)

The last technique, which necessary to be explained, is Muda. “Muda” is Japanese word and means “the waste”. This word can be associated with everything, which does not bring the profit. This term also takes into account the word “time”, which is also very important. The institutions that eliminated the useless things “Muda”, have the high level of Five S. The main areas for improvement and implication of Muda are manpower, technique, method, time, facilities, materials and etc.

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<sup>16</sup>Imai, M, Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw-Hill, 1986, ISBN: 0-07-554332-X, p. 233-234.

### **3.3.3 20 KEYS**

The 20 Keys system relates to 20 tools are crucial to run world-class company. It is not completely the Kaizen tool but it is often combined. 20 keys concerns with terms, such as quality, Five S, scheduling, skill building activities and etc. Kobayashi (1995), explains that the 20 Keys system not only brings the world's manufacturing improvement methods together into one package, but also integrates these separate methods into a closely interrelated whole. The result is a synergistic effect.<sup>17</sup>

The good example of using 20 keys is “Toyota” Company. The system is the foundation of Toyota's Production Systems that have been lauded as the backbone behind the successful international rise of “Toyota”. The all list of 20 keys is can be found in Appendix.

### **3.3.4 STRATEGIC PLANNING**

The strategic planning concept has very wide nature and has been described by many authors. Past centuries, a Prussian army general defined the strategy as follows: “The carrying through of an originally conceived plan under a constantly shifting set of circumstances. It is a matter of understanding correctly at every moment in a constantly changing situation.”<sup>18</sup> Two points need to be stressed in this statement. The first point is about the dual aspect of strategy, its implementation and formation. The second point is about the importance of understanding of the changing environment.

Each strategic planning starts from the creating a consistent strategic model. The good strategic planning is crucial for any business that wants to operate successfully. The planning should cover such issues as vision, mission, goals, strategies and analyzing of external and internal environment.<sup>19</sup> B. Richardson and R. Richardson propose eight approaches to planning strategic success: corporate and competitive

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<sup>17</sup>Kobayashi, I., 20 Keys to Workplace Improvement, 2<sup>nd</sup> ed, Portland, Oregon Productivity Press, 1995, ISBN: 9781563271090, p.3

<sup>18</sup>Ansoff, H., I., Corporate Strategy, NY, MvGraw-Hill, 1965, ISBN: 978-0070021112, p. 44

<sup>19</sup>A Model for Strategic Planning. [http://www.ealewisconsulting.com/Strategic\\_Planning\\_Basics.htm](http://www.ealewisconsulting.com/Strategic_Planning_Basics.htm)

planning, contingency planning, administration planning, productivity planning, team culture planning, innovation planning, shock event planning, aspiration planning.<sup>20</sup>

These approaches are very important for the management for strategic analysis of a company's future performance. The Figure 6 below illustrates the strategic planning model, which was adopted from SWOT analysis.

*Figure 6. Strategic Planning Model*



(Source: [http://www.ealewisconsulting.com/Strategic\\_Planning\\_Basics.htm](http://www.ealewisconsulting.com/Strategic_Planning_Basics.htm). Own illustration)

It identifies the influence of external and internal environment on current strategic planning and how the management would be able to figure out what is going to be with the environment and its meaning for the company. An organization's vision and mission is the fundament for any strategic planning. When people see their company's mission as an extension of their personal missions, then they can operate in a free environment.

<sup>20</sup>Richardson, B., Richardson, R., Business Planning: An Approach to Strategic Management, 2<sup>nd</sup> ed, London, Pitman Publishing, 1992, ISBN: 0-273-03720X, p. 1

### 3.4. CHANGE AND KAIZEN

The two approaches of changing of the organizations bring two different understandings. The Western “change” means innovation and have a wider view for a changing. But Japanese Kaizen pays attention to details and concerns with everyday small improvements in a company. It was mentioned before in other chapters. But there is one link between those two approaches – the word “Effective”. “The effective organization is the one which encourages and supports learning from change”.<sup>21</sup> This term “effectiveness” and kaizen tools bring us another term “group effectiveness”. Handy (1999), in his book “Understanding organization”, indicates the advantage of group effectiveness.<sup>22</sup>

- The group provides a psychological home for the individual. They are essential for the organization effectiveness in that they provide the cells within the honeycomb. If they were not required for the organization of work they would be formed by the individuals. Individuals will usually look to the work group, as a place of first resort, to satisfy their needs. Only if this fails will they turn elsewhere. Groups take riskier decisions than the individuals comprising them would have done if they had been acting independently.

Charles Handy said that change is necessary condition for survival. The organization should continuously search for improvement and apply it for the everyday operations and management. Handy’ s words are very close to Kaizen philosophy. He also said that the change could be made for improving but not necessarily for expanding. Hence, “better” does not mean always “bigger”.

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<sup>21</sup>Karnal, C., A., Managing Change in Organizations, 2<sup>nd</sup> ed, London, Prentice Hall International, 1995, ISBN:0-13-150954-3, p. 10

<sup>22</sup>Handy, C., Understanding Organizations, 4<sup>th</sup> ed, London, Penguin Books, 1999, ISBN: 978-0-140-15603-4, p.154

### 3.5. KAIZEN AND INNOVATION

Imai (1986) came up with two approaches concerning progress.<sup>23</sup> There are gradualist approach and great-leap approach. Japanese companies follow the gradualist approach while Western companies stick to great-leap approach, which is emphasized on innovation.

Innovation is successful exploitation of new ideas. Also, it is the process, which transfers ideas into services and goods in a business environment. Innovation creates additional value and wealth of any organization. There are some major differences those two approaches.

The Table 4 below represents all main differences of Kaizen and Innovation according to different criteria.

*Table 4. Kaizen versus Innovation*

|                | KAIZEN  | Innovation   |
|----------------|---|--|
| 1. Effect      | Long-term and Long-lasting but not dramatic   | Short-term and dramatic                            |
| 2. Pace        | Small steps                                   | Big steps  |
| 3. Timeframe   | Continuous and incremental                    | Intermittent and non-incremental                   |
| 4. Change      | Gradual and constant                          | Abrupt and volatile                                |
| 5. Involvement | Everybody                                     | Select few “champions”                             |
| 6. Approach    | Collectivism, group efforts, systems approach | Rugged individualism, individual ideas and efforts |
| 7. Mode        | Maintenance and improvement                   | Scrap and rebuild                                  |
|                | Conventional know-how and state               | Technological break-throughs, new                  |

<sup>23</sup>Imai, M, Kaizen: The Key to Japan’s Competitive Success, 1<sup>st</sup>ed, NY, McGraw-Hill, 1986, ISBN:0-07-554332-X, p. 23

|                           |  |  |
|---------------------------|--|--|
| 8. Spark                  | of the art   | inventions, new theory                                     |
| 9. Practical requirements | Requires little investment but grate effort to maintain it | Requires large investment but little effort to maintain it |
| 10. Effort orientation    | People   | Technology   |
| 11. Evaluation criteria   | Process and efforts for better results                     | Results for profits  |
| 12. Advantage             | Works well in slow-growth economy                          | Better suited to fast-growth economy                       |

(Source: Imai, M., Kaizen: The Key to Japan's Competitive Success, 1st ed, NY, McGraw-Hill, 1986, page 24)

After such differences, which were indicated above, it does not mean that the organization have to choose between Improvement and Innovation. From the point of view of Masaaki Imai (1986), Kaizen and Innovation components can be applied at every stage of manufacturing chain. But it should be mentioned that Kaizen is closer to production and market, while Innovation's impact is science- and technology- oriented.

In the later years, Japanese companies started to use Kaizen combining with Innovation. And it brought new technologies and methods. They switched from the Kaizen-oriented products, which used a quite low level technology, to innovative product with Kaizen orientation. The last one consists of technology-oriented innovation and technology-oriented Kaizen.

### **3.6. CONCLUSION**

Improvements in Kaizen are small and gradual, but later it will give amazing results. Kaizen explains why Japanese companies do not stop their development. Western management, meanwhile, is committed to innovation - the massive changes to achieve technological breakthroughs, the latest management concepts and production technologies. Kaizen is an approach characterized by low risk. Managers without experiencing large losses can always return to the "old ways" of their job. Most of the

"authentic Japanese" management practices, such as "Total Quality Control", "Quality Circles" and the style of labor relations can be described in one word - Kaizen. Kaizen strategy is "umbrella" for all of these methods, which are not necessarily limited to a Japanese style of management. The main elements of the concept of Kaizen can be summarized from this literature review:

- Kaizen and management (improvement and support);
- The process, not the result;
- The next cycle of PDCA / SDCA;
- Quality - first and foremost;
- Speak with data;
- The next process - is the consumer.

After this short literature review, a common "string" of tools and techniques are clearly linked to key aspects for creating, in our case, a successful construction business concern in a competitive environment. Kaizen is thus a collection of tools, which need to be trained and practiced in an organization to become second nature or cultural, and not imposed by senior management. Clearly, this literature review represents the main points, which are crucial for understanding Japanese management philosophy Kaizen and its tools through the several theorists' research works. The followings chapter will introduce with the practical part of this work.

## **4 SITUATIONAL ANALYSIS**

Kaizen method is not new for people. It was introduced to Kazakhstan with varying degrees of success for at least ten years. Nowadays, the main ideas and methods of Kaizen are widely.

At present time the ideas of Kaizen philosophy has been implemented in 27 local enterprises in Kazakhstan, and about 20 companies are using this technology in private. Only for consulting services from the state budget for the next five years has been allocated 700 million tenge (approx. EUR 3,5 mln). The construction business in Kazakhstan is still developing. There are still a few numbers of specialists, which can be trusted and the lack of labour and customer protection. The lack of specialists results in incoming of foreign labour. The trust of domestic companies is weak; hence the construction sector of the country is open for foreign investors. For this reason, it would be appropriate to pick a Korean construction company for the research.

This chapter will introduce a company “Highwill Astana”, which operates successfully for more then ten years in construction sector in Kazakhstan. It will also provide information about that organization, focusing on external and internal issues, such as SWOT analysis. The framework of practical part will be built under Toyota car manufacturing company’s management system, which using Kaizen for many years.

### **4.1. ORGANIZATIONAL PROFILE**

“Highvill” Company is a company placed in Astana, the capital of Kazakhstan. It is concentrated on construction of residential housing. A headquarter is situated in Seoul, South Korea. The beginning of the company’s history starts in May 1989 and the first president was Li Jon Suk. Nowadays, company builds elite and innovative housing complexes in different countries of the World.

In January 2001, the company signed a consulting contract with Japanese urban planning company “FJ”, which is leading today a new trend in the construction of residential buildings. This laid the basis for a new vector of development of residential



complexes Highwill, which seamlessly combines tradition with modern development and technologies.

The company started its activities in Kazakhstan in November 2004. The current CEO is Kim In. In December 2004, the presentation of new residential complex Highwill was presented to the President of Republic of Kazakhstan. As a result, many Kazakh residents live already in those houses and they are satisfied with the company's work.

The philosophy of "Highvill" increases the level of real estate construction rapidly. Since 2000 the headquarter company "Dongill Highvill" takes first place in construction sector in South Korea. The company believes that Kazakhstan with its fast growing economy will start its "impersonation" of improving the wealth of nation.<sup>24</sup>

**The vision of the company:** Highwill – the company, which is creating the new unique formula of housing with the combination of innovation and comfort.

**Management ideology:** Deeply impress clients by principles and integrity.

**The mission of the company:**

- Develop new areas through the initiative and passion;
- Always make a call through the principles of better quality and integrity;
- Serve on the basis if humanity.

**Values:**

- Reach agreement on the basis of trust and honesty;
- Improve through the dilligent work and humility;
- Take an action and positive thinking;
- Serve and be fit with society.<sup>25</sup>

## 4.2. SWOT ANALYSIS.

Strengths, weaknesses, opportunities and threats have to be considered at in order to assess the current organizational situation. Strengths and weaknesses are

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<sup>24</sup>History of Highvill Company. <http://www.highvill.kz/section-1-5.htm>

<sup>25</sup>Philosophy of Highvill Company. <http://www.highvill.kz/section-1-3.htm>

internal evaluation of an organization. Opportunities and threats are an external evaluation.<sup>26</sup>

It should be noted that this step was done by additional study of the external and internal environment of the company. In other words, here is the analysis of the results of investigation of market environment in Kazakhstan. The analysis of business environment and internal state of the company has showed the factors of company's actions. The following factors are needed for successful activity in construction market in Kazakhsatan:

1) Access to credit or debt finance. Without the access of the investment projects is extremely difficult to acquire and update the basic means of production and to have sufficient working capital.

2) The availability of sufficient administrative resources ("links" in the administration of the city) for the possibility of obtainig information on tenders and provide opportunities for large-scale contracts and public procurement.

3) High technical and technological level of company's activity.

4) Qualified managerial and technical personnel and availability of advanced trainig system.

5) License of appropriate level (for example, the construction of buildings over 120 meters tall, bridges, tunnels), certification of ISO.

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<sup>26</sup>A model for Strategic Planning. [http://www.ealewisconsulting.com/Strategic\\_Planning\\_Basics.htm](http://www.ealewisconsulting.com/Strategic_Planning_Basics.htm)

The following Table 5 includes all outcomes of SWOT analysis:

*Table 5. SWOT analysis of Highvill Company*

|                      | STRONG POINTS  | WEAK POINTS  |
|----------------------|--|--|
|                      | Opportunities  | Threats  |
| External Environment | <ol style="list-style-type: none"> <li>1. Opportunity of fast growth.</li> <li>2. Availability of new geographical markets.</li> <li>3. Emergence and implementation of new technologies in construction.</li> <li>4. Inflow of capital in construction sector.</li> <li>5. Implementation of new management techniques.</li> <li>6. Acquisition of related production.</li> <li>7. High-paid work places.</li> </ol>              | <ol style="list-style-type: none"> <li>1. Development of alternative technologies and equipment.</li> <li>2. Changes in the system of control in construction sector.</li> <li>3. High level of control of the business by Government.</li> <li>4. Shortage of specialists.</li> <li>5. The lack of guidelines for standardization.</li> <li>6. Growing number of competitors.</li> <li>7. Lack of labour protection.</li> </ol> |
|                      | Strengths  | Weaknesses   |
| Internal Environment | <ol style="list-style-type: none"> <li>1. Well-known brand.</li> <li>2. High-qualified personnel.</li> <li>3. Experience.</li> <li>4. System of professional trainings.</li> <li>5. Quality management and ISO.</li> <li>6. The program of social responsibility.</li> <li>7. After sales monitoring.</li> <li>8. Awards on the national and international levels.</li> <li>9. Flexibility in relations with customers.</li> </ol> | <ol style="list-style-type: none"> <li>1. Expensive housing.</li> <li>2. Limited number of customers.</li> <li>3. Narrow range of services offered.</li> </ol>   |

The following proposals are made for reducing the weak points of the company and increasing its opportunities and strengths.

**Question 1:** How does the company can use its strengths? (S-O)

*Strategy:* Maximization of using strong points and opportunities:

- Strategy of diversification: housing, transport, underground, production of own equipment and etc.
- Strategy of functional leadership.
- Participation in consortiums.

**Question 2:** How does the company can overcome weak points for mastery of opportunities? (W-O)

*Strategy:* Minimization of weaknesses and maximization of opportunities:

- Strategy of further geographical expansion.
- Strategy of development of adjacent markets.
- Strategy of further development of Quality Management.

**Question 3:** How does the company can use its strengths for leveling threats? (S-T)

*Strategy:* Maximization of strong points and minimization of possible threats:

- The strategy of reinforcement of organizational culture.
- Strategy of diversification with the aim to minimize the risks.
- Quality Management.
- Development of strong marketing policy.

**Question 4:** How does the company can overcome its weak points for leveling threats? (W-T)

*Strategy:* Minimization of influence of weaknesses and threats:

- Quality Management.
- Development, long-term investments in construction sector.

**Conclusion.**

Most effective strategy in this situation is:

Expantion: geographic expansion. Based on the favorable market situation. It is necessary to develop its presence in the market of other cities in Kazakhstan:

- a. The services are mostly demanded and adequate only onthe market of Astana city.
- b. The need in expantion of the company's share in the most promising segments:
  - i. Industrial and warehouse construction;
  - ii. Shopping malls.

## **5 DATA PRESENTATION AND ANALYSIS**

This chapter presents the main findings of research conducted. The results were analyzed and discussed.

### **5.1. RESEARCH DURATION**

The research project was planned to be completed in two weeks; however, because of problems associated with respondents returning the questionnaires, the duration was extended, approximately, by one month. Once the cut-off date for the receipt of questionnaires was reached, the demographic profile of the sample was analyzed in order to ensure that it was a reasonable representation of the “Highwill Astana” Company. Questionnaires in the form of follow-up e-mails were sent. The deadline was again extended, as it was mentioned before. The key personnel were asked to remind members of management about the deadline for replies. Also, the research was not funded by any of participants.

### **5.2. QUESTIONNAIRE AND ITS STRUCTURE**

The questionnaire was the primary source of data and was designed with input from the “Highwill Astana” Company management. It was electronically distributed with telephonic confirmation was made. Key personnel were tasked to send back the questionnaires by e-mail before the deadline.

The questionnaire was structured in three specific sections. The first part evaluated the respondent’s knowledge of the Continuous Improvement terms and his or her understanding of the implementation of this tool in his or her organization. The second part was a 20-question 5-point Likert-scale response set that included specific statements about the implementation of Kaizen tools and strategies and assessed the level of agreement or disagreement the individual had with the statement. The final part was needed for some biographical information in order to ensure that the sample was not biased in terms of different cultural perceptions and levels of education.

**a. Sampling Frame.** A total of 71 self-completion e-mail questionnaires were distributed electronically to various levels of managers at the identified organization. Thirty-two managers responded. This represents a response rate of 46%. The sample was quite large enough to draw valid conclusions.

A “Snowball” sampling technique was selected in terms of time saving and limited access to company’s profile and personal problems of the researcher. The analysis itself was concentrated on more abstract proposed recommendations and the research did not give a full insight of internal environment because of, as it was mentioned above, the limited access to the information of the selected company.

This, however, does not make the data less reliable because informal telephonic calls were conducted with personnel in order to gain insight into the culture and measure the accuracy of the data collected through the questionnaires.

**b. Non-Responses.** The main problem in self-completed instruments and postal or e-mailed surveys is the problem of non-response. Typically, those people who are indifferent to the topic did not respond. This survey has response rate of 46%. The number of not responded is 39 managers or 54.9%. To measure the possibility of errors, a sample of non-respondents were contacted via email in order to establish their reasons for not responding. The Table 6 indicates their feedback.

*Table 6. Non-Responses*

|  |    |
|--|----|
| <b>Did not receive questionnaire</b>         |    |
| - but would have responded                   | 4  |
| - would not have responded                   | 7  |
| <b>Received but did not respond</b>          |    |
| - too busy                                   | 21 |
| - had problems with electronic communication | 6  |
| - did not understand the questions           | 1  |
| TOTAL: 39                                    |    |

Upon analyzing the data, it became apparent that some of the Kaizen terms used have been open to differences of interpretation. Majority of respondents did not have a free time to complete the questionnaire.

## **6 DATA RESULTS, DISCUSSION AND RECOMMENDATIONS**

Chapter three reviewed and analyzed the relevant literature with respect to Kaizen and its tools, techniques, concepts, and philosophies. Chapter four and five documented the practical fieldwork, which was summarized, tabulated, and graphed. This chapter will endeavor to combine the two previous chapters into a general discussion that will result in recommendations and proposed strategic implementation of Kaizen for “Highvill Astana” Company. The recommendations may be applied in general to most construction businesses within the Kazakhstan construction market and abroad.

### **6.1. FINDINGS OF THE RESEARCH**

The one of the objectives of this Bachelor thesis was the assessment and evaluation of the knowledge and perceptions of Kaizen tools and principles among managers at various levels within the construction company “Highvill Astana”, and to identify how this philosophy works in construction market in Kazakhstan. This subchapter is focused on the following topics:

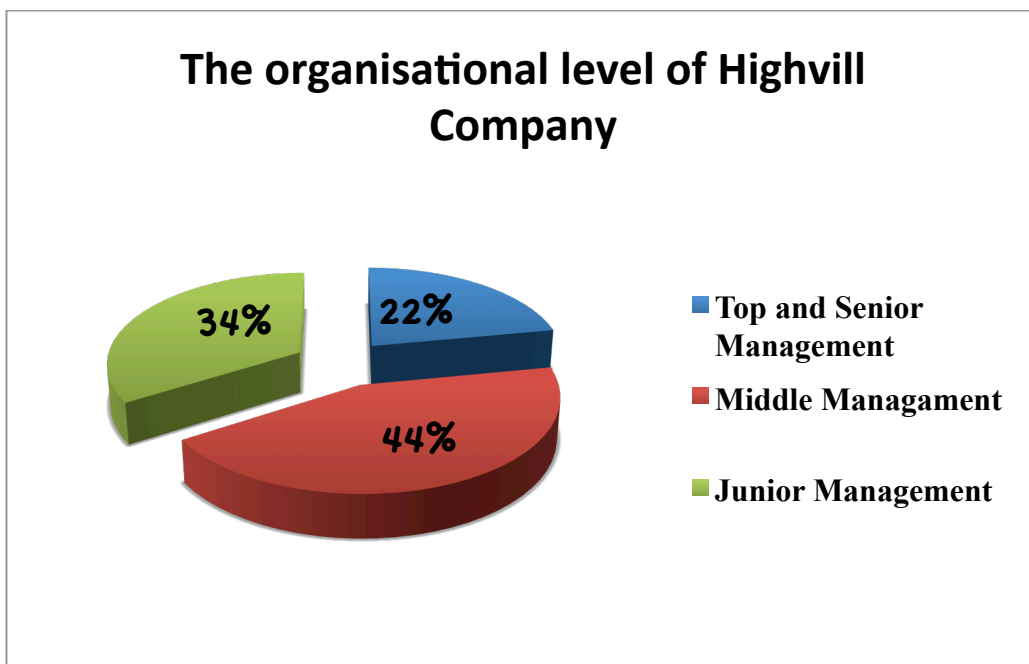
- the understanding of respondents of the important tools of Kaizen system;
- the respondents’ the knowledge of the implementation of those tools and strategies in construction business;
- the Respondents’ perceptions of the importance of the tools in their organization;
- perceptions of communication about the implementation of Kaizen methodologies;
- perceptions of customer and employee involvement in the implementation of Kaizen principles.

The demographic data was discussed in earlier chapters. It was specific to construction business in Kazakhstan. Within the chosen company “Higvill”, the survey

was limited to Astana branch, placed in Kazakhstan. Figure 7 presents the demographic profiles of the organization surveyed in terms of the functions the respondents performed and the management levels they occupied.

The demographics were analyzed in order to ensure that the survey covered a similar cross-section of respondents in chosen business in terms of both organizational levels and functions.

*Figure 7. The Organizational level of Highvill Company Respondents*



The organizational level pie chart indicates the number of respondents in “Highvill Astana” Company who participated in the survey. The management from all levels participated with the majority being from middle and senior management. The following outcomes of research results are made.

**1) Continuous Improvement Terms and Implementation.** The first part of the questionnaire was constructed in order to collect two important pieces of information. First, what Kaizen terms the individual had been exposed to and second, the Respondent’s perceptions about whether this term had been implemented within his or her organization.



Within the first part the following categories were emphasized:

- a. General tools of Kaizen (light green).
- b. Quality Management (orange).
- c. Exposure to Six Sigma (light purple).
- d. Gemba Kaizen tools (yellow).

Within the chosen company, the basics of Kaizen philosophy are understood by majority of managers of the organization. The important point is the understanding of what has been implemented within their company. Table 7 depicts this data.

Table 7. "Highvill Astana" Responses to Part 1

| Question number | Have heard the term |    | I don't know | Have been implemented |    |
|-----------------|---------------------|----|--------------|-----------------------|----|
|                 | Yes                 | No |              | Yes                   | No |
| 1               | 31                  | 1  | 3            | 23                    | 6  |
| 2               | 10                  | 22 | 20           | 2                     | 10 |
| 3               | 29                  | 3  | 1            | 30                    | 1  |
| 4               | 31                  | 1  | 3            | 24                    | 5  |
| 5               | 30                  | 2  | 0            | 28                    | 4  |
| 6               | 32                  | 0  | 8            | 14                    | 10 |
| 7               | 29                  | 3  | 6            | 24                    | 2  |
| 8               | 32                  | 0  | 0            | 32                    | 0  |
| 9               | 12                  | 20 | 5            | 7                     | 20 |
| 10              | 28                  | 4  | 4            | 28                    | 0  |
| 11              | 32                  | 0  | 3            | 18                    | 11 |
| 12              | 30                  | 2  | 3            | 28                    | 1  |
| 13              | 29                  | 3  | 9            | 18                    | 5  |
| 14              | 17                  | 15 | 10           | 12                    | 10 |
| 15              | 25                  | 7  | 8            | 24                    | 0  |
| 16              | 23                  | 9  | 11           | 14                    | 7  |
| 17              | 28                  | 4  | 5            | 21                    | 6  |
| 18              | 11                  | 20 | 20           | 2                     | 10 |
| 19              | 18                  | 21 | 4            | 20                    | 8  |
| 20              | 25                  | 7  | 2            | 24                    | 6  |

The basic questions scores in total are as follows:

1. Understanding of the terms: 85%
2. Implementation of these tools: 65%

3. Unclear as to the implementation: 10%

Scoring for the understanding of Kaizen terminology is as follows:

1. Understanding of the terms: 90.9%

2. Implementation of these tools: 72,7%

Scoring of the Quality Management System:

1. Understanding of the terms and implementation: 66,7%

Scoring of the Six Sigma approach is as follows:

1. Understanding of the terms and implementation: 50%

Scoring of Gemba Kaizen:

1. Understanding of the terms: 100%

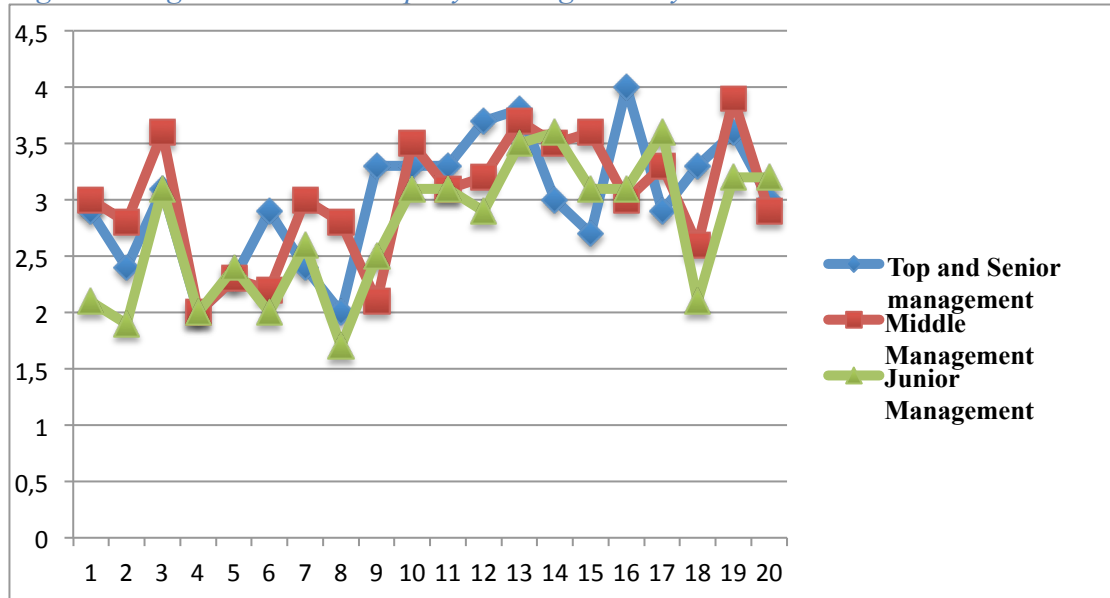
2. Implementation of the tools: 75%

Some questions were understood in the same way by all respondents and respondents also agreed about their implementation.

**2. Effectiveness of Continuous Improvement Tools.** The graphical representation below (Figure 8) has been constructed using the data collected within the Part Two of the questionnaire. This section represents the effectiveness of the use of Kaizen tools. The graph gives comparisons between the different levels of management involved in the survey and the average group perceptions.

The correlation between the different management levels in “Highvill Astana” Company is consistent for a number of questions. Some questions in this part demonstrate a spread of values over management levels, thus indicating a difference in opinion with respect to these items.

Figure 8. Highvill Astana Company Scoring Overlay



The findings about Highvill Astana Company were reviewed below.

As it was expected, the survey results show in some cases different understandings of Kaizen and other tools.

- Positive points from the survey conducted suggest that the basic fundamentals for continuous improvement exist in the organization. Agreement about issues such as quality control, implementation of Kaizen itself tells that certain basic Kaizen principles are already used and understood at all levels of management. Other positive results include importance and the understanding of continuous improvement.

- The culture for continuous improvement has not been clearly defined by different levels of management because of the some uncertainties in corporate communication. But generally, these tools were being used in different departments of the company. Kaizen activities were not highly visible in the organization, and not all managers were aware of the “right terminologies”. There were, also, some obstacles because of the language differences. The research was made in Russian while the study was in English.

- There was evident lack of internal communication between the levels of management, especially, with junior management. In some cases junior and middle

management do not see recognition being given, whereas senior and top and senior management believe that recognition is given. For example, there are some uncertainties of using standards of measurement results for every manager. Top and senior managers more agree with this statement while junior managers think otherwise (3.3 versus 2.1). In the question about strong connection between quality control and customer satisfaction, the gap is created among middle and top management. But in general, the results show consistency among different management levels and the “gaps” are not so big. How it was explained before, the employees aware about general basics of Kaizen tools and some of them are still implementing. The next subchapter will propose the model and the recommendations according to these results conducted via survey.

## **6.2. PROPOSED IMPLEMENTATION OF KAIZEN**

In this survey, minimal data has been collected because of the lack of time, access to company’s information with respect to the privacy reasons. But the appropriate recommendations for this research will be given in this subchapter. The tools and techniques, which need to be included, are Six Sigma, 20 keys, Gemba and other Kaizen tools. The model has been developed from the survey conducted later in this chapter. The model consists of a number of the models discussed in order to combine them in a way that is suited to Highvill Astana Company’s needs and to the construction business as a whole.

### **6.2.1 INVOLVEMENT**

The first level “Involvement” focuses on strategic context of the organization. It starts with consideration with stakeholders to ensure that support and understanding of the intent is clear. This allows creating a shared vision. The basic Kaizen questions in this analysis advert to the fundamentals that need for ensuring that the organization is aligned from the inside and focused on the vision of the company.

Some questions were identified in theoretical part of this paper work cited to Deming’s 14 points. These 14 points involve organizing all employees of the company

into smaller teams that interact in a supplier and customer relationship. It will drive continuous improvement through the organization. This team-focused culture needs some support from management at all levels for coaching, sponsoring and mentoring coaches.

## 6.2.2 STRUCTURING

Structuring covers strategic intent and considers the determination and reexamination of the vision and mission statements, objectives, goals and values, and SWOT analysis. Those statements must be understandable to all employees. Johnson and Scholes give such definition of mission as: “A mission and vision statements are a fundamental component in a strategic planning process when wanting to show the direction for a process roll out”.<sup>27</sup> “Highvill” Company presented their vision, mission statements and values, which were mentioned before in this chapter. The values of the company include openness, integrity, honesty, equality and loyalty. Hence, the values could describe how “Highvill Astana” Company images life to operate on a daily basis while pursuing its vision. Together, the vision, mission and other values may create a common connection among the people within “Highvill Astana” Company for further growth and success.

All these statements stand for quality, customer-orientation, continuous improvement and trust. The terms are connected to Kaizen principles. It claims that the organization is using the Kaizen methods. But the small reexamination is still needed because the finding of the research has showed some differences in the managers’ perceptions.

The second important issue of this step is organizational processes, which eliminate the waste. The activity includes techniques such as Five S, Gemba, Standardization and Total Quality Management. For the implementing of these tools and optimization of those processes, the following five steps are proposed:

1. *Identify the processes*: planning, design, allocation and ensuring of the processes;
2. *Extension of processes*: business processes must always match with goals of the

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<sup>27</sup>Johnson, G., Scholes, K., Exploring Corporate Strategy, 6<sup>th</sup> ed, Lombarda, Italy, Prentice Hall, 2002. ISBN: 978-0273651123, p. 239

company through effective allocation of information;

3. *Alignment of processes*: The processes must be flexible for further changes.

4. *Press out processes*: elimination of unnecessary actions, equipment, people, waste and reserves through 5 S, Muda, Gemba and Standardization;

5. *Cleaning of processes*: elimination of instability of processes must be on regular basis, because it can cause the risk arising from external and internal impacts.

### **6.2.3 EXPLICATION**

The next level is “Explication”, which focuses on cooperation of all employees in the company. All techniques that were mentioned above in previous level have to be worked out and improved through the team-building system. Respect of all employees and partners must be taken into account. The main outcome of this step is stabilization of results, using the tools from previous levels.

### **6.2.4 INTEGRATION**

Integration considers the flexible cooperation of employees and mission working teams. The main points, which need to be emphasized, are described below with proposed description of tools and techniques:

1. *Training and auditing* (quarterly multi-level meetings):

The two modules, which are most commonly used, are the goal alignment and 5S modules. Training in these modules needs to be completed. The training assists employees to apply the knowledge and it also assists in creating ownership and a relationship with other levels. Modules need to be trained and audited when there is some results of achievement are reached. “Highvill Astana” provides trainings for their employees once a year in a headquarter placed in South Korea. But there are some problems with managing schedules of these trainings due to some changes in regulations of auditing of working places in Kazakhstan. This important source of knowledge needs to be improved.

The auditing is important for the success of the process. Auditing is long-term process, which can be controlled internally and externally. In Kazakhstan, the attestation

of all working places is held once in five years. If the employee fails it, he or she can work under a contract for 1 year and re sit the attestation. The internal auditing with feedback to the employees gives them a sense of achievement or places pressure on the team to improve.

#### *2. Six Sigma:*

This tool is important for those employees who are dealing with complex problems that require statistical analysis. Six Sigma tools are needed for producing major improvements in process performance in short-term period.

Team members in this project can get the non-financial rewards after completing each step. Other smaller Kaizen activities can be done but these activities must be separated with Six Sigma projects. In our case, it is important to combine Six Sigma with Kaizen tools.

### **6.2.5 FULLY WORKING SYSTEM**

Fully working system focuses on performance measurement of already implemented techniques of previous levels and makes a review of next period. It is considered that all employees of the company already work on trust. Performance measurement will ensure support and commitment. And during the primary stages of implementation of the key tools of Kaizen, the measurement of success must be weighted in order to ensure a focus on implementation.

After the success of continuous improvement projects, recognition needs to be approved for people who participated in those campaigns and it was positive and assisted in reaching the teams' goals. The rewarding must be promoted in the form of trainings. It also facilitates the development of culture of "speaking using data" and consistency in the approach to problems.

### **6.3. RECOMMENDATIONS**

Kaizen and its tools are the long-term growth and profitability indicator for "Highvill Astana" Company. But continuous improvement is not a simple task. A

number of errors and biases may arise because of the lack of integration of different plans, the failure to plan in a right way, changes and concentration on not important issues, which are time consuming. The following recommendations are made for Highvill Astana Company's executive team.

**a. Implementation of the Continuous Improvement Model.**

The all levels of implementation of Kaizen from previous subchapter are illustrated in Table 8. It carries through the complete organizational alignment and by engages all levels of organization to apply their knowledge and create an environment for improvement. This model gives more comprehensive overview of activities and focuses on processes, waste elimination and cooperation.

The responsibilities within the company have to be given to all levels of management, with clear understandings how these responsibilities are to be measured. Responsibility needs to be distributed among all levels of management in the organization.

*Table 8. Proposed Model for the Implementation of Continuous Improvement*



| Level                 | Focus  | Tools/ Techniques  |
|-----------------------|--|--|
| <b>1. Involvement</b> | Planning context   | a. Steering committee with stakeholders: <ul style="list-style-type: none"> <li>○ formulation of fundamentals;</li> <li>○ problem-solving;</li> <li>○ 14 Deming points.</li> </ul> b. Team-building and meetings: <ul style="list-style-type: none"> <li>○ system of offers.</li> </ul>  |
| <b>2. Structuring</b> | Strategic intent<br><br><i>Processes: elimination of waste.</i>              | a. Vision, Mission reexamination;<br>b. SWOT analysis;<br>c. Waste elimination: <ul style="list-style-type: none"> <li>○ Explication of TQM;</li> <li>○ Standardization, Gemba.</li> </ul> d. 20 keys.   |
| <b>3. Explication</b> | Cooperation<br><br><i>Respect and improvement of employees and partners.</i> | a. Team-building.<br>Explication of instruments: <ul style="list-style-type: none"> <li>○ Development of employees;</li> <li>○ Values of the company.</li> </ul> b. Improvement of flows of previous level's processes.<br>=} Stabilization of results   |
| <b>4. Integration</b> | Strategic Choice and Formulation<br><br><i>Flexible work in teams.</i>       | a. Mission direct work teams: <ul style="list-style-type: none"> <li>○ Auditing/ coaching reviews;</li> <li>○ Recognition systems;</li> <li>○ Innovation.</li> </ul> b. Goal alignment.<br>c. 5 S.<br>d. Six Sigma + Kaizen: <ul style="list-style-type: none"> <li>○ Tracking and measurement framework;</li> <li>○ Allocation of terms and structures;</li> <li>○ -Allocation of working hours.</li> </ul> |

|                                       |  |  |
|---------------------------------------|--|--|
| <p><b>5. Fully working system</b></p> | <p>Performance Measurement and next period review</p> <p><i>Work on trust.</i></p> | <p>a. Monitoring and controlling;<br/> b. Benchmarking;<br/> c. Stretch targets based on results achieved;<br/> d. Recognition;<br/> e. Periodic Reviews.<br/> =} Result:<br/> - Achievement of Strategic goals. - -<br/> Continuous Improvement and learning.<br/> - Improvement of organizational structure.</p> |
|---------------------------------------|--|--|

The Kaizen-conscious company must have unity of goals, views, common values, systematic thinking and personal skills. It will contribute to different aspects of continuous improvement, such as quality, cost, delivery, morale and safety.

**b. Communication of Plans and Incentives.**

The communication of Kaizen and other continuous improvement plans and projects needs to be understandable and sent among all the employees. It needs to be communicated through the internal newsletters, notice boards, and addresses. The communication of successful results should be shared and the participants responsible need to be recognized and rewarded.

Those rewards and incentives are important for the success of the initiative. The rewards and incentives should be non-financial, as it was mentioned previously. However, it should promote teamwork and collective participation. Incentives such as direct financial rewards need to be avoided. A gain-sharing program shows that everyone in organization benefits from above mentioned performances. “Everyone” in this context means both the organization and employees.

## 7 CONCLUSION

Kaizen or Continuous Improvement is a flexible concept in management. Its tools can be adopted in any kind of business. But it should be noted that application of one of its tools will not help to achieve success, but the effective use of combination those techniques will help to achieve the goals and fulfill a mission and vision of a company. Kaizen is a method, which supports cooperation and flexibility, and shortens time of a business activity. Hence, it stands for everyday improvements.

Nowadays, there are so many companies around the World, which have implemented this philosophy. This Bachelor thesis's main goal was the understanding of Continuous Improvement concept and its application to construction business. The objectives below help to understand how Kaizen Philosophy can "help" to develop the construction sector in Kazakhstan. The Korean Company "Highvill" in Kazakhstan was chosen as a sample. The following outcomes of this research are presented:

- 1) "Highvill" Company currently implements Kaizen and managers of all levels are aware of majority of its tools. But a number of biases may arise because of the concentration on not important issues or the lack of integration of different plans. Some employees differently understand the meaning of Kaizen. The majority of techniques implemented are connected with Quality Control standards.

- 2) Kaizen theory claims that it is can be used successfully in any type of business. The proposed strategic model for selected construction company supports this statement. The majority of Continuous Improvement tools can be effectively implemented. Hence, the chosen techniques, which are used in "Toyota" Company, can be adopted. But some of those methods must be changed under the requirements of construction business type.

The strategic model is based on the suggested research. The study can be continued for further research. The outcome can be deeper conducted to measure any changes observed in the company after the implementation of given Kaizen model.

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## 9 APPENDIX A

### RAW DATA QUESTIONNAIRE

This questionnaire consists of three parts:

Part 1 indicates the kaizen tools which you are familiar with, and which your organization has employed.

Part 2 indicates the extent to which you feel that these tools have effectively been implemented into your organization and are strategically important to your organizations success.

In part 3 please complete all the biographic information.

#### Part 1: KAIZEN (CONTINUOUS IMPROVEMENT)

Indicate which continuous improvement tools you are familiar with, and which have been implemented within your organization.

| Kaizen tools   | Response            |    |              |  |    |
|--|---------------------|----|--------------|--|----|
|  | Have heard the term |    |              | Have been implemented in our organization. |    |
| 1. Has kaizen (continuous improvement) has been identified in your vision and mission? | Yes                 | No | I don't know | Yes  | No |
| 2. Does your organization manage the previous processes (managing upstream)?           | Yes                 | No | I don't know | Yes  | No |
| 3. Does your organization use standardization?   | Yes                 | No | I don't know | Yes  | No |
| 4. Do people in your organization use data at all times to make decision?              | Yes                 | No | I don't know | Yes  | No |
| 5. Does your organization use employee involvement teams?                              | Yes                 | No | I don't know | Yes  | No |
| 6. Does information is spread out openly (shared)?                                     | Yes                 | No | I don't know | Yes  | No |
| 7. Does your organization apply TQM?   | Yes                 | No | I don't know | Yes  | No |
| 8. Has your organization recognized Quality Management System?                         | Yes                 | No | I don't know | Yes  | No |

|  |     |    |              |     |    |
|--|-----|----|--------------|-----|----|
| 9. Does your organization apply PDCA cycle system?   | Yes | No | I don't know | Yes | No |
| 10. Does your organization apply Muda check-point concept?   | Yes | No | I don't know | Yes | No |
| 11. Do the all employees receive trainings?  | Yes | No | I don't know | Yes | No |
| 12. Is clear scorecard employed to ensure that the team is aware of its performance on a daily, weekly, monthly basis? | Yes | No | I don't know | Yes | No |
| 13. Is 5'S used to improve the safety and efficiency in the work place?  | Yes | No | I don't know | Yes | No |
| 14. Does your organization apply Gemba?  | Yes | No | I don't know | Yes | No |
| 15. Do the management and workers provide necessary support for working place?   | Yes | No | I don't know | Yes | No |
| 16. Does your organization use TPM (Total Productive Maintenance)?   | Yes | No | I don't know | Yes | No |
| 17. Is Poka-Yoke considered at all phases of an activity?  | Yes | No | I don't know | Yes | No |
| 18. Does your organization employ the 20 keys?   | Yes | No | I don't know | Yes | No |
| 19. Does your organization evaluate process and effort, primarily, for better results and not for profit?              | Yes | No | I don't know | Yes | No |
| 20. Has your organization recognized Environmental and health management system?                                       | Yes | No | I don't know | Yes | No |

**Part 2. CONTINUOUS IMPROVEMENT STRATEGIC IMPLEMENTATION EFFECTIVENESS**

Indicate the extent to which you disagree/agree with the following statements pertaining to the effective functioning of your organization. There are no right or wrong answers – merely mark the number that best reflects your views.

| <i>Statement</i>  | <i>Exhibited behavior</i> |   |                |   |   |
|---|---------------------------|---|----------------|---|---|
|   | Strongly disagree         |   | Strongly agree |   |   |
| 1. All acquaintances in your organization are Kaizen-conscious and support its implementation.                | 1                         | 2 | 3              | 4 | 5 |
| 2. Kaizen implementation is driven by all departments as it is a shared objective when measuring performance. | 1                         | 2 | 3              | 4 | 5 |
| 3. Management uses facts and data to make objective decisions at all times.                                   | 1                         | 2 | 3              | 4 | 5 |

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| 4. The employee's union fully understands the principles of Kaizen tools and supports its implementation.                                | 1 | 2 | 3 | 4 | 5 |
| 5. Direct labor employees spend working time in continuous improvement teams looking to reduce waste in all forms.                       | 1 | 2 | 3 | 4 | 5 |
| 6. More than 20% of the workforce submits improvement suggestions each month of which more than 50% are implemented.                     | 1 | 2 | 3 | 4 | 5 |
| 7. More than 30% of your employees participate in formal recognized training programs, which enhance their skills in the place of work.  | 1 | 2 | 3 | 4 | 5 |
| 8. Recognition is shown to those employees, which have out performed others in terms other in financial rewards.                         | 1 | 2 | 3 | 4 | 5 |
| 9. All employees contribute towards Kaizen programs without the fear of their job loss.  | 1 | 2 | 3 | 4 | 5 |
| 10. All senior management has been trained in Kaizen activities.   | 1 | 2 | 3 | 4 | 5 |
| 11. Being a part of successful improvement team is seen as promoting in one's career.  | 1 | 2 | 3 | 4 | 5 |
| 12. The transmitting of necessary knowledge to everyone is free.   | 1 | 2 | 3 | 4 | 5 |
| 13. Top managers are committed to TQC, making TQC a company-wide concern rather than the lonely job of specific QC manager.              | 1 | 2 | 3 | 4 | 5 |
| 14. All employees have self-discipline on working place.   | 1 | 2 | 3 | 4 | 5 |
| 15. Visual management is crucial for internal everyday operations in the organization.   | 1 | 2 | 3 | 4 | 5 |
| 16. Quality control is strongly connected with customer satisfaction.  | 1 | 2 | 3 | 4 | 5 |
| 17. There are no obstacles in feedback between the top management and workers.   | 1 | 2 | 3 | 4 | 5 |
| 18. There is a precise standard of measurement results for every manager.  | 1 | 2 | 3 | 4 | 5 |
| 19. Everyone in organization spreads the benefits of improvement throughout the organization.  | 1 | 2 | 3 | 4 | 5 |
| 20. Your organization has a dedicated training department, which does on the floor training and facilities identified external training. | 1 | 2 | 3 | 4 | 5 |

PART 3. BIOGRAPHICAL INFORMATION  
(ЧАСТЬ 3. ОБЩАЯ ИНФОРМАЦИЯ)

Occupation

(Профессия): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Company name (Название компании):

\_\_\_\_\_

**GENERAL INFORMATION**

*(Please mark your selection)*

1. Indicate to which population group you belong (Укажите Вашу расовую принадлежность).

- White (белый)
- Asian (азиат)
- Mixed (смешанный)
- Black (черный)
- Not willing to say (немогусказать)

2. Specify the highest level of tertiary education (Укажите уровень Вашего последнего образования).

- High school certificate (Диплом средней школы)
- College diploma (Средне-специальное образование)
- Bachelor degree (Бакалавр)
- Master degree (Магистр)
- Doctorate (Доктор)

***Thank you for your co-operation.***

***(Благодарим Вас за Ваше сотрудничество).***



## 10 APPENDIX B

### RESPONSES TO PART 2 OF QUESTIONNAIRE

#### Top and Senior Management

|    | 1 | 2 | 3 | 4 | 5 | Average |
|----|---|---|---|---|---|---------|
| 1  | 0 | 2 | 4 | 1 | 0 | 2,9     |
| 2  | 1 | 2 | 4 | 0 | 0 | 2,4     |
| 3  | 1 | 1 | 2 | 2 | 1 | 3,1     |
| 4  | 2 | 3 | 2 | 0 | 0 | 2       |
| 5  | 1 | 3 | 3 | 0 | 0 | 2,3     |
| 6  | 2 | 0 | 2 | 3 | 0 | 2,9     |
| 7  | 2 | 2 | 1 | 2 | 0 | 2,4     |
| 8  | 3 | 1 | 3 | 0 | 0 | 2       |
| 9  | 1 | 1 | 1 | 3 | 1 | 3,3     |
| 10 | 0 | 1 | 4 | 1 | 1 | 3,3     |
| 11 | 0 | 1 | 3 | 3 | 0 | 3,3     |
| 12 | 0 | 1 | 2 | 2 | 2 | 3,7     |
| 13 | 0 | 1 | 1 | 3 | 2 | 3,8     |
| 14 | 0 | 1 | 5 | 1 | 0 | 3       |
| 15 | 1 | 2 | 2 | 2 | 0 | 2,7     |
| 16 | 0 | 0 | 2 | 3 | 2 | 4       |
| 17 | 0 | 2 | 4 | 1 | 0 | 2,9     |
| 18 | 0 | 1 | 3 | 3 | 0 | 3,3     |
| 19 | 0 | 1 | 3 | 1 | 2 | 3,6     |
| 20 | 1 | 2 | 1 | 2 | 1 | 3       |

#### Middle Management

|    | 1 | 2 | 3 | 4 | 5 | Average |
|----|---|---|---|---|---|---------|
| 1  | 1 | 4 | 4 | 4 | 1 | 3       |
| 2  | 1 | 6 | 3 | 3 | 1 | 2,8     |
| 3  | 0 | 1 | 6 | 5 | 2 | 3,6     |
| 4  | 4 | 6 | 3 | 1 | 0 | 2       |
| 5  | 2 | 7 | 4 | 1 | 0 | 2,3     |
| 6  | 3 | 8 | 1 | 1 | 1 | 2,2     |
| 7  | 1 | 3 | 5 | 5 | 0 | 3       |
| 8  | 1 | 5 | 5 | 2 | 1 | 2,8     |
| 9  | 4 | 4 | 3 | 2 | 0 | 2,1     |
| 10 | 0 | 1 | 6 | 6 | 1 | 3,5     |
| 11 | 0 | 3 | 7 | 4 | 0 | 3,1     |
| 12 | 1 | 1 | 8 | 2 | 2 | 3,2     |
| 13 | 1 | 1 | 2 | 6 | 4 | 3,7     |
| 14 | 0 | 0 | 7 | 7 | 0 | 3,5     |
| 15 | 0 | 2 | 4 | 5 | 3 | 3,6     |
| 16 | 1 | 3 | 5 | 5 | 0 | 3       |
| 17 | 1 | 2 | 5 | 4 | 2 | 3,3     |
| 18 | 1 | 5 | 6 | 2 | 0 | 2,6     |
| 19 | 1 | 1 | 6 | 4 | 2 | 3,9     |
| 20 | 2 | 3 | 5 | 3 | 1 | 2,9     |

## Junior Management

|    | 1 | 2 | 3 | 4 | 5 | Average |
|----|---|---|---|---|---|---------|
| 1  | 1 | 8 | 2 | 0 | 0 | 2,1     |
| 2  | 3 | 4 | 2 | 1 | 0 | 1,9     |
| 3  | 1 | 1 | 5 | 4 | 0 | 3,1     |
| 4  | 2 | 7 | 2 | 0 | 0 | 2       |
| 5  | 0 | 7 | 4 | 0 | 0 | 2,4     |
| 6  | 3 | 5 | 3 | 0 | 0 | 2       |
| 7  | 1 | 5 | 2 | 3 | 0 | 2,6     |
| 8  | 5 | 4 | 2 | 0 | 0 | 1,7     |
| 9  | 2 | 3 | 5 | 1 | 0 | 2,5     |
| 10 | 0 | 3 | 4 | 4 | 0 | 3,1     |
| 11 | 1 | 1 | 5 | 4 | 0 | 3,1     |
| 12 | 0 | 2 | 8 | 1 | 0 | 2,9     |
| 13 | 0 | 1 | 5 | 4 | 1 | 3,5     |
| 14 | 0 | 0 | 6 | 3 | 2 | 3,6     |
| 15 | 0 | 3 | 4 | 4 | 0 | 3,1     |
| 16 | 1 | 1 | 5 | 5 | 0 | 3,1     |
| 17 | 0 | 0 | 6 | 3 | 2 | 3,6     |
| 18 | 4 | 3 | 3 | 1 | 0 | 2,1     |
| 19 | 1 | 0 | 7 | 2 | 1 | 3,2     |
| 20 | 1 | 2 | 3 | 4 | 1 | 3,2     |

## **11 APPENDIX C**

### **20 KEYS**

Key 1: Cleaning and Organizing

Key 2: Rationalizing the System/MBOs

Key 3: Improvement Team Activities

Key 4: Reducing Inventory(Shortening Lead Times)

Key 5: Quick Changeover Technology

Key 6: Manufacturing Value Analysis(Methods Improvement)

Key 7: Zero Monitor Manufacturing

Key 8: Coupled Manufacturing

Key 9: Maintaining Equipment

Key 10: Time Control and Commitment

Key 11: Quality Assurance System

Key 12: Developing Your Suppliers

Key 13: Eliminating Waste (Treasure Map)

Key 14: Empowering Workers to Make Improvements

Key 15: Skill Versatility and Cross Training

Key 16: Production Scheduling

Key 17: Efficiency Control

Key 18: Using Information Systems

Key 19: Conserving Energy and Materials

Key 20: Leading Technology and Site Technology