

Kaizen Applications in the Garment Industry: A Case Study

Ứng dụng Kaizen trong ngành may mặc: Trường hợp nghiên cứu điển hình

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Abstract: Industry 4.0 helps companies be more flexible in the production process and the supply chain. Thereby creating quality products and services at low prices, saving time and costs in manufacturing. Kaizen is known as an advanced tool in the application of a series of methods to eliminate waste and improve the quality and efficiency of production activities in enterprises in Japan. However, in Vietnam, many businesses are still hesitant and consider the effectiveness of this tool in Vietnamese enterprises. In the article, the author mentions the implementation of Kaizen at Thuan Phuong Group. The method selected in the article includes describing the current problem of the enterprise, proposing solutions for the Kaizen application, designing and programming Kaizen software, and deploying Kaizen at the factory according to the PDCA cycle. Kaizen tools have been deployed to almost all departments at the enterprise such as the production department, mechanics, engineering, quality management, and maintenance. After 2 years of application implementation Kaizen, the total improvement time of the business increased more than 10 times, saving companies a large amount of money. The article is an example of the successful application of Kaizen in production and business activities in Vietnam. Therefore, this article helps other businesses have a more objective view of the application aspects of Kaizen in their businesses.

Keywords: *Garment Industry; Industry 4.0; Kaizen; Lean manufacturing; Software*

Tóm tắt: Công nghiệp 4.0 giúp doanh nghiệp linh hoạt hơn trong quy trình sản xuất và chuỗi cung ứng, từ đó tạo ra những sản phẩm, dịch vụ chất lượng với giá thành rẻ, tiết kiệm thời gian và chi phí trong sản xuất. Kaizen được biết đến như một công cụ tiên tiến trong việc áp dụng hàng loạt phương pháp nhằm loại bỏ lãng phí và nâng cao chất lượng, hiệu quả hoạt động sản xuất tại các doanh nghiệp ở Nhật Bản. Tuy nhiên, nhiều doanh nghiệp vẫn còn e ngại và cân nhắc hiệu quả của công cụ này tại Việt Nam. Trong bài viết, tác giả đề cập đến việc triển khai Kaizen tại Thuận Phương Group. Phương pháp được lựa chọn trong bài bao gồm mô tả vấn đề hiện tại của doanh nghiệp, đề xuất giải pháp ứng dụng Kaizen, thiết kế và lập trình phần mềm Kaizen, triển khai Kaizen tại nhà máy theo chu trình PDCA. Công cụ Kaizen đã được triển khai đến hầu hết các bộ phận trong doanh nghiệp như bộ phận sản xuất, cơ khí, kỹ thuật, quản lý chất lượng, bảo trì. Sau 2 năm triển khai ứng dụng Kaizen, tổng thời gian cải tiến của doanh nghiệp tăng hơn 10 lần, tiết kiệm cho doanh nghiệp một khoản tiền lớn. Bài báo là một ví dụ về việc áp dụng thành công Kaizen trong hoạt động sản xuất kinh doanh tại Việt Nam. Vì vậy, bài viết này giúp các doanh nghiệp khác có cái nhìn khách quan hơn về các khía cạnh ứng dụng của Kaizen trong doanh nghiệp của mình.

Từ khóa: *Công nghiệp 4.0; Kaizen; Ngành may mặc; Phần mềm; Sản xuất tinh gọn*

1. Introduction

In recent decades, all goods have to change to better adapt to the increasing needs of markets. Companies are forcing it to cut costs and increase the efficiency of its production and business operations, so inefficient operations are being outsourced. The entire process of converting materials into goods is becoming more flexible, making the manufacturing process more modern and important [1].

The industrial revolution 4.0 opened a new era with many opportunities but also many difficulties and challenges. The 4th industrial revolution has opened spectacularly with the introduction of a series of smart technologies applying 4.0 technology. Kaizen is one of the ways to improve and bring excellent efficiency in saving costs and optimizing operating processes. Kaizen tool will improve productivity, quality, and service levels, reduce costs and delivery times, and create a very comfortable and safe working environment for everyone. When applying continuous Kaizen improvement in supply chain management operations, will change the way jobs are operated and the way people see each stage of the process. When Kaizen improvement takes place, it requires a lot of effort from the parties involved to agree on a complete process where costs are reduced and operations are optimized for high productivity [2].

The application of Kaizen in the factory will have many benefits.

Therefore, the paper deployed Kaizen software in a garment factory to measure these benefits. In addition, the application of 4.0 technology to programming Kaizen software is considered a breakthrough in the application of Kaizen.

The paper consists of 5 parts: the first part introduces; Parts 2 and part 3 are the Literature review and method of the article; Part 4 outlines the real problem and the application of Kaizen in Thuan Phuong Group enterprises; Part 5 concludes the paper.

2. Literature review

2.1. Kaizen

The Japanese have adopted three terms: wabi-sabi, ikigai, and kaizen. Kaizen is the most developed and improved of the three concepts. It is very simple to grasp and use in real life.

Management strategies that focus on employee engagement and empowerment through communication and connection, collaborative approaches, and improved job design were nothing new in 1980. However, some of These techniques seem to be used more effectively by Japanese companies than others. The business lesson learned from them is that in pursuing global competitiveness, they have demonstrated a greater commitment to the mindset of continuous improvement than other businesses. This gave rise to the phrase Kaizen [3].

In Japanese, Kaizen is a noun used to refer to improvement. This improvement can be large, small, continuous, or one-time. Kaizen is defined as continuous improvement, involving everyone in the organization from top management to middle and lower management. The basic concept of Kaizen is ingrained in the minds of every worker and manager. They don't even realize that they are thinking in a kaizen way. They don't realize they're thinking of it as a customer-facing strategy for organizational improvement. Kaizen is a broad knowledge that includes various technologies such as Lean Manufacturing System, 5S, 7 QC tools, TPS (Toyota Production System), and others. These technologies are used to pursue [4].

The core value of kaizen was first used in the manufacturing industry in Japan as a technique and tool to improve productivity and quality. It is recognized worldwide. The kaizen approach is very adaptable and flexible [2-3].

2.2. Kaizen Characteristics

Kaizen includes the following features [4]:

- Composition: from employees to senior management. Kaizen encourages employees to make suggestions within the organization.
- Continuity: Activities that consist of small daily efforts, when combined, produce large results.

- This is a statistically based scientific method.

- It encourages the use of the intelligence of everyone in the organization

2.3. The benefits of Kaizen

Kaizen brings great effects, including [4]:

- Reduces cost and delivery time
- Enhances communication and also builds a network
- Creates an organization that grows and grows with it
- Kaizen changes the mindset of both employees and managers
- Kaizen creates a very comfortable and safe working environment for everyone.

2.4. Results of implementing Kaizen in some enterprises around the world

To increase their competitiveness in the face of increased global competition, US businesses have drastically revised their production techniques over the last decade. To achieve this goal, they used a variety of innovative strategies, including just-in-time delivery, total quality management, lean manufacturing, flexible production systems, process improvement, and equipment design for manufacturing. All of these programs aim to reduce costs, improve quality, shorten cycle times, and increase production floor flexibility. One of them is the implementation of Kaizen by Boeing Commercial Aircraft Company to

reduce export costs and optimize production and transportation costs [5].

A major aerospace manufacturer used their expertise in Kaizen's ideas to reduce electricity usage, which is their highest utility cost. A pilot group was identified at the printed circuit board store, which is located in the headquarters building and consumes the most electricity of any of the company's facilities. This location was chosen because it has strong support from the Kaizen knowledge leadership and allows them to easily separate their electricity usage from the rest of the building. As a result, the company has saved more than expected on electricity consumption costs when compared to the previous electricity consumption budget [6].

In addition to articles on the effectiveness of Kaizen, in 2022 Eyob Alebachew assessed the Challenges of Kaizen Implementation in Manufacturing Industries under EKI supervision. According to the findings of the study, there was insufficient training on the concept and application of kaizen. This has an impact on the overall kaizen implementation and sustainability activities. Finally, for better results, the study suggested increasing Kaizen consulting and training [7].

A more detailed example of the application of this technology is cited in a paper that appeared in 2020 which demonstrates the use of the KAIZEN methodology as well as qualitative

methods and techniques for improving the quality of sales processes. Research results show that the application of Kaizen brings many benefits to businesses [8].

In 2018, Carnerud studied the applications of Kaizen from 1980 to 2017. The results showed that Kaizen was of particular interest to businesses from 1980 to 1990. After 1990, it did not receive much attention. However, from 2010 to 2017, businesses applied Kaizen to their businesses more [9].

In 2017, some authors published some interesting work on the use of the Kaizen Tool in Bangladesh's textile and apparel industry. According to the findings of these studies, the sole purpose of this paper is to identify the root causes of sewing defects in Bangladesh's apparel industry and to continuously improve in reducing defects using the Kaizen (Continuous Improvement) system. Productivity gains in the apparel industry. "ABOUT Color Tex. Ltd." is the garment manufacturing company we investigated. To identify the top defect items, Pareto Analysis is used. Cause-Effect Analysis assisted in determining the root causes of sewing defects. Kaizen is then used to continuously improve the minimization of sewing defects [10].

As reported by Saima Akter and others in 2015, Kaizen has increased line efficiency by up to 7% while decreasing defects per hundred units [11]. Another paper was also studied by

Arya et al. This study aims to represent Kaizen implementation in a machine vice manufacturing company. The results show that Inventory access time is reduced by up to 87 percent and the total distance traveled is reduced by up to 43.75 and 46.08 percent [12].

2.5. The benefits of Kaizen software

Kaizen has many benefits for the company. However, in industry 4.0, the application of Kaizen is not enough, it is necessary to research and deploy Kaizen software. Because Kaizen software has more benefits than basic Kaizen including real-time, automatic reporting, fast process, no paperwork, and increase user satisfaction [13] [14].

Real-time: Data is updated continuously in real-time.

Automatic reporting: All reports in Kaizen are generated automatically by the Kaizen software based on the data.

Fast process: The project approval process is done using software and waiting time is reduced.

No paperwork: Input data on the software so no paperwork is needed

Increase user satisfaction: Users can use modern software and not waste time

3. Methodology

3.1. The PDCA cycle

Kaizen is built on an iterative PDCA cycle. The PDCA cycle stands for Plan - Do - Check - Act (Figure 1). It is also referred to as the Deming Cycle. With this cycle, everyone in the organization develops the mindset and attitude to

strive for higher levels of productivity and quality. This results in improved work quality, quality, cost, and delivery. Kaizen enables organizations to improve individual cohesion, discipline, and teamwork while also increasing their capacity to improve the quality and productivity of goods and services within the organization [4] [15].

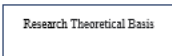
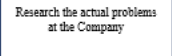
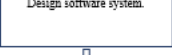





Figure 1. The PDCA cycle

3.2. Methodology

The methodology has 6 steps including researching the Theoretical Basis; researching the actual problems at the Company; Designing the software system; Programming Software; Testing the software; Training and implementing (Table 1).

Table 1. Article research process

No.	Process	Details
1		Learn and select: → Published documents or Published research → Several articles in other scientific journals → Several best-documented on the website are related to the research content.
2		→ Company documents → Ask and review information from the manager → Observe
3		Based on the requirement of the factory, write the requirement document of the system
4		Vocational IT Develop
5		Base on functions have been required to implement testing software
6		Training to operate and implementing the software system into production

4. Case study

4.1. Describe the company's current problem.

Thuan Phuong Group was founded in 1983 and has since grown to become one of Vietnam's leading private export embroidery companies. Thuan Phuong Group is a company operating in many industries and fields such as real estate, sewing, schools, embroidery, hospitals, and restaurants [16].

Thuan Phuong Group is proud to be one of Vietnam's leading embroidery companies, with over 7,000 professionally trained employees. and full of desire to grow and stay with the company for a long time With a working environment that meets 5S international standards, a clean and beautiful factory,

an experienced management team, and over 7,000 employees who are well cared for and fairly compensated. Thuan Phuong Group is always striving to improve to achieve maximum quality and productivity [16].

However, there are still some issues with the factory's improvement:

- The areas for improvement are primarily concentrated in the IE (industrial engineering) team and have not spread to other departments or larger organizations, suppliers, distributors, retailers, and customers.

- The factory lacks an improvement evaluation system; all improvements are managed solely through Excel software.

- Failing to timely encourage employees who are making good progress in order to promote continuous improvement at the factory.

- There is no improved emulation system among Group factories.

- There is still a lot of waste in the factory.

4.2. Software Design and Programming

After analyzing the weak points in the improvement of the factory, Thuan Phuong company proceeded to come up with the idea of designing Kaizen software. Based on the survey results of users and leaders in the company, the company's IT department wrote and tested Kaizen software within 2 months. To use this Software, users perform 4 steps:

Step 1. Input improvement ideas: the step will be done by everyone in the company including all departments, from sales, human resources, planning, and production... Whenever everyone in the company Companies with innovative ideas can use mobile phones or computers located at some point in the business to declare their ideas. Besides the module for business insiders, the Kaizen software system also has a system for non-enterprise partners such as customers, suppliers, retailers, etc., who can declare their improvement ideas. themselves, to improve the operational efficiency of the plant's components (Figure 2).

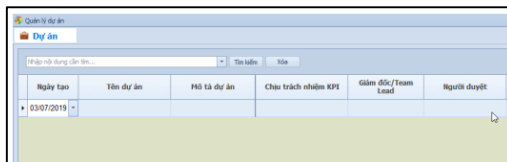


Figure 2. Input improvement ideas

Step 2. Approval of improvement ideas: After receiving improvement ideas, the Kaizen department in the company arranges ideas according to criteria such as feasibility analysis, analysis of benefits of improvement, the urgency of improvement, investment cost...and selection implementation improvement. Once the improvements have been approved, the factory Kaizen department guides the relevant department to implement these improvements (Figure 3).



Figure 3. Accept improvement ideas

Step 3. Fill in the information after implementing the idea: After the project has been implemented, the improvement department is responsible for entering the information achieved after implementation, including time, costs, and benefits received from improvement. It is the responsibility of the department head at the place of improvement to check that this input is factually correct.

Step 4. Project approval after implementation: After the project implementation results are available. The Kaizen department rewards individuals/organizations who come up with ideas for improvement and individuals/organizations that make improvements. This awarding is held weekly in the presence of all employees in the company to encourage and motivate the spirit of improvement throughout the factory. In addition, these data will be aggregated in the company-wide data, thereby serving as a basis for reward and emulation among factories in the group (Figure 4).



Figure 4. Kaizen Report

4.3. Training

Training employees to use new software is considered very important by Thuan Phuong company. When employees understand and follow the construction software steps correctly, then there will be results. However, in the process of the IT department writing software, consulted with all departments in the enterprise to design the most user-friendly interface. Therefore, the process of using the software is not without many problems.

After the training, the Kaizen department was surveyed to evaluate what level of understanding and use of the software by users. Individuals who have not yet understood and practiced the Kaizen software have arranged one more training session to ensure that everyone can use the software most easily.

When Kaizen is successfully applied to lean production in the enterprise, it will make a great impact on the people involved in it and will lead to the development of the culture. A successful innovation cannot be ignored. People are always eager to apply good improvements in production and continue to develop this idea.

Therefore, in addition to training employees to use software, Thuan Phuong company also organizes training courses on Kaizen, innovation and Lean manufacturing tools so that all employees have certain knowledge to develop ideas (Figure 5).



Figure 5. A Kaizen training session

4.4. Results after implementing Kaizen

The application of Kaizen software system has been gradually applied by Thuan Phuong company to all factories in the group since 2020. After 2 implementations, Kaizen is no longer a stranger to all employees of the company and has built a "Kaizen Culture" at the company. Figure 6 depicts the results of the application of the Kaizen system implementation in 2020 and 2021 at Thuan Phuong Group.

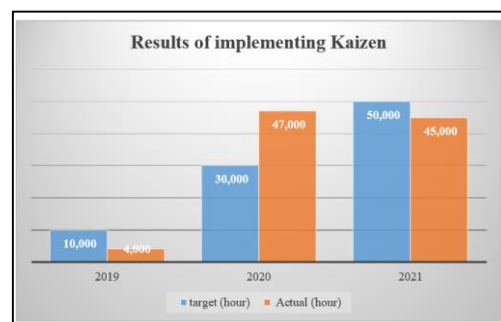


Figure 6. Results of application of the Kaizen software system

In the first year of implementation, Thuan Phuong Group saved 47,000 hours, more than 10 times higher than in 2019 (when Kaizen software was not applied). By 2021, despite being heavily affected by the stagnation in production and business due to the Covid 19 pandemic, all employees of the company still constantly make efforts to apply their insights and thinking to improvement. research, develop, and put into practice. As a result, the company has reduced 45,000 hours, equivalent to more than 1 billion VND. 2022, promises to be the year Thuan Phuong company will achieve even better results. Besides, thanks to this improved software, the partners, customers, suppliers, and retailers... in the enterprise's supply chain have better evaluated the company.

5. Results and discussion

In the context of the Industrial Revolution 4.0, the application of a digital platform is an inevitable trend, to improve competitive advantages and optimize corporate governance. Especially in the difficult situation caused by the Covid-19 epidemic, regardless of the scale, if it does not change, it will be difficult for businesses to survive and develop without timely catching up with technology trends. Kaizen is known as a famous Japanese business philosophy that has been successfully applied to many businesses around the world.

In Vietnam, some companies have gradually applied the Kaizen culture in

production and business activities. However, the application of Kaizen to form specialized management software in Vietnam has not been implemented by many businesses. Thuan Phuong Group realizes the importance of having an improved management software system for the whole business, so it has researched, applied, and deployed this software for the entire supply chain inside and outside the business.

Although there are still some limitations on how to prevent employees from running out of ideas for improvement, the initial step has brought great results not only in cost savings for the business but also in positive impacts positively to customer satisfaction, and employee satisfaction in the enterprise. Besides, it also helps businesses operate more efficiently, improving their competitive position in Vietnam.

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