

Kaizen Techniques' Implementation in a Nail Manufacturing Company: A Case Study

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Abstract

Kaizen represents a powerful philosophy for driving continuous improvement and operational excellence. Its principles, when effectively implemented, can transform organizational culture and performance. As global competition intensifies, Kaizen provides a robust framework for businesses to adapt, innovate, and thrive. This paper explored the implementation of Kaizen techniques in a nail manufacturing company, focusing on continuous improvement practices. It provided a comprehensive overview of Kaizen implementation in the firm, demonstrating the practical benefits and challenges of adopting continuous improvement practices in a manufacturing setting. The study outlined the concept of Kaizen, the steps taken to implement these practices, and the resulting improvements in efficiency, quality, and employee engagement, which led to 30% reduction in defect rates, as well as 25% and 20% increase in production output and job satisfaction respectively. Through a detailed analysis of the processes before and after Kaizen implementation, the research demonstrated the effectiveness of continuous improvement methodologies in a real-world setting.

Keywords: *Kaizen, continuous improvement, 5S, waste reduction, quality, efficiency, nail manufacturing, training*

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I. Introduction

Kaizen, a Japanese term meaning "continuous improvement," is a philosophy and practice that emphasizes the incremental and continuous enhancement of processes, products, and services. Rooted in post-World War II Japan, Kaizen became globally recognized through its implementation in the manufacturing sector, particularly within Toyota's Production System. Unlike radical, large-scale changes, Kaizen focuses on small, systematic improvements that cumulatively lead to substantial benefits over time. Okpala et al. (2020), defined Kaizen as an increasingly common organizational improvement process aimed at work area transformation and employee development. They opined that its major objective entails enabling operators and managers to detect problems, ascertain improvement priorities, determine root cause of the problem, fix it, and then establish better ways to prevent such problems from reoccurring.

However, Ihueze and Okpala (2014), pointed out that Kaizen is a very efficient tool and technique of lean production system aimed at the adoption of creativity and innovation to identify and reduce inherent wastes in manufacturing processes, and also affect the required changes within the shortest possible time, in order to enhance productivity. In the manufacturing sector, Kaizen lays emphasis on enhancing productivity, reducing waste, and improving overall quality through small, incremental changes. It involves the participation of all employees, from top management to the shop floor workers, in identifying areas for improvement and implementing solutions.

Central to the Kaizen philosophy is the involvement of all employees, from top management to frontline workers, in identifying opportunities for improvement and implementing changes. This collaborative approach fosters a culture of shared responsibility and proactive problem-solving, where every individual is encouraged to contribute ideas and take ownership of their work processes. Kalva, Kumar and Srinivasu (2018), advised companies to adopt kaizen events as part of the plan for the entire system and not a group of stand-alone activities, as Kaizen events can actually cause problems in a firm if they are not part of an entire system.

Kaizen's principles are not limited to manufacturing; they have been successfully applied across various industries, including healthcare, finance, and technology. By promoting efficiency, reducing waste, and

enhancing quality, Kaizen helps organizations achieve sustainable growth and a competitive edge in their respective markets. In essence, Kaizen is more than a set of tools or techniques; it is a mindset that values ongoing learning and development, encouraging organizations to strive for excellence through continuous, incremental improvements.

Originating in the manufacturing sector, particularly within Toyota's production system, Kaizen has evolved into a universal strategy applicable to various industries. It encourages all employees, from top management to frontline workers, to contribute ideas for improvement, fostering a culture of collaborative problem-solving and shared responsibility. Kaizen's holistic approach not only aims to boost operational performance but also to enhance employee morale and satisfaction by creating a work environment that values and utilizes their contributions. By integrating Kaizen into their organizational culture, companies can achieve sustainable growth and maintain a competitive edge in the marketplace.

In the manufacturing sector, Kaizen helps to enhance operational efficiency, reduce costs, improve product quality, and increase employee morale. By systematically identifying and eliminating inefficiencies, companies can achieve significant improvements in their production processes and overall business performance. The core principles of Kaizen include: the following: continuous improvement, employee involvement, standardization, elimination of waste, and quality circles. Kaizen's holistic approach not only aims to boost operational performance but also to enhance employee morale and satisfaction by creating a work environment that values and utilizes their contributions. By integrating Kaizen into their organizational culture, companies can achieve sustainable growth and maintain a competitive edge in the marketplace.

II. Literature Review

Kaizen has been widely recognized for its effectiveness in various industries. Studies by Imai (1986), and Liker (2004), illustrated the benefits of Kaizen in promoting a culture of continuous improvement. The concept is rooted in the involvement of all employees, from management to frontline workers, in identifying and implementing improvements. Previous research indicates that Kaizen can lead to significant enhancements in operational efficiency, product quality, and employee satisfaction. According to Githongo and Karugu (2023), the goal of Kaizen implementation is to enhance a culture of continuous improvement that can result to improved efficiency, higher quality, and enhanced customer satisfaction. They pointed out that the implementation Kaizen requires a comprehensive and systematic approach.

In an ever-evolving business environment, the ability to adapt and improve continuously is crucial for organizational success. Teian (1992), emphasized that Kaizen is more than just a means of improvement as it represents the daily struggles that occur in the shop floor and the manner in which these struggles are overcome. Kaizen, a cornerstone of lean manufacturing and management, offers a structured approach for incremental improvements that collectively lead to significant advancements. Okpala (2014), explained that Kaizen concept is the best approach for the identification and utilization of diverse skills that a firm and its employees already possess for impactful results that guarantees the attainment of rapid, evident and sustainable success. He noted that constant monitoring and evaluation are also employed to ensure the sustenance of the adopted improvements, as many companies have come to realize that Kaizen is a very important manufacturing technique because of its more efficient and faster ways of achieving success.

Kaizen is a powerful approach to fostering a culture of continuous improvement in any manufacturing company. Lina and Ullah (2019), noted that when Kaizen is applied as an action plan through a steady and sustained program of successful Kaizen events, it enables a company's staff to think differently about their work. They concluded that consistent application of Kaizen as an action plan creates enormous long-term benefit by developing the culture that is essential for truly beneficial continuous improvement. However, Dinka (2021), listed the following as the benefits of Kaizen implementation: increase in profit, customer satisfaction, sources of innovation, enhancement of self-development, motivation for employees, means of improvement for teamwork, means of reducing waste, and tool for proper use of time.

According to Pethkar et al. (2023), the main aim of kaizen is to eliminate waste, enhance efficiency, and also increase product quality by involving all employees in the process of continuous improvement. They noted that Kaizen encourages a culture of innovation, collaboration, and problem-solving, as well as cost reduction and increase in productivity and customer satisfaction. By engaging all employees in the process, focusing on small, incremental changes, and systematically eliminating waste, a manufacturing company can achieve significant enhancements in productivity, quality, and overall performance. The successful implementation of Kaizen requires commitment, collaboration, and a sustained focus on improvement, as the benefits it brings make it a worthwhile investment for any manufacturing organization.

III. Methodology

This case study examines the application of Kaizen techniques in Xteem Nail Manufacturing Company (XNMC), highlighting the strategies employed and the outcomes achieved. The firm, though not a widely recognized name in Nigeria's industrial history, represents a typical evolution of a specialized manufacturing

business which started in 2015 as a Small and Medium Scale Enterprise (SME). Driven by the increasing demand for construction materials, including nails and fasteners, the firm focuses on manufacturing basic types of nails, catering to local construction firms and hardware stores.

In 2021, faced with dwindling resources occasioned by stiff competition, negative Covid-19 effect on businesses, low patronage and profitability, XNMC embraced technological integration by adopting automation and Computer-Aided Design (CAD) to enhance precision and efficiency. However, their recent challenges which include inherent wastes in their manufacturing processes, high production costs, un-streamlined processes, as well as variability in product quality, led the company to implement Kaizen techniques in its establishment.

The study was conducted over a period of one year in the mid-sized nail manufacturing company. Data collection involved a combination of direct observation, employee interviews, and analysis of production records. The implementation process was divided into five phases: preparation and planning, training and education, implementation of Kaizen events, monitoring and sustaining Kaizen events, and continuous improvement and expansion.

The nail production process is shown in figure 1.



Figure 1: The nail production process

Source: Freeiplmk (2024)

Implementation Phases

Implementing Kaizen in a nail manufacturing company involves several steps and practices tailored to address the unique challenges and opportunities within the industry. The following sections outline a structured approach to introducing and embedding Kaizen techniques in a nail manufacturing environment.

Phase 1: Preparation and Planning

Training on Kaizen techniques:

The entire leadership and staff of the company were trained on the basic principles of Kaizen: continuous improvement, and employee involvement. Trainings were also conducted on the identification, reduction, and possible elimination of the seven wastes that are inherent in their manufacturing processes. The wastes include: defects and scraps, transportation, unnecessary movement, excess inventory which ties down the company's financial resources, overproduction, over processing, as well as waiting.

Setting of Objectives:

Measurable goals for the Kaizen implementation, such as improving production efficiency, reducing waste, enhancing product quality, and fostering a culture of continuous improvement were clearly defined.

Formation of Kaizen Team:

A cross-functional team that include the manager, supervisor, and frontline workers were subsequently created. The team was entrusted with the responsibility of leading the Kaizen initiatives, and also ensure that all levels of the company are involved.

Conducting of Initial Assessments:

A thorough analysis of current processes were performed in order to identify areas of waste (muda), and establish a baseline for performance metrics.

Phase 2: Training and Education

Kaizen Training:

Training for all employees on Kaizen concepts, tools, and techniques. Focus was on 5S (Sort, Set in order, Shine, Standardize, Sustain), problem-solving methods, waste reduction, process mapping, and the importance of teamwork.

Workshops and Seminars:

Workshops and seminars to reinforce the training and provide hands-on experience with Kaizen tools were conducted for the management and employees in the three units of wire drawing, molding, and polishing.

Phase 3: Implementation of Kaizen Events

5S Implementation:

The implementation phase was started with a 5S program to organize the workplace, improve efficiency, and establish a clean and safe environment. This involves sorting unnecessary items, setting in order the tools and materials, shining and cleaning the workspace, standardizing procedures, and sustaining these practices.

Table 1 shows the main activities applied for 5S practice implementation in the firm.

Table 1: Major activities for efficient implementation of 5S

Japanese term	English 5S	English 5C	Features
Seiri	Sort	Clear	Unnecessary materials like debris, scraps, etc. were sorted out and removed from the shop floor
Seiton	Set in order	Configure	Materials like nail wire, tools, equipment, and coating materials were properly kept in order to reduce accidents and enhance easy retrievals
Seiso	Shine	Clean and check	The workplace was carefully cleaned to remove dirt, greasy and oily surfaces, as well as dust
Seiketsu	Standardize	Conformity	Proper organization was introduced to ensure improved shop floor standard
Shitsuke	Sustain	Custom and practice	The entire staff were properly trained and motivated for enhanced housekeeping discipline in the shop floor

Identification of Improvement Opportunities:

Kaizen events (or Kaizen Blitz) where employees identify problems, brainstorm solutions, and implement changes were regularly conducted. Small and incremental improvements were focused on.

Standard Work Practices:

Standard work procedures to ensure consistency and repeatability of processes were developed and documented.

Phase 4: Monitoring and Sustaining Improvements

Measure and Analyze:

Performance against the baseline metrics established in Phase 1 were continuously measured. Data were applied to analyze the impact of changes before the identification of further improvement opportunities.

Feedback Loop:

A feedback loop where employees can share their observations and suggestions for further improvements was created. The feedback was regularly reviewed and properly addressed.

Celebrate Successes:

The achievements and contributions of employees were duly recognized and celebrated to foster a culture of continuous improvement and motivation.

Phase 5: Continuous Improvement and Expansion

Expand Kaizen Efforts:

Kaizen activities were gradually expanded in other areas of the company, such as inventory management, supply chain, and customer service in order to enhance overall efficiency.

Regular Kaizen Audits:

Regular audits were conducted to ensure adherence to Kaizen techniques, in order to identify any deviations or areas for further improvement.

Sustain and Innovate:

The employees were encouraged in innovation and new ideas to sustain the momentum of Kaizen. The Kaizen philosophy was also kept alive by continuously seeking ways to improve processes, reduce waste, and enhance quality.

Practical Tools and Techniques

Gemba Walks: "Gemba" (or "Genba") means "the real place" in Japanese, which refers to the actual location where work is done, value is created, and problems can be observed directly. It is a powerful tool within the Kaizen framework, emphasizing the importance of direct observation, employee engagement, and proactive problem-solving. The Kaizen team regularly visits the workplace, observing processes, and engaging with employees, thereby fostering a culture of continuous improvement and operational excellence.

The Kaizen implementation process depicting root cause determination is shown in figure 2.



Figure 2: Kaizen Implementation process

Source: Stock.adobe (2023)

Root Cause Analysis (RCA): This is a systematic process for identifying the root causes of problems or events and an essential tool in the Kaizen methodology. It helps in the identification of underlying issues that need to be addressed for improvement in the company. The application of RCA in the firm involved the following processes: problem identification, data collection, cause identification, which entails using the 5 Whys and Fishbone Diagram to identify potential causes such as improper maintenance, operator error, poor-quality materials, and outdated machine parts. Others are: root cause verification, solution development and implementation, and monitoring and review, which is aimed at monitoring the machine's performance after implementing the solutions to ensure that breakdowns are reduced or eliminated.

Visual Management (VM): This involves the use of visual signals to communicate information quickly and effectively, thereby enabling better understanding, faster decision-making, and improved workplace efficiency. By making information visible and accessible, the firm was able to enhance communication, reduce waste, and create a more productive and harmonious workplace.

PDCA Cycle (Plan-Do-Check-Act): The PDCA cycle, also known as the Deming Cycle or Plan-Do-Check-Act, is a fundamental tool and technique in the practice of Kaizen. It is a systematic approach for implementing and testing changes, analyzing results, and making further improvements. The application of PDCA cycle in the firm supports Kaizen philosophy by providing a structured approach to problem-solving and continuous improvement.

By following these phases, the nail manufacturing company succeeded in effectively implementing Kaizen techniques in its establishment, leading to enhanced efficiency, reduced waste, improved product quality, and a culture of continuous improvement.

II. Results and Discussion

Results

The implementation of Kaizen techniques in Xteem nail manufacturing company brought many benefits, fostering continuous improvement and enhancing overall efficiency, thereby leading to significant improvements across several key performance indicators:

Efficiency: Production output increased by 20%, attributed to streamlined processes and reduced downtime. This is in line with the findings of Okpala, Nwankwo and Onu (2020), as they pointed out that the implementation of Kaizen enables each personnel in a firm to work in the most efficient way, thereby leading to standardized work and continuous improvement.

Improved Quality: Defect rates decreased by 30%, resulting from enhanced quality control measures and employee involvement in problem-solving. Continuous monitoring and incremental improvements helped to identify and reduce defects in the production process, leading to higher quality nails.

Employee Engagement: Employee satisfaction surveys indicated a 25% improvement in job satisfaction, reflecting the positive impact of involving workers in decision-making processes. This is because involving the employees in the improvement process boosts morale and also creates a sense of ownership and responsibility.

Waste Reduction: Material waste was reduced by 15%, thanks to better inventory management and process optimization. By identifying and eliminating waste in materials, time, and processes, the company was able to significantly reduce production costs.

Standardization: Implementing standardized procedures ensured consistent quality across all production batches.

Process Optimization: Analyzing and refining production processes helped the company to reduce/eliminate waste, streamline operations, and enhance productivity.

Reduced Downtime: The introduction of regular maintenance and quick problem-solving approaches minimized machine downtime, thereby ensuring smoother operations, and improved throughput.

Energy Efficiency: the optimization of the entire manufacturing processes enabled XNMC to achieve lower energy consumption, which contributed immensely in the reduction of operational costs.

Skill Development: Kaizen's continuous improvement initiatives provided opportunities for employees to develop new skills and further enhance their capabilities.

Workplace Safety: Regular reviews and improvements led to safer work environments, reducing the risk of accidents and injuries.

Compliance: Staying updated with safety regulations guaranteed compliance and avoided potential fines or legal issues.

Reliability: Consistent production of high-quality nails enabled the company to achieve customer trust, satisfaction, and repeat patronage.

Responsiveness: Faster and more efficient production processes led to quicker response to market demands and customer orders.

Continuous Improvement Culture: Encouraging a culture of innovation and problem-solving led XNMC to achieve creative solutions and technological advancements.

Sustainable Practices: Reducing waste and optimizing resource use contributed to more sustainable manufacturing practices.

Corporate Responsibility: Demonstrating commitment to continuous improvement and sustainability enhanced the company's reputation and appeal to eco-conscious customers.

By integrating Kaizen techniques, Xteem nail manufacturing company was able to foster a culture of continuous improvement within just a year, leading to significant long-term benefits in quality, efficiency, cost savings, and overall competitiveness.

III. Discussion

The findings of this case study corroborate the benefits of Kaizen highlighted in existing literature. The involvement of employees at all levels proved crucial in identifying practical improvements and fostering a culture of continuous enhancement. Challenges encountered during the implementation included initial resistance to change by the employees, and the need for ongoing training. However, these were mitigated through effective communication and leadership support.

Kaizen represents a powerful philosophy for fostering continuous improvement within organizations. By embracing its principles and methods, the nail manufacturing company achieved lasting enhancements in efficiency, quality, and employee satisfaction. Although challenges exist, the long-term benefits of Kaizen make it a valuable strategy for any organization that committed to excellence.

IV. Conclusion

The application of Kaizen concept in Xteem nail manufacturing company resulted in substantial improvements in efficiency, quality, and employee engagement. This study underscores the value of continuous improvement methodologies in manufacturing and provides a roadmap for other companies seeking to implement Kaizen. The implementation of Kaizen techniques in the manufacturing firm has demonstrated substantial benefits in terms of quality, productivity, and cost-efficiency. While challenges such as cultural resistance and sustaining momentum exist, they can be mitigated through strong leadership commitment, employee engagement, and continuous training. The success story from the company underscore once again the transformative potential of Kaizen when effectively applied.

Future research could explore the long-term sustainability of Kaizen practices and their applicability to other manufacturing sectors, as well as the evolving applications of Kaizen in the digital age, particularly in the context of Industry 4.0 and artificial intelligence.

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