



KAIZEN APPROACH TO QUALITY IMPROVEMENT AND ITS FINANCIAL IMPLICATION

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ABSTRACT

Purpose: This study aims to investigate the impact of kaizen practice and how it affects the quality of large manufacturing firms particularly, Kilimanjaro international leather company.

Design/methodology/approach. In this study, the Plan-Do-Check-Act (PDCA) cycle technique was employed to lower the production process's defect rate. The fishbone served as a tool for support. The PDCA cycle and fishbone are two top-notch techniques that aid in reducing the number of defective parts.

Findings: The defect rate decreased by 2%. Improvement in the production process was achieved.

Research limitation: One large manufacturing industry is insufficient to generalize the study's primary results. This will be achieved in the future by doing additional investigations in several large manufacturing firms.

Practical implication: This study will provide consultants and practitioners with a valuable understanding of how Kaizen improves the financial performance of large manufacturing industries in Tanzania.

Social Implications: The majority of learning exercises carried out during kaizen projects seek to enhance social outcomes in terms of staff members' problem-solving skills and attitudes. Particularly, Kaizen coordinators are concerned with group members' understanding of continuous improvement as well as their communication and problem-solving abilities.

Originality/Value: Although some studies on kaizen have been conducted, it is currently discovered that there is insufficient literature on the application and impact of the kaizen concept in large manufacturing enterprises. Based on this case study, the framework of kaizen philosophy practices is offering useful insights for leather companies, other manufacturing industries, and organizations, including the Tanzania Kaizen unit, practitioners, and academicians.

Keywords: *Firms. financial. kaizen. performance. quality.*

INTRODUCTION

Business companies have been forced to review their operations to improve their standards due to global competition (Shan, Ahmad & Nor, 2016). As a result, businesses encounter a variety of challenges in increasing the quality of their products. Companies need to utilize the best management philosophies, techniques, and tools to deal with the challenges to survive and improve their financial performance (Leksic, Stefanic & Veza, 2020). Kaizen is a popular management philosophy that is used in a variety of industries, including but not limited to

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manufacturing, service, and commerce (Mellat & Safari, 2022). Kaizen is a Japanese word that translates to "continuous improvement" (Shrivastava & Jain, 2018). It places a strong emphasis on improvement, which is carried out to improve process parameters (Kumar, 2019). It's a tool that is being utilized to put an end to another Japanese policy 3M - MUDA, MURA, and MURI are three words that stand for the inconvenience, inconsistency, and waste, respectively. Four key stages can help to adopt Kaizen more effectively. These stages are PDCA - Plan, Do, Check, and Act (Kumar, 2021). Similarly, the term kaizen was employed in this study to describe a philosophy that encompasses a quality management approach.

Similarly, the concept of kaizen was first presented in Tanzania in 2013, and kaizen as a management tool was implemented with the assistance of the Japan International Corporation Agency (JICA) in response to the Tanzanian government's efforts to adopt kaizen technology (MIT & JICA, 2020). The government of Tanzania has given high attention to building manufacturing and service-providing organizations by introducing and dissemination of kaizen philosophy through establishing Tanzania Kaizen Unit (TKU) under the ministry of industry, investment and trade cooperatively conducting capacity-building program with JICA since 2013 (MIT & JICA, 2020). Several organizations in Tanzania have aggressively applied the Kaizen principle. Any management philosophy should be researched and investigated to find and discover the applied structural frameworks and practices, as well as their impact on performance (Rewers, Trojanowska, Chabowski, & Żywicki, 2016). This action allows business owners, government officials, stakeholders, and partners to take corrective action to enhance their policies and strategies linked to the Kaizen philosophy.

Moreover, the manufacturing industry is anticipated to serve as the growth and transformation engine for the development of a semi-industrialized economy, according to Tanzania's development plan 2021/22 – 2025/26. The manufacturing sector is anticipated to contribute 31.1% of the GDP by 2025, meeting the target. The current contribution of the industrial sector to the gross domestic product is 29.6% (Tanzania development plan, 2021). However, to accomplish this vision the government of Tanzania has taken steps to spread the Kaizen philosophy throughout the country's established and recently established industries to improve quality and productivity. By 2030, these efforts, which are still ongoing, hope to see 1,475 companies adopt this philosophy (TKU, 2020).

Numerous research on kaizen and the performance of SMEs have been conducted in Tanzania. For instance, Bwemelo (2017) examined the acceptability of kaizen as a strategy for improving Small Scale Manufacturing Enterprises (SSME's) performance with a particular focus on the 5S-Kaizen methodology. With an emphasis on 5S and Total Quality Management, Margaret (2019) investigated the factors that Small and Medium Enterprises (SMEs) should consider while doing kaizen to increase productivity and performance. However, to the best of the researcher's knowledge, there are insufficient studies conducted using PDCA cycle methodology during kaizen implementation, particularly in the production process of large manufacturing industries. Application of the PDCA cycle is effective in reducing costs and defects while also enhancing process and product quality (Realyvásquez-Vargas et al., 2018a). Therefore, this study aims to address a gap in knowledge by analyzing the effectiveness of the kaizen approach on defect reduction by utilizing the PDCA methodology at Kilimanjaro International Company Limited.



THEORIES UNDERPINNING THE STUDY

Lean management theory

This study was guided by lean management theory. The theory states that manufacturing companies should eliminate none value adding activities in their production processes by using one of the tools of lean manufacturing which is kaizen to improve the quality and productivity of their products (Rosak-Szyrocka, 2019). Kaizen is a Japanese word which refers to small, regular changes that are made to improve productivity, efficiency, and safety. Each small development requires numerous stages of growth and is mostly utilized to improve production processes (Antony et al., 2017). Even though lean was a developed approach, numerous weaknesses were discovered and revealed by numerous scholars as a result of their interactions with lean-practising enterprises. It observed that lean implementation failure occurs due to a lack of implementation experience, the organization's temptation to return to old habits, poor management commitment to the implementation programme, insufficient stakeholder education and training and lack of resources in terms of money, knowledge, and labor (Nithia et al., 2015).

Accordingly, this study suggests that removing non-value-adding activities in the production process will increase the quality and productivity of manufactured products. On the other hand, the theory assisted the authors in developing strategic measures that can be used to reduce defects encountered in the production process at Kilimanjaro Leather International Company.

Empirical Literature Review

A study was conducted by Realyvázquez-Vargas (2018a) to reduce the defects that were produced during the welding process by at least 20% at a manufacturing facility in Tijuana, Mexico. The study also aimed to boost by 20% the processing capacity of three double production lines for electronic boards. PDCA cycle as a kaizen technique was used throughout the research period. As a result, defects dropped by 65%, 79%, and 77% in the three product models that were examined. The study concluded that PDCA cycle was the most useful method for improving quality and reducing defects in the production process.

Alaaraj and Bakri (2019) assessed how managers in the industrial sector in South Lebanon perceived the impact of lean manufacturing on financial performance. This study used a quantitative methodology and randomly distributed 152 self-administered questionnaires to managers. Pearson correlation and regression analysis were used to find and test the proposed hypotheses. The findings demonstrated that kaizen significantly affects the financial performance of the company.

Kumar, (2019) employed a novel strategy known as "Global Customer Audit," which is essentially a vehicle audit from the perspective of the ultimate consumer of automotive interior components. The author of this audit has identified numerous defects by using various quality control methods including Pareto charts, histograms, and check sheets in order of their severity or frequency of occurrence. Various quality control tools were used in his study to identify the primary cause of defects. Kaizen was used to eliminate these defects and continuously enhance both the products and the production methods. The author concluded that kaizen contributes to a leaner, simpler, and more efficient manufacturing process.



Margaret (2019) examined the factors that influence the adoption of kaizen by Small and Medium Enterprises (SMEs) in African nations. It carefully evaluated the factors that influence SMEs in African nations to embrace kaizen. A thorough analysis of twelve pieces of relevant empirical research on the use of kaizen in African nations was conducted. According to the study's findings, African nations that practice kaizen should concentrate on the commitment and support of top management, training and education, teamwork, employee participation, and empowerment as the key significant determinants of kaizen to quicken its implementation and improve the performance and productivity of SMEs.

In his study, Bemwelo (2019) examined the acceptance and viability of KAIZEN among SMEs in Tanzania's Dar es Salaam region. The questionnaire, interviews, and observations were used to survey 500 stakeholders and 23 pilot enterprises during 5S-KAIZEN methodology sensitization seminars and on-site training. The study did identify some barriers to success, such as employee resistance and failure to reward hardworking employees.

METHODOLOGY

Case study design

The case study offers a complete approach to looking at and researching a specific instance (Widdowson, 2011). Utilizing case studies in research enables the researcher to become fully immersed in the situation and gain an in-depth understanding of a phenomenon (Takahashi & Araujo, 2019). Confirming the effectiveness of the research approach can be done by replicating the findings under comparable conditions (Widdowson, 2011). This study has been performed in a large-scale industry that manufactures leather products in Tanzania. The company is called Kilimanjaro international leather company.

Given the nature of the project and the related costs, consultants visited the business twice a week. As a result, the consultants may rapidly acquire information by visiting the process or asking workers questions. The case study has been underway since the project's inception. The amount of time spent on it changed as the project did; initially, only a few observations were made to understand the process; later, more time was invested to delve further into the process and gather data. Finally, additional observations were taken to help the improvement analysis produce its best results.

Data collection and analysis

Both primary and secondary data were used in the research. By interviewing and observing the operator, team manager, sub-section head, and section head in the field, primary data were acquired directly from the topic under study to determine the real happenings. The historical records of defects were the secondary data used in this study. The secondary data on defects were analyzed before and after the project by using excel to get a deeper understanding of the obtained data.

Interview and discussion

The interview is a fundamental method of data collection that involves verbal discussions between the researcher and the respondent (Alamri, 2019). When the project first started, a significant amount of time was spent talking with the quality manager to better understand the production processes. It was more about open discussions and explanations about various



aspects of the process or the company than formal interviews. The quality manager and several employees were involved in similar discussions later on in the project to gain a deeper understanding of the production process.

Observation

Observation is one of the most essential and versatile research methods in the social sciences, the choice of this method depends on the research topic and the surrounding environment (Ciesielska et al., 2018). A lot of time was spent on the work floor to watch what was happening in general; every week, roughly eight to ten hours were devoted to this task. It provided the chance to fully comprehend the process by learning something new virtually. It was also an excellent opportunity to discuss kaizen with employees and spread some awareness about it.

Pareto Analysis

A statistical technique for decision-making called Pareto analysis is used to pick only a small number of tasks that have a big overall impact (Powell & Sammut-Bonnici, 2015). A Pareto chart is frequently used to illustrate the findings of a Pareto analysis. A Pareto chart is a visual tool that aids in decomposing a large problem into its parts and determining which components are most significant (Powell & Sammut-Bonnici, 2015). The use of this tool has several implications. One of them reads, "In manufacturing, about 20% of causes or reasons account for 80% of problems." Another name for it is ABC analysis (Powell & Sammut-Bonnici, 2015).

PDCA cycle

Plan-Do-Check-Act (PDCA) is a four-step iterative management approach that is employed in the business for process and product control and continuous improvement (Realyvásquez-Vargas et al., 2018b). It is also known as the Deming Cycle (Moen & Norman, 2019).

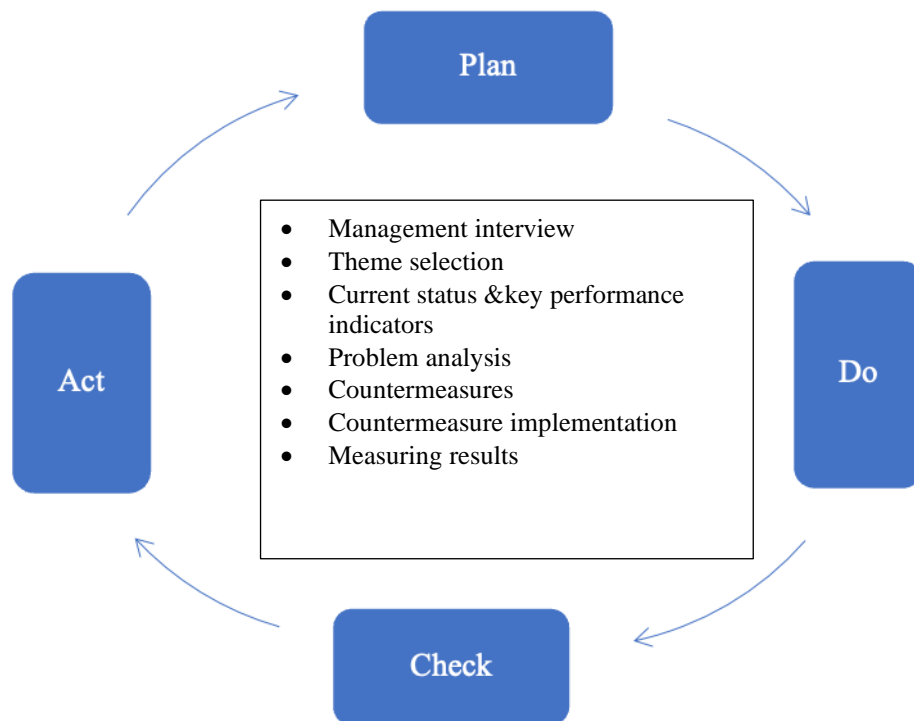


Figure 1: PDCA Cycle

Plan: The goal is to anticipate changes and plan accordingly Do: The strategy is carried out by making small, deliberate moves. Check: results are now been studied. Act: the company takes steps to improve the process (Realyvásquez-Vargas et al., 2018b).

FINDINGS AND DISCUSSION

Employees of Kilimanjaro international company limited were instructed to individually describe the types of defects they encountered during the discussion. Everyone was then required to prioritize their defects according to the significance of their impact on the manufacturing process, which they had to determine for themselves.

Different kind of defects on board was created to get things more visual, it was then easier to see which defects had a huge impact on the process in each stage of production; Pareto chart in figure 1 facilitated a quicker decision regarding which defects to address.

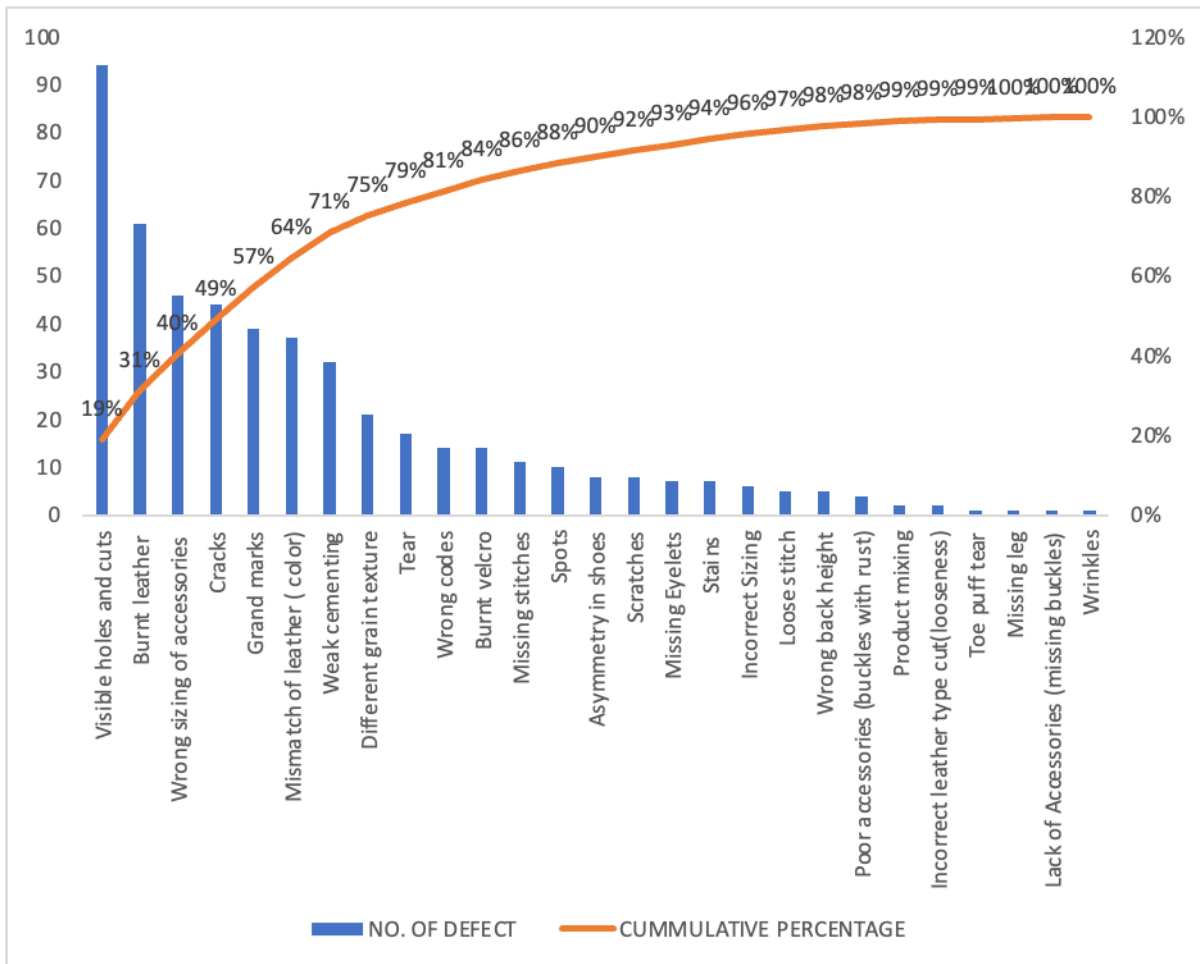


Figure 2: Pareto Chart

A Pareto chart was used as a visual aid for choosing which source the group should concentrate on. As working with every source would take too much time, a decision had to be made, and the source with the greatest influence was chosen.

From the Pareto chart as shown in Figure 2 following the 80 % and 20% rule visible cuts and hole was the major problem. The choice was made to deal with the major defect of visible cuts since they were appearing often compared to visible holes. This analysis was limited to defect "visible cuts" due to time constraints. The findings of this study are consistent with the results of the earlier study (Kapuria, Rahman & Halidar, 2017).

The choice was to analyze data to determine the current defect rate in the production process. The current defect rate from the analysis was calculated and it was 4%. Workers were further emphasized to record defects whenever they encounter them in the production process to compare results before and after Kaizen.

The Ishikawa diagram, commonly known as the fishbone diagram (Figure 3), was employed in this step to identify the possible sources of visible cuts based on four categories, including Man, Machine, Method, and Material (Agrahari et al., 2015). The issue with the quality is in effect. By highlighting the primary causes and minor causes that contributed to an effect, a process can



be analyzed and illustrated using the cause-and-effect method (Kapuria et al., 2017). This was done in a corporation with employees and it was done Individually on a piece of paper. Participants indicated that the three sources chosen had the most influence on visible cuts. Since different types of participants had similar thoughts, they were put together.

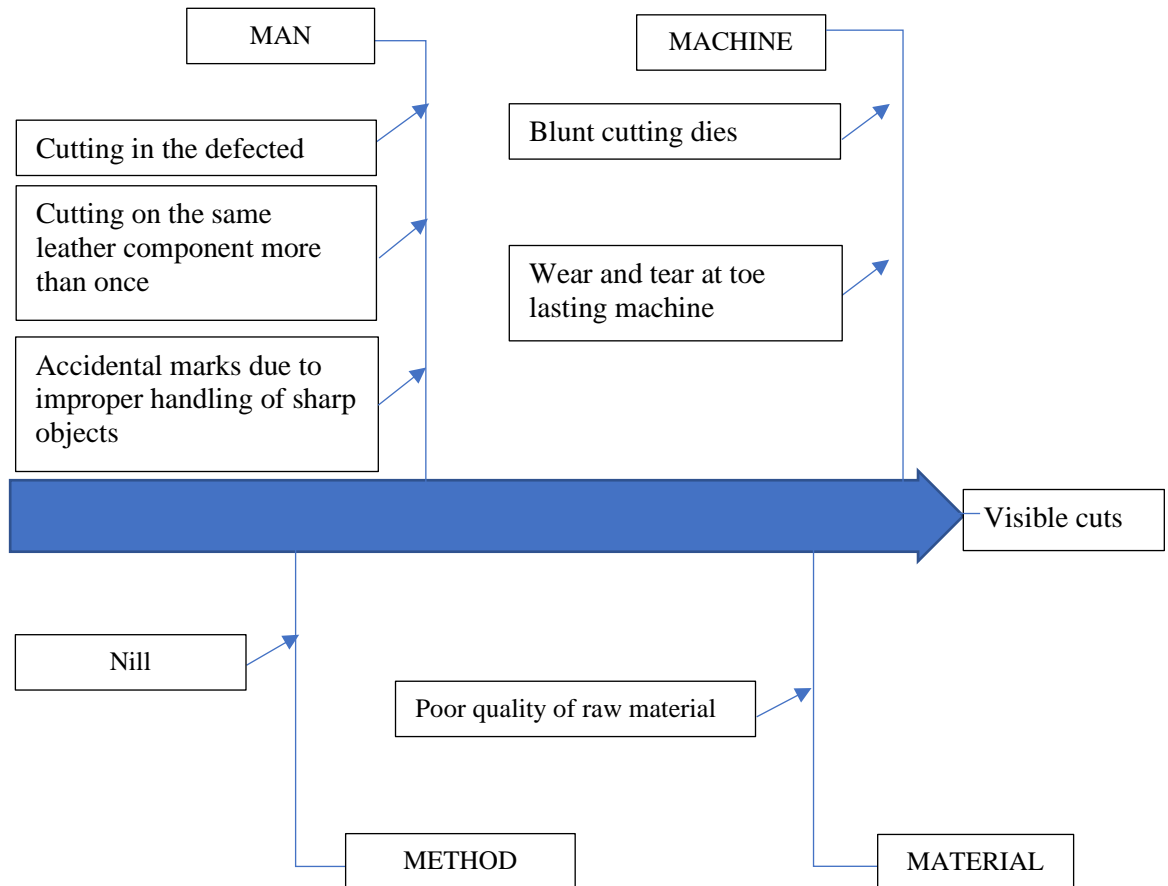


Figure 3: Fishbone diagram

An excel sheet was created before the presentation, and participants entered the values for each category. After everyone had provided their input, a diagram as shown in Figure 3 was drawn to illustrate which sources were primarily vital for the formation of visible cuts. After a deep discussion poor quality of raw material was observed to have a significant impact on visible cuts.

The 5 Whys analysis has been carried out to identify the main reason for the low quality of the raw material (Maarof & Mahmud, 2016). The quality manager and kaizen consultants worked together to identify the main cause of visible cuts, which was revealed to be a lack of modern inspection facilities.

The root cause appeared to be the poor quality of raw materials. The findings are consistent with facts pointed from a previous study (Maarof & Mahmud, 2016)



It takes years to successfully transform the current culture, which is a very difficult task. Even though the main problem cannot be resolved within the project timeframe, a little improvement can be seen if the following proposed countermeasures will be implemented.

Table 1: Countermeasures

What	Where	Why	How
<ul style="list-style-type: none"> • Training programs on quality issues • Skills mapping 	Quality Section	<ul style="list-style-type: none"> • To create a common understanding on quality issues • Assign operators jobs based on the level of experience 	To enforce in-house training
<ul style="list-style-type: none"> • To improve inspection facilities • To improve inter stage inspection by adding defect images on the checklist 	Quality section/Store	<ul style="list-style-type: none"> • To improve the quality of raw materials • To have a common understanding of what defect to tolerate 	<ul style="list-style-type: none"> • Possibility of Purchasing inspection facilities for stretching leather – Magnifying glasses, torches • Words & pictures
<ul style="list-style-type: none"> • Preparation of a visible maintenance plan • Preparation of visible machine parameters (E.g., Temperature, Pressure, etc) 	Lasting/sewing	<ul style="list-style-type: none"> • Easy accessibility and timely replacement of warning parts • A common understanding of machine operating parameters 	<ul style="list-style-type: none"> • Making it visible to every operator • Having a chart for (i.e., temperature/pressure) depending on the nature of leather
Suggesting the use of leather grades (long term plan)	Quality Section	To reduce cost	checking existing standards of leather grades (Since it is difficult to comply with specifications)

The 20th of December, 2020 was chosen as the deadline for the implementation of the countermeasures. The quality manager set aside time during the day to meet and talk about what they should do, and two meetings per week were scheduled to assess the implementation status.

To provide recommendations or convey an alternative perspective on the situation, the quality manager presented the current state of defects in the production process. Even though the sessions were held twice a week, there were informal discussions with the various employees to ensure implementation of countermeasures was achieved.

Daily records of defects were kept during Kaizen implementation for the sake of comparison. The defect rate was assessed by the Kaizen consultants after the data had been gathered to



determine whether there had been any improvement. The defect rate was 4% before the introduction of Kaizen, but it was reduced to 2% afterwards. These findings concur with those of studies by (Kumar, 2019) and (Realyvásquez-Vargas et al., 2018c).

CONCLUSION

This project's goal was to determine the effects of Kaizen in a large manufacturing industry. In a world where globalization is now widespread, it is vital for businesses to consistently work on advancements to maintain their competitiveness.

The case study's objective was to reduce the defect rate from 4% to 2% and actual results have been attained. This goal was fixed before Kaizen was learned. When starting with Kaizen, various measures must be done to prepare some people for the impending transformation, of course, there were a lot more technological options that could have been used, but not in the limited time available for the project.

This little implementation has demonstrated that change can occur and persist with thorough coordination and the application of Kaizen tools. To test its viability, it has only been applied to one defect. However, it can also be applied to the other defects in the production process, and if it is properly thought out, improvement will persist as well on a larger scale and it can even produce unexpectedly positive outcomes.

Kaizen is a culture; thus, it is best to start laying the foundation for it by telling staff members to be patient with improvements and look long-term when making decisions. Therefore, while the work done with Kilimanjaro International Leather Company has not yet yielded any major tangible results, it will start to pay off in a few months.

Throughout the entire project, the Kaizen consultants attempted to engage with Kilimanjaro International Leather Company and help raise awareness of Kaizen and its tools. This approach was used to provide as many cards as possible to the company's staff to enable them to continue utilizing kaizen tools in their production process after the project is completed.

Implications

This study will provide consultants and practitioners with a valuable understanding of how Kaizen improves the financial performance of large manufacturing industries in Tanzania. Moreover, the majority of learning exercises carried out during kaizen projects seek to enhance social outcomes in terms of staff members' problem-solving skills and attitudes. Particularly, Kaizen coordinators are concerned with group members' understanding of continuous improvement as well as their communication and problem-solving abilities.

Areas for further studies

One large manufacturing industry is insufficient to generalize the study's primary results. This will be achieved in the future by doing additional investigations in several large manufacturing firms.



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