

Productivity Improvement in a Bakery and Pastry Premix Company by Applying Preventive Maintenance, SMED and 5'S

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Abstract

This research work proposes the improvement of productivity in a bakery and pastry premix company in Lima, Peru. Through the implementation of Lean tools: 5S, SMED and preventive maintenance. In the initial situation, disorder was identified in the weighing area, delays in transfer times, high set-up times, and mechanical failures. To solve this problem, 5S was applied to eliminate the disorder and reduce transfer time losses, SMED to reduce set-up time, and preventive maintenance to avoid unscheduled stops. The proposal was validated by means of a pilot test and a simulation in Arena software, showing significant improvements in the main indicators of the study: batches produced increased from 8 to 9, setup time was reduced by 25 %, cycle time per batch decreased by 3.2 % and the number of mechanical failures, which averaged 7 per month, was reduced to 1 failure per machine. The results show that the integral use of these tools generates operational improvements and economic benefits, being replicable in similar industrial contexts.

Keywords

Productivity; Lean; 5S; SMED; Preventive maintenance.

1. Introduction

In the current industrial context, improving productivity through process optimization has become a strategic priority for organizations, especially in sectors such as food, where operational efficiency has a direct impact on profitability. In this regard, Lean Manufacturing has been widely adopted by companies seeking to reduce activities that do not add value to their processes (Rojas et al., 2021). Tools such as 5S, SMED, and preventive maintenance have proven effective in eliminating clutter, reducing setup times, and preventing unscheduled downtime, thus contributing to an overall improvement in performance indicators (Mamani et al., 2020; Vilca et al., 2021).

In recent years, studies have shown that the 5S methodology not only improves workplace organization but also has a significant impact on reducing downtime and improving staff morale. For example, research conducted by Luz and William (2021) reports a 23% improvement in efficiency following the implementation

of 5S and Kaizen in a Peruvian manufacturing plant. Similarly, Pawlak et al. (2023) demonstrated that combining 5S with standardized processes contributed to a decrease in the total production cycle time in food industries, validating the applicability of this tool in operational contexts similar to those in the present study.

On the other hand, the SMED (Single-Minute Exchange of Die) technique has been widely validated as an effective mechanism for reducing format changeover time in industrial machinery and equipment. Braglia et al. (2023) proposed a new Lean tool for measuring the efficiency of SMED projects, which made it possible to identify specific improvements in setup times. Complementarily, preventive maintenance has become particularly relevant in Industry 4.0, as it is essential for ensuring equipment availability and avoiding unplanned downtime. In this regard, Johnson et al. (2023) identified notable improvements in the reliability of pharmaceutical equipment following the implementation of structured maintenance routines, highlighting their importance in industries with high sanitary standards such as the food industry.

Despite the obvious benefits, many companies in developing countries still face challenges in implementing these tools in a synergistic and sustained manner. Recent local studies indicate that proper implementation requires not only technical training but also a change in organizational culture (Rodríguez et al., 2022). Likewise, it has been shown that lack of order in work areas, long preparation times, and constant mechanical failures are common bottlenecks in the sector (López et al., 2022; Peña et al., 2021). Therefore, this article aims to evaluate the impact of applying Lean tools in a bakery and pastry premix company in Metropolitan Lima, using a practical and quantitative approach to validate its effectiveness in a real-world setting.

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Biographies

Edgar Chavez graduated with honors in Industrial Engineering from Universidad de Lima. He is a production practitioner in the ceramics industry. He specializes in operations research, KPI management, and continuous improvement projects applied to manufacturing industries.

Steven Guzman graduated with honors from the Industrial Engineering program at the Universidad de Lima. He is currently involved in operations and after-sales process management in an automotive company, focusing on SAP workflows, operational support, and process optimization tools.