

Application of the Lean Six Sigma Methodology in the Dairy Industry: Case Study in the Manufacture of Fresh Cheeses, Mozzarella Cheese, and Butter

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Abstract: Lean Six Sigma (LSS) is a methodology that provides methods and tools to improve the performance of processes, so it could be applied in both manufacturing and service companies. The food industry is constantly expanding to meet the demands of a growing world population, hence the application of LSS in industries such as the dairy industry may present great benefits.

The present study applies the DMAIC cycle and several LSS tools in a small Ecuadorian dairy industry. First we identified the products and problems through the Voice of the customer and the business. For the Measure phase, we mapped the process, made an R&R analysis, and we got data about the metrics of the processes. To Analyze, we found the root causes through a cause - effect diagram and a matrix of interrelation, which were the excess of waste and the use of obsolete tools, besides it was detected that the processes were incapable of complying with the specifications. To improve, a Kaizen event was carried out to reduce waste such as transportation, movement and waiting and increase the cheese yield; also we used an experimental design 2³ with 2 replications to improve the yield of the butter; and through the standardization of processes and a Poka-yoke mechanism it was possible to reduce the excessive variability in the weights of the finished products; where all improvements were tested by hypothesis testing. Finally, based on small improvements with continuous efforts, we achieved more stable and more capable processes, which represent an economic saving for the company and meet the customer's requirements. Thus, the present study was able to improve the raw material yield and reduced the high variability in weight of the finished products.

Keywords: Lean, Six Sigma, Lean Six Sigma, dairy industry, application in food industry, waste reduction, quality, DMAIC