

INTISARI

Peningkatan Kualitas Produk Menggunakan Pendekatan *Seven Tools*, FMEA, dan Simulasi Monte Carlo pada UMKM Tempe

Oleh:

Anjar Suprianto, Erni Suparti, Muhammad ave Sina

Produk tempe pada UMKM Tempe Pak Suharto masih mengalami kecacatan yang menyebabkan kualitas hasil produksi belum optimal. Penelitian ini bertujuan untuk mengidentifikasi jenis dan faktor penyebab kecacatan menggunakan *Seven Tools*, menentukan prioritas penyebab kegagalan menggunakan *Failure Mode and Effects Analysis* (FMEA), serta mengevaluasi efektivitas usulan perbaikan melalui Simulasi Monte Carlo. Penelitian menggunakan data produksi dan kecacatan produk tempe selama periode pengamatan. Analisis dilakukan menggunakan *Seven Tools*, dilanjutkan dengan FMEA untuk menentukan nilai *Severity* (S), *Occurrence* (O), *Detection* (D), dan *Risk Priority Number* (RPN), kemudian dievaluasi menggunakan Simulasi Monte Carlo melalui tiga skenario implementasi usulan perbaikan. Hasil penelitian menunjukkan bahwa dari total produksi 41.270 produk, diperoleh 3.366 produk cacat (8,16%) dengan kerugian sebesar Rp6.732.000. Jenis kecacatan yang paling dominan adalah kemasan rusak sebanyak 1.452 produk (43,14%), diikuti kedelai kurang matang sebanyak 1.045 produk (31,05%), dan tempe kehitaman sebanyak 869 produk (25,81%). Hasil *fishbone diagram* menunjukkan bahwa faktor penyebab kecacatan berasal dari aspek manusia, metode, material, dan lingkungan. Simulasi Monte Carlo menunjukkan bahwa penerapan seluruh usulan perbaikan menghasilkan prediksi jumlah produk cacat paling rendah, yaitu 2.355 produk (5,71%), atau menurun 1.011 produk dibandingkan kondisi aktual, serta menurunkan kerugian menjadi Rp4.710.000. Dengan demikian, integrasi *Seven Tools*, FMEA, dan Simulasi Monte Carlo dapat digunakan untuk mengidentifikasi penyebab kecacatan, menentukan prioritas perbaikan, serta mengevaluasi efektivitas usulan perbaikan dalam meningkatkan kualitas produk tempe dan mengurangi kerugian yang dialami UMKM Tempe Pak Suharto.

Kata kunci: *Seven Tools*, FMEA, Simulasi Monte Carlo, Pengendalian Kualitas, Produk Tempe.

ABSTRACT

Product Quality Improvement Using the Seven Tools, FMEA, and Monte Carlo Simulation in Tempe MSMEs

By:

Anjar Suprianto, Erni Suparti, Muhammad Ave Sina

Tempe products at MSME Tempe Pak Suharto still experience defects that cause the quality of production results to be less than optimal. This study aims to identify the types and factors causing defects using Seven Tools, determine the priority of failure causes using Failure Mode and Effects Analysis (FMEA), and evaluate the effectiveness of proposed improvements through Monte Carlo Simulation. The study used production and product defect data collected during the observation period. The analysis was conducted using the Seven Tools, followed by FMEA to determine the Severity (S), Occurrence (O), Detection (D), and Risk Priority Number (RPN). The proposed improvements were then evaluated using Monte Carlo Simulation through three implementation scenarios. The results showed that out of a total production of 41,270 products, 3,366 defective products (8.16%) were identified, resulting in financial losses of IDR 6,732,000. The most dominant defect was damaged packaging with 1,452 products (43.14%), followed by undercooked soybeans with 1,045 products (31.05%) and blackened tempeh with 869 products (25.81%). The fishbone diagram indicated that the causes of defects originated from human, method, material, and environmental factors. Monte Carlo Simulation showed that implementing all proposed improvements produced the lowest predicted number of defective products, namely 2,355 products (5.71%), representing a reduction of 1,011 products compared to the actual condition, while reducing financial losses to IDR 4,710,000. Therefore, the integration of the Seven Tools, FMEA, and Monte Carlo Simulation can be used to identify the causes of product defects, determine improvement priorities, and evaluate the effectiveness of proposed improvements in enhancing tempeh product quality and reducing financial losses experienced by Pak Suharto's Tempeh MSME.

Keywords: Seven Tools, FMEA, Monte Carlo Simulation, Quality Control, Tempe Product.