

OPTIMASI *DRY HOUSE* DENGAN PENDEKATAN *LEAN SIX SIGMA* UNTUK MENGURANGI PERTUMBUHAN JAMUR PADA BIJI KOPI (STUDI KASUS: PT. KOPI RAWDEE RAWAGUEDE)

Rayhan Radinoor Akbar

ABSTRAK

Proses pengeringan biji kopi merupakan tahap krusial dalam pascapanen yang sangat mempengaruhi kualitas akhir produk. PT. Kopi Rawdee Rawageude masih menghadapi permasalahan berupa tingginya tingkat cacat biji kopi akibat pertumbuhan jamur serta lamanya waktu pengeringan, yang menyebabkan penurunan mutu dan efisiensi produksi. Permasalahan tersebut terjadi karena sistem *Dry House* yang digunakan belum dilengkapi alat pengendali suhu dan kelembapan otomatis, sehingga proses pengeringan tidak stabil dan tidak seragam. Penelitian ini bertujuan untuk mengoptimalkan kinerja *Dry House* dalam mengurangi pertumbuhan jamur dan cacat biji kopi menggunakan pendekatan *Lean Six Sigma*. Metode penelitian mengikuti tahapan *DMAIC* (*Define, Measure, Analyze, Improve, Control*) dengan pengumpulan data melalui observasi langsung, wawancara, dan data produksi perusahaan. Pada tahap *Define*, digunakan *Fishbone Diagram* dan *Pareto Chart* untuk mengidentifikasi jenis cacat utama yaitu biji berjamur, kopong, dan pecah. Tahap *Measure* dilakukan dengan perhitungan *DPMO* (*Defects Per Million Opportunities*) dan *P-Chart* untuk mengukur tingkat kualitas proses. Tahap *Analyze* menggunakan *Failure Mode and Effect Analysis* (*FMEA*) untuk menentukan prioritas perbaikan berdasarkan nilai *Risk Priority Number* (*RPN*), serta *Design of Experiment* (*DOE*) untuk menemukan kombinasi suhu, kelembapan, dan waktu pengeringan yang optimal. Hasil analisis menunjukkan nilai rata-rata *DPMO* sebesar 20.000 dengan level sigma 3,55, yang berarti proses pengeringan masih berada pada kategori *average quality*. Jenis cacat dengan nilai *RPN* tertinggi adalah biji berjamur (*RPN* = 1184), diikuti oleh kopong (*RPN*= 714) dan pecah (*RPN* = 622). Berdasarkan hasil eksperimen, kondisi pengeringan optimal diperoleh pada suhu 40–50°C, kelembapan 50%, dan durasi 10 hari. Tahap *Improve* menghasilkan rancangan sistem *Dry House* otomatis berbasis sensor suhu–kelembapan (*DHT22*), exhaust fan konveksi paksa, dan *smart plug Wi-Fi* untuk pengendalian otomatis. Implementasi sistem ini berhasil menurunkan waktu pengeringan dari 14 hari menjadi 10 hari (efisiensi waktu 28,6%), menurunkan tingkat cacat hingga ±60%, serta meningkatkan level sigma menjadi 4,05. Tahap *Control* dilakukan dengan penyusunan SOP baru, pelatihan operator, dan monitoring berkala agar hasil perbaikan dapat dipertahankan. Secara keseluruhan, penerapan pendekatan *Lean Six Sigma* terbukti efektif dalam mengoptimalkan sistem *Dry House*, meningkatkan efisiensi proses, serta menjaga stabilitas mutu biji kopi di PT. Kopi Rawdee Rawageude.

Kata kunci: *Lean Six Sigma, Dry House, Biji Kopi, FMEA, DMAIC, DPMO*

OPTIMIZATION OF DRY HOUSE USING LEAN SIX SIGMA APPROACH TO REDUCE MOLD GROWTH ON COFFEE BEANS (CASE STUDY: PT. KOPI RAWDEE RAWAGEUDE)

Rayhan Radinoor Akbar

ABSTRACT

The coffee bean drying process is a crucial post-harvest stage that significantly affects the final quality of the product. PT. Kopi Rawdee Rawageude still faces problems such as a high rate of defective coffee beans caused by mold growth and long drying time, which lead to decreased product quality and production efficiency. These issues occur because the existing Dry House system is not yet equipped with an automatic temperature and humidity control device, resulting in unstable and non-uniform drying conditions. This research aims to optimize the performance of the Dry House in reducing mold growth and coffee bean defects using the Lean Six Sigma approach. The research method follows the DMAIC stages (Define, Measure, Analyze, Improve, Control), with data collected through direct observation, interviews, and company production records. In the Define stage, a Fishbone Diagram and Pareto Chart were used to identify the main defect types, namely moldy beans, hollow beans, and broken beans. The Measure stage was carried out by calculating DPMO (Defects Per Million Opportunities) and creating a P-Chart to measure process quality levels. The Analyze stage employed Failure Mode and Effect Analysis (FMEA) to determine improvement priorities based on the Risk Priority Number (RPN) values, as well as Design of Experiment (DOE) to identify the optimal combination of temperature, humidity, and drying duration. The analysis results show that the average DPMO value is 20,000 with a sigma level of 3.55, indicating that the drying process is still in the average quality category. The defect with the highest RPN value was moldy beans (RPN = 1184), followed by hollow beans (RPN = 714) and broken beans (RPN = 622). Based on the experimental results, the optimal drying condition was achieved at a temperature of 40– 50°C, humidity of 50%, and duration of 10 days. The Improve stage resulted in the design of an automatic Dry House system equipped with a temperature–humidity sensor (DHT22), forced-convection exhaust fan, and Wi-Fi-based smart plug for automatic control. Implementation of this system successfully reduced the drying time from 14 days to 10 days (time efficiency of 28.6%), decreased the defect rate by approximately 60%, and improved the sigma level to 4.05. The Control stage involved the establishment of a new Standard Operating Procedure (SOP), operator training, and periodic monitoring to ensure that the improvements could be sustained. Overall, the application of the Lean Six Sigma approach has proven effective in optimizing the Dry House system, enhancing process efficiency, and maintaining the stability of coffee bean quality at PT. Kopi Rawdee Rawageude.

Keywords: Lean Six Sigma, Dry House, Coffee Beans, FMEA, DMAIC, DPMO