

INTISARI

PT Sanghiang Perkasa yang berlokasi di Kabupaten Karawang merupakan perusahaan yang memproduksi susu bubuk untuk berbagai usia. Perusahaan ini berfokus pada *zero operation loss* di tahun 2024 dan akan berfokus pada *half cost operation* di tahun 2025 melalui penerapan *lean system*, efisiensi *manufacturing lead time*, dan eliminasi *waste*. Sistem manufaktur di PT Sanghiang Perkasa terbagi menjadi dua, yaitu penyiapan bahan baku dan produksi. Proses penyiapan bahan baku terdiri atas proses penimbangan dan proses nontimbang yang masih banyak melibatkan intervensi manusia. Proses penimbangan selama ini menjadi *bottleneck* dalam penyiapan bahan baku karena memiliki kapasitas yang lebih kecil yaitu sebesar 11 *charges/jam* dibandingkan proses nontimbang dengan kapasitas sebesar 19 *charges/jam*. Hal tersebut menyebabkan kedua proses saat ini tidak berjalan paralel dan berujung pada *overtime*.

Penelitian ini bertujuan membangun model *discrete event simulation* (DES) untuk menganalisis dan menurunkan *manufacturing lead time* sistem penimbangan. Pemborosan dan potensi perbaikan pada proses penimbangan diidentifikasi menggunakan DES dan *process activity mapping*. Performansi sistem, yaitu rerata durasi antrean, rerata waktu proses, dan utilisasi operator dianalisis dan didapat stasiun kerja kritis yang menjadi *bottleneck* dalam proses penimbangan. *Process activity mapping* digunakan untuk memetakan setiap elemen kerja pada stasiun kerja kritis. Dari analisis yang telah dilakukan, disusun lima skenario perbaikan yang mungkin untuk dilakukan.

Model DES dijalankan untuk mengetahui *manufacturing lead time* dan performansi sistem kelima skenario. Hasil simulasi menunjukkan adanya penurunan *manufacturing lead time* sebesar 7,1%, 12,5%, 27,9%, dan 33,5% untuk skenario 2, skenario 3, skenario 4, dan skenario 5 dari *manufacturing lead time* saat ini. Sementara itu, skenario 1 mengalami kenaikan *manufacturing lead time* sebesar 0,3% akibat perpindahan *bottleneck*. *Net benefit* tiap skenario juga dihitung dengan pengurangan COGM sebagai *benefit* yang didapat. Didapat hasil *net benefit* positif untuk skenario 2, 3, 4, dan 5. Hal tersebut menunjukkan bahwa skenario dengan penambahan biaya, skenario 4 dan 5, tetap layak secara finansial untuk dilakukan.

Kata Kunci: *Discrete Event Simulation, Process Activity Mapping, Manufacturing Lead Time, Waste*

ABSTRACT

PT Sanghiang Perkasa, located in Karawang Regency, is a company that produces powdered milk for various age groups. The company aims to achieve zero operation loss in 2024 and focus on half-cost operation in 2025 through the implementation of lean systems, manufacturing lead time efficiency, and waste elimination. Its manufacturing system is divided into two main stages, raw material preparation and production. The raw material preparation stage includes weighing and non weighing processes, both of which still involve significant human intervention. The weighing process has become a bottleneck in raw material preparation due to its lower capacity of 11 charges per hour, compared to the non weighing process which has a capacity of 19 charges per hour. This imbalance prevents both processes from running in parallel and ultimately leads to overtime.

This study aims to develop a Discrete Event Simulation (DES) model to analyze and reduce the manufacturing lead time of the weighing system. Wastes and improvement opportunities were identified using DES and process activity mapping. System performance, measured by average queue time, processing time, and operator utilization, was analyzed to identify the bottleneck workstation. Process activity mapping was used to break down each activity at the critical workstation. Based on this analysis, five improvement scenarios were developed.

The DES model was executed to evaluate manufacturing lead time and system performance across all scenarios. The simulation results showed manufacturing lead time reductions of 7.1%, 12.5%, 27.9%, and 33.5% for scenarios 2 to 5, respectively. Scenario 1 showed a 0.3% increase due to bottleneck shifting. Net benefits were also calculated by estimating COGM savings, with scenarios 2 to 5 yielding positive results. This indicates that even scenarios with additional costs, scenario 4 and 5, remain financially feasible.

Keywords: Discrete Event Simulation, Process Activity Mapping, Manufacturing Lead Time, Waste