ABSTRACT

The cheese production process at PT ABC shows inefficiencies characterized by high material queue accumulation, particularly before the material handling stage using trolleys. This condition leads to transfer delays, with waiting times reaching 30–40 minutes, and causes significant idle conditions at several workstations. This study aims to analyze the existing production system and propose improvement alternatives using a discrete-event simulation approach with ProModel software. The existing system model was constructed based on interarrival times, processing times, material handling capacity, and actual production flow. Model validation was conducted using an independent t-test, which confirmed that the simulation model did not significantly differ from the real system. Two improvement scenarios were then developed: Scenario 1 (adding two operators, increasing the total to four) and Scenario 2 (increasing trolley capacity to seven units per transport cycle). Simulation results indicate that Scenario 1 reduces the percentage of entity waiting time from 86.74% to 55.42%, while Scenario 2 further reduces it to 48.42%. From a resource utilization perspective, Scenario 2 also achieves the largest decrease in utilization at high-load stations. In addition, the estimated average waiting time decreases from 77.61 minutes (existing system) to 49.59 minutes under Scenario 1 and 43.32 minutes under Scenario 2. Therefore, Scenario 2 is identified as the most effective improvement alternative, as it significantly reduces queue length, waiting time, and enhances the overall material flow performance.

Keywords: *Discrete Simulation, Production Queue, ProModel, Optimization, Cheese.*