

ABSTRACT

This study analyzes the actual condition of the queuing system and formulates optimization recommendations at Detailyn Carwash in Lippo Cikarang, a vehicle washing service business with two active service lanes that have significantly different service capacities, namely the robotic lane and the hydraulic lane.

A descriptive quantitative approach was used with the M/M/c queuing model, assisted by POM-QM for Windows software. Primary data were collected through direct field observation over seven days (56 effective observation hours) to obtain the actual arrival rate (λ) and service rate (μ) for each lane. Given that the two lanes operate separately with non-identical service capacities, the existing condition of each lane was analyzed as two independent M/M/1 queuing systems, while capacity-addition scenarios were analyzed using the M/M/c model.

The results show that the robotic lane under the existing condition ($c=1$) is in an unstable condition ($\rho=188.12\%$), while the hydraulic lane ($c=1$) is in a stable condition ($\rho=76.87\%$) but still has a relatively long waiting time ($Wq=82.54$ minutes). Capacity-addition simulations show that adding two units to the robotic lane ($c=3$) is the only scenario that meets the operational feasibility criteria ($\rho=62.71\%$, $Wq=5.34$ minutes), while capacity addition on the hydraulic lane is optional. This study recommends adding two robotic units to optimize the queuing system at Detailyn Carwash.

Keywords: queuing system, M/M/c model, POM-QM, waiting time, Detailyn Carwash

