

ABSTRACT

The efficiency of public service systems is an important aspect in maintaining the quality of health services, including international vaccination services at the Semarang Class I Health Quarantine Center. This study aims to model the queuing system and evaluate service performance to determine the level of efficiency of the system implemented. The service stages consist of registration, health screening, vaccination, and certificate issuance, which are carried out sequentially, forming a serial queueing system. The service system applies a First Come First Served (FCFS) queueing discipline with unlimited queue capacity and customer call sources. The distribution test results show that the inter-arrival time at the registration, health screening, and certificate issuance counters follows an exponential distribution, while at the vaccine service counter it follows a Weibull distribution. Meanwhile, the service time at all service stages follows a Weibull distribution. Based on these characteristics, the queueing model $(M/G/1):(GD/\infty/\infty)$ was obtained at the registration, health screening, and certificate issuance counters, and the model $(G/G/1):(GD/\infty/\infty)$ was obtained at the vaccine service counter. The analysis results show that the facility utilization rate ranges from 16.75% to 53.47%, with an average waiting time in the queue of 4.146 minutes and a customer time in the system of 14.413 minutes. The Monte Carlo simulation results show system performance measures consistent with theoretical calculations, indicating that the service system is stable and efficient.

Keywords: Queuing Theory, Monte Carlo Simulation, System Performance, International Vaccination, Weibull Distribution.