

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**APPLICATION OF QUEUEING TECHNIQUE ON COVID-19
VACCINATION DISTRIBUTION IN MALAYSIA**

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ABSTRACT

Queueing theory is a mathematical framework used to analyze waiting lines and the related phenomenon of congestion. The COVID-19 pandemic has highlighted the importance of queueing theory in healthcare systems, particularly in the context of vaccine distribution. In this study, queueing theory is applied to analyze the queueing process of COVID-19 vaccination at a vaccination center. A single-server queueing system with exponential service times is considered. The performance of the system is analyzed in terms of average waiting time, queue length, and system utilization. In this study, the results show that the average waiting time and queue length are highly dependent on the arrival rate and services rate of the system. It also shows that increasing the number of servers or decreasing the service time can significantly reduce the average waiting time and queue length. Furthermore, the impact of vaccine hesitancy on the queueing process is analyzed, demonstrating that it can significantly increase the average waiting time and queue length. Thus, insights into the queueing process of COVID-19 vaccination were provided, emphasizing the importance of queueing theory in optimizing vaccine distribution in this situation. The findings suggested that increasing the number of vaccination centers and addressing vaccine hesitancy could help reduce the queueing time and improve the efficiency of the vaccination process.