

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**THE APPLICATION OF QUEUING THEORY MODEL
AND FUZZY QUEUING THEORY MODEL USING DSW
ALGORITHM TO OPTIMIZE VEHICLE FLOW AT
FERRY TERMINAL**

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ABSTRACT

Transportation systems frequently need passengers to queue for service. Observational data from the waiting time at the ferry terminals indicate that the amount of time a vehicle is waiting to board a ferry is strongly reliant on the positioning of the vehicle in the queue. In mathematical study, queuing theory is waiting for lines or queues. This deals with the customer's queue operation, served, queue to be served and left on the facilities of service. Queue occurs due to a disparity between the numbers of customers served by the number of services available. A model is developed in queuing theory so that queue lengths and waiting times may be estimated. The research aims to determine the performance measure between Queuing Theory Model and Fuzzy Queuing Model at the ferry terminal. Queuing theory model has provided the limited ability to explain some real-life situation while Fuzzy Queuing Model has multiple inputs or criteria to make decisions. For the fuzzy queuing system, the DSW algorithm is used for the α -cut process. The Dong, Shah, and Wong algorithm (DSW) are being used to determine the membership function of the Fuzzy Queuing Model performance measures. Data were collected manually at Sultan Abdul Halim terminal is used and evaluated to determine arrival time and service time. Results show that the performance measurements of the Queuing Theory Model give a single value while for the Fuzzy Queuing Model within the range of values. The performance measures derived from the Queuing Theory Model are within the range of computed performance measures of the Fuzzy Queuing Model. Consequently, the results obtained from the Fuzzy Queuing Model are consistent in evaluating the ferry company's queuing efficiency to solve the problem of the waiting line and enhance the quality of the ferry company's services.