ABSTRACT

PT XYZ Port is a major container port in Malaysia that plays an important role in global logistics and supply chain by providing container ship handling services. Container vessels usually require tugboat assistance to berth, shift, and unberth. Effective tugboat scheduling is essential to ensure the safe and efficient movement of container ships at the port. This research addresses the tugboat scheduling problem (Tug-SP) at the Port of PT XYZ. The author formulates the Tug-SP using the Mixed Integer Linear Programming (MILP) model by considering various valid constraints to strengthen the model. To solve the Tug-SP efficiently, the author uses Python programming language and Gurobi optimisation solver. The results of solving the MILP model show optimal scheduling that can reduce the deviation time between the initial time of the tugging process and the estimated time of arrival (ETA). This reduction indicates better efficiency of vessel waiting time at the anchorage area, with shorter processing time. Overall, there was a decrease of 21 minutes or 21% of the processing time in the actual schedule, from 102 minutes to 82 minutes. With this decrease in vessel waiting time, it is expected that there will be no more delays that can reduce the performance of tugboat services at the Port of PT XYZ..

Keywords — [**Container Port, Tugboat Schedulling, Mixed Integer Linear Programming, Gurobi**]