

ABSTRACT

Distribution or delivery is one of the important activities for a company. Some of the problems in distribution or delivery include determining the number of vehicles used, and also determining distribution routes that can be optimized so that all customer demands can be met so that the company can obtain optimal profits. In the success of distribution, there are several factors, namely the distribution system. PT. XYZ is a company that distributes beverage products in bottles that supply a number of outlets in West Java Province, especially in the city of Bandung. PT. XYZ has a problem that within 7 (seven) days of product delivery, 6 out of 7 truck trips 1 and 4 out of 7 truck trips 3 exceed the working time limit. The working time limit is 8 (eight) working hours. If the driver and assistant return to the depot exceed the time limit, the company must bear the cost of overtime wages. The company sends products in the form of crates containing bottles and will be exchanged for empty crates which will be returned to the Depot. Therefore, the author intends to conduct research on the design of product distribution routes at PT. XYZ to minimize work overtime.

The purpose of this final project is to design a proposed route for the distribution of PT. XYZ so as to minimize the duration of the trip that exceeds the working time limit. Data collection was done by direct observation at PT. XYZ conducted in December 2020. Data collection at PT. XYZ is carried out in accordance with the directions of related parties, namely the admin section and the operational section. Based on actual conditions, it can be seen that PT. XYZ has problems in terms of transportation that can be solved by using the Vehicle Routing Problem approach with the type of Pick-up and Delivery and Time Window because the mode of carrying out delivery and pick-up tasks at the same time there is a time window in the form of a work time limit. Based on the purpose of this final project, to get the proposed route the data will be processed using genetic algorithms and data processing will be assisted by using a python programming language. The result of this calculation will be a proposed delivery route that is carried out every day with different results based on the number of truck loads, truck choices, and delivery destinations. The proposed delivery route is expected to minimize the duration of

the trip so that nothing exceeds the working time limit. Systematics of problem solving explain the process of conducting research. The problem-solving process is divided into 5 (five) stages, namely the preliminary stage, the data collection stage, the integrated system design stage, and the validation and evaluation stage of the design results and the conclusion and suggestion stage.

Based on the results of calculations using genetic algorithms, the results obtained in the form of distribution routes that have reached the target or research objectives, namely 100% of the proposed routes, none of which has a travel duration that exceeds the working time limit. Implementation of the proposed route results in a decrease in the duration of the trip so that it does not exceed the working time limit. In truck 1, it is known that there is a decrease in travel duration by 17% and in truck 3 there is a decrease in travel duration by 2%. With the duration of delivery, it is expected that there will be a decrease in work overtime costs that must be incurred by the company. Based on the calculations that have been made, it can be seen that the average decrease in travel duration obtained is 5%.

Keywords — Vehicle Routing Problem, Pick-up and Delivery, Time Travel, Working Time Limit, Genetic Algorithm