# *ABSTRACT*

*PT. XYZ is one of the largest textile companies in Indonesia, located in* Surakarta*, Central Java. The company has consumers spread throughout the city of Surakarta. PT. XYZ fulfils consumer demand by sending products directly to consumers using their transportation fleet. Therefore, PT. XYZ must determine a different shipping route each time it sends an order. The route is determined by the* driver *based on his experience and knowledge of roads in the city of Surakarta. The knowledge and experience of each* driver *are always different which can cause the route chosen is not fixed which has a big influence on the shipping costs. In the distribution of PT. XYZ uses its fleet of six vehicles with different capacities. Product delivery is carried out from Monday to Saturday starting from 08.00 to 17.00 to various destinations. The departure point for each shipment is made from PT. XYZ and back to PT. XYZ if have finished sending the product. In product delivery, the delivery time must adjust to the period that has been given by the consumer or it can also be called the time window. Based on the time window that has been given, if the time the* driver *arrives at the consumer's location has exceeded the time window, the product will be returned to the company and will be sent the next day. Delays that often occur are due to the absence of route planning that will be passed in the product delivery process. Hence, the number of delays experienced is very large and exceeds the target of delays by zero delays. Delivery delays can cause increasing transportation costs. Therefore, determining travel routes is very important to minimize transportation costs incurred by the company and to minimize product delivery delays.*

*The purpose of this final project is to design a proposed route for the distribution of PT. XYZ to minimize product delivery delays and minimize total transportation cost. By increasing the effectiveness of transportation routes, the company will be able to minimize transportation costs. Based on the conditions that occur, PT. XYZ has problems in terms of transportation that can be solved using the VRP approach. The VRP approach that can be done based on the case that occurs is to use a heterogeneous fleet and time window because product delivery uses several vehicles with different capacities and there is a time window. Based on the purpose of this final project, is to get the proposed route according*

*to the needs of PT. XYZ, the route design is carried out using a heterogeneous fleet with a time window VRP approach where data will be processed using the tabu search algorithm and data processing will be assisted by using a program called MATLAB. 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 truckloads, truck choices, and delivery destinations. The proposed delivery route is expected to minimize vehicle mileage, to reduce delivery delays properly.*

*Based on the results of the calculations that have been carried out, the design results obtained are the proposed route that has been adapted to the needs of PT. XYZ, which gives the result that there are no delays in delivery on all days, where the proposed route is by what is desired, namely that there are no delays in delivery and also the deliveries made have met the specified target where the target percentage of delays has been determined by the company is 0% (zero per cent) or it can be said that the percentage of delivery is 100% (one hundred per cent).Based on the evaluation of the design results, after obtaining the proposed delivery route that applies the tabu search algorithm, there is a reduction in the distance travelled by each vehicle owned by the company in delivering customer requests using the existing route and the proposed route, with an average reduction the distance travelled using the proposed route is 20% (twenty per cent) shorter than using the existing route. In addition to the distance reduction in the proposed route, it is also known that there is a reduction in the time taken by each vehicle in delivering customer requests, with an average reduction in travel time using the proposed route by 21% (twenty-one per cent) faster than using the existing route. With reduced delivery delays, it is expected that there will be a decrease in transportation costs that must be incurred by the company. Based on the calculations that have been done, the average reduction in transportation costs obtained is 8%.*

*Key Word: Vehicle Routing Problem, Heterogeneous Fleet, Time Window, Delays in Delivery, MATLAB*