ABSTRACT

The strategic decision of determining facility location and vehicle routing to serve a set of customer needs to be integrated in solving this problem so that a new concept of LRP is developed. Location routing problem with soft time windows (LRPSTW) is one of the logistic and distribution problems that is relatively new. LRPSTW is a variant of location routing problems in which time window constraint of customer and depot has to be considered. Each customer with certain demand has to be served during its interval time window. Thus, vehicle schedule need to be assigned properly to avoid early delivery or lateness.

VRPSTW is classified as combinatorial optimization problem. This condition makes LRPSTW became a more complex problem. Solving this problem using exact method is considered as an ineffective way because of its complexity and more time consuming for larger problem. Aside from that, metaheuristic methods have been developed successfully to be applied in solving combinatorial problem. In this research the authors developed mathematical model of LRPSTW and hybrid differential evolution algorithm adopting selection rule of simulated annealing to solve LRPSTW. A set of modified data is used in experiment. Experimental results show that proposed algorithm can outperforms when applied in 8 data Barreto and 3 data Solomon. Comparing in quality of solution, the solutions gap between hybrid DE and original DE are small, indicated that these two algorithm able to find a competitive solution. However, original DE is more time consuming than hybrid DE. Hybrid DE can save computational time 17 times of original DE.

**Keywords:** Differential evolution, location routing problem, location routing problem with time windows, simulated annealing, vehicle routing problem with time windows.
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