Optimization of Distribution to Retailers of Newspapers and Magazines

F. Mahmood[1] and H. M. Mirza[2]

[1]DTU Transport, Technical University of Denmark
[2]DTU Compute, Technical University of Denmark

INTRODUCTION

The transport sector, which includes everything from bike taxis to air transport plays a vital role in any society. Because of the fact that the transportation cost makes up approximately 70% of the production cost for a newspaper (Arnsted, 2014), a distribution optimization creates an option to reduce the transportation cost at A/S Bladkompaniet and furthermore reduce the impact on the environment. Hence, the project will end up with designing a solution model to reduce the cost of distribution.

METHOD

The solution is designed by two metaheuristics: GRASP and Simulated Annealing (SA). They have been developed in JAVA within Eclipse. Furthermore, OpenStreet Map and Graphhopper is used as geographical data. Both in GRASP (as a Hill Climber) and SA, three neighborhoods are searched according to the best-improvement principle. GRASP is used

Figure 1a: Solution by GRASP

to obtain an initial solution and the SA does the work of searching for better solutions. A parameter analysis is performed to determine which parameter combination to use within SA and some test runs are performed to determine the order of neighborhoods to search within.

RESULTS

After the parameter analysis the parameter combination with 1,750 as start temperature and 0.96 as cooling parameter is selected. The test runs show the best order of neighborhoods are first by moving a retailer from one route to another, then do a swap of two different retailers from two different routes and finally change the position of a route within the same route. Figure 1 and 2 shows respectively the solution by GRASP and SA. It's clear that the cost is reduced by SA and the trucks do not cross routes and visit retailers disorderly as in the GRASP solution. The cost is reduced by nearly 9% and considering the distribution takes place every day, the impact is huge.

CONCLUSION

By using metaheuristics it's possible to reduce the cost, so both A/S Bladkompagniet can earn more and reduce the environmental impact.

Figure 2: Solution by SA

REFERENCES

Arnsted, L. H. (2014). Chief of Planning, A/S Bladkompagniet