

Application of a Mobile Facility Routing Problem in a Delivery Company

Martin Salvador, Galo Eduardo Mosquera, and Sonia Valeria Avilés-Sacoto

Universidad San Francisco de Quito, Ecuador

Corresponding author's Email: martinsalvador1996@hotmail.com, gemosquera@usfq.edu.ec, svaviless@usfq.edu.ec

Abstract: A mobile facility routing problem (MFRP) is applied to a company dedicated to deliver products at home located in the city of Quito. The company shows a peak demand on Thursday, Friday and Saturdays night. Currently, the company delivers their products with a set of two vehicles that act like mobile facilities. In many occasions, as the customers do not have a regular pattern and have random orders, the company experiences problems in the delivery of the products; leading the vehicles to travel larger distances as they do not have a planned route. This problem decreases the quality of the service as the vehicles take more time to arrive to the customer increasing the transportation cost. Using the historical data of the customers' addresses a clustering method is done to divide the city of Quito in different zones where the mobile facilities could be located. Once the zones are determined, the travel time between each of them is set. Also, with the purpose of handling the uncertain demand a Monte Carlo simulation is applied to run different scenarios. Finally, the application of the MFRP will determine the optimal position through time of the mobile facilities by minimizing the costs of buying a mobile facility and the unmet demand.

Keywords: Mobile Facility Routing Problem, Monte Carlo Simulation, clustering