The Green Load Dependant Vehicle Routing Problem with Backhauls: A Revisited Case Study

Javier Belloso¹, Angel Juan², Javier Faulin∗³, and Adrian Serrano³

¹Departamento de Ingeniería Matemática e Informática, Universidad Pública de Navarra – Universidad Pública de Navarra Campus de Arrosadia 31006 Pamplona, Spain
²Universitat Oberta de Catalunya [Barcelona] (UOC) – Spain
³Universidad Pública de Navarra – Campus de Arrosadia 31006 Pamplona, Spain

Abstract

Environmental management principles are gaining interest in today’s highly competitive environment. Green logistics improvements presented in this paper are twofold. As a general framework, we consider the Vehicle Routing Problem with Backhauls (VRPB), where delivery and pick-up customers are to be served from a central depot. At the same time, the minimization of the CO2 emissions is included into the objective function as well as minimization of distance. Load factor is considered into the minimization objectives through the new introduced model: Load Dependant Vehicle Routing Problem with Backhauls (LD-VRPB). Our methodology will be constructed taking this variant as a basis. The resolution procedure uses a multi-start approach designed to avoid the local minima. The algorithm employs a biased-randomized version of the classical savings heuristic, together with some local search processes. The savings list of edges is randomized using a skewed probability distribution. In order to validate our methodological approach we have revisited a real case of a company working in the food distribution sector in Spain. The obtained results show improvements above 7% in both distances and CO2 emission reductions.

*Speaker