

Vehicle routing problem: case study in a retail automotive parts company.

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Abstract

The distribution of the merchandise for the retail companies concentrates approximately 30 percent of the operation costs. Costs generally increase if the company wants to have a high level of customer service, that is, achieve the fastest delivery. We focus on improving the distribution system of an automotive spare parts company to deliver its products, offering a high level of customer service. The company has a finite number of delivery drivers, which are assigned to specific areas of the city. Therefore, as a first step, a classification, grouping and assignment of the clients to the drivers is carried out using clustering algorithms, such that a balance of the workload is obtained. Once the coverage areas have been established, it is necessary to calculate departures and schedules in order to organize the visits of the delivery drivers to the customers. Finally, the best delivery routes are calculated through the use of metaheuristics considering the necessary restrictions that improve service times and reduce distribution costs. The results of the methodology applied in the company and a comparison of the savings generated against the current process are shown and cycles of continuous improvement are established.

Keywords

VRP, heuristics, clustering, case study.

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Biography

Leonardo G. Hernandez-Landa holds a BSc. in Industrial Engineering from ITSPe in Veracruz, México and earned his PhD in Engineering from the graduate program in System Engineering at Department of Mechanical and Electrical Engineering, Universidad Autónoma de Nuevo León (UANL). Leonardo is currently a Professor of operations management at Department of Industrial Engineering, UANL in San Nicolás de los Garza, México, where he joined in 2016. Dr. Hernandez' research has primarily focused on methods for solving difficult discrete optimization problems arising in logistic, routing and transportation systems. Previously, he has conducted funded research on vehicle routing problems with accessibility and route design. Dr. Hernandez is a SNI Fellow second highest country-wide distinction granted by the Mexican System of Research Scientists, where he has been a member since 2017.

Argelia Vargas-Moreno. BSc. in Industrial Engineering with minor in Management and Master of Industrial Engineering by the UANL. Chair of department of Industrial engineering and management. Full time professor and taught undergraduate and graduate courses such as Industrial Engineering, Methods engineering and Operations research. Worked as project engineer at Hylsa, at TUBACERO and IMSA. She has been recognized by the SEP with the PRODEP certification; Professor Vargas-Moreno is Member of the IISE and is the faculty advisor of student chapter # 358. Her academic publications include books on the following topics: Industrial Engineering, methods engineering, statistics, probability and accounting.

Elva Patricia Puente Aguilar is a Professor of Industrial Engineering and Management area in the Universidad Autónoma de Nuevo León since 2010, teaching courses such as Industrial Engineering, Work Study, Manufacturing Processes, Quality Culture and Production Control. She earned B.Sc. in Industrial Engineering with minor in Management and Master in Business Administration degree from Universidad Autónoma de Nuevo León. Currently she is a PhD student in Project Engineering at Universidad Internacional Iberoamericana. She has got ten years experience in manufacturing industry with expertise in the areas of material and production planning, manufacturing engineering, quality engineering and new products engineering. She has participated as co-author and speaker in conferences in Mexico and USA. Her research interests include design and optimization of operations and education and engineering linkage in production systems.