3rd Australian Conference on Industrial Engineering and Operations Management
Sydney, Australia, September 24-26, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/AU03.20240043
Published: September 24, 2024

An Optimization Approach for Capacitated Facility Location: a case study of delivery companies in Saudi Arabia

Abdulhadi A. Altherwi
Assistant Professor
College of Engineering and Computer Science
Jazan University
Jazan, Saudi Arabia
aaltherwi@jazanu.edu.sa; a.aaltherwi@hotmail.com

Abstract

This paper discusses optimization of the Capacitated Facility Location Problem (CFLP) under uncertainty in demand and supply. This research proposes an optimization framework that addresses the capacitated facility location problem by considering delivery companies to identify optimal warehouse locations so that orders are met at the lowest cost depending on warehouse capacity. This research was applied to the cities of the Kingdom of Saudi Arabia with high demand for delivery; therefore, census data were taken in the cities available for study, and a small proportion of each city was customers. A novel mixed integer linear programming was proposed and solved by Python to obtain the minimum total transportation and fixed costs for warehouse construction. The proposed warehouse sites were presented on a map, and each city was connected to its optimal warehouse. This research investigates the effects of determining the optimal warehouse sites for supplying goods to different cities in Saudi Arabia with high demand. This paper addressed one of the major problems that most companies face, namely, the Capacitated Facility Locations Problem (CFLP). A Python language based on different libraries was used to solve the problem, and the results were obtained. The results revealed that there were 19 proposed sites distributed throughout Saudi Arabia for constructing warehouses, which could meet customer demands and minimize transportation costs. The results also demonstrate that optimal warehouse sites can save money, decrease undesirable transportation and inventory costs, and satisfy customer requirements.

Biography

Abdulhadi A. Altherwi is an Assistant Professor in the Department of Industrial Engineering at Jazan University, Jazan, KSA. He earned B.S. in Industrial Engineering from Jazan University, Jazan, Saudi Arabia, Master of Science in Industrial Engineering from Lawrence Technological University, Southfield, MI, USA. and PhD in Systems Engineering from Oakland University, Rochester, MI, USA. He has published conference papers. His research interests include advanced optimization, scheduling, supply chain modeling, and Operations Research. He is member of IEOM and IEEE.