AN APPLICATION OF THE SAVINGS METHOD TO A VEHICLE ROUTING PROBLEM

Chatsuree Kamthornsawat*
Martin de Tours School of Management, Assumption University of Thailand

Athisarn Wayuparb
School of Logistics and Supply Chain, Naresuan University

ABSTRACT

This paper presents the authors’ research study of the vehicle routing practices of a transport company. This firm provides the delivery of Printed Circuit Board Assembly (PCBA) and electronics components to customers in the Bangkok Metropolitan Region and neighboring provinces in the Central and East regions of Thailand. Currently, traditional truck management is being practiced: this lacks a systematic approach by using only personal experience information. The inefficient truck management problem in this case study was identified as a Capacitated Vehicle Routing Problem (CVRP). Therefore, the ‘Savings Method’ designed by Clarke and Wright (1964) was applied to solve the CVRP, using Excel worksheets. The method consists of four procedures. Firstly, identify the distance matrix from the depot to all customers. Secondly, identify the savings matrix. Thirdly, assign customers to the vehicles or routes, in which the highest value is the criteria for selection. Lastly, sequence the customers within these routes.

The research results show that the Savings method reduces the total number of vehicles usage and total distribution distances by 16.46% and 15.70% respectively, and increases truck utilization of truck capacity by 19.70%. These results create significant cost saving for the company.

Keywords: Vehicle Routing Problem, Capacitated Vehicle Routing Problem, Savings Method,

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INTRODUCTION

At present, communication technologies are diversified and have grown rapidly, which lead to increasing business opportunities affecting transportation network expansion and complexity of vehicle routing. The competition becomes more intense, including transportation costs which also have increased accordingly, and thus become an unavoidable cost for the company. However, if the company had a systematic plan for vehicle routing, it would be able to reduce the distance of transportation. Using the optimum number of vehicles, with appropriate truck utilization by using full-load capabilities of vehicles in each delivery, would show a competitive cost of transportation and higher delivery completion capabilities. Therefore, the distribution problem is an important criterion today.

The focal ABC Company (a pseudonym for confidentiality) is a global business creating added value by fully utilizing its experience over 50 years to systematically link the business requirements of various firms. Its main function is a trading and logistics center which provides Printed Circuit Board Assembly (PCBA) and other electronic components. The main activities of this company are purchasing and importing electronic components, entering into intercompany links for the assembly of finished goods (FG). After receiving the finished goods (FG), ABC manages and delivers the shipments to customers. Currently, the company supplies around 39 customers in 20 areas located in Bangkok Metropolitan Region and neighboring provinces in Central and East regions in Thailand.