

ABSTRAK

PT XYZ yang melayani pendistribusian uang ke unit-unit ATM mitra kerjanya berusaha mencegah adanya cash out pada mesin ATM karena mempengaruhi potongan arus kas dari bank mitra yang berimbas kepada pemotongan gaji hingga pemecatan karyawan. Rekapitulasi menunjukkan rata-rata *availability* unit ATM sebesar 96,40%, hasil tersebut berada di bawah standard perusahaan sebesar 99%. Tujuan dalam penelitian ini adalah membangun model matematis untuk pemilihan rute proses distribusi *cash replenishment*, menyusun rute paling optimal untuk melakukan proses distribusi *cash replenishment*, dan membandingkan hasil pemilihan rute yang dibuat dalam model matematis penelitian ini dengan rute yang dibuat sesuai kebijakan perusahaan. Metode yang digunakan adalah *Vehicle Routing Problem With Time Window* (VRPTW) dengan algoritma *Nearest Insertion Heuristic* untuk menentukan titik guna disisipkan dengan mencari titik bebas yang paling dekat dengan suatu titik pada tur. Komputasi model matematis yang dibuat menghasilkan 8 tur dimana tur mewakili jumlah kendaraan yang digunakan. Tur 1 terdiri 2 rute, tur 2 terdiri 2 rute, dan tur 3 hingga tur 8 masing-masing terdiri 1 rute dengan total jarak tempuh 1.643,34 km dan tidak terdapat *cash out*. Pemilihan tur dan rute perusahaan menghasilkan 8 tur dengan masing-masing tur terdiri dari 1 rute, total jarak tempuh yang dihasilkan sebesar 3.790,8 km dan terdapat 2 unit ATM *cash out*.

Kata kunci: *Vehicle Routing Problem with Time Windows, Nearest Insertion Heuristic, Cash Replenishment.*

PT XYZ, which serves the distribution of money to its partner ATM units, tries to prevent cash out on ATM machines because it affects cash flow deductions from partner banks which have an impact on salary cuts to employee dismissal. The recapitulation shows that the average availability of ATM units is 96.40%, which is below the company standard of 99%. The objectives of this study are to build a mathematical model for route selection for the Cash Replenishment distribution process, to develop the most optimal route to carry out the Cash Replenishment distribution process, and to compare the route selection results made in the mathematical model of this study with the route made according to company policy. The method used is Vehicle Routing Problem With Time Window (VRPTW) with Nearest Insertion Heuristic algorithm to determine the point to insert by finding the free point closest to a point on the tour. The computation of the mathematical model created produces 8 tours where the tur represents the number of vehicles used. Tour 1 consists of 2 routes, tur 2 consists of 2 routes, and tur 3 to tur 8 each consists of 1 route with a total mileage of 1,643.34 km and no cash out. The selection of company turs and routes resulted in 8 tours with each tur consisting of 1 route, the total mileage generated was 3,790.8 km and there were 2 cash out ATM units.

Keywords: *Vehicle Routing Problem with Time Windows, Nearest Insertion Heuristic, Cash Replenishment.*