**Penyelesaian *Saving Heuristic Open Vehicle Routing Problem* dengan Pendekatan *Genetic Algorithm* pada Rute Pengangkutan Sampah di Kota Bandung**

Siti Habsah1, M. Nurman Helmi,Sutarman

Magister Teknik Industri, Universitas Pasundan

1Sitihabsah91@gmail.com

**Abstrak**

Kota Bandung mengalami peningkatan jumlah timbunan sampah.Sementara kegiatan pengangkutan sampah khususnya kendaraan angkutan sampah belum digunakan secara optimal.Kota Bandung Wilayah Timur memiliki 48 TPS atau bak sampah yang tersebar.Rute pengangkutan sampah dibuat dengan memperhatikan keterbatasan seperti kapasitas angkut kendaraan. Kondisi pengangkutan sampah dianalogikan dengan model *Open Vehicle Routing Problem*, yakni setiap kendaraan tidak wajib kembali ke depot atau kendaraan dapat berhenti disalah satu pelanggan. Model penelitian ini disebut *Capasitated with Open Vehicle Routing Problem* (COVRP) dengan tujuan meminimasi biaya transportasi.Permasalahan COVRP ini dapat diselesaikan dengan metode metaheuristik seperti algoritma genetika, dengan populasi awal menggunakan algoritma heuristik seperti *saving heuristic*.Hasil dari metode *saving heuristic* ini terbentuk 13 tur pengangkutan sampah yang tersebar di wilayah Bandung timur yang selanjutnya di integrasikan menggunakan pendekatan algoritma genetika.Hasil penelitian ini menunjukkan bahwa algoritma genetika dapat meminimalkan jarak tempuh pengangkutan sampah dan biaya transportasi. Dimana penurunan total jarak tempuh sebesar 7,1 % dan penurunan total biaya transportasi sebesar 6,49 %.

Kata Kunci :*Vehicle Routing Problem, COVRP, Saving Heuristic, Algoritma Genetika*

**Abstract**

The city of Bandung experienced an increase in the amount of landfill. While waste collection activities, especially waste collection vehicles has not been used optimally. East Bandung City has 48 TPS or waste bins scattered around. The waste transportation route is made with due regard to limitations such as vehicle transport capacity. Waste transportation conditions are analogous to the Open Vehicle Routing Problem model, that is, every vehicle is not obliged to return to the depot or the vehicle can stop at one of the customers. This research model is called Capasitated with Open Vehicle Routing Problem (COVRP) with the aim of minimizing transportation costs. This COVRP problem can be solved by metaheuristic methods such as genetic algorithms, with the initial population using heuristic algorithms such as saving heuristic. The results of this saving heuristic method formed 13 waste transportation tours spread in the eastern Bandung region which were then integrated using a genetic algorithm approach. The results of this study indicate that genetic algorithms can minimize the mileage of waste transport and transportation costs. Where the total mileage decreases by 7.1% and a decrease in total transportation costs by 6.49%

Keywords: Vehicle Routing Problem, COVRP, Saving Heuristic, Genetic Algorithm

**Daftar Pustaka**

Balai Pusat Statistik. (2016). *Provinsi Jawa Barat Dalam Angka 2016.* Bandung: Badan Pusat Statistik Provinsi Jawa Barat.

Christiana, L. A., & Prasetyo, H. (2016). Penyelesaian Capacitated Closed Vehicle Routing Problem with Time Windows menggunakan biased random key genetic algoritm dengan populasi terdegradasi. *publikasi ilmiah UMS*.

Dhika, G. M., Helmi, M. N., & Ramadhan, T. (2013). *Rancangan Rute Armada Angkutan Sampah di Wilayah Bandung Timur (PD Kebersihan Kota Bandung).* Bandung: Tugas Akhir UNPAS.

Gintaras, V. (2014). *Genetic Algorithm for Vehicle Routing Problem .* Vilnius : Doctoral Dissertation Vilnius University.

GurpreetSingh, & Dhir, V. (2014). Open Vehicle Routing Problem by Ant Colony Optimization. *International Journal of Advanced Computer Science and Applications (IJASCSA)*, Vol. 5, No.3.

Labadie, N., Prins, C., & Prodhon, C. (2016). *Metaheuristics for Vehicle Routing Volume 3.* United States: ISTE Ltd and John Wiley & Sons,Inc.

Lubis, H. A., Maulana, A., & Frazila, R. B. (2016). Penerapan Konsep Vehicle Routing Problem dalam Kasus Pengangkutan Sampah di Perkotaan. *Jurnal Teoretis dan Terapan Bidang Rekayasa Sipil (Jurnal Teknik Sipil), Vol 23 No.3*, ISSN 0853-2982.

Palit, H. C., & Sherly. (2012). Vehicle Routing Problem with Time Windows at Food Ingredients Distributor. *Prosiding Seminar Nasional Manajemen Teknologi XV MMT-ITS*.

PD Kebersihan Kota Bandung. (2014). *Action Plan PD Kebersihan Kota Bandung Tahun 2014-2018.* Bandung: Perusahaan Daerah Kebersihan Kota Bandung.

PD Kebersihan Kota Bandung. (n.d.). *Kondisi Sampah Kota Bandung.* http://pdkebersihan.bandung.go.id/index.php/profil/kondisi-sampah/ . diakses 5 November 2017.

Pujawan, I. N. (2010). *Supply Chain Management.* Guna Widya.

Slamet, A. S., Siregar, H. H., & Kustiyo, A. (2014). Vehicle Routing Problem (VRP) by Genetic Algorithm on the Distribution of Highland Vegetables. *Jurnal Teknologi Industri Pertanian*, 24 (1) : 1-10.

Tarantilis, C., Ioannou, G., Kiranoudis2, C., & Prastacos, G. (2005). Solving the open vehicle routeing problem via a single parameter metaheuristic algorithm. *Journal of the Operational Research Society*, 56, 588–596.

Tarigan, D. (2008). *Pemodelan Vehicle Routing Problem Terbuka dengan Keterbatasan Waktu.* Medan: Tesis USU.

Yu, V., Jewpanya, P., & Redi, P. (2016). *Open Vehicle Routing Problem with Cross-Docking.* Taiwan: Computers & Industrial Engineering.