

**DETERMINING THE DISTRIBUTION ROUTE OF MEDICAL
AND INDUSTRIAL GAS CYLINDERS AT PT PUTRI
KEMBAR GAS**

FINAL PROJECT

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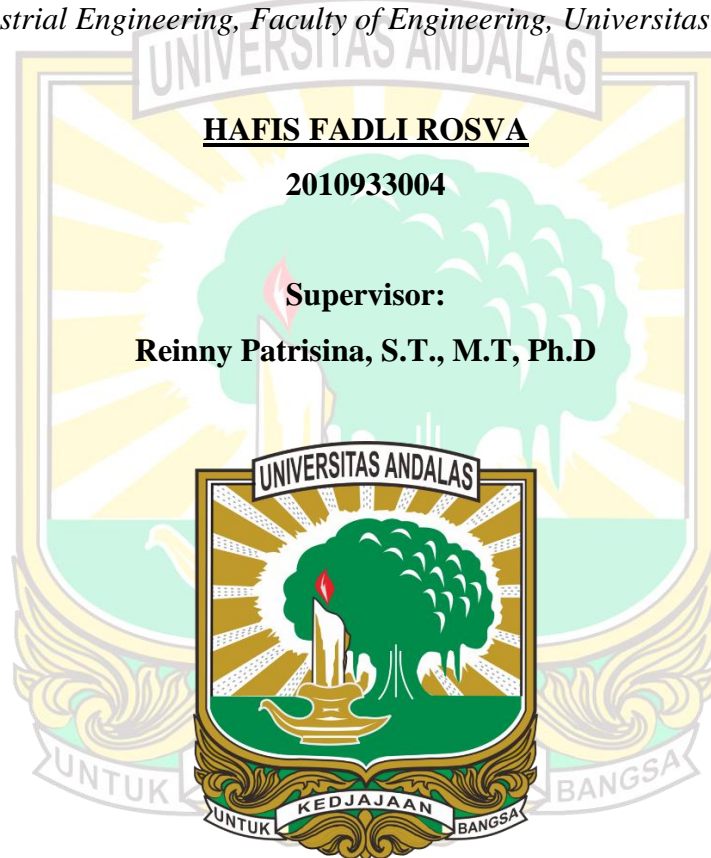


**INDUSTRIAL ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
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PADANG
2024**

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*Submitted to Fulfill One of the Requirements for Obtaining a Bachelor's Degree
in Industrial Engineering, Faculty of Engineering, Universitas Andalas*



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ABSTRAK

Logistik merupakan serangkaian kegiatan yang mencakup perencanaan, pelaksanaan, dan pengendalian aliran barang, jasa, dan informasi secara efisien dan efektif dari sumber menuju pelanggan. Salah satu bentuk dari kegiatan logistik yaitu distribusi. Pengiriman produk harus dilakukan secara efisien dan akurat kepada pelanggan agar distributor dapat memperoleh keuntungan. Salah satu strategi yang dapat dilakukan yaitu dengan merencanakan rute distribusi yang baik. PT Putri Kembar Gas merupakan distributor tabung gas medis dan industri seperti oksigen, argon, nitrogen, karbon dioksida, dan acetylene. Berdasarkan studi pendahuluan, penentuan rute distribusi hanya berdasarkan pembagian wilayah saja, sehingga perlu dievaluasi apakah kebijakan saat ini memberikan keuntungan dalam hal total biaya perjalanan. Oleh karena itu, diperlukan perencanaan rute distribusi yang optimal untuk meminimumkan biaya perjalanan dengan mempertimbangkan jarak tempuh, waktu distribusi, kapasitas kendaraan, dan permintaan pelanggan.

Penentuan rute distribusi dilakukan dengan menggunakan model Heterogeneous VRP Multi Trip Multi Product dari Setiawan et al. (2019). Perhitungan dilakukan terlebih dahulu dengan pendekatan eksak menggunakan software LINGO 19.0. Apabila pendekatan eksak tidak sesuai dengan sistem, pendekatan metaheuristik dengan algoritma genetika akan digunakan untuk menyelesaikan permasalahan.

Hasil dari rute usulan dengan pendekatan metaheuristik menunjukkan bahwa pada rute distribusi tanggal 5 Desember 2023 perusahaan mampu menghemat total biaya perjalanannya sebesar Rp180,447.22 atau 21.73% per hari dari biaya aktual. Selain itu, rute usulan mampu menghemat total jarak tempuh sebanyak 12.7 km atau 7.44% dari rute aktual dan total waktu distribusi sebanyak 25 menit 24 detik atau 3.62% dari rute aktual pada hari tersebut. Berdasarkan hasil ini, dapat disimpulkan bahwa kebijakan penentuan rute distribusi berdasarkan pembagian wilayah yang dilakukan saat ini belum memberikan hasil yang optimal.

Kata Kunci: Algoritma Genetika, Distribusi, LINGO, Logistik, Rute.

ABSTRACT

Logistics is a series of activities that include planning, implementing, and controlling the efficient and effective flow of goods, services, and information from sources to customers. One form of logistics activity is distribution. Product delivery must be carried out efficiently and accurately to customers so that distributors can make benefits. One of the strategies that can be done is by planning a proper distribution route. PT Putri Kembar Gas is a distributor of medical and industrial gas cylinders such as oxygen, argon, nitrogen, carbon dioxide, and acetylene. Based on preliminary studies, the determination of distribution routes is only based on regional clustering, so it is necessary to evaluate whether the current policy provides benefits in terms of total travel costs. Therefore, optimal distribution route planning is needed to minimize travel costs by considering travel distance, distribution time, vehicle capacity, and customer demand.

The distribution route is determined using the Heterogeneous VRP Multi Trip Multi Product model from Setiawan et al. (2019). The computation is conducted first using the exact approach by LINGO 19.0 software. If the exact approach is not suitable for the system, the metaheuristic approach with genetic algorithms will be used to solve the problem.

The results of the proposed route using the metaheuristic approach show that on the distribution route of December 5, 2023, the company can save the total travel cost of Rp180,447.22 or 21.73% per day from the actual cost. In addition, the proposed route can save a total distance of 12.7 km or 7.44% of the actual route and a total distribution time of 25 minutes 24 seconds or 3.62% of the actual route on that day. Based on these results, the current policy of determining distribution routes based on regional clustering has not provided optimal results.

Keywords: Distribution, Genetic Algorithm, LINGO, Logistics, Route