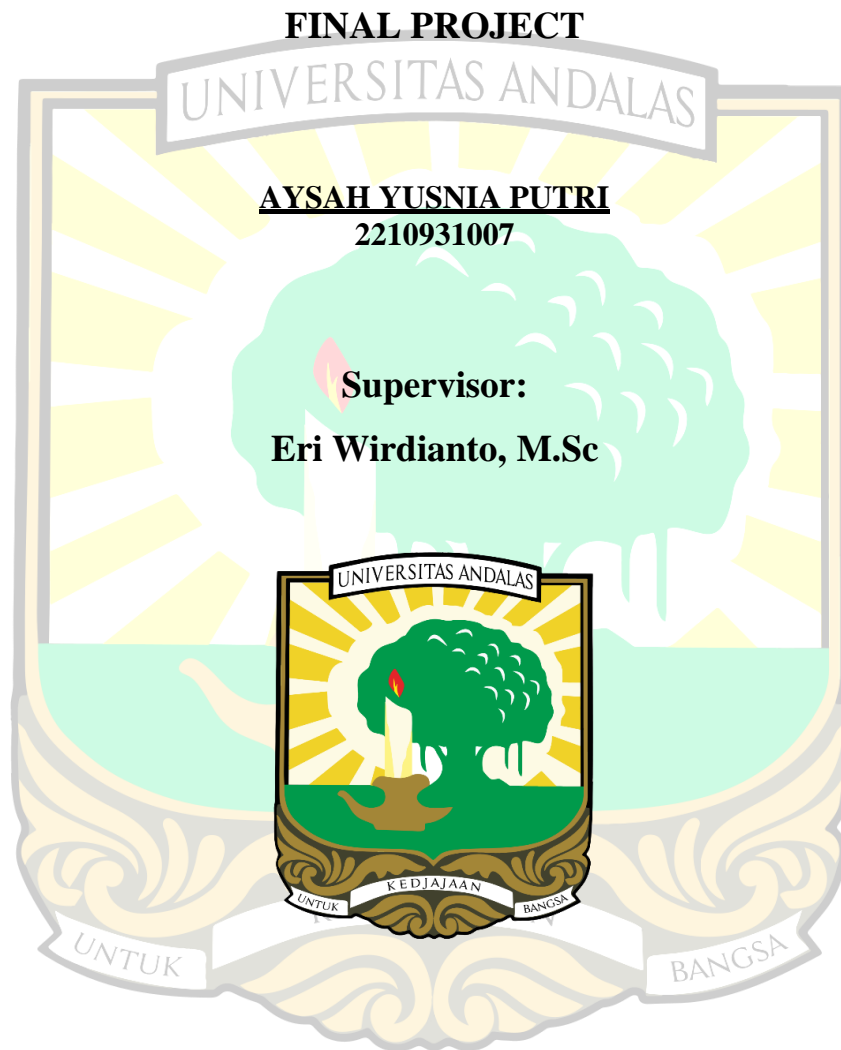


**VEHICLE ROUTING PROBLEM FOR OPTIMIZING  
THE CANVASSING DISTRIBUTION SYSTEM  
AT CV ANUGRAH SEMATA WAYANG 67**



**INDUSTRIAL ENGINEERING DEPARTMENT  
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2026**

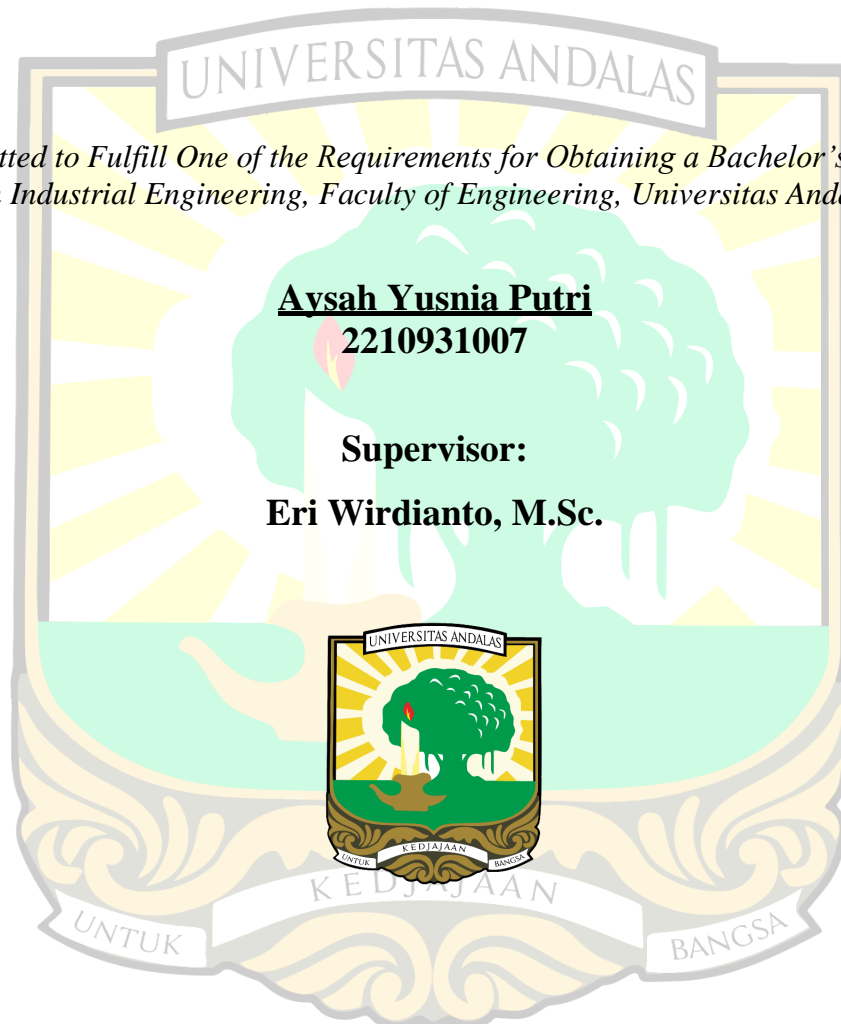
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**FINAL PROJECT**

*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

Permasalahan utama pada CV Anugrah Semata Wayang 67, khususnya pada distribusi Team 1 di wilayah Padang, Kabupaten Solok, dan Kabupaten Solok Selatan adalah rendahnya efisiensi operasional akibat belum adanya sistem perencanaan rute dan penjadwalan yang terstruktur. Penentuan muatan produk dalam sistem canvassing masih berbasis estimasi subjektif tanpa peramalan permintaan, sehingga berisiko menyebabkan ketidaksesuaian stok. Selain itu, penentuan rute yang dilakukan secara manual menggunakan pendekatan nearest-neighbor sering menghasilkan jalur tumpang tindih, backtracking, serta peningkatan konsumsi bahan bakar.

Penelitian ini menggunakan pendekatan berbasis data melalui metode peramalan deret waktu untuk mengestimasi permintaan pelanggan berdasarkan data historis. Selanjutnya, permasalahan distribusi dimodelkan menggunakan Periodic Vehicle Routing Problem with Multiple Products (PVRPMP) untuk menentukan jadwal kunjungan dan rute distribusi optimal dalam horizon enam hari kerja. Penyelesaian model dilakukan dengan dua pendekatan, yaitu metode eksak menggunakan Gurobi Optimizer dan metode metaheuristik menggunakan Cuckoo Search Algorithm (CSA). Proses analisis didukung oleh perangkat lunak seperti Minitab, Microsoft Excel, Google Maps, dan Python.

Hasil penelitian menunjukkan bahwa penerapan model PVRPMP mampu meningkatkan efisiensi distribusi secara signifikan. Total jarak tempuh berkurang sebesar 599.36 km per bulan (27.76%), dari 2,758.72 km menjadi 2,159.36 km. Pengurangan ini berdampak pada efisiensi biaya operasional sebesar Rp565,497.18 per bulan atau Rp6,785,966.14 per tahun. Dari sisi kelayakan ekonomi, hasil analisis menunjukkan nilai Benefit-Cost Ratio (BCR) sebesar 1.767 ( $>1$ ), yang mengindikasikan bahwa solusi yang diusulkan layak untuk diterapkan karena memberikan manfaat yang lebih besar dibandingkan biaya yang dikeluarkan. Selain itu, terjadi optimalisasi jadwal distribusi di wilayah Padang dari enam hari menjadi lima hari kerja, sehingga memberikan peluang untuk ekspansi pasar. Dengan demikian, integrasi peramalan permintaan dan optimasi rute berbasis PVRPMP terbukti efektif dalam meningkatkan efisiensi distribusi. Pendekatan ini tidak hanya menurunkan biaya dan jarak tempuh, tetapi juga memberikan fleksibilitas strategis dalam pengelolaan operasional perusahaan.

**Kata Kunci:** *Distribusi, Canvassing, Peramalan, Periodic Vehicle Routing Problem with Multiple Products and Multi-Day Trips (PVRPMP), Penjadwalan Pengiriman.*

## ABSTRACT

The main problem faced by CV Anugrah Semata Wayang 67, particularly in the distribution operations of Team 1 in the Padang City, Solok Regency, and South Solok Regency areas, is low operational efficiency due to the absence of a structured routing and scheduling system. Product loading in the canvassing system is still based on subjective estimation without demand forecasting, which leads to the risk of stock mismatches. In addition, route determination is carried out manually using a nearest-neighbor approach, often resulting in overlapping routes, backtracking, and increased fuel consumption.

This study adopts a data-driven approach by utilizing time series forecasting methods to estimate customer demand based on historical data. Furthermore, the distribution problem is modeled using the Periodic Vehicle Routing Problem with Multiple Products (PVRPMP) to determine optimal visit schedules and delivery routes within a six-day planning horizon. The model is solved using two approaches: an exact method with the Gurobi Optimizer and a metaheuristic method using the Cuckoo Search Algorithm (CSA). The analysis process is supported by software such as Minitab, Microsoft Excel, Google Maps, and Python.

The results show that the implementation of the PVRPMP model significantly improves distribution efficiency. The total travel distance is reduced by 599.36 km per month (27.76%), from 2,758.72 km to 2,159.36 km. This reduction leads to operational cost savings of Rp565,497.18 per month or Rp6,785,966.14 annually. From an economic feasibility perspective, the analysis results show a Benefit-Cost Ratio (BCR) of 1.767 ( $>1$ ), indicating that the proposed solution is feasible to implement as it provides greater benefits than the costs incurred. The distribution schedule in the Padang area is optimized from six days to five working days, providing opportunities for market expansion. Therefore, the integration of demand forecasting and route optimization based on PVRPMP is proven to be effective in improving distribution efficiency. This approach not only reduces costs and travel distance but also provides strategic flexibility in managing company operations.

**Keywords:** Distribution, Canvassing, Forecasting, Periodic Vehicle Routing Problem with Multiple Products and Multi-Day Trips (PVRPMP), Delivery Scheduling.