SKRIPSI

PERBANDINGAN METODE *EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL* TERHADAP MODIFIKASI VARIASI JENIS DISTRIBUSI PROBABILITAS PADA PENYELESAIAN MASALAH TRANSPORTASI

COMPARISON OF EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL METHOD TOWARDS MODIFICATION OF VARIATIONS OF PROBABILITY DISTRIBUTION TYPES IN SOLVING TRANSPORTATION PROBLEMS

ABDURRAHMAN RAIS

24010122120001

DEPARTEMEN MATEMATIKA

FAKULTAS SAINS DAN MATEMATIKA

UNIVERSITAS DIPONEGORO

SEMARANG

2026

SKRIPSI

PERBANDINGAN METODE *EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL* TERHADAP MODIFIKASI VARIASI JENIS DISTRIBUSI PROBABILITAS PADA PENYELESAIAN MASALAH TRANSPORTASI

COMPARISON OF EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL METHOD TOWARDS MODIFICATION OF VARIATIONS OF PROBABILITY DISTRIBUTION TYPES IN SOLVING TRANSPORTATION PROBLEMS

Diajukan untuk memenuhi salah satu syarat memperoleh derajat Sarjana Matematika (S.Mat.)

ABDURRAHMAN RAIS

24010122120001

DEPARTEMEN MATEMATIKA

FAKULTAS SAINS DAN MATEMATIKA

UNIVERSITAS DIPONEGORO

SEMARANG

2026

HALAMAN PENGESAHAN

SKRIPSI

PERBANDINGAN METODE *EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL* TERHADAP MODIFIKASI VARIASI JENIS DISTRIBUSI PROBABILITAS PADA PENYELESAIAN MASALAH TRANSPORTASI

Telah dipersiapkan dan disusun oleh:

ABDURRAHMAN RAIS

24010122120001

Telah dipertahankan di depan Tim Penguji

Pada tanggal 13 Maret 2026

Susunan Tim Penguji

Pembimbing II/Penguji,

Dr. Drs. Kartono, M.Si.
NIP. 196308251990031003

Penguji,

Dr. R. Heru Tjahjana, S.Si., M.Si.
NIP. 197407172000121001

Mengetahui,
Ketua Departemen Matematika,

Dr. Susilo Hariyanto, S.Si., M.Si.
NIP. 197410142000121001

Pembimbing I/Penguji,

Dr. Sutrisno, S.Si, M.Sc.
NIP. 198609012014041003

ABSTRAK

PERBANDINGAN METODE EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL TERHADAP MODIFIKASI VARIASI JENIS DISTRIBUSI PROBABILITAS PADA PENYELESAIAN MASALAH TRANSPORTASI

oleh:

Abdurrahman Rais

24010122120001

Masalah transportasi merupakan permasalahan optimasi dalam riset operasi yang bertujuan meminimumkan biaya transportasi dengan mempertimbangkan keterbatasan *supply* dan *demand*. Sering kali, biaya transportasi sudah ditentukan di awal sebelum pendistribusian dilakukan. Namun, ada kalanya seorang distributor mengalami kondisi dimana saat perjalanan pengiriman, terdapat variasi biaya yang berbeda dari biaya awal. Berdasarkan masalah tersebut, metode *Exponential Distribution and New Penalty Model* menjadi metode yang menyelesaikan kondisi tersebut, yakni dengan mengintegrasikan konsep distribusi probabilistik dalam proses transformasi biaya sebagai pendekatan alternatif dalam pembentukan solusi fisibel awal yang mempertimbangkan kemungkinan variasi biaya. Penelitian ini bertujuan mengkaji cara mencari solusi fisibel awal menggunakan metode tersebut, membandingkannya dengan modifikasi variasi jenis distribusi (Poisson dan seragam kontinu), serta membandingkannya dengan metode klasik *Vogel's Approximation Method* (VAM) dan *Least Cost*. Penelitian dilakukan dengan mengubah distribusi eksponensial dengan distribusi Poisson dan seragam kontinu, kemudian menganalisis pengaruhnya terhadap hasil simulasi numerik, serta membandingkan dengan metode VAM dan *Least Cost*. Hasil penelitian menunjukkan bahwa pergantian distribusi probabilitas memengaruhi pengalokasian serta total biaya transportasi. Hal ini dipengaruhi oleh parameter dan cdf masing-masing distribusi. Namun demikian, pendekatan probabilistik dapat digunakan sebagai alternatif dalam pembentukan solusi awal guna menyelesaikan kemungkinan variasi biaya.

Kata kunci: Biaya transportasi, Variasi biaya, Pendekatan probabilistik, Transformasi biaya, Solusi fisibel awal.

ABSTRACT

COMPARISON OF EXPONENTIAL DISTRIBUTION AND NEW PENALTY MODEL METHOD TOWARDS MODIFICATION OF VARIATIONS OF PROBABILITY DISTRIBUTION TYPES IN SOLVING TRANSPORTATION PROBLEMS

by:

Abdurrahman Rais

24010122120001

The transportation problem is an optimization problem in operations research that aims to minimize transportation costs while considering supply and demand constraints. In many cases, transportation costs are predetermined before the distribution process begins. However, in practice, distributors may encounter situations where cost variations occur during the delivery process, resulting in differences from the initial cost estimates. To address this issue, the Exponential Distribution and New Penalty Model method is introduced by integrating probabilistic distribution concepts into the cost transformation process as an alternative approach for generating an initial feasible solution that accounts for cost variability. This study aims to examine the procedure for determining an initial feasible solution using the proposed method, to compare it with modified variations of probability distributions (Poisson and continuous uniform), and to evaluate its performance against classical methods such as Vogel's Approximation Method (VAM) and the Least Cost method. The research is conducted by replacing the exponential distribution with Poisson and continuous uniform distributions, followed by analyzing their effects on numerical simulation results and comparing them with VAM and Least Cost methods. The results indicate that changes in probability distributions affect both the allocation decisions and the total transportation cost. This is influenced by the parameters and cumulative distribution functions (CDF) of each distribution. Nevertheless, the probabilistic approach can serve as an alternative method for generating initial feasible solutions in handling potential cost variations.

Keywords: Transportation cost, Cost variability, Probabilistic approach, Cost transformation, Initial feasible solution.