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ANALISIS KELAYAKAN INVESTASI PENGEMBANGAN TERMINAL BAHAN BAKAR MINYAK DAN GAS TERINTEGRASI DI
WILAYAH SUMATERA UTARA BAGIAN BARAT
Yopi Yuanggara, Prof. Ainun Naâ€™im, M.B.A., Ph.D.
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INTISARI

Penelitian ini bertujuan untuk menganalisis kelayakan investasi pengembangan Terminal Bahan Bakar Minyak dan Gas Terintegrasi (*Integrated* Terminal) di wilayah Sumatera Utara Bagian Barat. Investasi ini bertujuan untuk memperkuat rantai pasok dan ketahanan stok produk BBM, LPG, dan Avtur atas keterbatasan lahan infrastruktur eksisting, ketidaksesuaian tata ruang, kondisi infrastruktur yang jauh dari *center of gravity* pemasaran, serta kebutuhan energi yang terus meningkat setiap tahunnya.

Studi ini menggunakan pendekatan *descriptive-explanatory* dengan metode studi kasus dan kombinasi analisis kualitatif-kuantitatif. Analisis dilakukan melalui analisis penentuan lokasi menggunakan *Analytical Hierarchy Process (AHP)* atas kondisi operasi & pemasaran, teknis & legal, sosial & lingkungan, dan keselamatan & risiko, analisis proyeksi *demand* berbasis model regresi linear, analisis komparatif rantai pasok, analisis fasilitas produksi, serta analisis kelayakan finansial menggunakan pendekatan *capital budgeting* dengan indikator *Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI),* dan *Discounted Payback Period*. Selain itu, dilakukan analisis risiko melalui analisis sensitivitas dan skenario untuk menguji ketahanan proyek terhadap perubahan variabel kunci.

Hasil penelitian menunjukkan bahwa proyek *Integrated* Terminal layak secara aspek finansial dan non-finansial. Daerah Kalahan – Kabupaten Tapanuli Tengah merupakan lokasi yang terbaik untuk pengembangan infrastruktur. Proyeksi menunjukkan peningkatan *demand* BBM, LPG, dan Avtur hingga tahun 2047, serta adanya efisiensi jarak suplai dan distribusi atas optimasi rantai pasok dan biaya logistik. Secara finansial, proyek menghasilkan NPV positif dan IRR di atas biaya modal pada skema pendanaan *full equity* maupun kombinasi *loan* dengan struktur pendanaan optimal ditentukan berdasarkan keseimbangan antara manfaat *tax shield* dan risiko keuangan. Pendanaan terbaik yang digunakan dalam pengembangan infrastruktur adalah skema pendanaan kombinasi *loan* dengan memberikan NPV IDR 585,057 Miliar, IRR 12,80% > WACC, PI 1,80 > 1, dan *Discounted Payback Period* 14,24 tahun < masa manfaat proyek. Analisis sensitivitas menunjukkan bahwa variabel biaya investasi dan volume *demand* LPG menjadi faktor paling berpengaruh terhadap kelayakan proyek. Penelitian ini memberikan kontribusi akademis dalam pengembangan studi kelayakan investasi infrastruktur energi terintegrasi dan berkelanjutan, serta rekomendasi strategis bagi pengambilan keputusan investasi di perusahaan.

Kata kunci: Fuel & LPG Terminal, Energy Infrastructure, Feasibility Study, Investment, Optimization, Supply Chain, Capital Structure

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ABSTRACT

This study aims to analyze the investment feasibility of developing an Integrated Fuel and LPG Terminal (Integrated Terminal) in the West North Sumatra region. The investment is intended to strengthen the supply chain and stock resilience of fuel (BBM), LPG, and aviation fuel (Avtur) products in response to existing infrastructure land limitations, spatial planning non-compliance, infrastructure locations distant from the marketing center of gravity, and continuously increasing energy demand.

This research employs a descriptive-explanatory approach using a case study method and a combination of qualitative and quantitative analyses. The analysis includes location selection using a Analytical Hierarchy Process (AHP) covering operational & marketing, technical & legal, social & environmental, as well as safety & risk aspects, demand projection based on a linear regression model, comparative supply chain analysis and production facilities analysis, and financial feasibility analysis using a capital budgeting approach with indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and Discounted Payback Period. Furthermore, risk analysis is conducted through sensitivity and scenario analyses to assess project resilience against key variable changes.

The results indicate that the Integrated Terminal project is feasible from financial, and non-financial perspectives. Kalahan area in Cental Tapanuli regency identified as the most optimal for infrastructure development. Demand projections show an increase in BBM, LPG, and Avtur consumption through 2047, along with improved supply and distribution distance efficiency resulting from supply chain and logistics cost optimization. Financially, the project generates a positive NPV and an IRR exceeding the cost of capital under both full equity and loan combination financing schemes, with the optimal capital structure determined by balancing tax shield benefits and financial risk. The most favorable financing scheme is the loan combination structure, yielding an NPV of IDR 585.057 billion, an IRR of 12.80% exceeding the WACC, a PI of 1.80 (>1), and a discounted payback period of 14.24 years, which is shorter than the project's economic life. Sensitivity analysis indicates that capital expenditure and LPG demand volume are the most influential variables affecting project feasibility.

This study contributes academically to the development of integrated and sustainable energy infrastructure feasibility analysis and provides strategic recommendations for corporate investment decision-making.

Keywords: Fuel & LPG Terminal, Energy Infrastructure, Feasibility Study, Investment, Optimization, Supply Chain, Capital Structure