IMECONF
10th International Conference on Research in
MANAGEMENT AND ECONOMICS
25 - 27 July 2025
Toronto, Canada

Optimizing EPC Contracting Strategies for Green Refinery Projects in Indonesia: A Benchmarking Study Using Multi-Attribute Decision-Making

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Abstract

In pursuit of sustainability objectives, Indonesia has embarked on the development of green refinery projects, utilizing alternative feedstocks such as used cooking oil and palm oil mill effluent to produce sustainable aviation fuel and hydrotreated vegetable oil. These biofuels offer a significantly lower environmental impact than fossil fuels. However, the technological and operational complexities of green refinery projects necessitate a strategic approach to project execution, particularly in Engineering, Procurement, and Construction (EPC) contracting. Traditionally, EPC contracts in Indonesian refinery projects employ fixed-price models despite challenges such as underestimated timelines, delays, and cost overruns. Given the unique nature of green refinery projects, conventional contracting approaches may be insufficient. This study examines both traditional and collaborative contracting strategies, including Fixed Price, Cost Reimbursement, Time and Material, and Unit Price Contracts, alongside emerging collaborative models such as Integrated Project Delivery (IPD), Project Production Management, Lean, Partnering, and Agile methodologies. A Multi-Attribute Decision Making model is developed to evaluate these strategies based on 12 (twelve) scoring attributes, including ability to overcome vague scope, owner's cost-saving potential, schedule, contractor's involvement, risk allocation or sharing, quality, fit for purpose warranty, liability, project control and decision-making, problem-solving mechanism, familiarity, and Indonesia's regulatory compliance. Findings indicate that collaborative contracts outperform traditional models, with IPD achieving the highest score (0.81) due to its effectiveness in managing scope uncertainties and optimizing cost and schedule performance. In sum, collaborative contracting is a strategic framework for improving EPC contracting in green refinery projects, enhancing project feasibility, mitigating risks, and ensuring regulatory alignment.

Keywords: collaborative; contract; improvement; IPD; project