

ABSTRACT

The growth of Indonesian capital market investors reaching 17 million as of July 2025 demonstrates an increasing need for efficient portfolio management strategies. The infrastructure sector, represented by the SMInfra18 index, shows positive growth with construction sector growing 7.02%, transportation 7.92%, and energy 7.94% in Q4 2024, making it a strategic component in optimal portfolio formation. This research aims to form optimal portfolios using Multi-Objective Covariance Guided Artificial Bee Colony (MOCv-ABC) algorithm with cardinality constraints, weight constraints, and must-have constraints. Portfolio performance evaluated using Sharpe ratio, and measure risk with Value at Risk (VaR) based on Cornish-Fisher Expansion. The data consists of daily closing prices of 18 stocks in the SMInfra18 index from January 1, 2022 to September 30, 2025. The MOCv-ABC algorithm is combined with Non-dominated Sorting Genetic Algorithm II (NSGA-II) to generate portfolios with optimal balance between *return* and risk. Results show the MOCv-ABC algorithm successfully produces 84 optimal solutions in the first Pareto front. The optimal ABC_k5 portfolio with 5 stocks (MEDC, SSIA, UNTR, PGAS, TLKM) yields the best performance with Sharpe ratio of 0.8169, expected *return* of 0.27406, and standard deviation of 0.27732, far exceeding the conventional portfolio with Sharpe ratio of only 0.0633. Cornish-Fisher Expansion VaR calculation shows the ABC_k5 portfolio has a VaR value of -0.0288. Kupiec test validates all four portfolios with p-value > 0.05, confirming VaR estimation accuracy. This research proves MOCv-ABC as an effective alternative for multiobjective portfolio optimization in Indonesian infrastructure sector.

Keywords: SMInfra18, Portfolio Optimization, Multi-Objective, Artificial Bee Colony, Sharpe Ratio, Value at Risk, Cornish-Fisher Expansion, Kupiec Test