

ABSTRACT

Traditional portfolio optimisation focuses solely on financial data, ignoring non-financial factors such as Environment, Social, and Governance (ESG) that are of concern to investors due to the emergence of awareness of sustainable investment. This study uses historical stock price data and ESG score data from stocks listed in the IDX30 index from 2014 to 2024 to generate portfolio weights. The objective of this study is to produce optimal portfolio weights that minimise risk, with specified returns and ESG values. This study uses the Particle Swarm Optimization (PSO) algorithm for the optimisation problem. A single objective function is formulated to minimise risk while considering return and ESG value. The PSO algorithm iteratively searches for the combination of stock weights that yields the highest value for the objective function. The optimisation results without considering ESG show a portfolio with a risk of 11.23%, a Sharpe ratio of 0.94, and an ESG score of 28.40. Meanwhile, the ESG-based portfolio shows a better ESG value of 20.00 but with higher risk of 14.01% and a Sharpe ratio of 0.14. These results indicate that PSO can be used to generate a portfolio that balances financial and sustainability objectives.

Keywords: *sustainable investment, portfolio optimization, environmental social governance, particle swarm optimization*