

ABSTRACT

Environmental, Social, and Governance (ESG)-based investing is increasingly relevant, yet integrating ESG into stock portfolios remains challenging due to limited historical data and complex trade-offs between investment goals. This study aims to optimize ESG-based stock portfolios using the NSGA-II genetic algorithm with three objectives: maximizing return, minimizing risk, and maximizing ESG scores. The dataset includes weekly stock prices and ESG scores of IDX35 companies from 2014 to 2024, divided into sample and validation periods. The optimization produced Pareto-optimal portfolios. Evaluation on testing data (2022–2024) shows that the moderate portfolio, with the highest Sharpe ratio (0.1928), offers the best balance—achieving a weekly return of 0.45%, risk of 2.34%, and ESG score of 35.32. The highest-return portfolio achieved 0.65% per week but with higher risk and lower ESG scores, while the minimum-risk portfolio was more stable but less profitable. Comparison with alternative datasets revealed higher potential annual returns (up to 70.37%) but with significantly greater risk and lower efficiency. These findings demonstrate that NSGA-II is effective in constructing adaptive portfolios aligned with investor preferences and that ESG integration can be achieved without substantially compromising investment performance.

Keyword: *ESG, NSGA-II, optimasi portofolio, multi-objektif. IDX35*