## ABSTRACT

The growth in the number of investors and the increasing interest in sustainable investing emphasize the importance of stock portfolio management that not only focuses on achieving returns but also on controlling extreme downside risk. Extreme downside risk is not always well represented by volatility measures; therefore, maximum drawdown is used as a risk measure that more realistically reflects actual investor losses. This study aims to perform stock portfolio optimization for the IDXESGL index by simultaneously considering the trade-off between return and maximum drawdown using the Non-dominated Sorting Genetic Algorithm II (NSGA-II). The data consist of daily closing prices of 20 IDXESGL stocks over the period from January 1, 2023 to October 31, 2025. Based on expected return calculations, five stocks with positive expected returns (BSDE, EMTK, ERAA, JSMR, and SCMA) were selected as initial portfolio candidates. The optimization process was conducted using NSGA-II with two objective functions, namely maximizing return and minimizing maximum drawdown, while applying the Actual Portfolio Framework to calculate actual portfolio values. The optimization results produce a set of Pareto optimal solutions that form an efficient frontier. The optimal portfolio was determined based on the trade-off ratio between mean log return and maximum drawdown. Re-optimization with variations in the number of stocks shows that the best portfolio consists of four stocks, namely SCMA, JSMR, ERAA, and BSDE, with optimal weights of 53.03%, 23.05%, 13.77%, and 10.14%, respectively. This portfolio achieves a mean log return of 0.00045, a maximum drawdown of 0.17921, and the highest trade-off ratio of 0.00251. Risk evaluation using the Value at Risk (VaR) Historical Simulation method at a 95% confidence level yields a VaR value of −2.89%, indicating that the maximum potential loss of the optimal portfolio over one trading day is expected to not exceed 2.89% of the investment value.



**Keywords**: return, maximum drawdown, portfolio optimization, IDXESGL, NSGA-II, efficient frontier, Value at Risk