

I-URIP 2025
INTERNATIONAL UNDERGRADUATE RESEARCH
INNOVATION, INVENTION AND DESIGN

**UNDERGRADUATES
PIONEERING
TOMORROW'S
BREAKTHROUGH**

E-BOOK OF EXTENDED ABSTRACTS

StockXplore: BIG DATA-POWERED VIKOR SYSTEM FOR SMARTER STOCK SELECTION

Nur Humaira Najihah Mohd Hamidi, Surhana Amani Zakaria, and Muhammad Nur Azahari Johari, Nur Fathiah Fatin Mohamad Fauzi, and Zahari Md Rodzi*

Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Negeri Sembilan Branch, Seremban Campus, 70300 Seremban, Negeri Sembilan, Malaysia

*zahari@uitm.edu.my

ABSTRACT

StockXplore: Big Data-Powered VIKOR System for Smarter Stock Selection addresses the challenge of identifying the best stocks when faced with multiple and often conflicting criteria. Stock decision-making is complex, as investors must consider various financial indicators such as profitability, risk, and return potential simultaneously. To overcome this, the study applies the VIKOR Multi-Criteria Decision-Making (MCDM) method, which enables a structured evaluation and fair ranking of stock alternatives. The system processes stock data through normalisation, determines the best and worst values, and calculates three key measures: group utility (S), individual regret (R), and the compromise index (Q). The final outcome is a ranked list of stocks, where the top-ranked option represents the most suitable choice. Findings demonstrate that integrating VIKOR with MCDM produces a transparent, reliable, and data-driven decision support tool that benefits investors, policymakers, and financial analysts in making smarter and more sustainable stock decisions.

Keywords: *Stock Selection, Big Data, VIKOR, MCDM, Decision Support System*

INTRODUCTION

Stock market presents complex choices for investors, who must weigh multiple factors like earnings, risk, and potential returns. Traditional ways of evaluating stocks often focus on just one factor, which can lead to decisions that are unclear or unfair. To improve this, researchers use Multi-Criteria Decision-Making (MCDM) methods, which offer organised, data-driven approaches to compare stocks using multiple criteria simultaneously.

One of the trusted MCDM methods is VIKOR, known for finding balanced solutions by weighing both overall benefit and the worst-case scenario. A recent study examined several MCDM methods including VIKOR for choosing the best design strategies in energy-efficient buildings and found that VIKOR performed reliably in ranking solutions under different conditions (Rachman et al., 2024). Another systematic review in healthcare highlighted that modern MCDM tools like VIKOR are widely used for making fair and structured recommendations in complex decision settings (Chakraborty et al., 2023), it provides strong validation for MCDM use in critical areas.

In line with this, StockXplore has been developed as a user-friendly web platform that applies the VIKOR technique to rank stocks. Users upload stock data, choose how important each criterion is, and the system computes scores S for group utility, R for individual regret, and Q for the final rank then displays results using interactive charts and tables.

The objectives of this project are twofold:

- i. To develop a decision support system for stock selection using the VIKOR MCDM method
- ii. To provide investors with a systematic and transparent approach for ranking and selecting the most suitable stocks.

By fulfilling these objectives, the project aims to deliver a practical tool that empowers investors to make smarter, data-driven, and sustainable decisions

RESULTS AND DISCUSSION

The StockXplore system provides an easy, step-by-step workflow to guide users in stock evaluation. First, users upload stock datasets as input. Next, they select and assign weights to evaluation criteria according to their preferences. The system then normalises the data to ensure fair comparisons. After this, the VIKOR method computes three important values: S (Group Utility), representing overall performance; R (Individual Regret), representing the worst-case scenario; and Q (Compromise Index), which provides the final ranking of stocks. Finally, the results are displayed in clear tables and interactive charts, where users can dynamically adjust the weights and immediately observe changes in stock rankings. Figure 1 shows the workflow of StockXplore, highlighting the step-by-step process from data input to stock ranking using the VIKOR method.

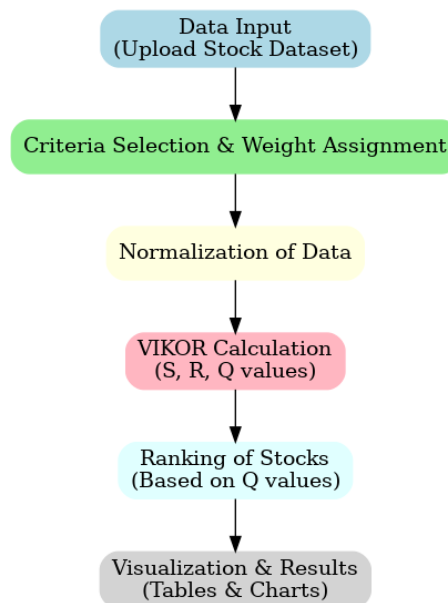


Figure 1: Flowchart of StockXplore

StockXplore evaluates multiple aspects of stock performance such as profitability, value, and risk. Each criterion is labeled as either a benefit (higher values are preferred) or a cost (lower values are preferred), enabling balanced and fair comparisons across indicators. By analysing all these factors together, the system provides a comprehensive view of stock strengths and trade-offs, supporting more accurate and transparent investment decisions. Figure 2 shows the StockXplore interface, which offers a simple and interactive platform for stock data input, analysis, and visualisation. While Fig. 3 shows the StockXplore output.



Figure 2: StockXplore inference

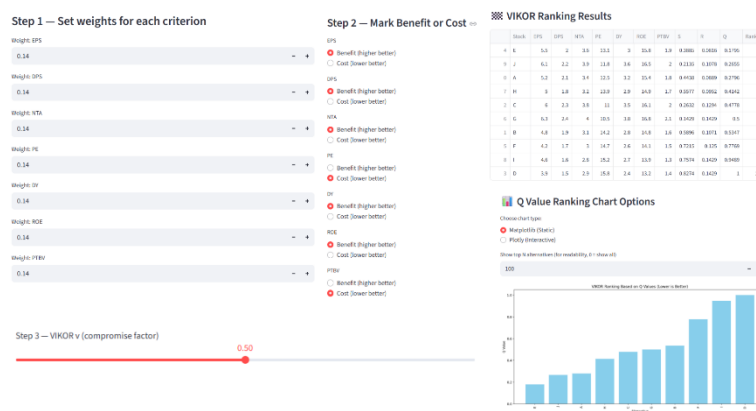


Figure 3: StockXplore output

The StockXplore platform is simple, interactive, and web-based, making it easily accessible to a wide range of users. The system can be accessed online via the following link:

<https://stockxplore-humairanajihah.streamlit.app/>

The novelty of StockXplore lies in its ability to integrate the VIKOR method with a web-based, interactive platform, moving beyond traditional stock evaluation approaches that often rely on a single financial indicator. Instead, StockXplore simultaneously considers multiple performance criteria such as profitability, value, and risk, classifying each as either a benefit (where higher values are better) or a cost (where lower values are better). By balancing group utility with individual regret, the system ensures fairer and more reliable rankings. Furthermore, the inclusion of interactive features, such as dynamic weight adjustment and instant visualisation, makes StockXplore both practical and user-friendly. These features provide a comprehensive view of stock strengths and trade-offs, thereby bridging the gap between theoretical MCDM methods and real-world financial decision-making.

CONCLUSION

StockXplore is a web-based decision support system that helps investors choose the best stocks using the VIKOR Multi-Criteria Decision-Making (MCDM) method. Unlike traditional evaluation approaches that focus on a single financial indicator, StockXplore compares multiple criteria such as profit, risk, and value. By balancing both group benefit and individual regret, the system provides fairer and more reliable results. The process is simple yet powerful: users upload data, set the importance of each criterion, and the system automatically calculates and ranks stocks. Results are presented through clear tables, visual charts, and interactive features that allow investors to adjust weights and instantly observe changes.

This project demonstrates how VIKOR can be applied in a practical and accessible way for financial decision-making. By reducing bias, enhancing transparency, and minimising human error, StockXplore offers a data-driven, user-friendly, and sustainable approach to stock evaluation. Ultimately, it serves as an innovative tool to support researchers, policymakers, and investors in making evidence-based financial decisions.

ACKNOWLEDGEMENT

We would like to acknowledge the Ministry of Higher Education Malaysia for their sponsorship of the Fundamental Research Grant Scheme (Project Code: FRGS/1/2023/STG06/UITM/02/5). This financial support has been crucial in advancing our research efforts, and we are grateful for their assistance.

REFERENCES

- Chakraborty, S., Raut, R. D., Rofin, T., & Chakraborty, S. (2023). A comprehensive and systematic review of multi-criteria decision-making methods and applications in healthcare. *Healthcare Analytics*, 4, 100232. <https://doi.org/10.1016/j.health.2023.100232>.
- Rachman, A. P., Ichwania, C., Mangkuto, R. A., Pradipta, J., Koerniawan, M. D., & Sarwono, J. (2024). Comparison of multi-criteria decision-making methods for selection of optimum passive design strategy. *Energy and Buildings*, 314, 114285. <https://doi.org/10.1016/j.enbuild.2024.114285>.