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OPTIMIZING SHARIA INVESTMENT PORTFOLIOS USING MODERN PORTFOLIO THEORY: A CASE STUDY OF ICBP AND SIDO IN INDONESIA STOCK MARKET

Chetrine Alya Rinaima[1], Nur Fauziyah[2], Athia Nur Kamilah[3]
[1]Sharia Economic, UIN Sunan Ampel Surabaya, Indonesia
[2,3]Islamic Business School, College of Business, Universiti Utara Malaysia
Email: chetrinealya@gmail.com (correspondence)

Abstract

This study evaluates the benefits of portfolio diversification by examining the relationship between the returns of Sido Muncul Tbk (SIDO) and Indofood CBP Sukses Makmur Tbk (ICBP) using Modern Portfolio Theory (MPT). Daily closing prices from October 1, 2023, to September 30, 2024, were analyzed. Daily returns were calculated and assessed using descriptive statistics, Pearson correlation, and mean–variance optimization to construct the efficient frontier and identify the optimal allocation. The results show ICBP offers a lower return (6.25%) and lower risk (1.92), while SIDO provides a higher return (7.35%) with slightly higher risk (1.97). Portfolio optimization suggests a 50/50 allocation yields the most balanced outcome, minimizing risk (1.46) while maintaining a solid return (6.80%). The low correlation (0.13) between the two stocks highlights significant diversification benefits. Practical implications include providing Shariah-compliant investors with empirical guidance to build efficient portfolios that balance return and risk. The study is limited by its use of only two stocks and a one-year observation period, which may affect the generalizability of results to broader market conditions.

Keywords: ***Modern Portfolio Theory, Portfolio Optimization, Efficient Frontier, Islamic Investment, Investment Decision-Making***

Introduction

Investing in the stock market is a dynamic and complex process that requires balancing the trade-off between risk and return (Wu, Syu, Lin, & Ho, 2021). For decades, investors and financial analysts have sought methodologies to optimize portfolios in a way that maximizes returns while keeping risks at a minimum. This pursuit has been significantly shaped by the introduction of the Modern Portfolio Theory (MPT) by Harry Markowitz in 1952 (Statman, 2024). MPT revolutionized portfolio management by introducing the concept of diversification, wherein combining assets with low or negative correlations could effectively reduce the overall risk of a portfolio without compromising its potential returns (Guerard, 2023). This theoretical framework remains one of the most influential models in modern finance and serves as a foundation for constructing efficient portfolios that align with diverse investor profiles.

In Indonesia, the stock market has grown rapidly over the years, with a wide array of opportunities for both individual and institutional investors (Batra, Yadav, Jindal, Saini, & Kumar, 2024; Rinaima, 2024; Zhan & Santos-Paulino, 2021). Among the numerous listed companies on the Indonesia Stock Exchange (IDX), Indofood CBP Sukses Makmur Tbk (ICBP) and Sido Muncul Tbk (SIDO) stand out as prominent players in their respective industries. ICBP, a subsidiary of Indofood Group, is a market leader in the consumer goods sector, particularly known for its instant noodle products and other food and beverage offerings (Cuandra et al. 2022a).On the other hand, SIDO is a key player in the pharmaceutical and herbal products industry, renowned for its traditional medicine and health supplements (Daru, 2021). These companies represent distinct industries with unique growth potentials and risk profiles, making them ideal candidates for a comparative portfolio analysis.

Both Indofood CBP Sukses Makmur Tbk (ICBP) and Sido Muncul Tbk (SIDO) are listed as Shariah-compliant stocks on the Indonesia Stock Exchange (IDX), making them attractive investment options for ethical and faith-based investors. As Shariah-compliant companies, they operate in accordance with Islamic financial principles, ensuring that their business activities avoid prohibited elements such as excessive uncertainty (*gharar*), interest-based transactions (*riba*), and unethical business practices (Aziz & Ghadas, 2021; Saba, Ariff, & Mohd Rasid, 2021; Tawfik & Elmaasrawy, 2024). This classification provides an added advantage, as Shariah-compliant stocks are often perceived as more stable, transparent, and ethically sound, attracting both domestic and international investors who seek sustainable and responsible investment opportunities (Alam, Miah, Siddiquii, & Hossain, 2020; Haji Wahab & Naim, 2021; Norchaevna, 2024). Additionally, the growing demand for Islamic financial products in Indonesia, one of the largest Muslim-majority economies, enhances the long-term growth prospects of these companies, reinforcing their potential role in a well-diversified and ethically aligned investment portfolio.

The selection of ICBP and SIDO also stems from the resilience of the consumer staples sector against economic volatility, as evidenced by the stable demand for daily necessities and the post-pandemic rise in popularity of herbal and Immunity Health Food (IHF) products. Furthermore, ICBP offers broad product diversification and export market penetration, while SIDO has experienced increased demand for wellness and herbal products. This study applies the principles of Modern Portfolio Theory to analyze the relationship between the returns of ICBP and SIDO and assess the potential diversification benefits. The primary objective is to evaluate the correlation between these two stocks to determine how their price movements interact and whether combining them in a portfolio can effectively reduce risk. Additionally, the study examines the expected returns and risks of each stock individually, providing a foundation for further portfolio analysis. By exploring different asset allocations, this research identifies the most efficient portfolio composition that maximizes diversification benefits while maintaining an optimal balance between risk and return.

This research contributes to the understanding of portfolio optimization in the Indonesian stock market, offering practical insights for investors with varying risk tolerances. For conservative investors seeking stability, this study identifies low-risk combinations, while for aggressive investors pursuing higher returns, it highlights the potential trade-offs. Ultimately, this research emphasizes the importance of diversification and strategic decision-making in navigating the complexities of the financial market, aligning with the broader goal of achieving sustainable and consistent investment performance.

Literature Review

Modern Portfolio Theory

Modern Portfolio Theory (MPT) was first introduced by Harry Markowitz (1952) as a systematic approach to constructing an optimal investment portfolio by maximizing returns and minimizing risk through the principle of diversification. The theory emphasizes that the total risk of a portfolio is not only determined by the risk of each individual asset but also by the correlation between the assets within the portfolio. By selecting assets with low correlation, investors can reduce overall risk without sacrificing expected returns (Fauziyah et al., 2025). MPT calculates portfolio returns as the weighted average of individual asset returns, while portfolio risk is measured using the variance or standard deviation of the combined returns. One of the key contributions of MPT is the concept of the efficient frontier, a curve representing a set of optimal portfolios that offer the highest return for a given level of risk (Jang & Seong, 2023). In the context of Shariah-compliant investing, the application of MPT is highly relevant, as it helps investors construct portfolios that are not only financially optimal but also aligned with Islamic principles by selecting stocks that have passed Shariah screening while still considering correlation and the characteristics of return and risk. Thus, MPT offers an effective approach for Shariah-compliant investors to design investment strategies that are efficient, diversified, and ethically grounded.

Research Methods

Data Collection

This study uses secondary data obtained from the investing.com website. The data used are the daily closing prices of two companies listed on the Indonesia Stock Exchange, namely Indofood CBP Sukses Makmur Tbk (ICBP) and Sido Muncul Tbk (SIDO). These companies were selected based on the resilience of the consumer staples sector to economic fluctuations, stable sales performance, and the post-pandemic growth in demand for wellness and herbal products. The data used are the daily closing prices of these companies from October 1, 2023, to September 30, 2024, providing a total of 12 months of historical data for analysis. To process and analyze the data, Microsoft Excel is utilized for calculating key financial metrics such as expected return, variance, standard deviation, and correlation. Additionally, Excel's data analysis tools and built-in functions are employed to construct the efficient frontier and determine the optimal asset allocation based on Modern Portfolio Theory (MPT).

Data Processing

The stock data obtained is processed to calculate daily returns. Daily returns are calculated using the following formula:

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} x\ 100\% \qquad \text{..... (1)}$$

Where:

Rt = daily return on day t

P_t = closing stock price on day t

P_{t-1} = the closing price of the stock on the previous day

After calculating daily returns, the next step is to analyze descriptive statistics for each stock, including average return, standard deviation, and data distribution.

Statistical Analysis

To analyze a stock portfolio, several analysis steps are carried out:

1. **Correlation Analysis**

Pearson correlation analysis is used to calculate the relationship between ICBP and SIDO stock returns. Low positive correlation or negative correlation indicates better diversification potential. The formula used to calculate the correlation is:

$$r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2 . \Sigma(y-\bar{y})^2}} \qquad \text{..... (2)}$$

Where r is the Pearson correlation coefficient, X and Y are the daily returns of each stock, and x ̄and ȳ are the average returns.

2. Portfolio Optimization

Portfolio optimization is conducted using the principles of Modern Portfolio Theory (MPT) to calculate the combination of assets that yields the highest returns with minimal risk, represented by the efficient frontier. The calculations include the following components:

a. Expected Portfolio Return

$$E(r_p) = w_A E(r_A) + w_B E(r_B) \qquad \text{..... (3)}$$

Where:

$E(r_p)$ is an estimation for the rate of return of the portfolio,

$E(r_A)$ is an estimation for the rate of return of SIDO,

w_A is investment weightage for SIDO,

$E(r_B)$ is an estimation for the rate of return of ICBP,

w_B is the investment weightage for ICBP.

b. Portfolio Risk

$$\sigma_p^2 = (w_A\sigma_A)^2 + (w_B\sigma_B)^2 + 2(w_A\sigma_A)(w_B\sigma_B)\,\rho_{AB} \qquad \text{..... (4)}$$

Where:

σ_p^2 is the standard deviation for portfolio return,

σ_A is the standard deviation for SIDO,

σ_B is the standard deviation for ICBP,

ρ_{AB} is Pearson correlation coefficient between the return of SIDO and ICBP.

Finding and Analysis

Daily Price and Daily Return of PT. Indofood Sukses Makmur Tbk. And PT. Industri Jamu dan Farmasi Sido Muncul Tbk.

1. PT. Indofood Sukses Makmur Tbk

PT Indofood Sukses Makmur Tbk, established on August 14, 1990, is one of Indonesia's leading food companies, primarily engaged in the processed food industry (Yulia Saputri & Pitri, 2024). Originally founded as PT Panganjaya Intikusuma, the company has undergone significant transformation and expansion over the years, evolving into a diversified food conglomerate. Indofood operates across various sectors, including instant noodles, flour, cooking oil, snacks, and dairy products, making it a household name in Indonesia and beyond (Siti Rokayah & Asep Achmad Rifa'I, 2024).

With its headquarters located in Sudirman Plaza, Indofood Tower, Jakarta, the company boasts a vast network of factories and estates throughout Indonesia, strategically positioned in key regions such as Java, Sumatra, and Kalimantan. This extensive operational footprint enables Indofood to efficiently meet the demands of its diverse customer base (Maulana, Rahmawati, & Helmiati, 2022). Additionally, the company has successfully extended its reach to international markets, establishing a presence in countries such as Malaysia, Saudi Arabia, Egypt, Turkey, Kenya, Morocco, Serbia, Nigeria, and Ghana.

Indofood is publicly listed on the Indonesia Stock Exchange under the stock code INDF, reflecting its commitment to transparency and corporate governance (Kenrick & Yanti, 2022). The company is dedicated to providing high-quality products while adhering to sustainable practices, which include responsible sourcing of raw materials, reducing environmental impact, and contributing to community welfare through various corporate social responsibility initiatives (Kerim, Ellyawati, Reza, & Destari, 2022).

As a market leader in Indonesia, Indofood holds a significant market share both locally and globally, supported by a robust distribution network that ensures its products are widely available (Marjohan, 2024). The company's competitive advantages lie in its strong brand portfolio, which includes well-known products such as Indomie instant noodles, and its ability to innovate and adapt to changing consumer preferences (Seru, Jannah, & Tandiangnga, 2024). Indofood invests heavily in research and development to create new products that cater to evolving tastes and dietary needs, including healthier options and convenient meal solutions.

Furthermore, Indofood's commitment to quality is reflected in its adherence to stringent food safety standards and certifications, ensuring that its products meet both local and international regulations. The company's strong financial performance and strategic partnerships further enhance its position in the food industry, allowing it to explore new growth opportunities and expand its product offerings.

In summary, PT Indofood Sukses Makmur Tbk is not only a key player in the Indonesian food industry but also a significant contributor to the global food market. Its dedication to innovation, quality, sustainability, and customer satisfaction positions Indofood as a trusted brand and a leader in the processed food sector, poised for continued growth and success in the years to come.

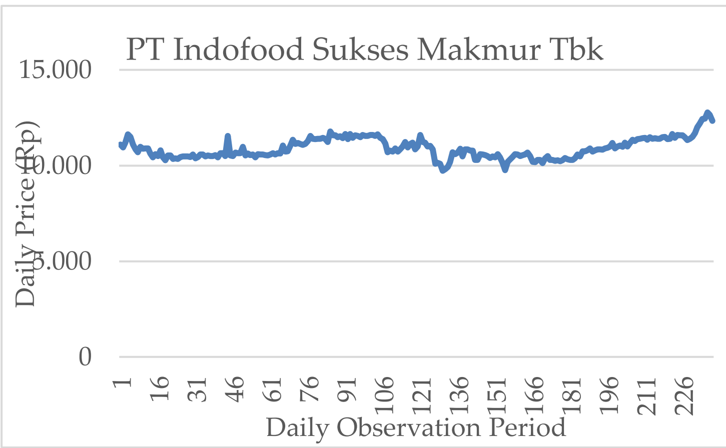

Figure 1. Daily Price PT. Indofood Sukses Makmur Tbk (Data Processed, 2024)

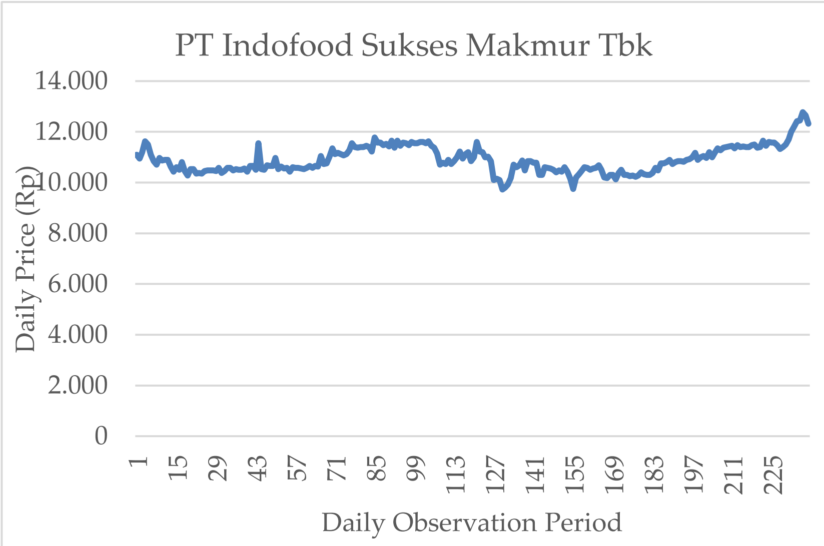

Figure 2. Daily Return PT. Indofood Sukses Makmur Tbk (Data Processed, 2024)

According to data on ICBP stock prices for the period under record, the maximum price was 11,950 on February 1, 2024. At 10,950, the stock price hit its lowest point on March 10, 2023. With a value of 4.90%, the highest return was achieved on January 31, 2024, suggesting a highly favorable day for the stock. On the other hand, the stock price had a notable decline on February 1, 2024, as seen by the lowest return of -8.87%.

2. PT. Industri Jamu dan Farmasi Sido Muncul Tbk

PT Industri Jamu Dan Farmasi Sido Muncul Tbk, established in 1940, is a leading entity in the herbal medicine industry in Indonesia (Fadilah, Mardiansyah, Rofiah, & Irmayati, 2024). With its headquarters located in Semarang, Central Java, the company has built a strong foundation over the decades, becoming synonymous with quality herbal products (Basuki, 2022). Sido Muncul's dedication to openness and corporate governance is demonstrated by its public listing on the Indonesian Company Exchange under the company code SIDO. In addition to keeping a sizable presence in the home market, the business has grown globally, exporting its goods to other nations and capitalizing on the rising demand for natural health solutions around the world (Neng Anis Safitri & Yuningsih, 2024).

Operating primarily in the pharmaceutical and herbal medicine sector, Sido Muncul focuses on the production of traditional herbal remedies and health products derived from natural ingredients. The company is particularly renowned for its flagship product, Jamu, a traditional Indonesian herbal drink that has been a staple in Indonesian culture for centuries (Zahra Amalina, 2022). In addition to Jamu, Sido Muncul offers a diverse range of health supplements, functional beverages, and herbal medicines that cater to various health needs, including immunity support, digestive health, and overall wellness (Anwar, Jazuni, & Juniarso, 2021). The emphasis on high-quality natural ingredients ensures that its products are both effective and safe for consumers, aligning with the increasing consumer preference for natural and organic products.

Sido Muncul's competitive advantage is rooted in its unique blend of traditional knowledge and modern innovation. The company has established a long-standing reputation for quality and efficacy, which has fostered consumer trust and loyalty (Tyana, Kantun, & Tiara, 2023). To maintain its market leadership, Sido Muncul invests heavily in research and development, continuously enhancing its product offerings and adapting to changing consumer preferences. The company also adheres to Good Corporate Governance principles, ensuring transparency and accountability in its operations, which further strengthens its brand image and consumer confidence (Hamidah, Prabowo, & Setiawati, 2023).

In addition to its commitment to quality and innovation, Sido Muncul is dedicated to sustainability and environmentally friendly practices. The company recognizes the importance of responsible business operations in today’s market and actively implements practices that minimize its environmental impact. This commitment resonates well with the growing consumer demand for brands that prioritize sustainability. Furthermore, Sido Muncul has embraced digital transformation, enhancing its marketing strategies through online platforms and e-commerce. By effectively reaching a broader audience and engaging customers through social media, the company not only boosts sales but also strengthens customer loyalty and brand recognition.

All things considered, PT Industri Jamu Dan Farmasi Sido Muncul Tbk distinguishes itself as a trailblazer in the herbal medicine sector by skillfully fusing conventional methods with cutting-edge commercial tactics to satisfy changing customer demands. With a strong commitment to quality, innovation, and sustainability, Sido Muncul is well-positioned for continued growth and success in both domestic and international markets. The company’s proactive approach to embracing digital trends and maintaining high standards of corporate governance further solidifies its status as a trusted leader in the herbal medicine sector, ensuring that it remains relevant and competitive in an ever-changing marketplace.

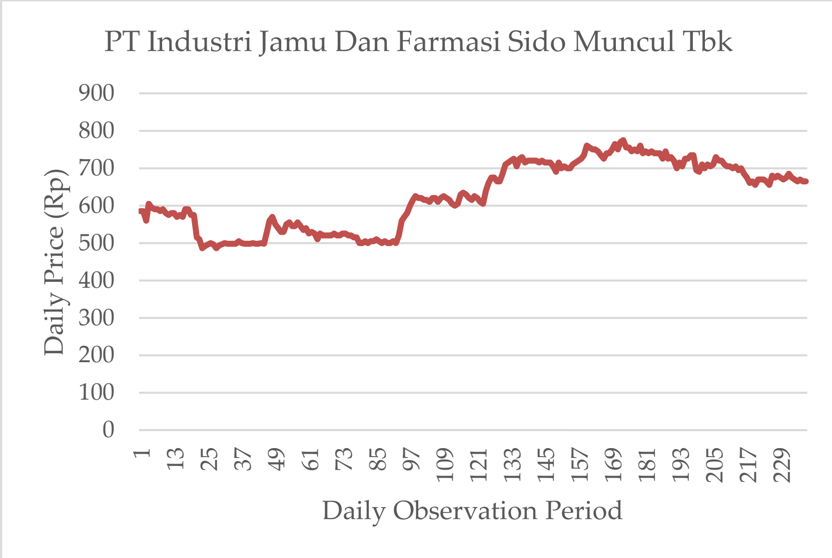

Figure 3. Daily Price PT. Industri Jamu dan Farmasi Sido Muncul Tbk (Data Processed,2024)

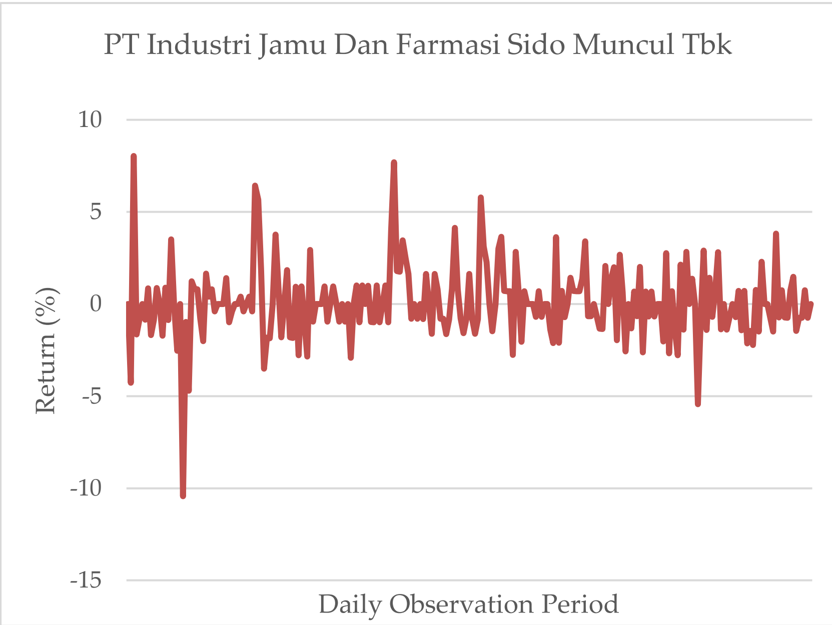

Figure 4. Daily Return PT. Industri Jamu dan Farmasi Sido Muncul Tbk (Data Processed, 2024)

The stock price of Sido Muncul (SIDO) reached its highest on April 04, 2024, at 730 IDR, while the lowest price was recorded on October 30, 2023, at 510 IDR. For returns, the highest return was recorded on February 16, 2024, at 7.69%, while the lowest return occurred on October 30, 2023, with a decrease of -10.43%, reflecting significant fluctuations during the period.

Statistical Correlation Test Between Share Price Return of PT Indofood Sukses Makmur Tbk and PT Industri Jamu and Farmasi Sido Muncul Tbk

Table 1. Correlation PT Indofood Sukses Makmur Tbk PT Industri Jamu dan Farmasi Sido Muncul Tbk

	ICBP	SIDO
AVG CLOSING PRICE	10904.62	627.2941
AVG RETURN	0.062519	0.073486
VARIANCE	3.668105	3.88455
STD DEVIATION	1.91523	1.970926
CORRELATION	0.12952719	

(Source: Data Processed, 2024)

The performance of Indofood CBP Sukses Makmur Tbk (ICBP) and Sido Muncul Tbk (SIDO) is the subject of various important conclusions derived from the statistical analysis of their stocks. The average closing price of ICBP is recorded at 10,904.62 IDR, significantly higher than SIDO’s average closing price of 627.29 IDR, reflecting a substantial difference in the nominal values of the two stocks. In terms of average returns, SIDO outperforms ICBP, with an average return of 7.35%, compared to ICBP’s 6.25%.

However, the standard deviation of the risk, which is 1.97 as opposed to 1.92 for ICBP, shows that SIDO is more volatile. This implies that SIDO involves a higher level of risk for investors, even though it gives a higher average return. This conclusion is further supported by the returns' variance, which shows that SIDO's variance was 3.88, marginally higher than ICBP's 3.67.

The correlation between the two stocks is 0.13, indicating a weak positive relationship between the returns of ICBP and SIDO. This low correlation suggests that the price movements of these two stocks are relatively independent of each other. As a result, adding these stocks to a portfolio may offer investors substantial diversification advantages. This view is consistent with Modern Portfolio Theory's diversification principles, which are designed to maximize the trade-off between risk and return.

Table 2. Weightage PT Indofood Sukses Makmur Tbk PT Industri Jamu dan Farmasi Sido Muncul Tbk

WEIGHTAGE	ICBP	SIDO	RETURN	VARIANCE	RISK
1	0	1	0.0734	3.88	1.97
2	0.1	0.9	0.0723	3.27	1.80
3	0.2	0.8	0.0712	2.78	1.67
4	0.3	0.7	0.0701	2.43	1.56
5	0.4	0.6	0.0690	2.22	1.48

6	0.5	0.5	0.0680	2.13	1.46
7	0.6	0.4	0.0669	2.17	1.47
8	0.7	0.3	0.0658	2.35	1.53
9	0.8	0.2	0.0647	2.65	1.63
10	0.9	0.1	0.0636	3.09	1.76
11	1	0	0.0625	3.66	1.91

(Source: Data Processed, 2024)

A portfolio simulation between two stocks, ICBP and SIDO, with different allocation weights and their effects on the return, variance, and risk (standard deviation) of the portfolio are shown in this table. The "Weightage" column for each stock ranges from 0 to 1, representing the investment weights, which indicate the percentage of money allotted to each stock. A stock with a weight of 0 indicates that no money is invested in it, whereas a stock with a weight of 1 suggests that all money is put in it.

The average return of the portfolio is determined by calculating the weighted contribution of each stock in the return column. The highest return of 0.0734, or around 7.35%, is obtained by the portfolio when all funds are put in SIDO (ICBP weight = 0, SIDO weight = 1). On the other hand, the portfolio yields the lowest return of 0.0625, or roughly 6.25%, when all assets are allocated to ICBP (ICBP weight = 1, SIDO weight = 0). Since SIDO delivers a larger average return than ICBP, the portfolio return generally declines linearly as the weight of ICBP grows.

Risk is measured by the variance column, which shows the distribution of portfolio returns. When all weights are assigned to SIDO, the variance is at its greatest, 3.884. The allocation with 50% ICBP and 50% SIDO has the lowest variance (2.132). Because investments are balanced between two stocks with low correlation, the overall risk of the portfolio is reduced, indicating that optimal diversification is attained with this combination.

The risk (standard deviation) column, the square root of the variance, provides an overview of the portfolio's volatility. The highest risk, 1.9709, occurs when all investments are allocated to SIDO. Meanwhile, the lowest risk, 1.46, is observed at a 50% ICBP and 50% SIDO allocation. This risk level indicates that the most stable portfolio can be achieved by combining the two stocks in a balanced proportion, as the volatility of returns is reduced through effective diversification.

In conclusion, this table illustrates the fundamental principles of diversification under Modern Portfolio Theory (MPT), where combining assets with low correlation can result in an optimal portfolio. While SIDO offers a higher average return, it comes with greater risk. On the other hand, ICBP has a lower risk but yields a lower return. The optimal combination is observed at a 50% ICBP and 50% SIDO allocation, which achieves the lowest risk (1.4603) while maintaining a competitive return (0.068 or 6.80%).

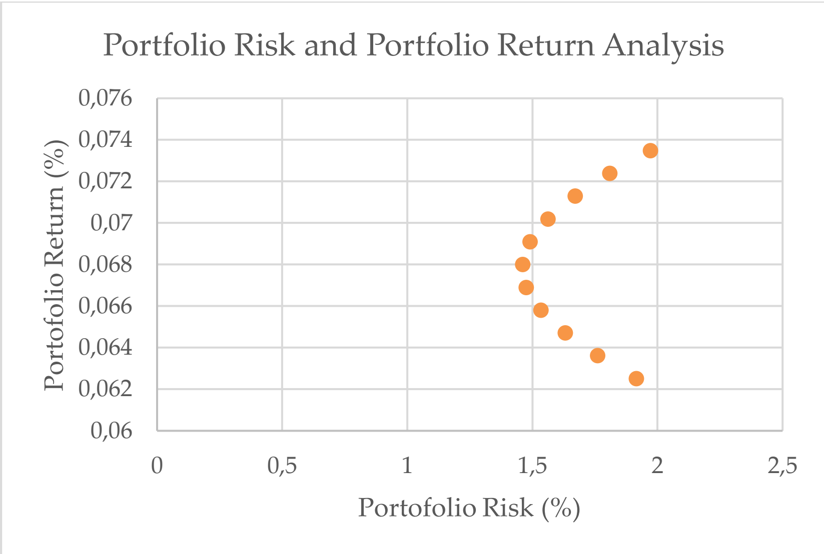

Figure 5. Daily Return PT Industri Jamu Dan Farmasi Sido Muncul Tbk
(Data Processed, 2024)

According to portfolio research, points in the bottom left portion of the curve are more likely to be chosen by conservative investors, who often shun risk. These figures indicate low-risk portfolios, despite the comparatively poor returns. For instance, an ideal portfolio combination for conservative investors involves assigning a greater weight to ICBP stocks, which are assumed to be more stable, with a ratio of approximately 80% ICBP and 20% SIDO. The goal of this strategy is to protect investment capital and maintain return stability, albeit with potentially lower returns.

The midpoint of the curve, however, represents portfolio options for moderate investors looking for a balance between risk and return. In this situation, investors may choose a more balanced stock mix, like 50% SIDO and 50% ICBP. Suitable for investors seeking medium-term asset growth with an acceptable degree of risk control, this portfolio offers a low amount of risk while still yielding respectable returns.

For aggressive investors who prioritize high returns despite higher risk, the best choices lie in the upper right section of the curve. At these points, higher returns can be achieved, albeit with significant risk fluctuations. For example, aggressive investors might choose to assign a greater weight to SIDO stocks, with a portfolio combination of 20% ICBP and 80% SIDO. The primary goal of this strategy is to maximize asset growth with the potential for significant returns, despite the need to endure higher fluctuations in portfolio value.

Thus, this study shows that portfolio allocation strategies should be tailored to individual risk profiles and investment goals. Each profile, whether conservative, moderate, or aggressive, has a different approach in determining the appropriate stock composition to maximize investment returns.

For investment managers, the results of this study provide practical guidance in designing Shariah-compliant portfolios that balance stability and growth potential. ICBP, with its broad product diversification and export market presence, can serve as a defensive core asset, offering consistent performance even during economic volatility. Meanwhile, SIDO, supported by rising post-pandemic demand for herbal and wellness products, can be positioned as a growth-oriented asset within the portfolio. By applying the optimal allocation identified in this study, while adjusting weights according to market conditions and client preferences. Investment managers can create portfolios that not only meet return objectives but also comply with ethical and Islamic finance principles, enhancing both performance and client trust.

Conclusion

Modern Portfolio Theory (MPT) is used in this study to examine the risks, expected returns, and best asset allocation between SIDO and ICBP. The results indicate that ICBP offers more consistency with a return of 6.25% and a risk of 1.92, while SIDO delivers a higher return (7.35%) but has a higher risk (1.97). According to portfolio optimization, moderate investors can benefit from a 50/50 allocation between ICBP and SIDO since it has the lowest risk (1.46), while still yielding a competitive return (6.80%). The benefits of diversification are shown by the two equities' low correlation (0.13), which lowers unsystematic risk due to their comparatively independent price movements. Overall, ICBP and SIDO offer complementary investment opportunities, and the optimal portfolio should be tailored to individual risk tolerance and investment goals.

From a practical perspective, these findings provide clear guidance for both individual investors and investment managers in structuring efficient portfolios that align with varying risk profiles. For investment managers, understanding the diversification benefits between these two stocks can help in designing balanced strategies that optimize returns while managing volatility, especially for Shariah-compliant portfolios. For future research, subsequent studies could expand the sample to include more Shariah-compliant stocks across different sectors, apply alternative portfolio optimization models beyond MPT, or analyze the impact of macroeconomic shocks on portfolio performance. Additionally, a longer observation period could capture different market cycles, offering a more comprehensive view of risk-return dynamics.

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