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Optimizing Pension Fund Investment Portfolio Using Post-modern Portfolio Theory (PMPT) Study Case: An Indonesian Institution

Rifqi Tyaga Wisista and Ana Noveria

ABSTRACT

Categorized as first-level funding by OJK, their asset is greater than its actuarial present value, the funding ratio is greater than 100%, and the Pension Fund of PT XYZ (Dapen XYZ) found that their net asset was not growing as they should. This study employs Post-Modern Portfolio Theory (PMPT) to address the current issue facing the company, with the goal of determining the optimal extant portfolio and optimal stock recommendations from the IDXQ30 Index. The company's portfolio optimization complies with OJK regulations and its investment direction, with the proportion of direct investments and property assets remaining unchanged. The findings showed the historical existing portfolio of Dapen XYZ from 2018 to 2022 has an expected return of 5.27% with a downside risk of 5.00%. Through optimization and substituting the composition of the listed stock with the optimized one, the overall portfolio might yield a 6.80% return with a 3.59% downside risk; this result is still below its target. This optimization suggested emptying the deposits, corporate bonds, and mutual funds and focusing on listed stock instruments. This action will yield an 8.80% return on 1.70% downside risk. In conclusion, the current portfolio of Dapen XYZ is not optimal, and the decision of the fund manager to re-enter the stock market for its portfolio is perfect for the current situation since this instrument might yield higher profit and liquidity if they are willing to change their stock universe to the more profitable one.

Keywords: IDXQ30, pension fund, portfolio optimization, PMPT.

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R. T. Wisista*
Institute Technology of Bandung, Indonesia.
(e-mail: rifqi_tyaga@sbm-itb.ac.id)
A. Noveria
Institute Technology of Bandung, Indonesia.
(e-mail: ana.noveria@sbm-itb.ac.id)

****Corresponding Author***

I. Introduction

Indonesia is facing a demographic challenge with its aging population, which has significant implications for age productivity and the need for a robust pension system. According to data from the (World Bank, 2021), Indonesia's population is aging at a faster rate than any other country in Southeast Asia. By 2040, it is projected that 25% of the population will be over 60 years old. The aging population has significant implications for age productivity, as older workers may experience declining physical and cognitive abilities, leading to reduced productivity (ADB, 2021). Additionally, older workers may face discrimination in the labour market due to their age, limiting their opportunities for employment. To address the needs of the aging population and ensure retirement security, a robust pension system is essential.

A pension fund's primary goal is to offer retirement benefits to individuals by making long-term investments from contributions. It's crucial to manage the portfolio of the pension fund to generate higher returns on investments so that it can offer suitable retirement benefits. The pension fund can create higher returns through portfolio optimization, which can then be used to provide retirees with larger benefits. This can be done by carefully choosing investments, diversifying the portfolio, and reviewing and adjusting investment methods on a regular basis to keep the portfolio in line with the goals and objectives of the fund.

According to OJK (2021), the capital market plays a big role in Indonesia's pension fund. Most pension fund places their funding in the majority in the capital market because of the higher return. A well-prepared strategy is needed to withstand the current capital market situation. The pension fund institution for PT. XYZ Tbk. Dapen XYZ, although it is categorized as a group I institution by OJK based on their funding that is above 100%, their average ROI in the last five years is below their target. Hence, Dapen XYZ should consider optimizing its portfolio to reach its full potential in managing the assets of the pension fund. The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

II. Literature Review

Modern Portfolio Theory (MPT) is a fundamental concept in the field of finance that was first introduced by Harry Markowitz (1952) in his paper titled "Portfolio Selection." By analyzing the risk-return trade-offs of various investment

assets, this theory provides investors with a framework for optimizing their investment portfolios. Diversification, which refers to distributing investments across various assets to reduce risk, is the central concept of MPT.

Numerous studies have been conducted to evaluate the efficacy of MPT in real-world settings. Sharpe *et al.* (1995) discovered that well-diversified portfolios constructed using MPT performed significantly better than weakly diversified portfolios. In addition, the study found that MPT was effective at reducing portfolio risk while maintaining a high rate of return. Even though MPT was not always able to accurately predict the performance of individual assets, Roll (1992) found that it was still a useful instrument for constructing diversified portfolios that performed well over time. The study also found that MPT was beneficial for determining the optimal asset allocation for various types of investors based on their risk aversion and investment objectives.

Post-Modern Portfolio Theory (PMPT) is a framework for portfolio optimization that seeks to overcome some of Modern Portfolio Theory's (MPT) limitations. The term PMPT first appears in the literature with Rom and Ferguson's (1994) new approach theory for asset allocation, which adds a component to the risk/return paradigm. PMPT accounts for the shortcomings of MPT, such as the assumption of normally distributed returns and the reliance on mean-variance optimization and integrates alternative risk measures and a more nuanced understanding of market dynamics.

In some research, namely (Rom & Ferguson, 2001) as a software developer, the authors conclude that using PMPT-based performance measures and simulation techniques can assist investors and portfolio managers in making better-informed investment decisions and achieving higher risk-adjusted returns. In addition, they note that the development of software tools that incorporate PMPT-based optimization and performance measurement can help democratize access to advanced portfolio management techniques and boost the overall efficiency of financial markets. Emilia Rocha (2016) did this in her research. This paper illustrates the prospective advantages of applying PMPT to security selection on the European stock market. PMPT can result in higher risk-adjusted returns and enhanced portfolio diversification by incorporating non-normal return distributions and alternative risk measures.

III. Research Methodology

A. Expected Return

As demonstrated by (Fabozzi *et al.*, 2002), one method for calculating the expected return of a portfolio's assets is to use the asset's historical data; however, the time horizon of the data can be a drawback of this method. However, due to time constraints and a lack of data, the most practical method to construct an optimal portfolio is to generate the expected return of PT. XYZ pension fund using its historical data. This is also true for other inputs, such as volatility and correlation estimates.

The calculation of return in Dapen XYZ complies with its internal investment direction, which alludes to Financial Services Authority Regulation No. 5/2016, which mandates the calculation of return on investment using the following formula:

$$ROI = \frac{Total\ of\ Investment\ Return}{Average\ of\ investment} \tag{1}$$

The total investment return is obtained by subtracting investment expenses from the investment result, and the average investment return is calculated using the geometric monthly average return of investment from the following formula:

$$G = \sqrt{X_1 X\, X_2 X \ldots X_n} \tag{2}$$

where:
G: Average geometric,
X: Monthly investment value,
n: Number of months.

B. Downside Risk

Downside risk is measured by the target semi-deviation (the square root of the target semi-variance) and is referred to as the adverse deviation. As it is expressed in percentages, it permits classification in the same manner as standard deviation.

The annualized standard deviation of returns below the target is a common method to evaluate downside risk. The square root of the probability-weighted squared below-target returns is another metric. The square of below-target returns has the effect of exponentially penalizing failures. This is consistent with observations on the decision-making behavior of individuals under uncertainty that can be defined as:

$$\sqrt{\int_{-\infty}^{t} (t-r)^2 f(r) dr} \tag{3}$$

where:
T: Annual target return,
R: The random variable representing the return for the distribution of annual returns f(r),
f(r): Normal or three-parameter lognormal distribution.

In this research, the author uses the continuous formula because the continuous form permits all calculations to be performed with annual returns, which is the most natural method for investors to specify their investment objectives, whereas the discrete form requires monthly returns to have sufficient data points for a meaningful calculation. Examining only the discrete monthly values does not reveal the full picture. Instead, these values must be utilized to determine the distribution of all possible values. This distribution allows us to calculate the assumed risk (Sortino & Satchell, 2001).

C. Volatility Skewness

Volatility skewness is the ratio of a distribution's upside variance to its downside variance, measured relative to the distribution's mean. The skewness of a symmetrical distribution is 1.00. Negative skewness is indicated by values less than 1.00, and positive skewness by values larger than 1.00. There appears to be no correlation between skewness and the broader market environment. One might expect bull markets to generate positive skewness and bear markets to generate negative skewness.

In PMPT, skewness volatility is used as a risk metric to construct portfolios that are better equipped to deal with asymmetric risk. Through the incorporation of skewness volatility, PMPT can construct portfolios with enhanced downside protection and greater upside potential. This results in increased risk-adjusted returns and a more efficient allocation of assets.

Multiple studies have demonstrated the benefits of incorporating skewness volatility into portfolio optimization. In terms of risk-adjusted returns, for instance, (Choueifaty & Coignard, 2008) discovered that a PMPT-based portfolio with skewness volatility outperformed traditional mean-variance optimized portfolios.

D. Portfolio Optimization

The Sortino ratio is a risk-adjusted performance measure utilized in Post-Modern Portfolio Theory (PMPT) to assess the risk-return trade-off of a portfolio. The Sortino ratio, in contrast to traditional measures such as the Sharpe ratio, which considers total volatility, only considers downside volatility or the volatility of negative returns.

The Sortino ratio is incorporated by PMPT as an essential measure of risk-adjusted performance because it focuses on the downside risk of the portfolio, which is crucial for risk-averse investors. The Sortino ratio is used in PMPT to identify portfolios that provide higher returns for a given level of downside risk, which can be accomplished by selecting assets with a low downside deviation.

To determine the Sortino ratio, divide the average excess return of the portfolio over the risk-free rate by its adverse deviation. The downside deviation is computed by considering only those returns that fall below a predetermined threshold, typically the acceptable minimum return or the target return. It is defined as:

$$\frac{r - t}{d} \tag{4}$$

where:
r: Annualized rate of return,
t: Target return,
d: Downside risk.

After determining the optimal capital allocation based on the Sortino optimal model, the investor must also determine the lowest risk given any expected rate of return. This can be graphed to the minimum-variance frontier, which includes the Global Minimum Variance (GMV) and the efficient frontier. Due to minimal variance (horizontal axis) and expected return (vertical axis), the graph displays a horizontal U-shaped curve. By minimizing risk without regard to expected return, GMV is determined.

The upper side of the GMV will be the efficient frontier or viable options for the investor to take into account its expected return, in contrast to the lower side of the GMV, which is referred to as an inefficient portfolio due to other options with a higher anticipated return at the same risk level. The ideal portfolio model for the investor will be the tangency of the optimal slope of CAL to the efficient frontier, which implies the optimal allocation of a portfolio that yields the optimal return with the least amount of risk.

E. Stock Selection

Stock selection in this research using the universe of the IDXQ30 index, which consists of 30 stocks that historically have relatively high profitability, good solvency, and stable profit growth with high trading liquidity and good financial performance (Indonesia Stock Exchange, 2023) [13]. The selection of the stocks within this index was determined by their performance, which was measured by this formula:

$$Index = \frac{\sum_{k=1}^{n} MC_i . FF_i . QS_i}{BMC} \text{ x } 100 \tag{5}$$

where:
MC: Market Capitalization,
FF: Free Float Ratio,
QS: Quality Score,
BMC: Base Market Capitalization,
n: Number of Constituent.

F. Portfolio Evaluation

Portfolio evaluation is conducted by comparing the optimal stock portfolio from scenarios available based on Dapen XYZ's current condition. The first scenario is the optimal of the existing portfolio of Dapen XYZ in 2022 with no stock instrument since they already sold all of the stock, while the second scenario is the optimal portfolio of Dapen XYZ with optimized stock instrument in their previous stock portfolio, and third is author's proposed optimized stock portfolio compared to the year 2021 as the last year they have stock instrument in their portfolio. In order to evaluate the listed stock portfolio, some ratios are used in this research, namely Jensen Alpha, Beta, Treynor ratio, Information ratio, and M2. The Sortino ratio is used to compare those scenarios when the new stock portfolio is inputted into the investment portfolio, and the highest Sortino ratio, among other scenarios, will be the solution for the business issue.

Jensen's alpha is a risk-adjusted measure that evaluates the excess return of a portfolio compared to its expected return based on its level of systematic risk (beta) (Bodie *et al.*, 2020). It measures the portfolio manager's ability to outperform or underperform the market return. Positive alpha values indicate outperformance, whereas negative alpha values indicate underperformance. This can be obtained by the formula:

$$\alpha = R_i - R_f + \beta_x (R_m - R_f) \tag{6}$$

where:
R_i: Realized return of the portfolio,
R_m: Realized return of appropriate market indexes,
R_f: Risk-free rate,
β_x: Beta of the portfolio of investment with respect to the chosen market index.

Beta assesses the sensitivity of an investment portfolio's returns to market fluctuations. It quantifies the systematic risk or market exposure of the portfolio. A beta of 1 indicates that the portfolio's returns track the market, whereas a beta greater than 1 indicates greater volatility, and a beta less than 1 indicates lower volatility than the market.

Modigliani risk-adjusted performance, also referred to as the Modigliani-Modigliani measure (M2), is a risk-adjusted performance measure that evaluates the risk-adjusted return of an investment portfolio. It takes the portfolio's return and volatility into consideration to provide a measure of risk-adjusted performance. The Modigliani risk-adjusted performance measure compares the portfolio's return to the return of a benchmark index while considering the portfolio's risk profile. It endeavors to determine if the portfolio has generated greater returns relative to its risk level than the benchmark (Elton *et al.*, 2014). The M^2 formula can be defined as follows:

$$M^2 = S\ x\ \sigma B + R_f \tag{7}$$

where:
S: Sharpe ratio,
σB: Standard deviation of the excess returns for some benchmark portfolio against which you are comparing the portfolio in question (often, the benchmark portfolio is the market),
R_f: Average risk-free rate for the period in question.

The Treynor ratio, also known as the reward-to-volatility ratio, is a performance metric that measures how much excess return a portfolio generated for each unit of risk it assumed. In this context, excess return refers to the return gained in addition to the return that could have been earned on a risk-free investment. The formula of the Treynoy Ratio can be defined as:

$$Treynoy\ Ratio = \frac{r_p - r_f}{\beta_p} \tag{8}$$

where:
r_p: Portfolio return,
r_f: Risk-free rate,
β_p: Beta of the portfolio.

The information ratio (IR) measures the excess returns of a portfolio over a benchmark, typically an index, relative to the volatility of those excess returns. Typically, the benchmark is an index that represents the market or a specific sector or industry. The information ratio can be defined as:

$$IR = \frac{Ri - Rm}{Tracking\ error} \tag{9}$$

where:
Ri: Return of the investment,
Rm: Return of the market as a benchmark.
Tracking error: Standard deviation of the difference between portfolio and benchmark return.

IV. Results and Discussion

A. Risk and Return

Overall, from the assets in the existing portfolio, Dapen XYZ's listed stock investment had the second-lowest expected return. As we can see, in 2022, the return is up to 12.16%, but this is only until June. At the end of 2022, the company decided to cut the contract with the external fund manager and ended up selling all of its stock portfolio, which can be categorized as an anomaly. If we exclude this year, the listed stock average return is only -0.61%. It happened due to the negative return that appeared in 2019 and 2020. As we remember, those years were the year when COVID-19 started to spread. Investment in mutual funds has shown the worst performance by negative return on straight for the last five years, starting from 2018 until 2021, compared to the other instruments. Land and buildings that have the most allocation of investment by Dapen XYZ are far below the 8% target for these instruments. The company is facing difficulty selling the land; hence, its assets are less in liquidity. The historical return of Dapen XYZ is shown in Fig. 1.

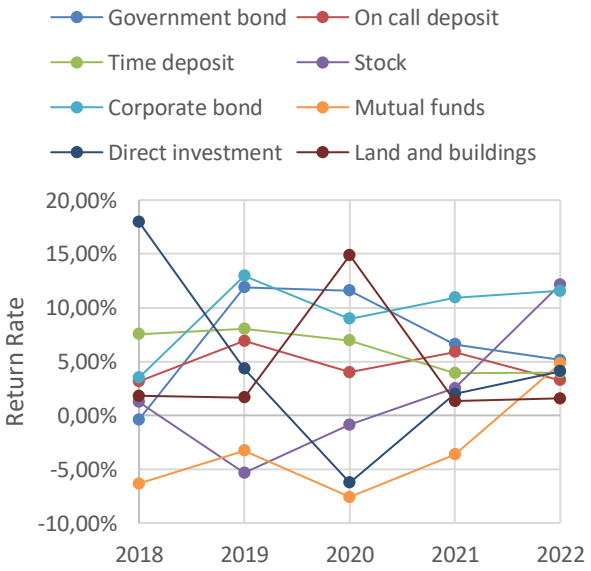

Fig. 1. Historical return of Dapen XYZ.

The highest risk based on the standard deviation is obtained by the direct investment of Dapen XYZ with 8.71%, but the result is different from the downside risk. In terms of downside risk, direct investment's risk is only 6.57%, almost the same as land and buildings, making it not as risky as shown by the standard deviation calculation. On the other hand, mutual funds and stocks showed a

significant number of downside risks, with 16.06% and 11.02%, respectively. This is because Dapen XYZ's mutual funds and stock instruments have generated a significant number of negative returns over the past five years; it is regarded as a greater risk relative to the target of each instrument.

Dapen XYZ's portfolio entailed a 5% risk with an average return of 5.27 %, as shown in Table I, equating to a return per risk of 1.05 for the portfolio. Time deposits yield the highest average return per risk that had been taken, with 5.5 times almost the same with corporate bonds with only a 0.1 difference in value, while both mutual funds and stocks yield the lowest yields, at -0.2 and 0.05, respectively. According to this analysis, it is more beneficial for the company to invest in time deposits than in the market.

TABLE I: DAPEN XYZ INVESTMENT RISK

Investment Instrument	Avg.	Risk	Downside Risk
Government bond	6.97%	5.08%	3.81%
On call deposit	4.65%	1.67%	1.78%
Time deposit	6.09%	1.99%	1.10%
Stock	1.94%	6.45%	11.02%
Corporate bond	9.59%	3.69%	1.75%
Mutual funds	-3.20%	4.83%	16.06%
Direct investment	4.43%	8.71%	6.57%
Land and buildings	4.25%	5.94%	6.41%
Total	5.27%	3.27%	5.00%

B. Existing Listed Stock Optimization

Solver tools in Microsoft Excel were used to optimize the company's existing portfolio with the objective of maximizing the slope of the Capital Allocation Line (CAL) and minimizing the downside volatility of the portfolio, resulting in a tangency between the efficient frontier line and the optimal CAL.

The efficient frontier that was generated from the optimization of Dapen XYZ's portfolio in Fig. 2 demonstrated that the portfolio that Dapen XYZ is currently holding is not the most viable one. Global minimum variance from the efficient frontier has a return of -2.0% with a risk of 7%. The existing portfolio of the company has a return of 7.5% with a risk of 0.19, while the optimal portfolio has a return of 41% with a risk of 0.22. Nevertheless, assuming the company has a moderate risk profile and a propensity to minimize the risk of its current portfolio, the company has the potential for a higher return of 32.4% with a risk of 0.17 if it follows the combination in the efficient frontier.

The objective of Dapen XYZ is to increase its return to around 10% per annum so that the company can boost its financial performance. It is enough for the company to choose the composition that yields 15.2% per annum with a risk of 0.10, but in terms of risk based on the existing portfolio, Dapen XYZ could bear 18% risk due to this reason, it is acceptable to choose the composition that yields 23.8% return with the consequences of 0.14 risk since this composition will have more return and have slightly lower risk than it already existed, however, as there is no restriction on the stock universe, the company can benefit more by altering the listed stock.

C. Alternative Listed Stock Optimization

The original universe of LQ45 that the company usually uses is IDX80; hence, it is acceptable for the company to use another index that has the same origin universe as LQ45. In this research, the author used the IDXQ30 Index, which has the same origin universe as LQ45, to optimize the stock portfolio of Dapen XYZ. The idea of using the IDXQ30 index as the new universe for the stock portfolio is based on the need of the company to increase the return of the portfolio. While the LQ45 index measured stocks that have relatively large market capitalization, high liquidity, and good fundamentals, the IDXQ30, on the other hand, measured stocks with relatively high profitability, good solvency, and stable profit growth with high trading liquidity, and good financial performance that are more in line with the company's objectives.

The efficient frontier of the IDXQ30 index that is shown in Fig. 3 indicates all the possible portfolio returns with the minimum risk. The optimal portfolio—the one that intersects with the CAL line—has a return of 25.18% with a risk of 8%, while the GMV of IDXQ30 has a return of 13.91% with a risk of 6.5%. Both returns and risks provided by the efficient frontier differ significantly from Dapen

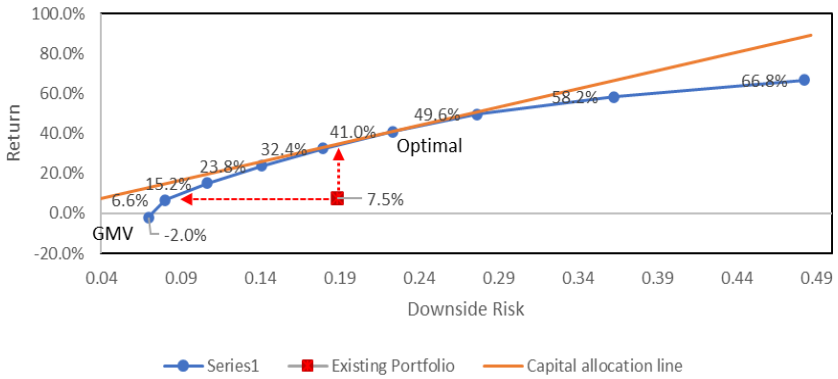

Fig. 2. Efficient frontier of existing listed stock optimization Dapen XYZ.

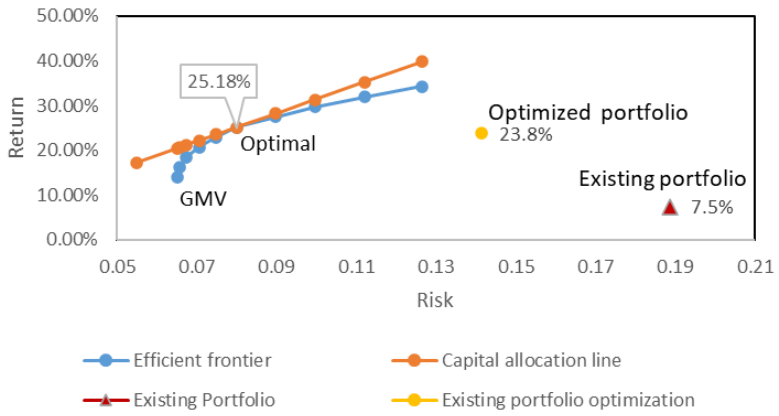

Fig. 3. Efficient frontier of IDXQ30 as the alternative.

XYZ's current stock portfolio, which had a return of 7.5% and a risk of 18.8%. While the previous optimization of the existing portfolio only yielded a 23.8% return with 14% risk, which passed the target with acceptable risk, the optimization of the IDXQ30 index will be a recommendation for Dapen XYZ if the fund manager would like to change their stock universe and take a greater return with a lower risk.

D. Listed Stock Portfolio Evaluation

Listed stock portfolio evaluation is conducted by using additional indicators that are commonly used in analyzing investment portfolios to ensure the optimal portfolio scenario described in the previous subsection. The evaluation is done by comparing three portfolios available in this case: the existing portfolio, the optimized existing portfolio, and the optimized IDXQ30. The average rate of Indonesia's 10-year government bond is used as the risk-free rate to calculate the risk premium from the investment. The regression is used as a method to figure out alpha and beta for further calculation, comparing each portfolio to the JKSE return as the benchmark. The regression results from all three portfolios resulted in a P-value of below 0.05, which means the coefficient is statistically significant.

While the return and risk are already discussed in the previous subsection, which suggested Dapen XYZ consider changing their universe with Optimized IDXQ30, the other indicators show similar tendencies. As shown in Table II, all indicators show the optimized IDXQ30 portfolio is superior compared to the others except for Jensen's Alpha and R-squared values that resulted from the regression. The R squared measured how strong the correlation between the portfolio and the benchmark, in this case, JKSE. Since the existing portfolio consists of 26 stocks from LQ45 while LQ45 is the index that consists of companies that have large market cap and liquidity, it makes sense the existing portfolio that has more diversified stocks will correlate more to the benchmark portfolio, which means higher R squared value. Jensen's Alpha, on the other hand, uses the arithmetic average calculation, not the geometric average, which does not consider the compounding that occurs from period to period. This is also the reason why the average return of the optimized existing portfolio seems bigger than IDXQ30, while, in fact, the geometric average calculation used in this research shows the opposite, as already shown in the previous subsection.

TABLE II: LISTED STOCK PORTFOLIO PERFORMANCE COMPARISON

Indicators	Existing Portfolio	Optimized Existing	Optimized IDXQ30
Average return	0.1695	0.3622	0.2863
Std. Deviation	0.0772	0.0846	0.0486
Downside volatility	0.1888	0.1414	0.0801
Sharpe Ratio	1.2855	3.4497	4.4488
Sortino Ratio	0.3911	1.8854	2.3817
Beta	1.7617	1.1023	0.7344
Treynor	0.0563	0.2648	0.2941
Jensen's alpha	0.0118	0.0265	0.0195
IR	0.3944	0.3664	0.5026
R Square	0.8531	0.2787	0.3748
M2	0.0758	0.1633	0.2037

E. Portfolio Evaluation

Switching Dapen XYZ's stock portfolio with the Optimized IDXQ30 portfolio gave an average return of 6.80% with a risk of 3.59% as shown in Table III. This alternative is closer to the target of Dapen XYZ. Although this portfolio, as shown in Table IV. 14 is better in terms of return and risk. This portfolio is still below the target of the company, and due to this reason, the change in weight of the portfolio will be the solution for the company.

TABLE III: HISTORICAL RISK AND RETURN MODEL WITH ALTERNATIVE PORTFOLIO

Portfolio	Portfolio Return (%)					Avg (%)	Risk
	2018	2019	2020	2021	2022		
Modified portfolio	3.57	7.45	12.15	6.09	4.75	6.80	3.59
Current portfolio	1.75	5.56	10.58	4.05	4.42	5.27	5.00

The optimization of the company's existing portfolio was conducted by Solver tools in Microsoft Excel using the same principle as the optimization of listed stocks, which considered downside volatility as the risk with a target of 8.75 per annum, as the company needed. This optimization consists of two assumptions: the first (OMP1) is in accordance with this research scope and limitation that focuses only on financial assets without changing the composition of direct investment and property as the constraint, while the second assumption (OMP2) is optimization based on the portfolio regulation by OJK only. In this situation, the author assumes that the company can meet the OJK's regulation, especially in property, since it was already discussed in the previous discussion that the company exceeds 28.44% for the land and buildings instrument.

As shown in Table IV, in OMP1, all financial assets turned into zero and focused on the listed stock instrument with the composition of 14.9% since the optimization in the previous subsection led to a significant increase in listed stock return this composition yield of 8.8% annual return with 1.7% downside volatility. Until this point, this portfolio is already meeting its target. Furthermore, if the company manages to sell its property at least as the same as the regulation, OMP2 shows a more promising return with 12.11% with a downside risk of 0 and a standard deviation of risk of 2.19%. This happened because the calculation of downside risk is based on the volatility below the target only, which means, in this case, there are no annual returns below the target from 2018–2022; hence, the standard deviation volatility can be considered as risk.

TABLE IV: PERFORMANCE COMPARISON DAPEN XYZ ALTERNATIVE MODIFIED PORTFOLIO

Indicators	Modified Portfolio	OMP1	OMP2
Return, annual	6.8%	8.8%	12.11%
Volatility	3.3%	3.5%	2.19%
Downside Volatility	3.6%	1.7%	0.0%
Government bond	33.8%	30.0%	30.0%
On call deposit	0.4%	0.0%	0.0%
Time deposit	2.8%	0.0%	0.0%
Stock	0.0%	14.9%	23.4%
Corporate bond	4.0%	0.0%	20.5%
Mutual funds	3.9%	0.0%	0.0%
Direct investment	6.6%	6.6%	6.0%
Land and buildings	48.4%	48.4%	20.0%

V. CONCLUSION

With this current portfolio, Dapen XYZ can meet its actuarial liabilities; however, the average five-year return of the company's portfolio was lower than 8.75% as their expected return. The stock portfolio of Dapen XYZ became the asset with the second lowest return after the mutual fund investments, and by the end of 2022, Dapen XYZ did not have a stock portfolio; thus, re-entering the stock market became a priority. Comparing the result of stock optimization between the current stock universe and the IDXQ30 portfolio as the author suggests that the company can obtain a higher return at a lower risk by utilizing the IDXQ30 Optimized portfolio. This portfolio optimization will yield 25.18% at risk 8%. This optimization expects 10% per annum as a target, causing the elimination of some stocks from thirty to nine companies.

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Rifqi Tyaga Wisista is a graduate of Padjadjaran University, majoring in Geological Engineering with a 3.46 GPA. He has extensive knowledge in structural geology, hydrogeology, GIS applications, exploration and mining, energy, and HSE. He is experienced in geological mapping and has developed other skills by opening his own business and being responsible as head of marketing. Currently, he is undertaking his master's degree in business administration at the School of Business and Management ITB and has an interest in decision-making, strategic negotiation, and finance, especially in capital markets.