



Performance Analysis of Stock Portfolios Incorporated in IDX30 Using the Sharpe, Treynor and Jensen Method in 2016-2020

Selvyna Ougesia Claransia¹, Totok Sugiharto²

Fakultas Ekonomi Univeristas Pelita Harapan

ARTICLE INFO

Keywords:

Sharpe Index, Treynor, Jensen, Optimal Portfolio Performance, Kruskal Wallis

ABSTRACT

This study aims to determine whether or not there is a difference between the Sharpe, Treynor, and Jensen methods in measuring the optimal IDX30 portfolio. This study uses the One Way of Variance by Rank Kruskal Wallis test. In this study, the values of Sharpe, Treynor, and Jensen were standardized through the Zscore transformation (standardized) followed by the Mean Rank difference test between treatments to determine which index performance was the most consistent. The test results using the Kruskal Wallis test obtained $\chi^2 = 0.850$, with a probability of 0.654. It is known that the test probability 0.05. These results indicate that there is no significant difference between the tests using the Sharpe, Treynor, and Jensen methods. Thus, the null hypothesis H_0 in this study is accepted. The results of the test between the three treatments, the difference between the three mean ranks, showed that there was no significant difference between each treatment because the difference was not that far away. The Treynor method has the lowest mean rank difference between Sharpe and Jensen, meaning that Treynor is the most consistent with non-difference.

E-mail:

Dr.totok.sugiharto@gmail.com
Selvyna.ougesia@gmail.com

Copyright © 2021 Enrichment : Journal of Management.
All rights reserved.

1. Introduction

The development of investment in Indonesia is experiencing a positive upward trend which can be seen through the increase in the number of investors and also the value of asset capitalization. Based on data from the website www.ksei.co.id, the number of Single Investor Identification (SID) from 2018 to 2021 continues to increase. The increase in SID from 2018 to 2019 is 53.41%, the increase in SID from 2019 to 2020 is 56.21% and the increase from 2020 to the February 2021 period is 16.35%. The total investors in the capital market recorded based on KSEI data until the end of February 2021 are 4,515,013 investors. With the increasing trend of investment in society, this can encourage Indonesia's economic growth. One of the contributors to economic growth in Indonesia is public investment in the capital market. Positive growth in the capital market is indicated by an increase in the value of share capitalization. The capital market is a place to collect investor funds for companies that need funds that can be used, among others, for company expansion, increasing output and productivity, creating job opportunities. Increasing community income in a country can encourage economic growth, one of which is investment. In making investment decisions, investors need to be sensitive to economic conditions and quickly respond to information and issues that are circulating at that time.

Investment in stocks is very attractive because it produces high returns as well as high risk. Shares are a sign of someone's ownership of a company. The returns that investors get from stock investments are capital gains and dividends, while the risks they face are capital loss. Stock prices are classified as very sensitive which is influenced by the performance of the company itself, also influenced by factors outside the company's control such as economic, political, monetary changes. In investing in stocks, investors can use several references found on the Indonesia Stock Exchange such as the IDX30 index, LQ45 index, Kompas 100 index, IDX Growth30, IDX High Dividend 20, IDR Sri Kehati and others. JCI is a combination of all shares listed and actively traded on the Indonesia Stock Exchange. www.idx.co.id March 2021 shows there are currently 720 shares traded. This study will use issuers listed on IDX30 as the research sample.

Husnan (2005) said that in investing, investors cannot only focus on returns because high returns are not necessarily able to cover the existing risks so that returns need to be adjusted to risk or known as risk-adjusted returns. Return and risk have a positive correlation, which means that the greater the return, the greater the risk. Both can be said as a trade off (exchange), meaning that the return generated by the portfolio must be able to cover the existing risks. Return is the return on investment and is the main motivation for investors to invest.

Zubir (2011) says that to minimize risk, investors can form a portfolio. Portfolio is a combination of several investment instruments such as stocks, bonds, and deposits. In forming a stock portfolio, investors can diversify into stocks of different types. The process of forming a portfolio is not an easy task because investors need to analyze certain indexes in selecting stocks. Mistakes in choosing stocks can result in a less than optimal return, but the risk is large. The purpose of forming a portfolio is not to eliminate risk, but to reduce the risk that arises so that when an asset experiences a loss, it can be covered by profits from other assets. In determining the portfolio, investors are expected to have extensive information and try to collect as much information as possible. The knowledge possessed by investors will affect different behavior in making investment decisions or this term is known as behavioral finance.

According to Hartono (2010: 285), the main problem faced by investors when investing is the many possible portfolios formed from a combination of assets so that it is difficult to determine which portfolio should be chosen. Investors who lack information and knowledge will find it difficult to determine their portfolio plus fluctuating market and economic conditions.



Enrichment: Journal of Management

journal homepage: www.enrichment.iocspublisher.org



Portfolios need to be evaluated regularly to assess whether performance is optimal and in line with investor expectations. Various market changes that often occur make portfolio performance change and even instability. If the results of the portfolio performance evaluation do not match expectations, investors can change the combination of assets. The results of portfolio performance in the past can be used as material for consideration and decision making in compiling portfolio combinations.

In an effort to form an optimal portfolio, investors can measure the performance of their investment portfolio by calculating the level of return and risk. Samsul (2006), there are 3 methods in measuring investment portfolio performance, namely the Sharpe, Treynor, and Jensen methods. The difference between the three methods, among others, is the Sharpe method of measuring portfolio performance by emphasizing the standard deviation, which is systematic risk and non-systematic risk. The Treynor method emphasizes beta as a systematic risk. The Treynor method relies on portfolio beta, which is the sensitivity of portfolio returns to movements in the market to assess risk. The Treynor method tries to measure how successful an investment is in compensating investors for taking investment risks. It is different with Jensen's method which uses Alpha which is based on the Capital Asset Pricing Model (CAPM), measuring additional returns as excess returns above the securities market line in the capital asset pricing model. Alpha represents the amount by which the average return of the portfolio deviates from the expected return given by the CAPM.

By looking at the characteristics and differences in performance standards that differ from the three methods of measuring investment risk and return, this study wants to test whether there are significant differences in measuring stock performance on IDX30 using the three methods and testing the consistency of the three methods so as to provide an overview. which stocks have the best performance.

2. Theory Study and Literature Review

2.1 Investment

Tandelilin (2010), investment is an action to allocate excess money held in an asset with the aim of obtaining a number of benefits in the future. For their willingness to take risks and sacrifice time, investors will benefit in the form of rising stock prices and dividends in the future.

2.2 Share

Tandelilin (2010:18) shares are a sign of ownership in the form of a piece of paper as a sign that a person has the right to equity participation in a Limited Company (PT). Stocks are a form of financial instrument with a high risk category but with a high return. It can be said to be high risk because prices are very volatile so investors must be prepared with big risks. When the company earns a profit, the investor has the right to obtain the distribution of the profit in accordance with the size of the shareholding. The distribution of profits is known as dividends. However, the distribution of dividends is not an obligation that must be carried out, but depends on the conditions and the company's future plans.

2.3 Return, Risk and Portfolio

Tandelilin (2010) return is the reward obtained because investors are willing to bear the investment risk. Capital gain is an increase in the current stock price compared to the price when buying the stock. Dividends will be distributed when the company earns a profit. Jogiyanto (2013) divides risk into 2 types, namely diversified risk and undiversified risk. Diversified risk is a non-systematic risk that can be minimized by carrying out a portfolio of assets in different types of stocks. Undiversified risk is a systematic risk that arises from the market because it is influenced by macro conditions such as interest rates, taxation, exchange rates, international policies, and commodity prices. Systematic risk is measured by beta (β). Robert Ang (1997), portfolio is a combination of investment assets to meet investment objectives.

2.4 Modern Portfolio Theory

Markowitz explains how to select and shape an investment portfolio by maximizing the expected return on the portfolio and minimizing investment risk at the same time. Risk in stock investment can be minimized by forming a diversified portfolio (Jogiyanto; 2017). Portfolio diversification can be done by identifying and calculating the selected stocks. Investors need to periodically evaluate their portfolios. Portfolio diversification is choosing different stocks to spread the risk into each of these stocks. If investors only own one type of stock, then the risk will be concentrated on one stock only. If one stock turns out to be detrimental, investors' funds will decrease.

2.5 Capital Asset Pricing Model

Jogiyanto (2017) CAPM illustrates the relationship between the required rate of return of a security and the level of market systematic risk. The systematic risk is denoted by Beta (β). The emphasis on the CAPM is that systematic risk cannot be eliminated even by diversification because it is an inherent risk of the market which is reflected in changes in interest rates, inflation and so on. The higher the beta, the higher the risk and volatility of a stock, therefore investors also expect higher returns. Jogiyanto (2017) said that Beta = 1 means that the risk of the stock portfolio is the same as the market risk. Beta > 1 means that the risk of the stock portfolio is greater than the risk in the market, as a result, investors expect higher returns. Vice versa Beta <

2.6 Efficient Portfolio and Optimal Portfolio

By carefully selecting the proportions of the various assets, an efficient portfolio can be built. The concept of an efficient portfolio is that investors choose the smallest risk on investments that offer the same rate of return and choose the highest return with the lowest possible risk, if there are two securities with the same return but different risks, then choose the lowest risk. Tandelilin (2001) states that the optimal portfolio is a collection of investments placed in an efficient portfolio. The key to building a portfolio that provides the highest return at the lowest level of risk is determining the proportion or weight of the various assets in the portfolio.



2.7 Portfolio Performance Evaluation Assessment

Tandellin (2010) argues that periodically portfolio investors need to evaluate their portfolios to find out whether the returns obtained are in line with expectations and cover the risks borne by investors. This study uses the method of Sharpe, Treynor and Jensen in measuring portfolio performance.

The Sharpe method measures total risk with a standard deviation. The standard deviation is reflected by the difference between the average of a stock and the average of the entire stock. The smaller the value of the standard deviation, the better because the total risk of the portfolio is getting smaller and resulting in a larger Sharpe value. The data used in calculating the Sharpe ratio are the average portfolio return, standard deviation and Bank Indonesia interest rates. The larger the standard deviation indicates that the higher the return deviation, which means that the stock portfolio has high volatility. The higher the Sharpe calculation result, the better the portfolio performance. Here is the formula for calculating the Sharpe ratio:

$$S_p = \frac{\bar{R}_i - \bar{R}_f}{\sigma_p}$$

S_p : Sharpe Indeks Index
 R_i : Average *return* portfolio i
 R_f : Average level *return* risk free assets
 σ_p : Portfolio standard deviation

The Treynor method emphasizes beta as a risk measure. Beta is the systematic risk of the market and measures the sensitivity of the portfolio to market movements. Beta reflected through market fluctuations. The smaller the beta value, which is <1, the better because the market does not fluctuate too much, if beta>1 means that market conditions are fluctuating. Since the Treynor ratio is based on historical data, it is important to note that it does not necessarily indicate future performance, and one ratio should not be the only factor to rely on for investment decisions. If the portfolio has a negative beta, the ratio results are meaningless. A higher yield ratio is more desirable because it is considered a more profitable portfolio. Here is the formula for calculating Treynor's method:

$$T_p = \frac{\bar{R}_i - \bar{R}_f}{\beta_p}$$

t_p : Treynor index
 R_i : Average portfolio return i
 R_f : Average level *return* risk free assets
 β_p : Beta portfolio

Jensen's method emphasizes the alpha. Jensen's method is based on the CAPM, which is to calculate the difference between the average return and the minimum rate of return which will produce alpha. This method is the same as Treynor in that it will give a good assessment when the portfolio is well diversified. A higher alpha indicates that the portfolio's performance has exceeded the returns predicted by the market. Here is the formula for calculating Jensen's method:

$$\alpha_p = \bar{R}_p - [\bar{R}_f + \beta_p (\bar{R}_m - \bar{R}_f)]$$

α_p : Jensen Index
 R_p : Average *return* portfolio
 R_f : Average level *return* risk free assets
 r_m : Average *return* market
 B_p : Beta portfolio

2.8 Theoretical Framework

This study wants to test whether there are significant differences in portfolio performance between stocks on the IDX30 index evaluated using the Sharpe, Treynor and Jensen methods. The data used include stock closing prices, Bank Indonesia interest rates as a reference for risk-free asset returns, and the price of the Jakarta Composite Index (JCI). There are 2 tests carried out, namely the Kruskal Wallis test to test whether there is a difference in the results of the calculations with the three methods, then in the final stage of the treatment test between the mean ranks to determine the most consistent method.

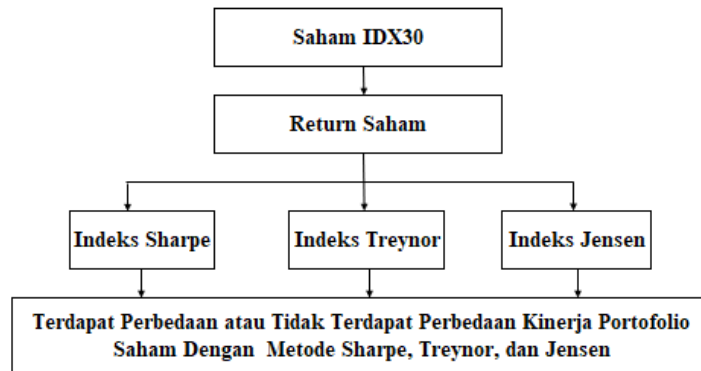


Fig 1. Research Framework

The hypotheses proposed in the following research are as follows:

HO : There is no significant difference in portfolio performance between IDX30 stocks evaluated using the Sharpe, Treynor, and Jensen methods.

H1: There are significant differences in stock portfolio performance between IDX30 stocks evaluated using the Sharpe, Treynor, and Jensen methods.

3. Research methods

The approach used is a quantitative approach, which is to analyze the performance of a portfolio consisting of IDX 30 shares using a different test. The closing share price on the IDX30 index is obtained through the website www.yahoofinance.com; Bank Indonesia interest rate website www.bps.go.id. The data collected will be processed using SPSS software version 27 and also using Microsoft Excel.

The population in this study were all companies listed on the IDX30 index on the Indonesia Stock Exchange in the period January 2016 – December 2020. The sampling method used was purposive sampling. The sample criteria in this study are stocks that are consistent on the IDX 30 index for 5 consecutive years in the 2016-2020 period and do not do stock splits. The author performs data processing through Microsoft Excel on 300 company populations. Based on the above criteria, the following 12 companies were selected: ADRO, ASII, BBKA, BBNI, GGRM, INDF, INTP, KLBF, PGAS, SMGR, TLKM, UNTR.

The data will be processed using Z-score transformation because the three methods of Sharpe, Treynor and Jensen have different characters. The results of the z-score must show a mean value of zero and a standard deviation of 1. After the data is transformed into a Z-Score, the next step is to perform the Kruskal Wallis test. Sulistyorini (2009) the benchmark for decision making based on the Kruskal Wallis test is a significance value of 0.05 meaning that there is no significant difference in portfolio performance and a significance value of 0.05 meaning that there is a significant difference in portfolio performance. The basis for the next decision is that the value of χ^2 must be greater than the Chi-Square table (Table T). The results of the Kruskal Wallis test will show whether or not there is a significant difference between the tests using the Sharpe, Treynor and Jensen methods. The next stage is the test between treatments. This test is to see the consistency and indifference of the three methods by looking at the smallest difference.

4. Results and Discussion

4.1 Stock Portfolio Performance Analysis with Sharpe . Method

The Sharpe method measures portfolio performance by emphasizing total risk through standard deviation. Based on calculations using the Sharpe method, the issuer with the highest performance result was ADRO in 2016 with a value of 0.9986 while the issuer with the lowest performance result was INTP in 2016 with a value of -0.5964. The higher the Sharpe Ratio results indicate the better Portfolio performance and the smaller average deviation from the overall average. A positive Sharpe ratio indicates that the return generated by the issuer is greater than the total risk.

4.2 Stock Portfolio Performance Analysis with Treynor Method

Based on calculations using the Treynor method, the issuer with the highest performance result is UNTR in 2017 of 0.0570 while the issuer with the lowest performance result is PGAS in 2017 of -0.0416. The higher Treynor Ratio results indicate the better Portfolio performance. Positive performance indicates that the return generated by the issuer is greater than the market's systematic risk.

4.3 Stock Portfolio Performance Analysis with Jensen . Method

Based on calculations using the Jensen method, the issuer with the highest performance result is ADRO in 2016 of 0.0856 while the issuer with the lowest performance is PGAS in 2017 of -0.0438. The result of the higher Jensen Ratio indicates that the portfolio performance is getting better.



Enrichment: Journal of Management

journal homepage: www.enrichment.iocspublisher.org



4.4 Kruskal Wallis Test

The Kruskal Wallis test is a non-parametric test conducted by comparing each sample tested with 3 different methods, namely Sharpe, Treynor, and Jensen.

Table 1
Npar Test

	N	mean	Std. Deviation	Minimum	Maximum
Zscore	180	0.0000000	1.0000000	-3,57297	5,72454
Method	180	2.00	0.819	1	3

Source: SPSS output

Table 1 shows the total data processed in this study amounted to 180 data originating from 12 issuers in the 2016 to 2020 period with a mean value of 0 and a standard deviation of 1. The lowest value generated by the Sharpe method was -3.57297 and the highest value was generated. by the Treynor method of 5.72454. The results of the Kruskal Wallis test can be seen in the following table:

Table 2
Kruskal Wallis Test Results on the Sharpe, Treynor, and Jensen Z-score Method

	Zscore
Kruskal-Wal	0.850
df	2
asymp. Sig.	0.654

Source: SPSS output

From the results of the SPSS output in table 2, the results of the Kruskal Wallis test show a value of X2 count of 0.850 with a probability of 0.654 which means:

- a. Probability test results 0.654 significance level 0.05
- b. X2 count (0.850) < X2 table (5.99)

From these results, it can be concluded that there is no significant difference in performance on the results of Portfolio performance using the Sharpe, Treynor and Jensen methods. Thus, the null hypothesis (H0) is accepted and the first hypothesis (H1) is rejected in this study. The absence of differences between the three performance measurement methods indicates that the performance measurement using the Sharpe, Treynor and Jensen methods does not produce a significant difference in the portfolio performance results in a period.

4.5 Mean Rank Test Between Treatments

After doing the Kruskal Wallis test, the next step is to do a treatment test by comparing between treatments for calculating portfolio performance. Comparison between treatments is done by calculating the difference in the mean rank of each method of Sharpe, Treynor and Jensen. The results of the treatment test can be seen in the following table:

Table 3.
Comparison between Treatment Methods Sharpe, Treynor and Jensen

	Method	N	Mean Rank
Zscore	Sharpe	60	95.56
	Treynor	60	88,19
	Jensen	60	87.75
	Total	180	

Source: SPSS output

The results of the SPSS output in table 3 show that the method that best demonstrates the consistency of the differences between the three measurement methods is the Treynor method because it has the lowest difference to the Sharpe and Jensen methods. The three methods are relatively consistent in measuring portfolio performance because the mean rank results are not much different.



Enrichment: Journal of Management

journal homepage: www.enrichment.iocspublisher.org



4.6 Analysis of IDX30 Stocks Worth Investing

Table 4
IDX30 . Portfolio Ranking Comparison

No	Issuer	Sharpe method		Treynor method		Jensen method	
		RVAL	Rank	RVOL	Rank	Jensen Alpha	Rank
1	ADRO	0.2041	2	0.0067	3	0.0167	1
2	ASII	- 0.0086	8	- 0.0020	9	- 0.0030	9
3	BBCA	0.3185	1	0.0114	1	0.0106	2
4	BBNI	0.0935	4	0.0026	5	0.0036	5
5	GGRM	- 0.0461	11	0.0006	6	- 0.0058	11
6	INDF	0.0167	5	- 0.0020	8	0.0002	7
7	INTP	- 0.1095	12	- 0.0094	12	- 0.0113	12
8	KLBF	0.0095	7	- 0.0021	10	- 0.0024	8
9	PGAS	- 0.0335	10	- 0.0061	11	0.0031	6
10	SMGR	- 0.0286	9	- 0.0000	7	0.0050	4
11	TLKM	0.0116	6	0.0074	2	- 0.0044	10
12	UNTR	0.1367	3	0.0065	4	0.0057	3

Source: Data processed

In table 4, the average results of the Sharpe method in 2016 to 2020 show that the highest rank was achieved by PT Bank Central Asia Tbk (BBCA) while the lowest rank was achieved by PT Indocement Tunggal Prakarsa (INTP). From the results of Sharpe's average calculation in 2016-2020 for 12 issuers, there are 5 issuers with negative performance results and 7 issuers with positive performance results.

In table 4 the average results of the Treynor method in 2016 to 2020 show that the highest rank was achieved by PT Bank Central Asia Tbk (BBCA) while the lowest rank was achieved by PT Indocement Tunggal Prakarsa (INTP). From the average results of Treynor's calculations in 2016-2020 for 12 issuers, there are 6 issuers with negative performance results and 6 issuers with positive performance results.

In table 4 the average results of the Jensen method in 2016 to 2020 show that the highest rank was achieved by PT Adaro Energy Tbk (ADRO). while the lowest rank was achieved by PT Indocement Tunggal Prakarsa (INTP). From the average results of Jensen's calculations in 2016-2020 for 12 issuers, there are 5 issuers with negative performance results and 7 issuers with positive performance results.

Of the 12 issuers in table 4.15, there are 4 issuers that always consistently have a positive value when calculated using the Sharpe, Treynor and Jensen method. The issuers are ADRO, BBCA, BBNI, UNTR. Investors can consider this issuer in forming their portfolio. It can be concluded that the difference in ranking of the three methods is not significantly different, for example, BBCA (Sharpe ranking 1, Treynor ranking 1, and Jensen ranking 2), ADRO (Sharpe ranking 2, Treynor ranking 3, and Jensen ranking 1), INTP (Sharpe ranking 12, Treynor ranked 12 and Jensen ranked 12), UNTR (Sharpe ranked 3, Treynor ranked 4, and Jensen ranked 3), BBNI (Sharpe ranked 4, Treynor ranked 5, and Jensen ranked 5), ASII (Sharpe ranked 8, Treynor ranked 9, and Jensen ranked 9).

The difference in ranking is because each method has different measurement characteristics. Sharpe (RVAR) emphasizes the standard deviation, namely how far the actual return deviation is different from the average return. In this case the standard deviation includes both systematic risk and non-systematic risk. The Treynor method (RVOR) emphasizes beta or market risk which is beyond the control of investors. This method assumes that investors are familiar with systematic risk and diversify well so that they only focus on market risk. The Jensen (Alpha) method emphasizes portfolio returns compared to the JCI. The difference in characteristics that need to be taken into consideration for investors will emphasize the standard deviation,

It is important to note that the calculation of the Sharpe and Treynor method uses historical data, so the method does not necessarily indicate future performance. One ratio should not be the only reliable factor for investment decisions. If the portfolio has a negative beta, the ratio results are meaningless. A higher yield ratio is more desirable because it is considered a more profitable portfolio. The Sharpe, Treynor and Jensen methods should be used simultaneously so that they can provide better information about the condition of the portfolio to determine a better strategy. To deal with today's market volatility, a better understanding of the portfolio is needed to get better returns. By evaluating portfolio performance using the Sharpe method,

5. Conclusion

The results of the Kruskal Wallish test show that investors can use the Sharpe, Treynor and Jensen methods to measure stock portfolio performance simultaneously because there is no significant difference between the Sharpe, Jensen and Treynor methods. The Mean Rank Test between Treatments shows that the Treynor method is the most consistent because it produces the smallest difference between Sharpe and Jensen. The three methods should be used simultaneously in order to provide maximum return at a certain level of risk for investors in evaluating portfolios.

6. Reference

- [1] Ang, Robert. (1997). *Buku Pintar Pasar Modal Indonesia*. Jakarta: Mediasoft Indonesia.



IOCS PUBLISHER

Enrichment: Journal of Management

journal homepage: www.enrichment.iocspublisher.org

- [2] Bart, J. (1992). *International Diversification: Part I – Risk Reduction & Return Enhancement*, *Canadian Shareowner* 5: 10-11
- [3] Brigham, Eugne F & Houston, Joel F. (2006). *Dasar-Dasar Manajemen Keuangan*. Edisi Kesepuluh. Jakarta: Salemba Empat.
- [4] Bella, Annisa Prinaty dan Siti Aisjah. (2017). *Analisis Kinerja Portofolio Saham dengan Metode Sharpe Ratio, Treynor Ratio, Dan Jensen Alpha* (Studi Pada Indeks LQ 45 Yang Terdaftar Di BEI Tahun 2014-2016) Tesis Fakultas Ekonomi dan Bisnis Universitas Brawijaya.
- [6] Elton, Edwin J., and Grubber. (1995). *Modern Portofolio Theory and Investment Analysis 5th ed.* New York: John Wiley & Sons.
- [7] Fabbiozi, Frank J. (1999). *Manajemen investasi*, Jakarta: Salemba Empat.
- [8] Fahmi, Irham. (2013). *Pengantar Manajemen Keuangan Teori dan Soal Jawab*. Bandung: Alfabeta.
- [9] Halim, Abdul. (2015). *Analisis Investasi dan Aplikasinya dalam Aset Keuangan dan Aset Riil*. Jakarta: Salemba Empat.
- [10] Hartono, Jogiyanto, (2010). *Teori Portofolio dan Analisis Investasi*. Yogyakarta: BPFE UGM.
- [11] Hartono, Jogiyanto, (2013). *Teori Portofolio dan Analisis Investasi*. Yogyakarta: BPFE UGM.
- [12] Hartono, Jogiyanto. (2017). *Teori Portofolio dan Analisis Investasi*. Edisi Kesebelas. Yogyakarta: BPFE UGM.
- [13] Husnan, Suad, (2005). *Dasar-Dasar Teori Portofolio & Analisis Sekuritas*, Edisi Keempat, Yogyakarta: Unit Penerbit dan Percetakan AMP & YKPN.
- [14] Jones, Charles P. (2000). *Investment Analysis and Management 7th ed.* USA: John Wiley & Sons, Inc
- [15] Kusumawardhani, Srihartati. (2001). *Analisis Reaksi Berlebihan, Efek Bid-Ask, Firm Size, dan Likuiditas dalam Fenomena Price Reversal di Bursa Efek Jakarta*. Tesis UNDIP. Semarang.
- [17] Manurung, Adler Haymans. (2019). *Analisis Kinerja Portofolio Saham dengan Menggunakan Metode Sharpe, Jensen dan Treynor*. *Journal of Business Studies*, 4(1), 1-16.
- [18] Markowitz, Harry. (1999). *The Early History of Portofolio Theory: 1600-1960*. Financial Analysis Journal, July-August p.5-16.
- [20] Nurlaeli, Siti dan Dwi Artati. (2020). *Analisis Kinerja Portofolio Saham dengan Metode Sharpe, Treynor, dan Jensen* (Saham IDX30 Tahun 2015 sampai 2019). *Jurnal Ilmiah Mahasiswa Manajemen, Bisnis dan Akuntansi* 2(6).
- [21] Pratomo, Eko Priyo. (2004). *Berwisata ke Dunia Reksa Dana*. Jakarta: Gramedia Media Utama.
- [22] Reilly, Frank K. and Brown Keith C. (1997). *Investment Analysis & Portofolio Management*. Edisi Kelima. Orlando Florida: The Dryden.
- [23] Samsul, Mohammad. (2015). *Pasar Modal dan Manajemen Portofolio*. Jakarta: Erlangga.
- [24] Sharpe, William F. (1995). *Risk, Market Sensitivity and Diversification*. *Financial Analysts Journal*. Januari-Februari, pp. 84-88
- [25] Sharpe, William F., Alexander, Gordon J and Bailey Jeffrey V. (2005). *Investment*. Edisi 2. Boston: Pearson Custom Publishing.
- [26] Sugiyono. 2013. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: CV Alfabeta.
- [27] Sujadi. (2003). *Metodologi Penelitian Pendidikan*. Jakarta: Rineka Cipta.
- [28] Sulistyorini, Agustin. (2009). *Analisis Kinerja Portofolio Saham Dengan Metode Sharpe, Treynor dan Jensen* (Saham LQ45 di Bursa Efek Indonesia Tahun 2003 Sampai 2007). *Jurnal Fakultas Ekonomika dan Bisnis Universitas Diponegoro*.
- [29] Supranto, J. (2009). *Statistik: Teori dan Aplikasi*. Edisi Ketujuh. Jakarta: Erlangga.
- [30] Suryani, Arna dan Eva Herianti. (2015). *The Analysis of Risk Adjusted Return Portofolio Performance Share for LQ45 Index in Indonesia Stock Exchange in 2010-2014 Period*. *Jurnal Universitas Batanghari Jambi dan Universitas Muhammadiyah Jakarta*.
- [31] Tandellin, Eduardus. (2010). *Portofolio dan Investasi Teori dan Aplikasi*. Edisi Pertama. Yogyakarta: Kanisius.
- [32] Yuniara, Rissa, Nurdin dan Azib. (2017). *Analisis Kinerja Portofolio Saham dengan Menggunakan Indeks Sharpe, Treynor, dan Jensen* (Saham LQ45 yang Terdaftar di Bursa Efek Indonesia (BEI) Periode 2012-2015 *Jurnal Universitas Islam Bandung*.
- [33] Zakarias, Vernando A. dan Ferdinand Tumewu. (2015). *Evaluating Portofolio Performance of Companies Stock Listed in LQ45 Based on Sharpe, Treynor, and Jensen Method*. *Jurnal Universitas of Sam Ratulangi Manado*.
- [34] Zubir, Zalmi. (2011). *Manajemen Portofolio: Penerapannya dalam Investasi Saham*. Jakarta: Salemba Empat.