Analysis Of Investment Portfolio Performance Optimization (Case Study on ABC Pension Fund)

[1] Indah Zulmita Putri, [2] Dr. Fajri Adrianto, SE, M.Bus
[1.] Master Student, [2.]Head (Dr). Fajri Adrianto SE, M.Bus
Magister Management of Andalas University, Padang, Indonesia
Email – [1]zpindah@gmail.com, [2]fajri.adrianto@gmail.com

Abstract: *This study aims to analyze the performance of portfolio investment and the composition of portfolio investment that could give optimum result. The average returns of portfolio always exceed the annual investment's target. The calculation of portfolio optimization is using two assumptions, first minimizing the portfoliorisk and second maximizing portfolio average return. The prior average return before portfolio optimization is 9.87% with a risk of 1.89%. This study using Solver program on Microsoft Excel. The resulting report will describe how the actual conditions will be and the best scenario will be designed to obtain optimal returns with a certain level of risk. The portfolio optimization result using the first assumptions average return reach 8.88% with a risk of 1.66% and average return reach 9.87% with a risk of 1.95%. Meanwhile, the results of portfolio optimization using second assumption average return reach 10.18% with a risk of 2.09% and average return reach 9.79% with a risk of 1.89%.*

Keywords *: Pension Funds; Portfolio Performance; Portfolio Performance, Average Return; and Portfolio Risk.*

1. INTRODUCTION :

Uncertainty is sure thing, continuity of income in old age must be sought from now on. For this reason the workers set aside the income they currently have for their retirement in the future. Management and carried out by pension funds have long-term and medium-term time horizons, and guarantee income sustainability for participants and make participants more prosperous.

According to the records of the Indonesian Pension Fund Bureau, each year the pension fund industry continues to grow, as of 2017 it grows by 10.90%, both in terms of assets, the amount of pension funds and the amount of investment owned. However, an increase in the amount of pension fund assets in Indonesia has not been able to achieve significant results compared to the level of Indonesia's gross domestic product which is only able to reach an average of 1.69%. In the world of investment, the term high risk is high return, low risk low return and don't put all your eggs in one basket.

Pension fund administrators must pay attention to the basic things relating to investment instruments selected in the portfolio. The three important things are: risk, expected return or return, and the relationship between return and risk. Pension Fund administrators are required to carry out management prudently, optimally, professionally and productively. Managers must be able to invest funds that have been collected in investment instruments that can generate optimal returns and do not conflict with investment directives.

The ABC Pension Fund is an Employer Pension Fund with a Defined Benefit Pension Program scheme, which requires an optimal return, but is also obliged to maintain the sustainability of the pension program implementation so that evaluation is needed when managing its investment portfolio. So it will be known whether the strategy of portfolio deployment and asset allocation (asset allocation) goes as it should, or if improvements are needed so that optimal portfolio performance can be achieved in the current and future periods.

The ABC Pension Fund investment portfolio and a variety of dams are spread across several types of investment instruments in order to produce optimal returns and remain in accordance with the investment direction set by the founder. Currently the indicator of success in managing Pension Fund investments is the ROI value generated at the end of the financial year. Is this ROI higher than the return set in the RKAT or lower? In addition, it also considers the amount of actuarial technical interest rates.

ABC Pension Fund has a total investment and returns that tend to increase every year although not as significant as shown in Figure 1.1. This is what underlies the notion that the composition of the investment portfolio owned and ABC's retirement is still not optimal. The formulation of the problem in this study are: 1) What is the performance of each type of investment instrument owned by ABC's Pension Fund from 2013 to 2017 ? 2) What is the performance of the investment portfolio owned by ABC's Pension Fund from 2013 to 2017 ? 3) What is the composition of the investment portfolio or asset allocation (asset allocation) that will provide the most optimal return with certain risks ?

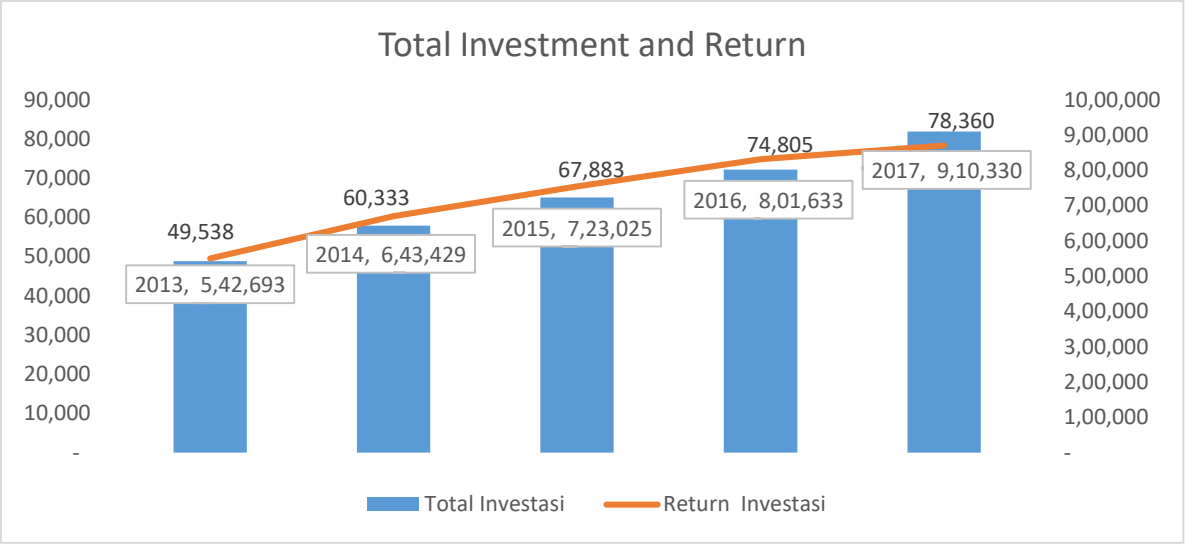

Figure 1
Total Investment and Return ABC's Pension Fund
Source : ABC Pension Fund (processed data)

The objectives of this study are: 1) to analyze the performance of each type of investment instrument owned by ABC's Pension Fund from 2013 to 2017; 2) analyze the performance of the investment portfolio owned by ABC's Pension Fund from 2013 to 2017; 3) analyze the composition of the investment portfolio or asset allocation (asset allocation) that will provide the most optimal return with certain risks. This study focuses on the Employee Pension Fund, namely the ABC Pension Fund that runs the Defined Benefit Pension Program scheme by analyzing the performance of each type of investment instrument and investment portfolio held during the period 2013 to 2017.

2. LITERATURE REVIEW :

Pension Fund

Pension Funds as a form of non-bank financial institutions are formed by the government or the private sector, trusted to manage funds received from participants. Having long-term and medium-term time horizons due to contributions collected from participants, the benefits will only be taken when the post-devotee participants, so that the pension fund program will guarantee the sustainability of income and make participants more prosperous. Pension funds or pension funds are actually an institution or institution originating from the Anglo-American legal system.

The Pension Fund Law (Law Number 11 of 1992) article 1 describes the definition of pension funds, namely a legal entity that manages and runs programs that promise pension benefits for participants, widows / widowers / children, which are associated with the attainment of a certain age and have a status as a body law and start activities from the date of approval by the Minister of Finance.

Tanner (2007) stated that the main purpose of funding a pension plan is the availability of liquidity to pay obligations on time to participants, collected on time, systematically, to guarantee the promise of the founder of the pension fund to the participants. The amount of assets that are managed requires the pension fund administrators to manage prudently, optimally, professionally and productively.

Markowitz (1952) has proven that the risk of investing can be minimized by combining several assets into a portfolio. The Markowitz method shows that if financial assets in a portfolio have a smaller return correlation than positive one, overall portfolio risk can be reduced. Minimum risk will be achieved if the correlation of investment returns is perfect negative.

Brown et al. (2009) have conducted research with the object of research is a state-owned pension fund institution that highlights the implementation of its investment policy, whether through investment managers or in-house management.

Purpose of the Pension Fund

Wahab (2005) stated that the purpose and objective of establishing a pension fund can be seen from various sides, as follows:

1. Employer side

Pension Funds as an attempt to attract or retain corporate employees who have the potential, intelligence, skills and productivity that are expected to increase or develop the company, in addition to being a moral and social responsibility of the employer and his family when employees are no longer able to work or retire or die.

2. Employee Side
The Pension Fund is to provide a sense of security for the future in the sense that it still has income upon entering retirement.
3. Government side
With the existence of pension funds, will reduce social vulnerability.
4. Community Side
The existence of a pension fund is one of the fund collection institutions that originates from contributions and development results.

Types and Pension Program Schemes

World Bank (2006), Employer Pension Fund, which is a pension fund that applies a voluntary scheme for workers in the private sector. Financial Institution Pension Fund is a pension fund established by a bank or life insurance company to organize a Defined Contribution Pension Plan for individuals, which is separate from the Employee Pension Fund.

Investment Instruments in the Pension Fund

Investment instruments in the Pension Fund are regulated in the Financial Services Authority (OJK) Regulation Number 3/POJK.05 / 2015 dated March 31, 2015 concerning Pension Fund Investment, in article 2 paragraph (1) it is explained that "Pension Funds are prohibited from placing investments, except for the following types of investments :
a. Savings on the Bank;
b. Deposits on call to the Bank;
c. Time deposits at the Bank;
d. Deposit certificate with the Bank;
e. Securities issued by Bank Indonesia;
f. Government Securities;
g. Shares listed on the Stock Exchange in Indonesia;
h. Corporate bonds listed on the Stock Exchange in Indonesia;
i. Mutual Fund consisting of:
1. Money market mutual funds, fixed income funds, mixed funds, and equity funds;
2. Protected Mutual Funds, Mutual Funds with guarantees and index Mutual Funds;
3. Mutual Funds in the form of limited investment collective investment contracts;
4. An Investment Fund whose shares or investment units are traded on a Stock Exchange in Indonesia;
j. Medium Term Notes (MTN);
k. Asset Backed Securities (EBA);
l. Real Estate Investment Fund (DIRE) in the form of a Collective Investment Contract (KIK);
m. Option contracts and securities futures contracts traded on the Stock Exchange in Indonesia
n. REPO;
o. Direct participation in both Indonesia and abroad;
p. Land in Indonesia; and / or
q. Buildings in Indonesia.
This regulation is a guideline and reference for ABC Pension Fund in making investments and does not violate the provisions of the OJK.

Investment

Horne (2005) stated that investment is an important decision in the company as an effort to utilize funds to be optimal and generate interest. Bodie (2014) stated that investment is the current commitment to money or other resources in the hope of gaining profit in the future. Halim (2005) stated that investment is the current investment of funds to gain profits in the future. The investment process shows how investors should invest in securities, which securities will be chosen, how much investment they will make and when they can be made. Thus, the first step that needs to be done is to understand how to measure the expected level of profit and investment risk (a group of investments). The purpose of investing is to choose investment instruments that are able to maximize returns or to maximize the welfare of shareholders at a certain level of risk, because the greater the return obtained, the greater the level of prosperity (Amalia, 2012).

Expected Returns and Portfolio Risks

Investment is a commitment of a number of funds for the purpose of obtaining hopes of future profits. Future benefits are compensation for the time and risks associated with the investments made. In the context of investment, it is hoped that these benefits are often referred to as returns (Tandelilin, 2011).

Besides returns, investment is also known as the concept of risk. Risk is the chance that the probability of the results being received is different from what is expected. Risk is usually measured using historical returns or average returns. Higher risk is usually correlated with opportunities to get a higher return (Bodie, 2014). Risk is also called uncertainty that is known for the probability of occurrence of the achievement of a target. Investment risk is defined as the possibility of a difference between actual return and expected return (Tandelilin, 2011).

Risk and return, like two sides of a coin that is always side by side. That is, in investing, besides calculating the expected return, investors must also pay attention to the risks that must be borne. Therefore, investors must be very clever looking for alternative investments that offer the highest expected level of return with a certain level of risk, or investments that offer certain returns at the lowest risk level.

The aim of investors in investing is to maximize returns without forgetting the investment risk factors they must face. Return is one of the factors that motivate investors to invest and is also a reward for the courage of investors to bear the risk of investment. Investors also need to consider the level of risk of an investment (Tandelilin, 2011). According to Tandelilin (2011) the relationship between risk and the expected level of return on investment is a unidirectional relationship. This means that the greater the risk that must be borne, the greater the level of expected return. In accordance with the investment concept "high risk high return low risk low return". Before deciding to invest in the capital market, an investor should analyze all existing securities and then choose those that are considered safe and able to generate the expected profits.

As for how to calculate and to get the most optimal return and avoid large fluctuations that occur and have the lowest risk in each type of investment, the steps taken are as follows:

a. Calculate the level of profit and fluctuations in each type of investment.

The optimal level of profit and fluctuations in investment types can be calculated using the expected return formula.

b. Calculate the risk level of each type of investment

The level of risk for each type of investment can be calculated using the standard deviation formula.

Investment Portfolio

An investment portfolio is defined as the incorporation of existing assets to be invested, both individuals and institutions such as real assets, financial assets and a mixture of both. The preparation of investment portfolios starts from the distribution of investment allocations to minimize risks. If optimal portfolio performance, then the payment of benefits for retirement will be guaranteed. Management of the pension portfolio optimally is very important, where the financial resources are very large with a long term period.

The investor portfolio is simply a collection of investment assets. Investors take two types of decisions in forming their portfolio, namely: asset allocation decisions and securities selection decisions (Bodie, 2014). Evaluation in portfolio management must be careful and prudent. The selection of investment portfolios must be guided, namely: a) safety, b) target optimal return, c) liquidity, d) portfolio diversification (investment spread).

Portfolio selection is 2 (two), namely: efficient portfolio and optimal portfolio.

1. Efficient Portfolio

An Efficient Portfolio is a collection of portfolios that may be formed from a combination of portfolio building assets that provide a minimum risk value at a certain rate of return or provide maximum profit at a certain level of risk (Tandelilin, 2011).

Optimal Portfolio

Optimal portfolio is one of the efficient portfolios chosen by investors according to investor preferences (Tandelilin, 2011). Investor preferences have three types, including:

1. Risk-seeking investors
2. Investors who are risk-neutral
3. Investors who avoid risk (risk aversion).

The guidelines used to select the optimal portfolio are as follows:

1. Sharpe Ratio index approach

This method assumes that the portfolio that has the best performance is the one that has a reward to variability ratio (the ratio between the rate of return on a portfolio and portfolio risk) has the highest value.

2. Indifference Curve

In the context of management, the investment indifference curve (IC) is a curve that shows various combinations of effects that provide indifferent returns for investors. The slope IC shows the marginal rate of subtitation of return and risk.

If return and risk are perfect substitutions, the IC is a straight line. In reality both are not a perfect substitution, because at a certain level of risk in each increase in risk, maybe investors will ask for additional returns that are getting bigger, so that the IC is no longer a straight line. The greater the IC slope indicates that investors are increasingly cautious about

risk. Conversely, the smaller the IC slope shows that investors are increasingly brave to face risks. The positive IC slope indicates that investors always want a large return as compensation for the greater risk that they must bear.

3. Treynor / Treynor Ratio index approach

This method assumes that the portfolio that has the best performance is the one that has a reward to volatility ratio (the ratio between portfolio return rate and portfolio volatility level) has the highest value.

4. Treynor / Treynor Ratio index approach

This method assumes that the portfolio that has the best performance is the one that has the actual portfolio return obtained above the expected portfolio return rate.

3. PREVIOUS RESEARCHES REVIEW:

Several studies that became the basis of this study are: Wijaya (2011) conducted a study with the topic of analyzing the comparison between the Defined Contribution Pension Program and the Defined Benefit Pension Program which was reviewed in the perspective of the employer and participants whose research was conducted at the Sampoerna Surabaya Pension Fund. Suheiri (2009) evaluated the possibility of applying sharia principles in the management of pension fund portfolios.

Rahardjo (2009) the success or failure of managing pension funds is reflected in the development of optimal assets and high returns and with a low risk. Managing an optimal portfolio is the main thing, where high financial resources are owned with a long-term investment horizon. Rizki (2009) proved that the concept of diversification can reduce risk. Diversification of investment portfolio will provide an optimal return if the return of each investment instrument in one portfolio has an inverse relationship. Ammann (2010) examined the effect of investment performance on pension fund governance. Frajtova (2015) in his research proves that portfolio optimization can be done by applying a strict selection of the investment fund, and better portfolio composition.

Markowitz (1952) proves that risk can be reduced by combining several types of investment instruments in an investment portfolio. The Markowitz method shows that if a financial asset in a portfolio has a return relationship <1, the total portfolio risk can be reduced. The Pension Fund strives so that risks can be quantified so as to facilitate decision making.

Tonks (2005) argues that in an Employer Pension Fund with a Defined Benefit Pension Program, the investment portfolio policy is very careful because it must really maintain the fund's adequacy ratio, and pension fund funding is the responsibility of the employer / founder. In addition, the founders are required to pay dues in either normal fees or additional fees (if any). The Fund Adequacy Ratio (RKD) is a division of funding wealth for actuarial obligations. If the Fund Adequacy Ratio> 100% means that the pension fund is in a surplus condition, if the Fund Adequacy Ratio <100% means that the pension fund is in a deficit condition so the founders are required to pay additional contributions, the amount of which is determined based on actuarial calculations made by the actuary besides the founders are required to pay contributions normal. However, if the Fund Adequacy Ratio> 120% can be used as a normal contribution deduction.

Ambachtsheer (1998) states that combining the best things between a defined benefit pension plan and a contribution pension plan can definitely minimize the risks that will arise. The advantage of PPMP is that the employee pension contributions are usually relatively small and pension participants are like receiving a monthly salary (pension benefit) unless there is a problem with the Employer. Losses from PPMP, namely the Employer provides additional if there is a shortage of pension benefits, and the payment of pension benefits is the expense of the employer. The advantage of PPIP is that the amount of contributions paid by the company is certain, so that it can be more measurable and planned, participants do not need to bother determining the amount of contributions, and if the investment performance is profitable then the pension benefits received are more. The disadvantage of PPIP is that the pension benefits become uncertain in accordance with the investment performance, and if the investment performance loses the pension benefits received are less. It can be concluded that PPIP is more profitable for Employers while PPMP is more profitable from the perspective of Participants.

Sialm (2012) stated that US mutual funds with a defined contribution scheme have a higher level of volatility compared to non-defined contribution schemes. In addition, portfolio adjustments not carried out periodically make higher performance sensitivity resulting in negative investment performance. The difference in cash flow between defined contribution schemes and non-contributions must occur due to diversification carried out by the Investment Manager in investment placement and the application of strict discipline in the management of investment portfolios.

Huberman (2006) said that there are two alternatives that can be done by participants in allocating their contributions, namely the allocation of funds equally across all types of investment instruments or the allocation of more funds to equity by increasing the investment weight offered which is also called "401 (k) plan. " More than half a million participants used this 401 (k) plan and this study failed to find major errors and systematic errors due to the implementation of this plan for the type of investment selected. The rational choice hypothesis shows that participants with similar attributes should not make different choices systematically. Investors increase the amount of funds used because the fees increase and are allocated to equity with a relatively greater weight by increasing the choice of investment types offered.

Gallery (2011) revealed in his research on the Pension Program in Australia that there was a significant change from the use of the Defined Benefit Pension Program to the Defined Contribution Pension Program. Freezing of new participants with the PPMP scheme, and new participants are included in PPIP with a superannuation investment model. This model has increased asset growth and number of participants. In this model participants have a choice of how their savings are invested, the adequacy of the pension benefits that will ultimately be accepted by individuals, in part or in full, depending on the decisions taken during their work. They must decide on investment options where they will invest their superannuation savings and must periodically monitor and evaluate the investment performance of the choice. To achieve optimal results in complex decision-making environments, decision makers must have an adequate level of knowledge and financial skills. Because understanding finance is the key to retirement savings, better financial education is needed if individuals want to achieve their retirement income goals. Furthermore, this study also provides an overview of the superannuation system in Australia and how investment decision making has shifted to pension fund members, followed by a review of previous research on financial literacy.

Wang (2015) said that there was an influence of political incentives in the investment activities of public pension fund shareholders. This study uses a sample of shareholder proposals from 1993 to 2013 and data sets of political variables manually collected in public pension funds, and documents consistent evidence of the "political attention hypothesis". It was found that the number of politicians on the public pension fund board was significantly positively related to the frequency at which portfolio companies were targeted. Moreover, the frequency of social responsibility proposals by public pension funds has increased significantly, because public pension funds have a larger number of members who run for general elections. However, the frequency of corporate governance proposals is not related to the number of board members who are running for elections. Next, we document that the political connections between portfolio companies and public pension funds alleviate the possibility of companies being targeted by pension funds with social responsibility proposals. This result supports the ‘‘ hypothesis of political contribution. This research provides direct evidence that public pension funds make investments to increase the political capital of board members who are their shareholders.

Tores et al. (2015) in his research proposed a minimum variance portfolio as a weighting method in the benchmark strategy for pension fund performance in Mexico. By carrying out three separate simulations with daily data from January 2002 to May 2013, they tested this benchmark weighting method against the Max Sharpe one ratio and a linear combination of the two benchmarks (minimum variant and Max Sharpe).

Conceptual Framework

Based on the formulation of the problem, the purpose of the study and the review of the literature that has been proposed, a customized conceptual framework can be created to support the following research:

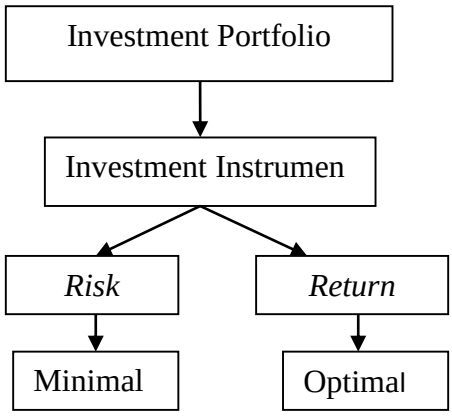

Figure 2.1
Conceptual Framework

3. METHOD :

This research is a descriptive research and does not use a hypothesis. According to Sekaran (2017) a descriptive study was conducted to find out and be able to explain the characteristics of the variables studied in a situation. In this study, it is described is an evaluation of the investment portfolio owned by ABC’s Pension Fund whether it has optimal performance or not, and how the composition of the investment portfolio will provide the most optimal return with a certain level of risk.

The data used is secondary data in the form of financial statements and investment portfolio reports. This research period is from 2013 to 2017. The variables studied are 1) return on investment instruments; 2) investment

instrument risk; 3) establishment of investment portfolio; 4) portfolio return; 5) portfolio risk; 6) the weight of investment funds; 7) efficient portfolio selection and 8) determine the decision to choose the best portfolio model seen from the level of return (return), risk given, and portfolio optimization in the form of Sharpe Ratio, Treynor Ratio and Jensen Ratio which give the highest value.

Portfolio analysis begins with analyzing each type of investment instrument owned by the ABC Pension Fund, for later an analysis of the portfolio formed. Analysis of the portfolio formed will be compared to the technical interest rates used by actuarial, investment targets and fund adequacy ratios (RKD). This study will also look at the weight of the investment portfolio that influences the return of the ABC Pension Fund investment portfolio. Investment portfolio optimization will be calculated with the help of Microsoft Excel Solver program. The portfolio results from this calculation will be compared to the portfolio formed in the ABC Pension Fund.

The stages of data processing and analysis are as follows: 1) performance analysis of each type of investment instrument owned by ABC Pension Fund (using the calculation of return & risk for each type of investment instrument); 2) performance analysis of investment portfolios owned by ABC Pension Fund (using portfolio return and risk calculations, Sharpe Ratio, Treynor Ratio and Jensen Ratio.

The constraints in this study are: 1. Investments in time deposits are only allowed in banks that are classified as healthy; 2. Investment in corporate bonds and MTNs is prioritized for BUMN / BUMD or for issuers that have a minimum investment grade rating from rating agencies; 3. Investments in shares listed on the Indonesia Stock Exchange are permitted on shares included in the Lq45 Index or Kompas100 Index; 4. Investments in direct placements are only permitted to insurance companies, subsidiaries or rural people's banks; 5. Investments in land and buildings are only permitted on land and / or buildings that do not have legal disputes and certificates in the name of the institution, namely the ABC Pension Fund not on behalf of individuals; 6. The total allocation of all investment instruments is 100% or = 1; 7. The amount of allocation for investment instruments in deposits is ≤ 60% and ≥ 10%; 8. Amount of allocation of types of investment instruments in stocks, bonds, state securities, sukuk, mutual funds, medium term notes, direct placements, and land and buildings ≥ 0%; 9. Amount of allocation of investment instruments in shares ≤ 4%; 10. The total allocation of investment instruments in bonds and sukuk is ≤ 55%; 11. The total allocation of investment instruments in mutual funds ≤ 15%; 12. Total allocation of investment instruments in medium term notes notes 3%; 13. The amount of allocation of investment instrument types on direct placement ≤ 15%; and 14. The amount of allocation of investment instruments in land and / or buildings ≤ 20%.

4. RESEARCH RESULTS AND DISCUSSION :

ABC Pension Fund runs a Defined Benefit Pension Program scheme. Strong funding support from the founders, maintained liquidity and proper arrangement of investment instruments in accordance with investment profiles which at the medium and long term horizons make pension fund operational activities run smoothly. Dana Pensiun ABC has a well-diversified portfolio, the majority invests in the capital market with a percentage of ± 75%, in the money market ± 14%, direct placement in shares of ± 8%, and on land & buildings ± 3%, proper management is needed in order to produce optimal benefits and minimal risks.

Needham (2012) argues that the trade-off between risk and return is the most important step in determining the right investment strategy. In accordance with the concept of investment, namely "high risk high return, low risk low return". ABC Pension Fund is a pension fund that is quite aggressive because it has an investment placement in the capital market in a large composition. Based on Table 4.1, it can be seen that during the research period, ABC Pension Fund investment placements were mostly placed in corporate bonds, time deposits and state securities, which had the largest returns, namely direct placements, shares, land & buildings, and those with the greatest risk, namely shares. direct placement and land and/or building.

Table 4.1
Average Return, Risk dan Average Investment Allocation ABC's Pension Fund

Type of Investment	*Average Return*	Risk	Average Investment Allocation
Government Securities	9,28%	1,65%	15,36%
Time deposit	10,19%	1,54%	24,13%
Stock	16,24%	10,40%	0,42%
Corporate Bonds	9,19%	0,30%	45,59%
Sukuk	8,35%	0,92%	2,29%
Mutual Funds	3,67%	2,17%	1,19%
MTN	1,05%	2,34%	0,28%
Direct Placement	30,61%	8,17%	6,59%
Land and/or Building	13,09%	3,73%	4,17%

Source: Processed data

The risk of pension fund investment with the Defined Benefit Pension Program scheme is with the employer, and the employer is fully responsible for funding pension funds. Based on Figure 4.1, it can be seen that the average return obtained by the ABC Pension Fund always reaches the investment target set in the Annual Budget Work Plan (RKAT). However, the investment portfolio return that has exceeded the investment target has not been able to maintain the adequacy ratio of ABC Pension Fund funds in the event that funds are met, there are still deficits.

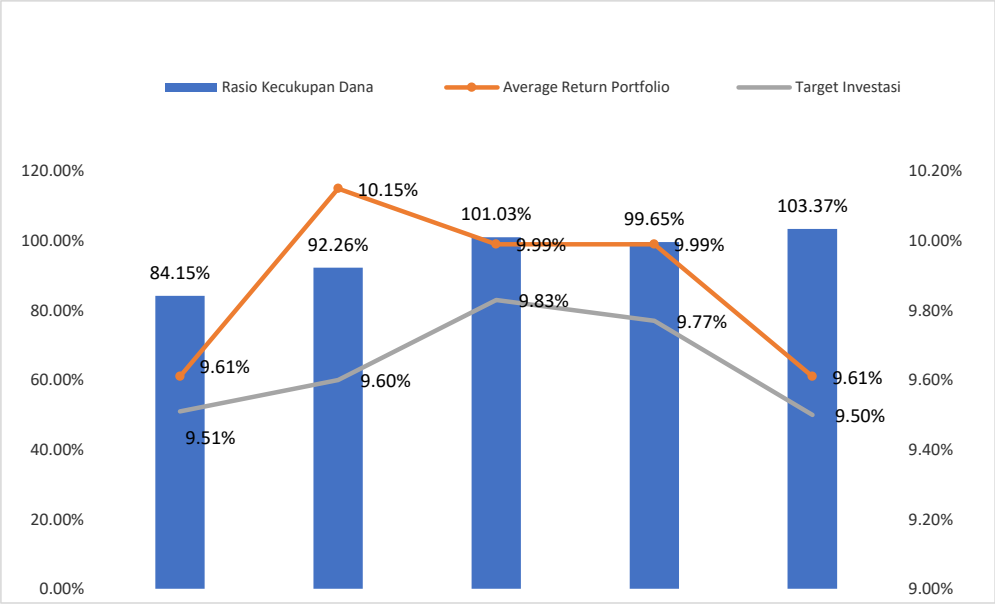

Figure 4.1
Average Return Portfolio, Investment Target and Fund Adequacy Ratio
(ABC Pension Fund, 2018)

Determination of the optimal portfolio using nine investment instruments owned by ABC Pension Funds is done using Microsoft Excel Solver program using two assumptions, namely assuming one minimizes portfolio risk and two estimates average return. In table 4.2 the column before optimization shows the average allocation before optimization measurement that reflects the real conditions during the study period. Optimization of one to four illustrates the conditions after measuring optimization using both assumptions.

Table 4.2
Results of Calculation of Investment Allocation, Risk, Average Return and Sharpe Ratio Value, Treynor Ratio and Jensen Ratio before and after Optimization

Type of Investment	Average Investment Allocation				
	Before Optimization	Optimization 1	Optimization 2	Optimization 3	Optimization 4
Government Securities	15,36%	20,00%	20,00%	20,00%	10,00%
Time deposit	24,13%	10,00%	17,00%	17,00%	20,00%
Stock	0,42%	3,00%	3,00%	2,00%	3,00%
Corporate Bonds	45,59%	45,00%	50,00%	53,00%	50,00%
Sukuk	2,29%	5%%	3,00%	1,00%	2,00%
Mutual Funds	1,19%	4,00%	3,00%	4,00%	4,00%
MTN	0,28%	3,00%	2,00%	3,00%	3,00%
Direct Placement	6,59%	6,00%	1,00%	0,00%	8,00%
Land and/or Building	4,17%	4,00%	1,00%	0,00%	0%
Total Portfolio Composition	100,00%	100,00%	100,00%	100,00%	100,00%
Average Return	9,87%	8,88%	9,87%	10,18%	9,79%
Portfolio Risk	1,89%	1,66%	1,95%	2,09%	1,89%
Sharpe Ratio	1,8210	1,4857	1,7716	1,8011	1,7809
Treynor Ratio	2,7919	2,0012	2,8076	3,0541	2,7409
Jensen Ratio	1,0398	0,9972	1,0071	1,0101	1,0063

Source: Processed data

Optimization of one and two uses the first assumption, which is minimizing portfolio risk. One optimization (optimization 1) is done using the assumption of risk minimization. Based on the calculation results obtained a very small risk that is with a standard deviation of 1.66%. However, the average return obtained also decreased from 9.87% to 8.88%. The decrease in the average return value is not what is desired, both by the founder of the pension fund and by the pension fund manager. Decreasing investment returns can signal a decline in the performance of pension fund administrators. This also means that it is feared to increase the burden on employers because the funding risk and investment risk for pension funds with a defined benefit pension plan scheme are the founders' responsibility.

In this one optimization, when compared to before optimization there is an increase in the amount of state securities investment, stocks, sukuk, mutual funds, MTN, and a reduction in the amount of time deposit investment. This makes average return eroded and has a small portfolio risk as well. Besides that Sharpe Ratio, Treynor Ratio and Jensen Ratio have the lowest value compared to the others.

The results of two optimization calculations (optimization 2) also use minimization of portfolio risk, but in this optimization calculation added constraints in the form of average portfolio return is more than or equal to the average portfolio return before optimization (average return ≥ 9.87%). In this optimization results obtained the same average return as before optimization, but has a greater portfolio risk, namely 1.95%. On the results of this calculation, the value of portfolio risk is greater than the value of portfolio risk carried out in the first optimization calculation, but has a larger average return.

In the optimization of these two, when compared to before optimization there was an increase in the amount of investment in state securities, corporate bonds, shares, sukuk, mutual funds, MTN, and a reduction in the amount of time deposit investments, direct placements and land & buildings. This makes the average return equal to before optimization and has a portfolio risk that is greater than before the portfolio. Besides that Sharpe Ratio, Treynor Ratio and Jensen Ratio have a higher value than one optimization but under optimization three and four.

Optimization of three (optimization 3) and optimization of four (optimization 4) using the second assumption, namely the maximization of average portfolio return. Three optimization (optimization 3) is done by maximizing the average portfolio return by using restrictions as described in the research methodology chapter. Based on Table 4.4, it can be seen that the average return portfolio generated from this optimization result, namely 10.18% is greater than before optimization (9.87%). However, portfolio risk also increased, from 1.89% to 2.09%.

In this three optimization, when compared to before optimization there is an increase in the amount of state securities investment, corporate bonds, stocks, mutual funds, MTN, and a reduction in the amount of time deposits, sukuk, direct placements and land & building investments. This makes average return rise and has a large portfolio risk as well. Besides that Sharpe Ratio, Treynor Ratio and Jensen Ratio have the highest value compared to the others.

The results of the fourth optimization calculation (optimization 4) are carried out using the assumption of portfolio portfolio maximization with additional constraints, namely portfolio risk is less than or equal to portfolio risk before optimization (isasi 1.89%). The average return generated was 9.79%.

In this four optimization, when compared to before optimization there is an additional investment in corporate bonds, stocks, mutual funds, MTN, direct placement and reduction in the amount of investment in state securities, time deposits, sukuk, and land & buildings. This makes the average return smaller before optimization but greater than one optimization, and has the same portfolio risk as before optimization. In addition Sharpe Ratio, Treynor Ratio and Jensen Ratio have higher values than optimization of one and two but under optimization of three.

Based on the analysis above shows that the investment results of the ABC Pension Fund have not been able to provide optimal results. The results of this study are similar to those of Osu, et al. (2016) in his research on the Pension Fund in Nigeria. Setiawan et al. (2015) also calculates optimization by using Pertamina's Pension Fund as the object of research. The results of his research stated that Pertamina's Pension Fund had not been able to provide optimal results for its investment allocation. Of the four optimizations obtained Sharpe Ratio value of 1.4857 - 1.8011; Treynor Ratio of 2.0012 - 3.0541; and Jensen Ratios for 0.9972 - 1.0101. In order for portfolio performance to provide optimal results, ABC Pension Fund should choose three optimizations that have Sharpe Ratio, Treynor Ratio and Jensen Ratio values higher than other optimizations that indicate better portfolio performance than others.

5. CONCLUSION:

The conclusions that can be drawn based on the results of the analysis and discussion above are: First, the investment instruments owned by ABC Pension Funds during the study period have the largest average returns in sequence (direct placements, stocks, land & buildings, time deposits, state securities, corporate bonds, sukuk, mutual funds and medium term notes). In terms of risk, investment instruments have the greatest risk in sequence (stocks, direct placements, land & buildings, medium term notes, mutual funds, state securities, time deposits, sukuk and corporate bonds. Average allocation of investment instruments owned by the Pension Fund ABC sequentially (corporate bonds, time deposits, state securities, direct placements, land & buildings, sukuk, mutual funds, stocks and medium term notes. Second, the composition of the portfolio owned by ABC Pension Fund before optimization does not provide optimal results, seen in the average return portfolio produced is 9.87% with a risk of 1.89%, Third, during the study period the

average return portfolio generated always exceeds the annual investment target set in the RKAT. Meanwhile, the value of the fund adequacy ratio (RKD) is still in deficit conditions, except those that occurred in 2015 and 2017 were in funded conditions, which amounted to 101 , 03% and 103.37%. Fourth, using the Solver program, the optimization results with the assumption of minimizing portfolio risk resulted in two alternative optimization results, namely one optimization with an average portfolio return of 8.88% and a risk of 1.66% and two optimization results with an average portfolio return of 9.87 % and risk of 1.95%. Fifth, by using the Solver program, the optimization results with the assumption of maximizing average return results in two alternative optimization results, namely three optimization with an average portfolio return of 10.18% and a risk of 2.09% as well as four optimization results with an average portfolio return of 9.79 % and risk of 1.89%.

6. IMPLICATION:

Based on the three optimization results that give the highest Sharpe Ratio, Treynor Ratio and Jensen Ratio values, ABC Pension Fund should consider adding the composition of investments in bonds, state securities, medium term notes, mutual funds and shares and considering the reduction in the amount of investment in time deposits, sukuk , direct placement, and land & buildings in order to provide optimal portfolio performance. In addition, ABC Pension Fund should calculate portfolio optimization before the Annual Investment Plan is determined for the following year.

7. LIMITATIONS AND SUGGESTIONS:

This research is only focused on the Employer Pension Fund with the Defined Benefit Pension Program scheme and the study period is only five years starting from 2013 to 2017. Further research can be done by trying to compare the performance of the investment portfolio with other similar pension funds or with funds Employee pension with a defined contribution pension plan scheme. In addition, further research can be carried out using the Black Litterman Model method or other methods.

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