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Article

The Best Investment Scenario for Hajj Fund Management in Indonesia

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ABSTRACT - The Hajj Fund Management Agency (Badan Pengelola Keuangan Haji [BPKH]) is an institution responsible for managing Hajj funds in Indonesia. Through the investment mechanism, the BPKH's benefit value can reduce the burden of prospective pilgrims in covering the cost of organizing the Hajj pilgrimage (Biaya Penyelanggaran Ibadah Haji [BPIH]). This study examined the combination of optimal portfolio construction in two situations, namely, without using regulatory restrictions and with government regulatory restrictions. The results of a linear programming approach with the Markowitz method revealed that investment allocation without regulatory restrictions forms an optimal portfolio to maximize Sharpe with a moderate scenario. Likewise, investment allocation based on regulations forms a portfolio with the same goal, namely maximizing the Sharpe ratio. This is in accordance with BPKH's investment characteristics, which consider acceptable levels of return and risk, as well as BPKH's risk profile, namely low to moderate. This research is expected to be useful for BPKH, especially in compiling investment portfolios to produce the optimal value of benefits and create sustainability in Hajj finance.

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INTRODUCTION

As a country where 86.9% of the population is Muslim, Indonesia ranks as the first country to perform the Hajj pilgrimage (Reuters & DinarStandard, 2017). It can be observed that since 2017, the number of applicants for prospective pilgrims has continued to increase. The decline occurred in 2020 due to the COVID-19 pandemic; hence, the departure of pilgrims was delayed for two consecutive years. However, the number of applicants still exceeds the national quota of 221,000 pilgrims each year.

The gap between the limited Hajj quota and the large number of applicants for prospective pilgrims has resulted in a longer waiting schedule for the departure of prospective pilgrims. This results in the number of waiting pilgrims increasing (Witjaksono et al., 2020).

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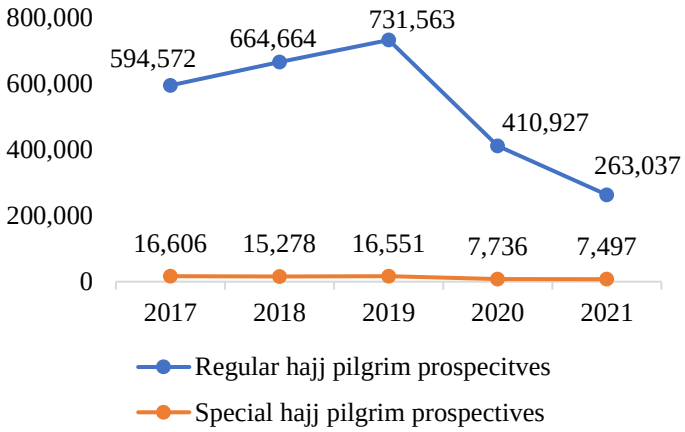

Figure 1: Hajj pilgrim prospective additional participants in Indonesia 2017-2022 (people)

Based on this, it is possible to estimate the initial deposit payments paid by prospective pilgrims in order to receive a portion of Hajj's departure. Until 2022, the initial deposit per regular Hajj is IDR 25 million and around USD 4,000 for Hajj plus. With the number of deposit funds and waiting pilgrims reaching 5.2 million, the amount of Indonesia's Hajj funds in 2021 reached IDR 159 trillion (BPKH, 2021). Notably, the larger the Hajj's managed funds, the greater the challenge of conducting an effective investment strategy in order to obtain optimum benefit value.

In implementation, Law No. 34/2014 regarding Hajj Financial Management has mandated the Hajj Fund Management Agency (Badan Pengelola Keuangan Haji [BPKH]) to manage the revenue, development, expenditure, accountability, reporting, and supervision of Hajj finances. BPKH must place the ummah's funds into Shariah investment instruments in a prudent, safe, and beneficial manner. In this regard, Law No. 34 of 2014 Article 26 states that the expenditure of Hajj Finance placement can be made in the form of Shariah banking products, securities, gold, direct investment, and other investments. It is also explained that the placement and/or investment of Hajj Finance is performed in accordance with Shariah principles by considering aspects of security, prudence, value of benefits, and liquidity. Furthermore, PP No. 5/2018 articles 27, 28, 29, and 30 regulate the management of BPKH Hajj funds through investment diversification in accordance with predetermined investment allocation limits. Based on these regulations, BPKH managed to demonstrate growth in the acquisition of the value of benefits obtained from the placement and investment of Hajj funds.

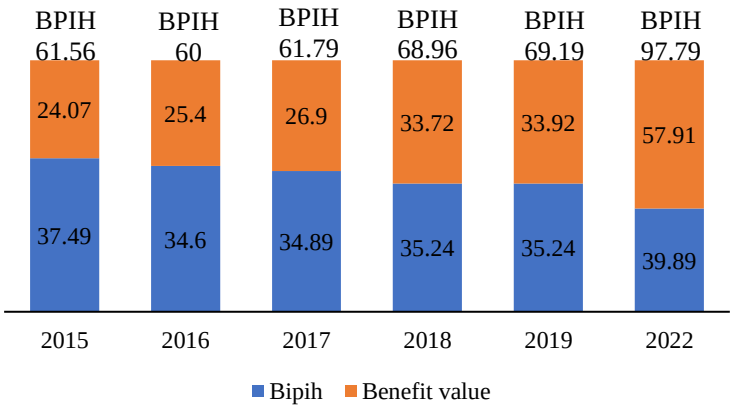

Figure 2: Development of BPIH, Bipih, and benefit value (IDR million)

Regarding the value of the benefits of managing Hajj funds, one of BPKH's main challenges is overcoming the gap between the Hajj Pilgrim Organising Cost (BPIH) and the Hajj

Pilgrim Travel Cost (Bipih). BPIH is the overall cost of organising the pilgrimage (including direct and indirect costs). Meanwhile, Bipih is a fee that prospective regular pilgrims must pay without indirect costs. Based on Figure 2, the development of BPIH has continued to increase to reach 60 to 70 million rupiah. At the same time, Bipih has been set the same in the last three years (2017-2019), nearly 50% of BPIH has been subsidised by BPKH through optimising the value of benefits from managing Hajj funds. As of two years after the departure of the pilgrimage was stopped, namely in 2022, BPIH has increased significantly. If this continues without being accompanied by an increase in Bipih and the value of benefits, it poses a sustainability problem in the finances of the Hajj.

Based on the statement above, the study of optimising the management of Hajj funds through the best investment scenario is crucial. This aims to ensure that BPKH's investments generate optimal returns and create sustainability in managing Hajj finances. Studies on the management of Hajj funds in Indonesia have been discussed in previous literature. Sopiatunniqmah (2020) examined the risks and returns associated with managing Hajj funds in Indonesia in 2019 using the Single Index Model approach. Meanwhile, Setyawan et al. (2020) adopted the Markowitz approach and identified three BPKH Indonesia portfolio scenarios for the period of 2017-2019. Additionally, Witjaksono and Hamzah (2021) presented the results of their analysis using Strategic Asset Allocation in the management of Hajj funds in Indonesia for the period of 2018-2019.

The novelty of this research lies in the investment period and instruments used to determine the optimal investment scenario for Hajj funds in Indonesia. This research was conducted from 2018 to 2022 using Shariah deposits, shares, corporate Sukuk, government Sukuk, gold, and direct investments, which were analysed using the Markowitz approach. Furthermore, this research examines the combination of investment composition, divided into two conditions: without investment rule restrictions and with investment rule restrictions based on PP No. 5/2018 concerning Hajj Fund Management. In investment allocations without regulatory restrictions, each objective will be arranged in three scenarios, namely conservative, moderate, and aggressive, which are arranged based on the risk of each asset. Accordingly, this research is expected to provide new insights for BPKH regarding optimal investment portfolio composition scenarios and become an additional reference in evaluating the performance of Hajj financial management.

LITERATURE REVIEW

Optimal Portfolio

An optimal portfolio is one with the best combination of expected return and risk (Hartono, 2014a). One of the best-known optimal portfolio theories is the Markowitz model (Markowitz, 1952), a theory of investment diversification. Markowitz's portfolio theory assumes investors make investment decisions based on expected returns and portfolio risk.

In forming the optimal portfolio, several previous studies have considered using cardinal constraints and specific stock weights as a diversification strategy in portfolio optimisation (Siew et al., 2019; Mendoca et al., 2020; dan Razak et al., 2014). Mansini et al. (2015) mentioned that at least three kinds of constraints are commonly used in diversification strategies. This includes Threshold constraints or specific stock weight constraints, which are restrictions placed on the weight of each stock in the portfolio. Meanwhile, Cardinality constraints are restrictions on the number of stocks that can be selected in a portfolio. At the same time, logical constraints are constraints that determine the relationship between assets, forcing selection or exclusion based on certain preferences.

Return and Risk

Every investment comes with both returns and risks. Return on investment is the acquisition of profits on investments made by investors. Two types of returns that need to be considered are the

expected return or the rate of return calculated and identified at the beginning of the investment. It also includes the realised return or the rate of return actually received at the end of the investment period (French, 2019).

Meanwhile, the risk is the opportunity for the emergence of undesirable results (Witjaksono et al., 2020). In investment science, Tandelilin (2017) argued that risk is the possibility of the difference between the actual return received and the expected return. From an Islamic perspective, the rate of return and risk are explained in the Shariah rule *Al ghunmu bil ghurmi*; namely, the return is always accompanied by risk. The point is that someone who receives benefits should bear the risks that follow (Adinugraha, 2017).

Hajj Funds and Benefit Value

The Hajj Fund is a deposit fund for the costs of organising the Hajj, the Hajj implementation efficiency fund, the eternal fund of the ummah, as well as the value of benefits controlled by the state in the context of organising the Hajj and implementing program activities for the benefit of Muslims. The benefit value is the funds obtained from the results of the Hajj fund development through placement or investment. The optimal value of benefits can be observed through yields and the results of Hajj financial management through placements and investments made by BPKH. Based on Law 34 of 2014, BPKH is mandated to provide optimal value for pilgrims and the ummah. Furthermore, BPKH must be able to provide high returns or yields by allocating Hajj finance at above-average levels but still at low risk (Witjaksono et al., 2020).

BPKH Hajj Fund Investment

Hajj Financial Investment is an activity that involves investing BPKH's financial resources in business activities that comply with Shariah principles, laws, and regulations. These investments are made after thoroughly analysing the potential risks and benefits. The goal is to optimise the value of managing Hajj funds to benefit stakeholders, especially Indonesian pilgrims (Witjaksono et al., 2020).

In their study on investment management of Hajj funds in Indonesia, Setyawan et al. (2020) used the Markowitz approach. They identified three scenarios for BPKH portfolios, which comprised deposit instruments, shares, Sukuk, and the real sector. Meanwhile, Sopiatunniqmah (2020) employed the Single Index Model approach and discovered that five out of eight investment instruments were capable of producing an optimal portfolio for BPKH Hajj fund investments, including Sukuk Dana Haji Indonesia – Dana Abadi Umat (SDHI – DAU), Sukuk Dana Haji Indonesia (SDHI), Reksa Dana Syariah Terproteksi (RDST), Corporate Sukuk, and Surat Berharga Syariah Negara – USD (SBSN – USD). Using the Strategic Asset Allocation method, Witjaksono dan Hamzah (2021) stated that investments in Shariah banking deposits and gold are riskless assets and the best investment instruments, while investments in shares and Sukuk are 47.62% and 52.38%, respectively. By following this composition, the resulting portfolio benefit value can be higher than the average depreciation of the Rupiah exchange rate against the US Dollar (Witjaksono et al., 2020).

METHODOLOGY

This study uses a quantitative approach with a linear programming method to determine the optimal investment scenario for managing the Indonesian Hajj fund. The data analysis techniques in this study were processed through the construction of a portfolio simulation conducted by the Markowitz method with the following stages (Hartono, 2014b):

1. Calculating the return (Ri) of each investment instrument.
2. Calculating the expected return E (Ri) for each investment instrument.

3. Calculates the standard deviation of each investment instrument.
4. Calculating the matrix variances of investment instruments.
5. Determine the proportion of each investment instrument, which can be determined using the optimisation solution method through the Solver feature in Microsoft Excel.

The function of the objectives set out in this study is, among others, to 1) maximise the expected return, 2) minimise risks, and 3) maximise the Sharpe ratio. Each objective is prepared in two circumstances, namely, without using the limitations of government regulation and with the limitations of PP No. 5/2018 concerning Hajj Fund Management. In the allocation without regulatory constraints, each objective is divided into three scenarios, namely conservative, moderate, and aggressive, constructed using a combination of constraints placed on each asset in the portfolio. From the solver application, the optimal expected return ($E(Rp)$) and portfolio risk ($\boldsymbol{\sigma_p^2}$) is obtained:

$$E(Rp) = \sum_{i=1}^{n}(\boldsymbol{W_i} - \boldsymbol{E}\ (\boldsymbol{R_i})), \quad (1)$$

$$\boldsymbol{\sigma_p^2} = \sum_{i=1}^{n}\sum_{j=1}^{n}(\boldsymbol{W_i} - \boldsymbol{E}\ (\boldsymbol{R_i})). \quad (2)$$

Data collection techniques are obtained from secondary data used to support the analysis of optimal investment in BPKH. The data was collected from 2018 to 2022 on a monthly basis. Among the data that will be used are (1) Lembaga Penjamin Simpanan (LPS) interest rate; (2) Indonesia Sharia Stock Index (ISSI) in the Indonesia Stock Exchange (IDX); (3) Data on the outstanding value of corporate Sukuk; (4) Data on the outstanding value of government Sukuk; (5) Data of gold prices; and (6) Data of Net Operating Margin (NOM) from Islamic commercial banks in Indonesia Financial Services Authority (OJK). In addition, other supporting data comes from laws and regulations regarding the management of Hajj funds, as well as literature and journals from previous studies related to the research theme.

RESULT

Descriptive Statistics

In order to obtain optimal investment returns, the investor's risk profile must be mapped in advance with the aim that the investment instrument selected is in accordance with that profile (Witjaksono et al., 2020). Through the descriptive statistics, the risk and return profiles of each investment asset, namely Shariah deposit banking, stock, Sukuk, Shariah mutual funds, and gold, can be calculated.

Table 1: Descriptive statistics

Investment Instrument	Mean	Std. Deviation	Min.	Max.
Shariah deposit banking	0.43%	0.11%	0.29%	0.58%
Stock	0.31%	4.12%	-14.52%	9.73%
Corporate sukuk	1.76%	4.37%	-6.69%	15.71%
Government sukuk	1.53%	2.66%	-6.65%	7.75%
Gold	0.64%	3.05%	-5.31%	6.80%
Direct Investment	1.84%	0.49%	0.45%	2.72%

The expected return can be observed through the mean value, which indicates the expected rate of return for each investment instrument. A positive value on the expected rate of return suggests the potential for the instrument to create an optimal portfolio.

Based on Table 1, the highest expected yield is owned by direct investment at 1.84%. Returns on direct investments made abroad can be an additional source of income for BPKH to meet foreign currency needs in organising the Hajj pilgrimage. In addition, direct investment can serve as a hedge to overcome the weakening of the rupiah exchange rate with foreign currencies. That is why direct investment has the potential to generate high returns (Witjaksono et al., 2020). The risk level of each investment instrument is indicated by its standard deviation. In Table 1, Shariah deposit banking is included in the low-risk asset category with a standard deviation of 0.11%. Even though there is a possibility of default, Shariah banking has been guaranteed by the Deposit Insurance Agency (LPS). This causes a low possibility of loss from the risk of default in Shariah banking.

Thus, by knowing the yield and risk profile of each investment instrument, BPKH can improve Hajj's financial management in Indonesia in the future. Through an optimal Hajj fund management strategy, the investment fund placement is expected to achieve optimal benefit values.

Best Investment Composition without Regulatory Restrictions on BPKH Hajj Fund Management

After knowing the return and risk profile of each instrument, the next step is to determine the allocation of funds to be invested in each asset class. Based on the Markowitz portfolio model, a diversification strategy can be implemented to achieve investment purposes, namely to maximise returns at a certain level of risk or minimise risk at a certain level of return (Witjaksono et al., 2020). In this case, the researchers set three types of investment purposes as the basis for compiling the best investment composition in Hajj fund management, namely: 1) investment portfolio with maximum returns, 2) investment portfolio with minimal total risk, and 3) investment portfolio by maximising the Sharpe ratio.

In an allocation without regulatory restrictions, each objective will be divided into three scenarios, namely conservative, moderate, and aggressive, which are prepared using a combination of the limitations given to each asset in the portfolio. This limit indicates that the asset weight should not exceed or be less than a certain predetermined value to limit risk and ensure the portfolio is not too focused on one particular asset or sector (Nirmala et al., 2020).

In compiling the optimal portfolio, several assumptions in this research include that the managed funds to be invested have been reduced by two times the BPIH to meet liquidity needs in accordance with PP No. 5 of 2018. Note that the total investment weight is 100%, and the minimum weight for each asset is 0%. Meanwhile, asset weight constraints for each investment objective are determined based on the investor's risk profile and the risk of each asset, including:

1. Conservative: The maximum allocation for Shariah deposits is 30%; the maximum allocation for direct investment is 20%; the government Sukuk's weight is greater than the weight for direct investment.
2. Moderate: The maximum allocation for Shariah deposits is 20%; the maximum allocation for direct investment is 25%; the gold weight is greater than the weight of government Sukuk.
3. Aggressive: The maximum allocation for Shariah deposits is 10%; the maximum allocation for direct investment is 30%; the corporate Sukuk weight is greater than that for the government Sukuk.

The following are the outcomes of allocating investment instruments without regulatory restrictions after applying the established constraints.

Table 2: Allocation of investment assets without limitation of government regulation

	Purpose		Maximising Returns					
	Annual	**Monthly**	**A**	**B**	**C**	**D**	**E**	**F**
			Conservative					
Return	21.12%	1.76%						
Risk	71.28%	5.94%	0%	0%	100%	0%	0%	0%
Sharpe	0.30	0.30						
			Moderate					
Return	21.36%	1.78%						
Risk	53.52%	4.46%	0%	0%	75%	0%	0%	25%
Sharpe	0.40	0.40						
			Aggressive					
Return	21.36%	1.78%						
Risk	49.2%	4.17%	0%	0%	70%	0%	0%	30%
Sharpe	0.43	0.43						
	Purpose		**Minimising Risks**					
	Annual	**Monthly**	**A**	**B**	**C**	**D**	**E**	**F**
			Conservative					
Return	12.36%	1.03%						
Risk	12.04%	1.04%	30%	8%	3.5%	22%	16%	20%
Sharpe	0.99	0.99						
			Moderate					
Return	13.32%	1.11%						
Risk	13.8%	1.15%	20%	8.5%	4.5%	21%	21%	25%
Sharpe	0.96	0.96						
			Aggressive					
Return	13.92%	1.16%						
Risk	19.8%	1.65%	10%	12%	14%	28%	21%	14%
Sharpe	0.70	0.70						
	Purpose		**Maximising Sharpe Ratio**					
	Annual	**Monthly**	**A**	**B**	**C**	**D**	**E**	**F**
			Conservative					
Return	12.84%	1.07%						
Risk	12.72%	1.06%	30%	6%	5%	24%	14%	20%
Sharpe	1.01	1.01						
			Moderate					
Return	13.68%	1.14%						
Risk	14.04%	1.17%	20%	6%	7%	21%	21%	25%
Sharpe	0.97	0.97						
			Aggressive					
Return	16.08%	1.34%						
Risk	21.24%	1.77%	10%	6%	21%	28%	13%	21%
Sharpe	0.76	0.76						

*Notes: Shariah Deposit Banking (A), Stock (B), Corporate sukuk (C), Government sukuk (D), Gold (E), Direct investment (F)

Based on the Markowitz model simulation results, the first purpose is to maximise portfolio returns. For this purpose, corporate Sukuk and direct investment dominate the allocation of investment funds. Based on Table 1, these two instruments have a higher expected rate of return than other instruments. However, the risk difference between the two instruments is very significant. Corporate Sukuk, as the instrument with the greatest risk, has investment risks, including interest rate, default, and maturity risks. Meanwhile, direct investment has a low level of risk as it is proxied by investment in Shariah banking, which tends not to experience fluctuations. This proxy was selected in accordance with one of the direct investments made by BPKH, namely

capital participation or investment in PT Bank Muamalat Indonesia Tbk. Of the three investment scenarios, the expected return for conservatives is 21.12%, and for moderate and aggressive scenarios, it is 21.36%.

For the second purpose, the investment composition is meant to minimise the level of portfolio risk. Based on Table 1, Shariah deposits, direct investment, and government Sukuk have a lower level of risk than other instruments. Note that Shariah deposits are assets with the lowest level of risk; hence, they have the potential to produce an optimal portfolio with a low level of risk. Suppose BPKH chooses a lower or conservative risk profile. In that case, the level of investment placement in deposits is 30% and continues to decrease according to the investor's risk profile to 20% in the moderate scenario and 10% in the aggressive scenario. The low level of risk in government Sukuk is due to the state guarantee of both principal payments and returns. Therefore, currently, government Sukuk is still the main focus of BPKH's allocation of Hajj funds. At the same time, it can contribute to supporting Anggaran Pendapatan dan Belanja Negara (APBN) financing and developing the Shariah financial market in Indonesia (OJK, 2022).

Furthermore, the third purpose attempts to obtain the highest Sharpe ratio, one of the ratios used to measure portfolio performance, by comparing the level of return with the level of risk. The higher the Sharpe ratio, the better the portfolio performance (Tandelilin, 2010). In a conservative scenario, Shariah deposits dominate the allocation of investment funds, followed by government Sukuk, direct investment, gold, stocks, and corporate Sukuk. This scenario has a Sharpe ratio of 1.01, producing an expected return of 12.84% with a risk of 12.72%. The level of portfolio return will increase when the weight of placements in Shariah banking is reduced and distributed proportionally to Sukuk, gold, and direct investment. In the moderate scenario, direct investment dominates the portfolio after the allocation to Shariah deposits is reduced and distributed. This scenario has a Sharpe ratio of 0.97 and produces an expected return of 13.68% with a risk of 14.04%. This scenario is in accordance with BPKH's investment characteristics, which consider acceptable levels of return and risk, as well as BPKH's risk profile, which is low to moderate. Furthermore, in the aggressive scenario, government Sukuk dominates the portfolio after the allocation to Shariah deposits and direct investment is reduced and distributed. This scenario has a Sharpe ratio of 0.76 and produces an expected return of 16.08% with a risk of 21.24%.

Based on several investment scenarios above, this research considers a moderate scenario to maximise the Sharpe ratio as an optimal portfolio in accordance with the characteristics of BPKH's risk profile, which is low to moderate. Hence, it is hoped that this scenario can be an alternative for BPKH in achieving the projected double-digit yield in 2034 by increasing the portion of direct investment, both at home and abroad.

Best Investment Composition Based on Government Regulation on BPKH's Hajj Fund Management

The planning of Hajj fund management by BPKH has been declared in accordance with applicable rules and laws (Mubarak & Fuhaidah, 2018). In managing the allocation of Hajj funds, BPKH refers to PP No. 5/2018, which will require investment limits in compiling the best investment composition in this study.

Among the contents of the regulations are: 1) Hajj financial placements can be in the form of Shariah banking products, securities, gold, direct investment, and other investments; 2) Allocation of funds for Shariah banking products is a maximum of 30% after previously being 50% in the first three years after BPKH was formed; 3) Maximum gold investment of 5%; 4) Maximum direct investment of 20%; 5) Other investments up to 10%; and 6) Investment allocation for Shariah securities is the remainder of the difference in the total placement of Hajj fund in Shariah banking with investment in the form of gold, direct investment, and other investments.

Based on these regulations, the results of preparing an optimal portfolio are formed with constraints that adapt to the requirements contained in government regulations. These limitations include:

1. The total investment weight is 100%, and the minimum weight for each asset is 0%.
2. Allocation to Shariah deposits is a maximum of 30%.
3. Allocation to gold is a maximum of 5%.
4. Allocation to direct investment is a maximum of 20%.

The following are the outcomes of allocating investment instruments based on regulatory restrictions after applying the established constraints.

Table 3: Allocation of investment assets based on PP No. 5/2018

	Purpose		**Instrument Allocation Weight**					
	Annual	**Monthly**	**A**	**B**	**C**	**D**	**E**	**F**
			Maximising Returns					
Return	20.8%	1.73%						
Risk	54.3%	4.52%	0.00%	0.00%	76.00%	0.00%	0.00%	24.00%
Sharpe	0.38	0.38						
			Minimising Risks					
Return	12.9%	1.08%						
Risk	14.1%	1.18%	30.00%	13.00%	6.00%	26.00%	5.00%	20.00%
Sharpe	0.92	0.92						
			Maximising Sharpe Ratio					
Return	13.5%	1.12%						
Risk	14.4%	1.20%	30.00%	9.00%	8.00%	28.00%	5.00%	20.00%
Sharpe	0.94	0.94						

*Notes: Shariah Deposit Banking (A), Stock (B), Corporate sukuk (C), Government sukuk (D), Gold (E), Direct investment (F)

Through government regulations, investment allocation has been diversified across many instruments to reduce the potential risk of failure or portfolio loss, support BPKH's vision regarding the benefit of the people and contribute to the development of the Republic of Indonesia. In simulation, the first purpose produces a greater expected return than the second and third objectives. At the same time, the risks are also greater than other goals. Likewise, investment allocation is limited to two types of financial instruments: corporate Sukuk and direct investment. Therefore, by adjusting BPKH's investment characteristics to consider returns and risks, the third purpose (maximising the Sharpe ratio) can be an option to achieve BPKH's 2-digit return target before deducting BPKH's operational costs.

Understanding asset risk and return behaviour underlie optimal investment strategies (Ahmad et al., 2020). In connection with BPKH's responsibilities regarding funds belonging to prospective Hajj pilgrims on the waiting list, BPKH looks for investments with low or moderate risk (Witjaksono et al., 2020). This explains why BPKH has not invested in stock instruments until now since the risks are quite large, and historically, stock prices have not been good, and they are experiencing losses. On the other hand, BPKH's risk appetite is in accordance with the characteristics of Sukuk, a tax-exempt investment instrument that is fully safe and guaranteed by the government.

The Sukuk market is the fastest-growing Islamic financial market, where the price is based on the value of the underlying asset (Ahmad et al., 2020). Apart from that, in terms of maturity period and disbursement method, Surat Berharga Syariah Negara (SBSN)−National Islamic Securities is also considered relatively suitable for meeting BPIH's liquidity every year (Abidin, 2016). That is why, until now, Sukuk has always been the main preference for investing in Hajj

funds. As for the benefit side, both state Sukuk and corporate Sukuk have become sources of financing for the development of several Hajj infrastructure projects, one of which is the revitalisation of Hajj dormitories (Abidin, 2016). This supports BPKH's vision of providing for the benefit of Muslims.

Through PP No. 5 of 2018, investment allocation with regulatory restrictions has indirectly supported Markowitz's theory regarding diversification, namely allocating funds to several instruments to reduce the risks that will be borne. However, in portfolios without the restrictions of PP No. 5 of 2018 regulations, investment allocation can also be diversified within the limits set by researchers. With these limitations, the allocation to each instrument is expected to produce optimal benefit value after considering the opportunities and challenges.

Table 4: Comparison of portfolios without regulatory restrictions with regulatory restrictions (PP No. 5 of 2018) for the aim of maximising sharpe

Asset	Without Restrictions			PP 5/2018
	Conservative	Moderate	Aggressive	
A	30%	20%	10%	30%
B	6%	6%	6%	9%
C	6%	7%	21%	8%
D	24%	21%	28%	28%
E	14%	21%	14%	5%
F	20%	25%	21%	20%
Total	100%	100%	100%	100%
Exp. Return	12.84%	13.68%	16.08%	13.5%
Risk	12.72%	14.04%	21.24%	14.4%
Sharpe ratio	1.01	0.97	0.76	0.94

Basically, the purpose of maximising the Sharpe ratio can be further optimised according to moderate scenarios in portfolios without the restrictions of PP No. 5 of 2018 regulations. Even though the difference in expected return in the moderate scenario is only 0.18 larger, it can be observed from the risk level that there is a decrease of 0.36. In this portfolio, several allocations have experienced increases and decreases in weight. Gold instruments increased significantly to 21%, and direct investments increased by 5%. This increase came from reducing the weight in the allocation of Shariah deposits by 10%, shares by 3%, corporate Sukuk by 1%, and government Sukuk by 7%. Note that these allocations are obtained from asset weight constraints determined based on the investor's risk profile and the risk of each asset.

In his research, Nazari (2013) revealed that Hajj financial management in Indonesia can be improved in accordance with the need to analyse probability strategies for optimising Hajj funds. Gunawan (2023) has studied the comparison of asset allocation strategies and recommendations for the performance of Hajj funds and discovered that there is an increase in the value of the benefit of Hajj fund management in the range of 2011–2016 (Hajj funds managed by the Ministry of Religion) to 2017–2021 (Hajj funds managed by BPKH). When the Ministry of Religion managed Hajj funds, the value of the benefits obtained was still below banking interest rates since more than 50% of the portion of funds for prospective pilgrims was placed in the banking sector. As in 2017, Hajj funds were only allocated to two instruments, namely 65% in savings/deposit and 35% in Sukuk.

When BPKH took over the management of Hajj funds, the value of the benefits it produced far outweighed bank interest rates. In 2018, the proportion of Hajj funds placed in Shariah banking reached 50%, and the proportion in the investment sector will become more differentiated. Likewise, in 2020, after the proportion of Hajj funds placed in Shariah banking is reduced to 30% and focused on Sukuk and direct investment, the value of the benefits will be even better. Thus, by implementing investment diversification and adjusting the level of risk tolerance and expected returns, BPKH will achieve optimal benefits.

CONCLUSION

This research provides further empirical evidence regarding the significance of portfolio diversification, especially how to allocate assets optimally in a portfolio. Using the Markowitz method, this research discovered a different composition of investment instruments for each purpose, where each purpose was divided into two states: without using government restrictions and with government restrictions.

In investment allocations without government restrictions, each purpose are arranged in three scenarios, namely conservative, moderate, and aggressive, which are arranged based on the risk of each asset. Investment allocation without government restrictions forms an optimal portfolio for the third objective, maximising the Sharpe ratio in a moderate scenario. This is in accordance with BPKH's investment characteristics, which consider acceptable levels of return and risk, as well as BPKH's risk profile, namely low to moderate. In a moderate scenario to maximise Sharpe, the portfolio produces a return of 13.68%, a risk of 14.04%, and a Sharpe ratio of 0.97. The investment allocation is based on government regulations with the same objective, namely maximising the Sharpe ratio, resulting in a return of 0.18 lower, namely 13.5% per year, a risk of 0.36 higher, namely 14.4%, and a Sharpe ratio of 0.03 lower, or 0.94. This difference suggests that BPKH can re-optimise the benefit value by considering the optimal portfolio in a moderate scenario to maximise the Sharpe ratio, which has been discovered in this research.

Based on research findings, BPKH is expected to be able to implement optimal investment allocation of Hajj funds through various financial instruments based on the best combination of returns and risks or based on previously stated investment targets. For further research, it is hoped that it can examine and compare the management of Hajj funds in various countries. Furthermore, researchers can also attempt to observe research objects using different and better approaches, which are open to conditions of development and time.

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REFERENCES

Abidin, M. Z. (2016). Analisis investasi dana haji dalam pembiayaan infrastruktur dan peningkatan kualitas penyelenggaraan ibadah haji. *Harmoni*, *15*(2), 152–164. https://jurnalharmoni.kemenag.go.id/index.php/harmoni/article/view/38

Adinugraha, H. H. (2017). Penerapan kaidah al-ghunm bi al-ghurm dalam pembiayaan mushārakah pada perbankan Syariah. *Economica: Jurnal Ekonomi Islam*, *8*(1), 81–102. https://doi.org/10.21580/economica.2017.8.1.1827

Ahmad, N., Hashim, N. H., & Abd Rahim, S. (2020). Is sukuk market efficient? Evidence from the Malaysian sukuk market. *The Journal of Muamalat and Islamic Finance Research.*, *17*(2), 32–43. https://doi.org/10.33102/jmifr.v17i2.292

Badan Pengelola Keuangan Haji (BPKH). (2021). *Annual Report BPKH 2021*.

French, N. (2019). Predicted property investment returns: risk and growth models. *Journal of Property Investment & Finance*, *37*(6), 580–588. https://doi.org/10.1108/jpif-07-2019-0096

Gunawan, I. (2023). *Komparasi strategi aset alokasi dan rekomendasi kinerja dana haji*.

Hartono, J. (2014a). *Teori portofolio dan analisis investasi*. Yogyakarta: BFE-Yogyakarta.

Hartono, J. (2014b). *Teori dan praktik portofolio dengan excel*. Jakarta Selatan: Salemba Empat.

Mansini, R., Ogryczak, W., & Speranza, M. G. (2015). Linear and mixed integer programming for portfolio optimization. In *Edition: EURO Advanced Tutorials on Operational Research, volume 1*. Springer: Switzerland.

Markowitz, H. M. (1952). Portofolio Selection. *The Journal of Finance*, *7*(1), 77–91. https://doi.org/10.2307/2975974

Mendoca, G. H. M., Ferreira, F. G. D. C., Cardoso, R. T. N., & Martin, F. V. C. (2020). Multi attribute decision making applied to financial portofolio optimization problem. *Journal of Expert System with Application, 158, 113527*. https://doi.org/10.1016/j.eswa.2020.113527

Mubarak, M. A., & Fuhaidah, U. (2018). Manajemen pengelolaan dana haji republik Indonesia (Studi kolaborasi antar lembaga BPKH, KEMENAG, dan mitra keuangan dalam pengelolaan dana haji). *Iltizam Journal of Shariah Economic Research*, *2*(2), 67–88. https://doi.org/10.30631/iltizam.v2i2.165

Nazari, R. (2013). Bank Haji Indonesia: Optimalisasi pengelolaan dana haji untuk kesejahteraan jamaah haji Indonesia (Sebuah Gagasan). *Jurnal Khazanah*, *6*(1), 13–26. https://doi.org/10.20885/khazanah.vol6.iss1.art2

Nirmala, A., Darmawan, A., & Herliansyah, M. K. (2020). Optimasi portofolio dengan modified risk measure mempertimbangkan batasan kardinalitas dan bobot saham. *In Seminar Nasional Informatika (SEMNASIF)*, *1*(1), 111–122.

Otoritas Jasa Keuangan (OJK). (2022). *Laporan perkembangan keuangan Syariah Indonesia (LPKSI)*. https://ojk.go.id/id/kanal/syariah/data-dan-statistik/laporan-perkembangan-keuangan-syariah-indonesia/Documents/LAPORAN%20PERKEMBANGAN%20KEUANGAN%20SYARIAH%20INDONESIA%202022.pdf

Pemerintah Pusat. (2014). *Undang-Undang Nomor 34 Tahun 2014 Tentang Pengelolaan Keuangan Haji*.

Pemerintah Pusat. (2018). *Peraturan Pemerintah Nomor 5 Tahun 2018 tentang Pelaksanaan Undang-Undang Nomor 34 Tahun 2014 tentang Pengelolaan Keuangan Haji*.

Razak, N. B. A., Kamil, K. H., & Elias, S. M. (2014). Linear versus quadratic portfolio optimization model with transaction cost. *International Conference on Mathematical Sciences*, *3*, 533–540. https://doi.org/10.1063/1.4882537

Reuters, T., & DinarStandard. (2017). *Hajj and umrah: Development and opportunities*. Dubai : Thomson Reuters.

Setyawan, A., Wibowo, H., & Kamal, M. (2020). Analysis of optimization model of haji financial investment portfolio in BPKH RI (Haji Financial Management Agency of the Republic of Indonesia). *Jurnal Ekonomi Dan Perbankan Syariah*, *8*(1), 5–27. https://doi.org/10.46899/jeps.v8i1.173

Siew, L. W., Jaaman, S. H., & Hoe, L. W. (2019). Mathematical modelling of risk in portfolio optimization with mean-gini approach. *Journal of Physics: Conference Series, 1212, 012031*. https://doi.org/10.1088/1742-6596/1212/1/012031

Sopiatunniqmah. (2020). *Optimalisasi investasi dana haji menggunakan single index model pada Badan Pengelola Keuangan Haji* [(Bachelor's thesis, Fakultas Ekonomi dan Bisnis, UIN Jakarta)]. http://repository.uinjkt.ac.id/dspace/handle/123456789/52016

Tandelilin, E. (2010). *Portofolio dan investasi (Teori dan Aplikasi)*. Edisi Pertama. Kanisius: Yogyakarta.

Tandelilin, E. (2017). *Analisis investasi dan manajemen portofolio*. Yogyakarta: BFE-Yogyakarta.

Witjaksono, B., & Hamzah. (2021). Optimum of strategic asset allocation for Indonesian Hajj fund. *Jurnal Ilmu Ekonomi*, *10*(2), 195–208. https://doi.org/10.15408/sjie.v10i2.20020

Witjaksono, B., Harto, P. P., & Wibowo, H. & Suprapto, E. (2020). *Apa & bagaimana investasi keuangan haji BPKH*. Badan Pengelola Keuangan Haji.