Global Journal of Engineering Science and Research Management

INVESTMENT DECISION MAKING IN SHARIA BANKING IN INDONESIA USING ANALYTICAL HIERARCHY PROCESS (AHP) METHOD

Sarwani*, B Hasmanto
* Graduate Lecturer of Pamulang University

ABSTRACT
This research aims at obtain a picture of the decision to invest in shariabanking. Acombination of qualitative and quantitative approaches was used. The qualitative approach was used to measure the comparisons between the factors that influenced the decision making and the list of references from the primary data, while the quantitative approach was used to rank the hierarchy and calculate the weight of each criterion by using the AHP method. The quantitative data were financial ratios of Non-Performing Financing, Provisioning Allowance Earning Assets, and Risk Weighted Assets. The results showed that of three sharia banks that were the samples, the priority weight value for BNI Syariah Bank was 0.51, Mandiri Syariah Bank 0.19, and BRI Syariah Bank 0.31. It can be concluded that BNI Syariah Bank had the highest priority weight value (0.51).

INTRODUCTION
Sharia banks are competing to create new products and competitive sharia services with international banking quality for customers and global investors to survive in the international business arena. Sharia banking products are now far more complex. Consequently, the risks they contain (inherent risks) are higher compared to non-bank financial institutions. The complexity can be seen from the extensivenessof business activities carried out by sharia banks including the basic functions of banks as financial institutions (depository financial institutions) and channel them in the form of loans and investments as a form of intermediary function.

As a depository financial institution, sharia banks have permission to raise funds directly from the public in the form of deposits in the form of mudarabah demand deposits, savings (*wadiah* deposits), and mudarabah deposits. Funds obtained can then be allocated into assets in the form of loans and investments. The intermediation function starts from raising funds from the first party, namely funds placed by bank owners; the second party, which originates from a bank or other financial institution; and especially from the third party, namely funds from the community; and then channel them to individuals or institutions who need them. The failure of a sharia bank (partial or total failure), similar to a conventional bank, can have an impact on the economy as a whole and is referred to as Systemic Risk.

Sharia banks also face other unique risks that arise because the contents of the sharia bank balance are different from conventional banks. In this case, profit and loss sharing by sharia banks adds to the possibility of other risks arising such as withdrawal risk, and displaced commercial risk.

Based on the explanation, this research aims at obtaining an overview of making decisions about investing in sharia banking. The financing indicators in this research are data of Non-Performing Financing (NPF), Provisioning Allowance Earning Assets (PAEA) and Risk Weighted Assets (RWA) obtained from the quarterly financial reports published through the Financial Services Authority (FSA) website. To compare the importance of each indicator variable (NPF, PAEA and RWA), professional judgment was used and obtained from online questionnaire given toselected respondents using Google-Form application. The online questionnaire was used considering time, distance, and mobility of the respondents.

The objectsof this research are companiesin the shariabanking industry that has the status of a Sharia Commercial Bank owned by a State-Owned Enterprise, which havebeen operating for more than one year and have published

---

their financial statements that ended onDecember 31, 2016. Based on the criteria, three sharia banks met the sampling requirements, namely BNI Syariah Bank, Mandiri Syariah Bank, and BRI Syariah Bank.

THEORY

Financing management and risks
Financing is a type of investment activity that often becomes a big problem for banks, thusit can be said that bank business is strongly influenced by the success of banks in managing financing and managing Investment Risks. To measure bank risk in general, the methods are: the standard approach (Risk Weighted Asset) that measures risk based on certain established criteria and applied uniformly for all banks, and the internal approach that measures risk based on the specific risk potential of each bank.

The requirement for Indonesian banks to carry out risk management is stipulated by the Regulation of the Financial Services Authority Number 65/POJK.03/2016 concerning Application of Risk Management for Sharia Commercial Banks and Sharia Business Units.

Management of Non-Performing Financing (NPF)
Non-Performing Financing (NPF) arises due to delinquency in payment of financing by debtors. On the other hand, banks experience a dilemma between continuing to expand financing or channeling funds at safer levels, such as the Financial Services Authority (FSA) Certificate which has a small risk.

The calculation of NPF is determined based on problem financing before deducting the allowance for possible losses on assets that have been reserved by each bank. Lower NPF is better because the amount of financing that is problematic or stalled in the bank is getting smaller, and vice versa, the higher the NPF of a bank, the greater the problematic or stalled financing. The formula of NPF is as follows:

$$NPF = \frac{Non-Performing\ Financing}{Total\ Financing} x\ 100\%$$

(1)

Management of Provisioning Allowance Earning Assets (PAEA)
The amount of allowance for possible losses on earning assets will reflect the quality of earning assets. The greater the allowance for possible losses on earning assets, the quality of earning assets is lower. OJK requires national banks to establish PAEA. PAEA established for financing is in the form of General and Special Reserves. The amount of general reserves is at least 1% of financing with smooth quality, while special reserves are:

- 5% for financing under Special Supervision quality after deducting collateral value
- 15% for financing with Sub-standard quality after deducting collateral value
- 50% for financing with doubtful quality after deducting collateral value
- 100% for financing with Loss quality after deducting collateral value

PAEA derived from financial statements must be made into a ratio using the following formula:

$$\%\ PAEA = \frac{PAEA}{Total\ Assets}$$

(2)

Management of Risk-Weighted Assets (RWA)
RWA are balance sheet assets and some items in the off balance sheet that are weighted according to the level of inherent financing risk. In Indonesia, the risk weight is based on the provisions of the OJK which is based on the Basel Committee. Determining risk weight with the consideration that the 0% risk weighted value is defined as productive assets without risk. Increasing weighting figures indicate the likelihood of increasing default. RWA can be calculated by the following formula:

Global Journal of Engineering Science and Research Management

$$\% RWA = \frac{RWA}{Earning\ Assets\ Related\ and\ Not\ Related}$$

(3)

Analytical Hierarchy Process (AHP)
In solving problems using the AHP method, there are several basic principles of the AHP method as follows:
1.1.1. Principle of decomposition. The Decomposition Principle describes the problem in a hierarchical manner that is dividing the problem into separate elements. To obtain more accurate results, these elements are solved again until it is impossible to do further solutions, so that they are obtained in several levels.
1.1.2. Synthesis of priority. The preparation and setting priorities are to determine the ranks according to the relative importance by making comparisons in pairs with these elements.
1.1.3. Logical consistency. Logical consistency is guaranteeing that all elements are grouped logically and ranked consistently according to logical criteria, including Pairwise Comparison, Pairwise Matrix Preparation (PM), Consistency Test, Weighting, Process of Hierarchy Analysis or Scoring, and Data Analysis Design.

RESEARCH METHOD
This research employed a combination of qualitative and quantitative approaches. The qualitative approach was used to measure relativity or comparison between the factors that influence decision making and a list of primary data. The quantitative approach was used to rank hierarchies and calculate the weighting of each criterion using the Analytical Hierarchy Process method.

FINDINGS
NPF (Non-Performing Financing) data
The NPF is based on Bank Indonesia Regulation Number 6/10/PBI/2004 dated April 12, 2004 concerning the Rating System for Commercial Banks, stipulating that the Non-Performing Loan (NPF) ratio is 5%, NPF Net calculation results is depicted in the following graph:
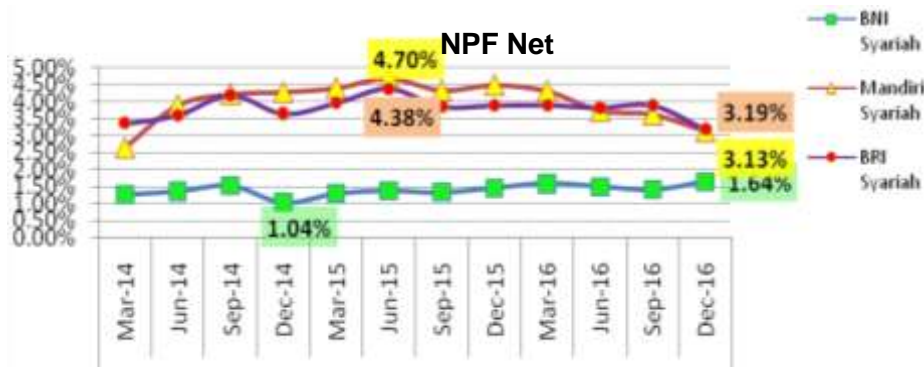
Source: Data processed based on the Bank's quarterly report for the 2014-2016 period.
Figure 1. Non Performing Financing

RWA (Risk Weighted Assets) data
RWA is a ratio that shows how much the total assets of a bank that contain risks (credit, investments, securities, bills to other banks) that are funded by their own capital in addition to obtaining funds from sources outside the bank, which affect the Capital ratio Adequacy Ratio (CAR) or bank capital adequacy.Thus in general, the smaller the RWA of a bank, the tighter the bank calculates the risk of assets.

The Bank's RWA and Minimum Capital data is depicted in the following data graph:

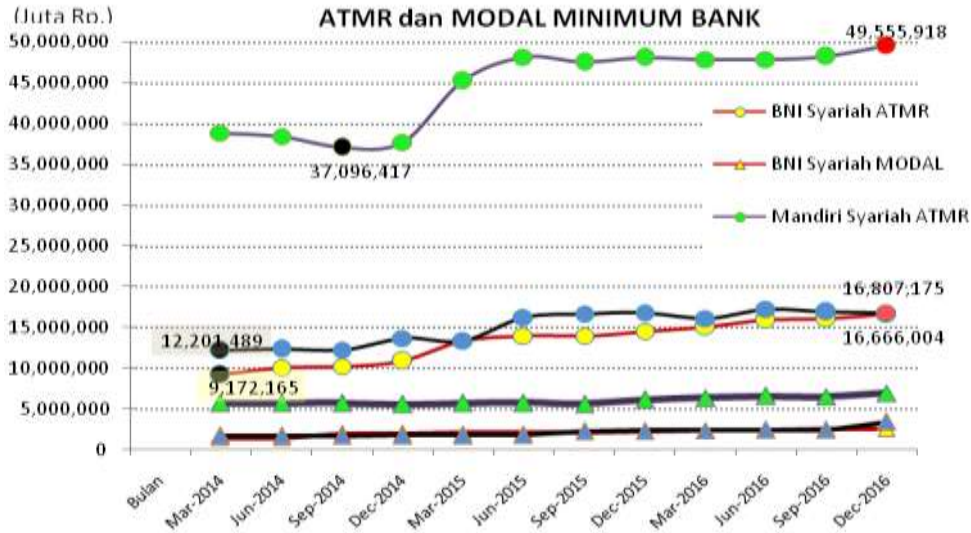Global Journal of Engineering Science and Research Management

Figure 2. Data on RWA and Minimum Capital

Provisioning allowance Earning Assets (PAEA) Data

PAEA is an attempt to allow the elimination of productive assets on the risk of loss of financing arising from a loss reserve that is formed to anticipate if a time for deletion of financing will occur. This is based on Bank Indonesia Regulation Number 13/13/PBI/2011 and DSN Fatwa Number 18/DSN/-MUI/IX/2000 concerning Earning Assets Backup in Islamic Financial Institutions, which are intended to reduce the risk of possible losses in financing given. The calculation for PAEA is based on the level of customer credit collectability, as follows:

- General PAEA :
  Current Financing = Earning Assets x 0.5%
- Special PAEA :
  - Substandard Financing = (Earning Assets x 10%) - Collateral Value
  - Doubtful financing = (Earning Assets x 50%) - Collateral Value
  - Financing Loss = (Earning Assets x 100%) - Collateral Value

To better understand the movement of managing PAEA values on RWA can be seen in the following figures.
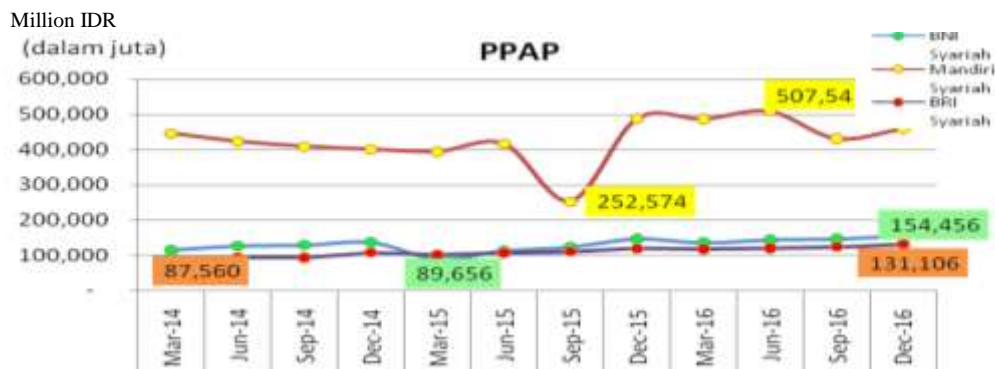
Source: Publication of the 2014-2016 Bank Three Months Report, processed by the compiler.
Figure 3. Three Months Report Data: PAEA Chart

G**lobal** J**ournal of** E**ngineering** S**cience and** R**esearch** M**anagement**
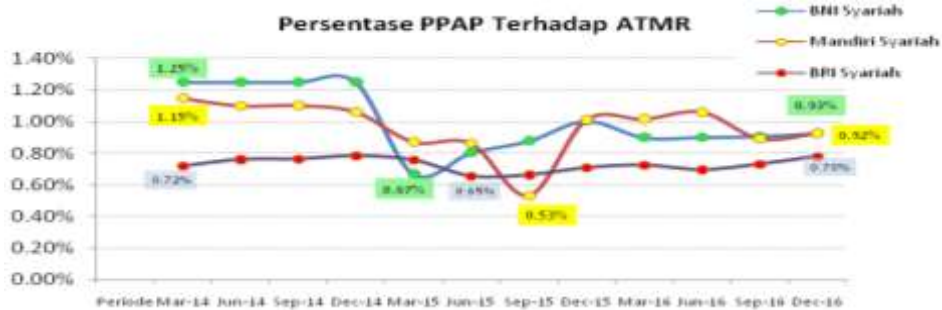

Figure 4. Percentage of PAEA on RWA (Three Months Report Data)

Funds from investors

In carrying out these fund raising activities, it can be ascertained that the management of each sharia bank in Indonesia will implement a strategy that is realized in the fund raising program. However, it must be admitted that the competition for public funds in the fund market is very tight, plus the increasingly rational attitude of the community. The following is the data on the average Third Party Fund Balance that can at can be seen in the Distribution Report on the Quarterly Reports of BNI Syariah Bank, Mandiri Syariah Bank, and BRI Syariah Bank.
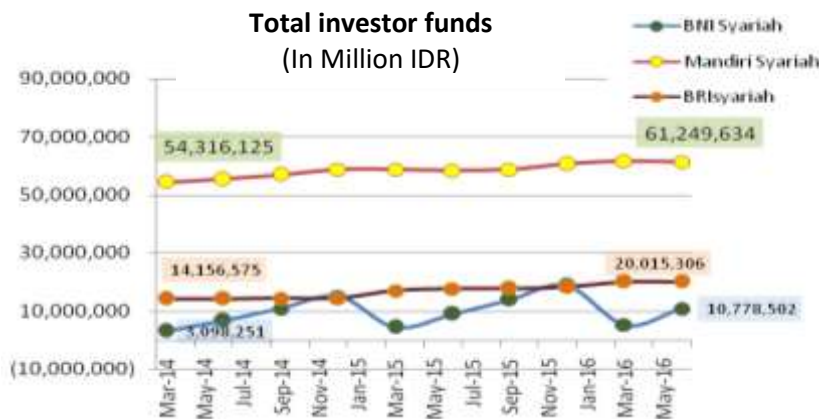
Source: Publication of the 2014-2016 Bank Quarterly Report, processed by the compiler.
Figure 5.Total Fund Data from investors

Determining of NPF, PAEA and RWA Weight

In determining the variable weights of NPF, PAEA, and RWA, survey were administered using Google Form in January to June 2018 to 42 selected respondents. The respondents' answers to the ratio of each NPF, PPAP and ATMR ratio are as follows:

- Comparison of NPF to PPAP = 68.4%: 31.6% = 1.75 (nearly double), which means that NPF is more important than PPAP or is 5 in accordance with the inter-criteria rating scale (Saaty, 2008).
- Comparison of PPAP to ATMR = 63.2%: 36.8% = 1.71 (less than 1.75), which means that PPAP is slightly more important than ATMR or value 3 according to the inter-criteria rating scale (Saaty, 2008).
- Comparison of NPF to RWA = 76.3%: 23.7% = 3.21 (larger than3), which means that NPF is more important than the RWA Ratio or is seven according to the inter-criteria rating scale.

Based on the survey results, the paired comparison tables are as follows:

Global Journal of Engineering Science and Research Management

Table 1. Pairwise Comparison

	NPF	PAEA	RWA
NPF	1	5	7
PAEA	1/5	1	3
RWA	1/7	1/3	1

Determining investment decisions based on NPF, PAEA and RWA
1.1.4. Pairwise comparison matrix of NPF, PAEA and RWA variables
- Pairwise variable matrix and Priority Weight of NPF, PAEA and RWA

Table 2. Pairwise Matrix Variable NPF, PAEA, and RWA

Ratio	NPF	PAEA	RWA	=	Ratio	NPF	PAEA	RWA
NPF	1	5	7		NPF	1.00	5.00	7.00
PAEA	1/5	1	3		PAEA	0.20	1.00	3.00
RWA	1/7	1/3	1		RWA	0.14	0.33	1.00
					Total Value	1.34	6.33	11.00

- Eigen Vector Value for NPF, PAEA and RWA Variables
  - Normalization and calculation of Priority Weight (average number of lines)

Table 3. Eigen Vector NPF, PAEA and RWA

	NPF	PAEA	RWA		Priority Weight	
NPF	0.74	0.79	0.64		0.72	(Total NPF / 3)
PAEA	0.15	0.16	0.27	=	0.19	(Total PAEA/ 3)
RWA	0.11	0.05	0.09		0.08	(Total RWA / 3)
Normalization	1.00	1.00	1.00			

- Consistency Ratio
  Calculating the Eigen Value Vector Value or Consistency Measures (CM) is by multiplying the matrix between values in Table 3 with Priority Weight, and dividing the multiplication results by Priority Weight, as follows:

Table 4. Consistency Ratio

Ratio					PW		Result Value	CM
NPF	1.00	5.00	7.00	x	0.72	=	2.27	3.14
PAEA	0.20	1.00	3.00		0.19		0.59	3.04
RWA	0.14	0.33	1.00		0.08		0.25	3.01

The calculationof the average maximum value of the maximum Eigen Value (max) is as follows:

λ max = Σ CM/n; λ max = Average value of eigen value; n= 3

λ max = (3.14+3.04+3.01) / 3 = 3.07

In the calculation of the Consistency Index Value (CI), zero CI means the matrix is consistent. Limits are not consistently measured using the Random Consistency Index (RI) value as follows:

$CI = \dfrac{\lambda \max - n}{(n-1)}$; $CI = \dfrac{3.07-3}{(3-1)}$ = 0.033 (consistent)

- Priority

Global Journal of Engineering Science and Research Management

Table 5. Priority Table of NPF, PAEA and RWA

Ratio	Priority Weight	Priority
NPF	0.72	1
PAEA	0.19	2
RWA	0.08	3

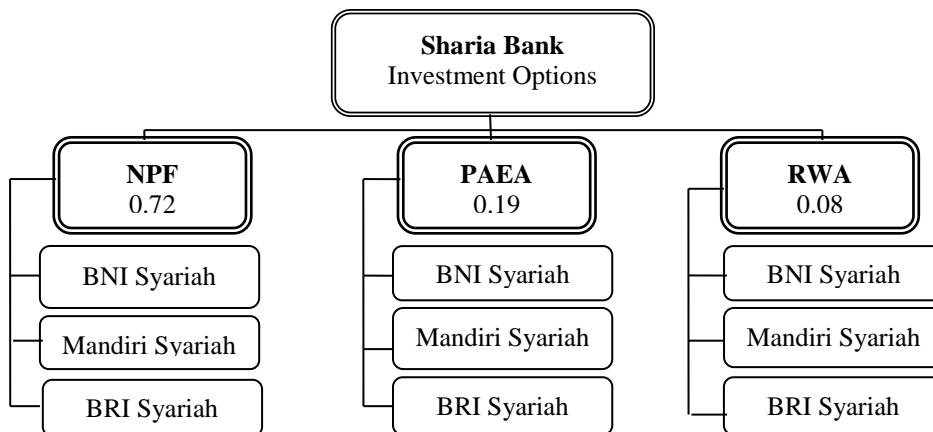- Hierarchy Tree of Weighting NPF, PAEA and RWA

Figure 6. Hierarchy Tree of Weighting NPF, PAEA and RWA

1.1.5. Priority. Based on the calculations of pairwise matrix, Eigen vector value, Consistency ratio, and the Average maximum value of Eigen value based on NPS, PAEA, and RWA, the priority values were obtained and presented in the following table.

Table 6. Priority values ofsharia banks

Basis	Bank	Priority Weight	Priority
NPF	BNI Syariah	0.59	1
	Mandiri Syariah	0.16	3
	BRI Syariah	0.25	2
PAEA	BNI Syariah	0.16	3
	Mandiri Syariah	0.30	2
	BRI Syariah	0.54	1
RWA	BNI Syariah	0.59	1
	Mandiri Syariah	0.16	3
	BRI Syariah	0.25	2

1.1.6. Hierarchy Tree. The selection of sharia banks based on NPF, PAEA and RWA Based on the criteria weight and complete alternative options, we can describe the Hierarchy Tree as follows:
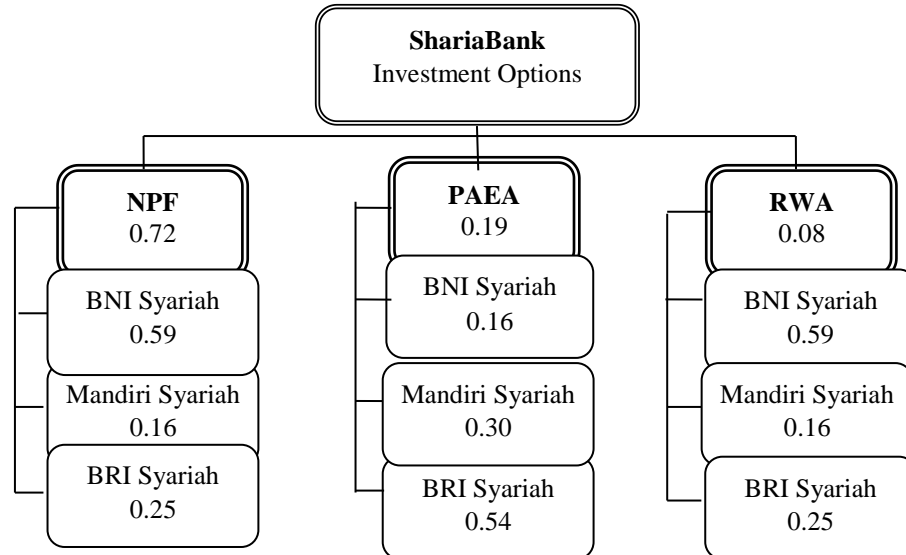
Global Journal of Engineering Science and Research Management

Figure 7. Hierarchy Tree of Weighting NPF, PAEA and RWA of sharia banks

Determining the decision on the placement of investment in sharia banks in accordance with the Variables of NPF, PAEA and RWA

To obtain the results of the decision, each weight for alternative choices is multiplied by the weight of the criteria in the form of matrix multiplication as follows:

Table 7. Determining the decision of investment

Bank	Matrix Multiplication						Final score
BNI Syariah	0.59	0.16	0.59		0.72		0.51
Mandiri Syariah	0.16	0.30	0.16	x	0.19	=	0.19
BRI Syariah	0.25	0.54	0.25		0.08		0.31
Total	**1.00**	**1.00**	**1.00**		**1.00**		**1.00**

Based on the calculation of the matrix, the Final Value is obtained as the value of the determination weight. The decision in determining the sharia banks for investment placements is based on the data of NPF, PAEA and RWA variables. The sharia bank that had the biggest value weight was BNI Syariah Bank (0.51).

CONCLUSION
Based on the findings, it can be concluded that by using the AHP method, investors can make the most realistic placement of funds. The results showed that the priority weight values for Bank BNI Syariah were 0.51, Bank Mandiri Syariah 0.19 and BRI Syariah Bank 0.31, hence it can be concluded that BNI Syariah Bank had the highest priority weight value (0.51) which was the most appropriate place to invest.

REFERENCES
1. Fatimah D 2006 Potensi Preferensi dan Perilaku Masyarakat terhadap Bank Syariah di Kota Depok. *Jurnal Ekonomi dan Bisnis* vol 5 no.2 July.
2. Jones CP 2002 *Investments: Analysis and Management* 8[th]ed. (New York: John Wiley & Sons, Inc.).
3. Keuhn K, Bley J 2004 Conventional Versus Syariah Finance: Student Knowledge and Perception in the United Arab Emirates *International Journal of Syariah Financial Services* vol 5 no 4
4. Ross, Westerfield, Jaffe 2002 *Corporate Finance, 6[th]ed*
5. Surya R A S 2012 *Akuntansi Keuangan Versi IFRS+* (Yogyakarta: Graha Ilmu)
6. Saaty T L 2000 Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process *Analytic Hierarchy Process Series* Vol 6 RWS Publications

Global Journal of Engineering Science and Research Management

7. Saaty T L 2008 *Decision making with the analytic hierarchy process*International journal of services sciencesvol 1 no 1p 83-98
8. Saaty T L 2005*Theory and Applications of the Analytic Network Process: Decision Making with Benefits, Opportunities, Costs, and Risks* RWS Publications p 352 ISBN1-888603-06-2
9. WestonJFetal 1995*ManajemenKeuangan*edisi9Jilid1(Jakarta: BinaRupaAksara)
10. Jayakumar V, Stephen Leon J, Mariappan C2014 A Decision-Making Framework For Investment Diversification Using The Analytic Hierarchy Process*American Journal of Mechanical Engineering and Automation* vol 1(2)p 10-14
11. Vyas R 2012 Mutual Fund Investor's Behaviour And Perception In Indore City *Researchers World* vol 3 no 3 p 67-75
12. Otoritas Jasa Keuangan Republik Indonesia (OJK). *Peraturan Otoritas Jasa Keuangan Nomor 65/POJK.03/2016 Tentang Penerapan Manajemen Risiko Bagi Bank Umum Syariah Dan Unit Usaha Syariah*https://www.ojk.go.id.
13. Otoritas Jasa Keuangan Republik Indonesia (OJK).*Peraturan Otoritas Jasa Keuangan Nomor 16/POJK.03/2014 tentang Penilaian Kualitas Aset Bank Umum Syariah dan Unit Usaha Syariah*https://www.ojk.go.id.
14. Otoritas Jasa Keuangan Republik Indonesia (OJK) *Laporan Triwulan Bank* https://www.ojk.go.id.
15. Otoritas Jasa Keuangan Republik Indonesia (OJK) *Surat Edaran Otoritas Jasa Keuangan Nomor 14/SEOJK.03/2017 Tentang Penilaian Tingkat Kesehatan Bank Umum.*