TO BUILD PORTFOLIOS USING MARKOWITZ MODEL WITH EVALUATION OF PERFORMANCE OF MUTUAL FUND IN INDIA

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Abstract:

A portfolio is a grouping of financial assets such as stocks, bonds and cash equivalents, as well as their funds counterparts, including mutual, exchange-traded and closed funds. The main objective is to build static portfolios and evaluation of performance of mutual funds and making portfolios with tax efficiency. The study is based on 10 equity and 10 dynamic bond funds are taken to analyse best 7 out of 10 with help of Jenson alpha,Sharpe ,Treynor , Standard deviation (volatility) , R Squared and information ratio(Appraisal ratio). Static portfolios are made with the help of Markowitz model and analyse its return with sharpe ratio. There are three portfolios namely Aggressive, Moderate and Conservative. These portfolios are made to gain risk adjusted return with tax efficiency. From the study it was found that aggressive portfolio will give the highest return and tax liability can decrease by investing in arbitrage fund. It also shows that asset allocation perform massive role than fund selection while building Portfolio.

**KeyWords:Asset Allocation, Tax Efficiency, Markowitz Model, Portfolio Management**

I. Introduction:

Harry Markowitz put forward this model in 1952. It assists in the selection of the most efficient by analysing various possible portfolios of the given securities. By choosing securities that do not 'move' exactly together, the HM model shows investors how to reduce their risk. The HM model is also called mean-variance model due to the fact that it is based on expected returns (mean) and the standard deviation (variance) of the various portfolios A portfolio that gives maximum return for a given risk, or minimum risk for given return is an efficient portfolio. Thus, portfolios are selected as follows:

(a) From the portfolios that have the same return, the investor will prefer the portfolio with lower risk, and

(b) From the portfolios that have the same risk level, an investor will prefer the portfolio with higher rate of return.

As the investor is rational, they would like to have higher return. And as he is risk averse, he wants to have lower risk.

Asset allocation is an investment strategy that aims to balance risk and reward by apportioning a portfolio's assets according to an individual's goals, risk tolerance and investment horizon. The three main asset classes - equities, fixed-income, and cash and equivalents - have different levels of risk and return, so each will behave differently over time.
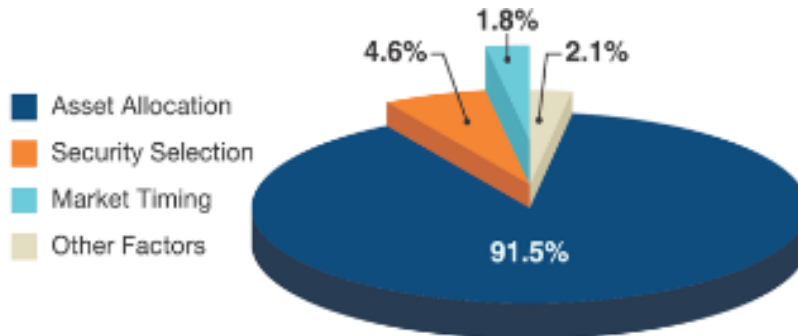
The basic "rule of thumb" is a mix of 80 per cent equity and 20 per cent debt (for a high risk/high return portfolio); a mix of 60 per cent equity and 40 per cent debt (for a moderate risk/moderate return portfolio); and a mix of 20 per cent equity and 80 per cent debt (for a low-risk/low-return portfolio). One may call these three portfolios as aggressive, balanced, and conservative respectively. The mutual fund riskometer is a simple representation of the risk a fund carries.

Every mutual fund investment carries some level of risk. Most investors do not know these and either end up staying away from mutual funds or at times invest in funds that do not meet their risk appetite.

While the mutual fund offer documents provide all the information one requires, it is not always presented in an easily readable form. AMFI and various Asset Management Companies continue to strive to educate investors so that they can take the most informed decisions.

II.　REVIEW OF LITERATURE

HiralMathukiya ,PurvishaFadadu, Dr. Chetna Parmar from RK University - Rajkot, Gujarat (India) (2012) has conducted research on "Portfolio Selection: Using Markowitz Model on selected Sectors Companies in India" in RESEARCH HUB – International Multidisciplinary Research Journal (RHIMRJ).The objective of Study was " To understand, analyse and select the best portfolio among set of portfolio with lower risk and calculate portfolio risk". Researcher has used Markowitz Model, Diversification of Portfolio, Proportion of Investment, co variance, co efficient of correlation, efficient frontier, Expected Return, Portfolio Risk. From his study, they found that Portfolio selected on the basis of high return, low variance and low risk and Calculation of forth script the proportion of 2:2:6 are ideal one.

Nimalathasan and Gandhi has conducted research on "mutual fund financial performance analysis - a comparative study on equity diversified schemes and equity mid-cap schemes"(2012).The objective of Study was studied and focused on the financial performance analysis of mutual fund schemes (equity diversified schemes and equity mid-cap schemes).Researcher has used Jensen alpha and Treynor. The results of the research work concerned among the open ended – tax saving schemes,

canararobeco equity diversified was preferred and ranked top most, at the same time among the open ended – midcap schemes, HDFC capital builder was preferred and ranked top.

Sahadevan and Thiripalraju, in their research paper titled "Mutual Funds – Data Interpretations And Analysis" (1997), analyzed the performance of private sector funds they compiled and analyzed the monthly average return and standard deviation of 10- selected private sector funds. The investigation reveals that in terms of the rate of return, 5 funds viz., Alliance 95, ICICI Power, Kothari Prima, Kothari Pioneer Blue Chip and Morgan Stanley Growth Fund out performed the market, during the period of comparison. The analysis also shows that, by and large, performance of a fund is not closely associated with its size.

Gupta & Sehgal, in their research paper "Investment Performance of Mutual Funds: The Indian Experience" (1998), tried to find out the investment performance of 80 schemes managed by 25 mutual funds, 15 in private sector and 10 in public sector for the time period of June 1992-1996. The study has examined the performance in terms of fund diversification and consistency of performance. The paper concludes that mutual fund industry's portfolio diversification has performed well. But it supported the consistency of performance.

Bijan Roy, ET. al., conducted an empirical study on conditional performance of Indian mutual funds. This paper uses a technique called conditional performance evaluation on a sample of eighty-nine Indian mutual fund schemes .This paper measures the performance of various mutual funds with both unconditional and conditional form of CAPM, Treynor- Mazuy model and Henriksson-Merton model. The effect of incorporating lagged information variables into the evaluation of mutual fund managers' performance is examined in the Indian context. The results suggest that the use of conditioning lagged information variables improves the performance of mutual fund schemes, causing alphas to shift towards right and reducing the number of negative timing coefficients

DrVikas Choudhary, and Preeti Sehgal Chawla (Oct 1-2, 2014) has conducted research on "Performance Evaluation of Mutual Funds: A Study of Selected Diversified Equity Mutual Funds in India" at International Conference on Business, Law and Corporate Social Responsibility in Phuket (Thailand). The objective of research was to study the performance of Selected Diversified Equity Mutual Funds in India and compare the performance . The period of the study is for 8 Years (2005-2013). The study uses a sample of 8 mutual fund schemes comprising of all equity diversified funds. Researcher has used Treynor's Performance Index, Average Returns, The Sharpe Measure, Coefficient of Determination (R). From his study, they found that All the funds have beta less than one and positive which imply that they were less risky than the market portfolio and in terms of coefficient of determination (R^2), all eight funds were near to one which indicates higher diversification of portfolio. Seven out of eight funds have shown superior performance under the Sharpe ratio as well as Treynor Ratio.

širůček martin, křenlukáš. 2015. has conducted research on application of markowitz portfolio theory by building optimal portfolio on the us stock market. This paper is focused on building investment portfolios by using the markowitz portfolio theory (mpt). Researcher has used markowitz and capm model. from his study, the found that on the inclusion of a particular stock title to the portfolio depends on the expected excess return a security relative to beta coefficient of that security, riskiness of the stock and its beta coefficient.

Prof. Kalpesh p prajapati and prof. Mahesh k patel, has conducted research on "comparative study on performance evaluation of mutual fund schemes of indiancompanies".the objective of study was to evaluate and compare the performance of equity diversified mutual fund schemes of selected companies and to compare the performance of equity diversified mutual fund schemes of selected companies vis-à-vis the market. Researcher has used sharp ratio, treynor ratio, jensen ratio, Alpha, Beta, R-squared,fama. From his study, he found that all selected mutual fund companies have positive return during 2007 to 2011. Hdfc and reliance mutual fund have performed well as compared to the sensex return. ICICI prudential and UTI mutual fund has lower level of risk compare to hdfc and reliance mutual fund.

Dr.R.Narayanasamy, V. Rathnamani, has conducted research on Performance Evaluation of Equity Mutual Funds (On Selected Equity Large Cap Funds).The objective of research was to study the performance of a growth scheme of a selected mutual funds and to examine the return from the selected mutual fund. Researcher has used Trey nor, Sharpe, Fama. From his study, he found that From foregoing performance analysis of the selected five equity large cap funds, its clear that all the funds have performed well during the study period. The fall in the CNX NIFTY during the year 2011 has impacted the performance of all the selected funds.

Ms. Rajeswari T.R., Prof. V.E. Rama Moorthy (2001) in the paper —An Empirical Study on Factors Influencing the Mutual Fund Scheme Selection by Retail Investors. have expressed that mutual fund is a retail product designed to target small investors, salaried people and others who are not intimidated by the mysteries of stock market but, nevertheless, like to reap the benefits of stock market investing. At the retail level, investors are unique and are a highly heterogeneous group. Hence, their fund/scheme selection also widely differs.

Kumar Vikas (2010) Evaluated the performance of 20 mutual funds schemes managed by five mutual funds using monthly NAV for period between 1st Jan 2000 to 31st Dec 2009 for 10 year i.e. 120 months. The rate of return was compared with the BSE National 100 index over the period. The performance was evaluated in the term of rate of return, Total risk (i.e. S.D.), systematic risk (i.e. Beta), coefficient of determination and risk adjusted performance suggested by Sharpe (1966) ,Treynor(1965) and Jensen (1968). The outcome shows that out of 20 schemes selected equity schemes shows better return as compared to debt and balanced schemes.

III. RESEARCH METHODOLOGY

Problem statement:

"**To build portfolios using Markowitz model with evaluation of performance of mutual fund.**"

Objective:

- To measure risk adjusted return through asset allocation.
- To evaluate consistency of performance of mutual funds in creating the portfolio.
- To create diversified mutual fund portfolio , which can cater to different investors.
- To evaluate the performance of equity and debt mutual funds.
- To generate the tax efficient portfolio.

Research design : Descriptive (statistical)

Data collection : 5 year monthly NAV of the mutual fund – Equity and Debt

Source of data : Secondary data

Tools used in the research : MS excel 2016

Research sample: (AMC- Asset Management Company)

1.Aditya Birla Sunlife Mutual Fund

2.BNP Paribas Mutual Fund

3.DSP Black Rock Mutual Fund

4.Franklin Templeton Mutual Fund

5.HDFC Mutual Fund

6.ICICI prudential Mutual Fund

7.Invesco Mutual Fund

8.L&T Mutual Fund

9.Reliance Mutual Fund

10.TATA Mutual Fund

11.Axis Mutual Fund

12.Baroda Pioneer Mutual Fund

13.Canara Robeco Mutual Fund

14.DHFL Pramerica Mutual Fund

15.IDFC Mutual Fund

16.UTI Mutual fund

Schemes:

Equity:

1.Aditya Birla Sunlife Advantage fund Gr.

2.BNP Paribas Dividend yield fund Gr.

3.DSP black Rock Equity fund Regualr plan- Gr.

4.Franklin build India Fund – Gr

5.HDFC Capital Build -Gr

6. ICICI Prudential Multicap Fund - Gr

7.Invesco India contra fund – Gr

8.L&T India Value Fund- Gr.

9.Reliance Regular savings fund Equity plan - Gr.

10.Tata equity P/E fund – Gr.

Debt fund:

❖ Dynamic bond fund:

1.Aditya Birla Sunlife Dynamic Bond Fund Retail Gr.

2.Axis Dynamic Bond Fund – Gr.

3.Baroda pioneer Dynamic Bond Fund – Gr.

4.Canara Robeco Dynamic bond fund- Gr.

5.DHFL Pramerica Dynamic Bond Fund – Gr

6.ICICI prudential Dynamic Bond Fund -Gr

7.IDFC Dynamic Bond fund -Gr.

8.L&T Flexi bond – Gr.

9.Tata Dynamic Bond fund – Gr.

10.UTI Dynamic Bond Fund – Gr

❖ Arbitrage fund:

1.Axis Enhanced Arbitrage Fund -dividend reinvestment

2.Kotak Equity Arbitrage Fund- dividend reinvestment

3.Reliance Arbitrage Advantage - dividend reinvestment

Type:Multi cap(Equity)

Mutual fund scheme:

Equity: -

Debt:- Dynamic and Arbitrage

Model used in research:

-Markowitz

-Jensen's alpha

-Sharpe ratio

-Treynor ratio

- R-squared

-Information ratio

IV.   ANALYSIS AND INTERPRETATION

a) **Ranking of the funds (Equity and Dynamic Bond funds)**

There are two broad categories of mutual funds. **Equity funds primarily invests in to stock and share market. Debt base mutual fund invest into debt investments like bond , debentures , T-bill , call money ect.**

Table 1 represents the ranking of Equity and debt funds. Jensen alpha, Treynor ratio and Sharpe ratio has been used to evaluate the best 7 mutual funds out of the sample size of 10.The total of Jensen , Treynor , sharpe ratio gives result of ranking in which higher the total better the fund. All the funds are weighted equally.

Jensen alpha: This ratio states the risk adjusted performance. Expected performance(return) can be measure by alpha. Higher alpha suggests better fund. **L&T India Value Fund -GR. and Franklin Build India Fund – Gr** are best equity multi cap funds because of higher alpha. Both the funds are outperforming expected return.

Treynor ratio: This ratio manifest systematic risk or market related risk. Higher treynor ratio suggest better fund. **Franklin Build India Fund – Gr and UTI Dynamic Bond Fund – Gr** are best equityand debt mutual funds.

Sharpe ratio: Sharpe ratio consist of total risk which include market and company specific risk. Higher sharpe ratio is the sign of better fund. **L&T India Value Fund -GR., UTI Dynamic Bond Fund – Gr, DHFL Pramerica Dynamic Bond Fund – Gr and ICICI Prudential Dynamic Bond Fund - Retail – Gr** are funds with good return.

b) **Best 7 Equity multi cap mutual funds:**

Equity funds	Jensen alpha	Treynor	Sharpe	Total	Rank
L&T India Value Fund -GR.	11.974	14.993	3.168	30.135	1
Franklin Build India Fund – Gr	12.414	14.376	3.131	29.921	2
ICICI Prudential Multi cap Fund – Gr	6.714	10.293	2.339	19.346	3
Aditya Birla Sun Life Advantage Fund Gr	7.647	10.247	2.285	20.178	4
Tata Equity P/E Fund Gr	8.164	10.536	2.269	20.970	5
Invesco India Contra Fund – Gr	7.157	9.812	2.187	19.156	6
BNP Paribas Dividend Yield Fund- Gr	6.328	10.402	2.277	19.007	7

Dynamic Debt funds	Jensen alpha	Treynor	Sharpe	Total	Rank
UTI Dynamic Bond Fund - Gr	3.317	67.219	3.525	74.060	1
ICICI Prudential Dynamic Bond Fund - Retail – Gr	2.565	60.824	2.521	65.910	2
Tata Dynamic Bond Fund Regular Plan – Gr	2.748	50.677	2.881	56.305	3
Aditya Birla Sun Life Dynamic Bond Fund -	3.056	41.965	2.833	47.854	4

Retail – Gr					
IDFC Dynamic Bond Fund - Regular Gr	2.610	40.168	2.379	45.157	5
L&T Flexi bond fund - Gr.	2.821	37.770	2.760	43.351	6
Canara Robeco Dynamic Bond Fund - Regular – Gr	2.750	31.316	2.654	36.720	7

The funds are in ascending order, ranking from **1st to 7th**. Rank is given as per the highest total of all evaluative ratios except the information ratio. Higher total of ratios suggest first rank and remaining ranks are given as per the descending order of the summation.**L&T India Value Fund -GR. is first ranked and BNP Paribas Dividend Yield Fund- Gr is ranked last**.

The table represent 7 best debt funds with ranking. Ranking is given on the bases of higher value of summation of all evaluative ratios. **UTI Dynamic Bond Fund – G**r is the best fund to invest ,according to the ranking.

c) **Information ratio:**

Above table explains about information ratio which measures a portfolio manager's ability to generate excess returns relative to a benchmark but also attempts to identify the consistency of the investor**. Franklin Build India Fund – Gr.(4.465),ICICI Prudential Multi Cap Fund – Gr(3.958) and L&T India Vlue Fund -GR.(4.584)**are well manage equity funds with good expected return. **UTI Dynamic Bond Fund – Gr(10.490)** is the best bond fund to invest. If the investor wants to invest in only selective funds then , these fund are best to invest.

d) **Standard deviation:**

Standard deviation is absolute measure of volatility. It suggests the deviation of return from its mean. Above table have 10 equity and debt funds in which ranking is given as per the standard deviation. More standard deviation suggest volatility that can be hamper the profitable return. Less volatile fund have good and constant return which is best to invest. **BNP Paribas Dividend Yield Fund- Gr(4.105) , HDFC Capital Builder-Gr (4.531), L&T India Value Fund -GR.(4.872)** are good equity fund that give constant return. **UTI Dynamic Bond Fund – Gr (0.991)and Tata Dynamic Bond Fund Regular Plan – Gr(1.021)**are best bond fund that gives high return with low risk.

e) **R squared**

R squared is the correlation of mutual fund return and the return of the index. It relative to the index and check the relation between index and mutual fund. Mutual fund is more preferable when it is more related with the index. All the equity funds are related to the index(Nifty 50) with higher ratio. **HDFC Capital Builder-G (0.889), ICICI Prudential Multi cap Fund – Gr(0.889)and DSP BlackRock Equity Fund - Reg. Plan –Gr(0.843)**are good mutual funds as their returns are highly correlate with the index(Nifty 50).

Correlation of debt fund cannot measure with the index (nifty 50). Generally debt funds are measured with **Average maturity, Modified duration and yield to maturity.**

f) Aggressive portfolio:

Aggressive portfolio:(80% Equity, 20% Debt-Arbitrage)		
Funds	Annual return	Weight
L&T India Value Fund -GR.	22.334	16.00%
Franklin Build India Fund - Gr	23.102	16.00%
ICICI Prudential Multi Cap Fund – Gr	16.868	16.00%
Aditya Birla Sun Life Advantage Fund Gr	18.278	16.00%
Tata Equity P/E Fund Gr	18.888	16.00%
Axis Dynamic Bond Fund - Gr	9.1338	10.00%
Kotak Equity Arbitrage Fund – Gr	8.0443	10.00%
TOTAL RETURN	116.648	100.00%
Return	17.633	
Risk free rate of return	6.900	
Variance	14.914	
Standard deviation	3.862	
sharp ratio	2.779	
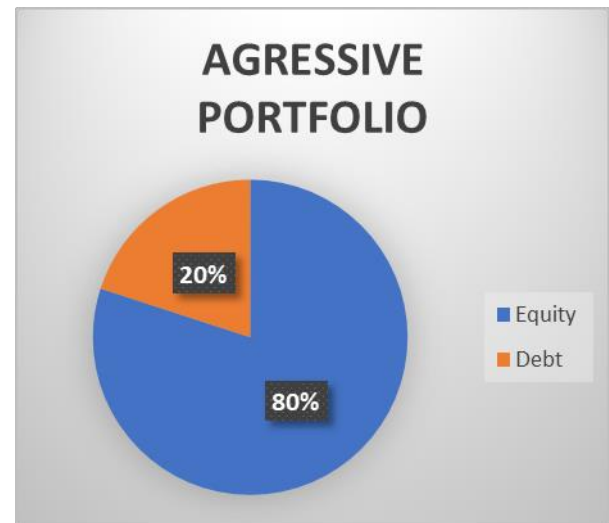
Aggressive portfolio which holds 80% equity fund and 20% debt fund. Aggressive portfolio carries more risk than moderate and conservative portfolio. It is useful strategy for those investors whose risk apatite is high and the period of portfolio holding is also for long time. This portfolio can beat the inflation and in long term it can earn inflation adjusted return . Here 5 funds are taken from equity and 2 are Arbitrage funds. This kinds of strategy will help to build tax efficient portfolio and give flexibility to the investors when the market crash or go down. **Return of this portfolio is 17.63% and volatility is 3.86**. Sharpe ratio is 2% which indicates good portfolio construction.

g) Moderate portfolio

| Moderate portfolio:(50% Equity, 50% debt-30% Arbitrage, 20% Dynamic)		
Funds	Annual return	Weight
L&T India Value Fund -GR.	22.334	12.50%
Franklin Build India Fund - Gr	23.102	12.50%
ICICI Prudential Multi cap Fund – Gr	23.102	12.50%
Aditya Birla Sun Life Advantage Fund Gr	18.278	12.50%
UTI Dynamic Bond Fund - Gr	10.392	20.00%
Axis Dynamic Bond Fund - Gr	9.1338	15.00%
Kotak Equity Arbitrage Fund - Gr	8.0443	15.00%
TOTAL RETURN	114.3847899	100.00%
Return	15.50691798	
Risk free rate of return	6.9	
Variance	4.113638259	
Standard deviation	2.028210605	
sharp ratio	4.243601704	
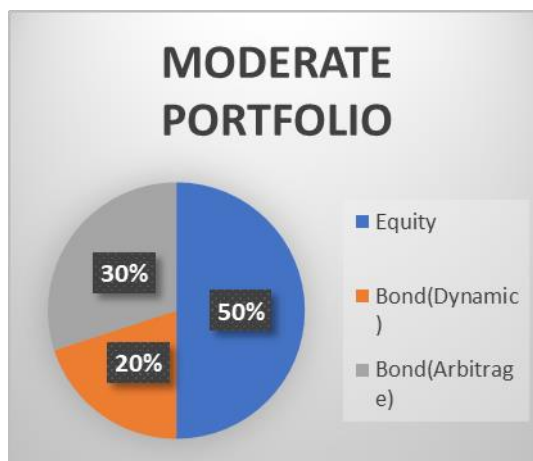
This table shows **Moderate portfolio with 50% equity and 50% debt funds.** Moderate portfolio have balance of equity and debt fund. Risk is at moderate level and so it is helpful for those investors who can bear moderate risk. Here out of **50% debt ,30%** is form arbitrage fund and **20%** is dynamic. **In Equity 4 funds are taken which are first four ranked.** In this portfolio, only one dynamic fund is taken for risk diversification of debt proportion ,investing arbitrage and dynamic funds. Arbitrage fund will generate return as debt fund but the tax consideration is of equity fund. So there is no taxation for more than one year holding. **. Return of this portfolio is 15.506% which is 2% low than aggressive portfolio and volatility is 2.02% .Sharpe ratio is 4% which indicates excellent portfolio construction.**

h) Conservative portfolio:

Conservative portfolio:(25 equity, 75% debt-45%Dynamic, 30% Arbitrage)		
Funds	Annual return	Weight
L&T India Value Fund -GR.	22.334	12.50%
Franklin Build India Fund – Gr	23.102	12.50%
UTI Dynamic Bond Fund – Gr	10.392	22.50%
ICICI Prudential Dynamic Bond Fund - Retail – Gr	9.615	22.50%
Axis Dynamic Bond Fund – Gr	9.1338	15.00%
Kotak Equity Arbitrage Fund – Gr	8.0443	15.00%
TOTAL RETURN	82.620	100.00%

Return	12.75765593	
Risk free rate of return	6.9	
Variance	1.976006386	
Standard deviation	1.405704943	
sharp ratio	4.167059354	
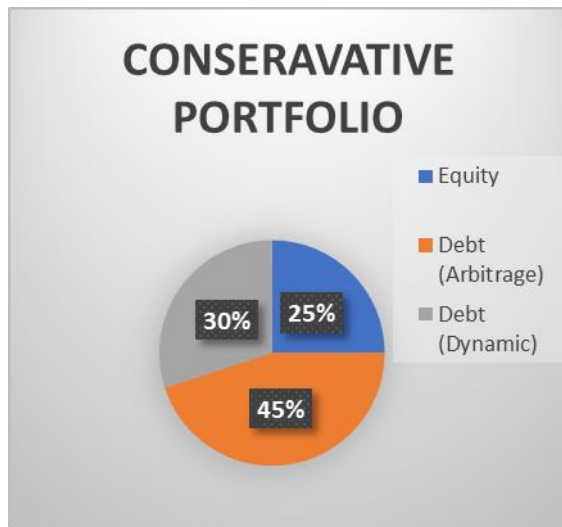
Above table is about **Conservative portfolio with 25% equity and 75%** debt funds. This portfolio consider **12.75%** return with **1.4%** standard deviation and **4.16%**sharpe ratio.Sharpe ratio is 4.16 which indicates efficient portfolio. Here only 2 funds are taken from equity as the risk apatite of the investor is very low. And 2 arbitrage and bond funds are there as to take tax advantage and increase the return by holding the portfolio in debt more than 3 years. Conservative portfolio is more preferred the retired or old age people whose risk bearing capacity is low and are looking for better than FDs returns.

V.   Conclusion

Financial planning is essential part to focus on while making investing strategy by goal planning or portfolio management. Objective of the asset allocation and portfolio management is to customise the investment as per the requirement. Risk taking capacity and holding period.Education should be imparted to the investors about the investment strategy and portfolio management as per their need by their investment advisors.Mutual funds are more tax efficient as compared to other traditional formats of investing like FD's etc.If the risk apatite of investor is high and wants to compete the inflation then Aggressive portfolio is the best to invest.If the investor has long term perspective of investment with moderate risk then Moderate portfolio is more useful.If the holding period of the fund is not for long time and the risk apatite is also low then conservative portfolio is more applicable.

Reference:

- Dr.ChetnaParmar.(December-2015) Portfolio Selection: Using Markowitz Model on selected Sectors Companies in India, Volume-2, ISSN: 2349-7637 , DOI: 10.13140/RG.2.1.3545.6086

- Dr Vikas Choudhary and PreetiSehgal.(Oct 1-2, 2014) Performance Evaluation of Mutual Funds: A Study of Selected Diversified Equity Mutual Funds in India , CBLCSR'14 , DOI.ORG/10.15242

- Prof. Kalpesh P Prajapati and Prof. Mahesh K Patel, (July 2012), Comparative study on performance evaluation of mutual fund schemes of Indian companies , Vol–III, Issue3(3), ISSN 2231-4172

- Michael G.McMillan, Jerals . E. Pinto, Wendy L.Pirie, Gerhard Van de Venter(2011): *Investment principles of portfolio and equity analysis.*USA, New Jersey .CFA institute investment series.

- S.Kevin (2nd edition) : *portfolio management.*

- Benjamin Graham, Revised edition (2008). Update with New Commentary by Janson Zweig.*The intelligent investor*.

- Magazine of research AMFI and CRISIL (June 2017).Quantum Leap Beckons.67,66

- HDFC mutual fund (November 2017). intouch mutually. 37, 39, 40

- HDFC mutual fund (October 2017). intouch mutually. 37, 39, 40