CHAPTER 4

RESEARCH METHODOLOGY

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CHAPTER 4
RESEARCH METHODOLOGY

INTRODUCTION

In this chapter, an attempt has been made to outline various aspects of the research methodology. This chapter discusses the research methodology followed in the study to evaluate the overall performance of the mutual fund schemes in India and to know the investment behavior of the retail Investors toward mutual funds. This chapter is divided into two sections i.e. Section 1 and Section 2. Section 1 deals with the research methodology used for analysis of secondary data to evaluate the performance of the mutual funds schemes and to examine the market timing abilities of the fund manager. Section 2 deals with the research methodology used for analysis of primary data to know the investment behavior of the retail investors.

SECTION: 1
RESEARCH METHODOLOGY: FOR ANALYSIS OF
SECONDARY DATA

This section presents discussion on the Data source and sample, Hypotheses, Methodology adopted to evaluate the performance of the mutual fund schemes, Methodology followed to evaluate the market timing abilities of the fund managers, and Statistical tools applied for analysis of the data.

4.1 DATA SOURCE AND SAMPLE

4.1.1 THE STUDY PERIOD

For the purpose of analysis a period of 10 years is selected from January 2000 to December 2009. A maximum of 119 monthly observations could be obtained for each of the sample schemes as well as for the benchmark indices (i.e. BSE 30 and Nifty 50) and for the 91 days Treasury-bills (T-bills) rate.

4.1.2 THE SAMPLE SCHEMES

In case of mutual fund schemes there are various schemes being launched over a period of time and being matured also over a period of time. As on 1st January 2000, total 325 schemes were in operation. But during the period January 2000 to December 2009, total 188 schemes were matured, out of 325 schemes which were launched before 1st January 2000. For the purpose of our study ten years period is selected.

Hence out of all the available schemes, the schemes for which data were available for the entire span of study period are selected. For 137 schemes such data were available from January 2000 to December 2009 and hence they are selected as sample for the study to analyze the performance of the mutual fund schemes. These schemes are from public as well as private sectors. The details of the 137 schemes selected for the analysis are given by the way of Appendix- I with inception date, scheme-category and the sponsorship. The summary is presented in the Table 4.1.

Table 4.1 : Characteristics of the Sample Schemes					
Schemes Characteristics	Scheme Category-wise Classification				
Scheme Sponsorship-wise classification	Growth	Income	Balanced	Tax-Planning	Total Sample Size
Bank Sponsored: Joint Ventures - Predominantly Indian (BS-JV-PI)	7	4	1	2	14
Bank Sponsored: Joint Ventures - Predominantly Foreign (BS-JV-PF)	1	-	-	1	2
Bank Sponsored: Others (BS-O)	2	3	3		8
Institutions (INST.)	2	6	3	1	12
Private Sector: Indian (PS-I)	15	11	4	3	33
Private Sector: Foreign (PS-F)	11	4	2		17
Private Sector: Joint Ventures - Predominantly Indian (PS-JV-PI)	18	17	6	3	44
Private Sector: Joint Ventures - Predominantly Foreign (PS-JV-PF)	1	2	2	2	7
Total Sample Size	57	47	21	12	137

4.1.3 DATA SOURCE

- ● Net Asset Value (NAV)

The pooled in funds of the investors under the management of the mutual fund company, is normally divided into individual claims. These claims are proportional to the number of shares purchased by the investors. The value of this share owned by them is known as the Net Asset Value. It is often expressed as:

Net Asset Value (NAV) = $\frac{\text{Market Value of the mutual fund companies assets} - \text{Liabilities}}{\text{Shares Outstanding}}$ ----- (1)

NAV's of the mutual funds are calculated on a daily basis, for then it would be easy for the investors to know the per unit claim they can have on the assets of the mutual fund company. For evaluating the performance of mutual funds, one can use either price or net asset value (NAV) data or both. For the purpose of the research the closing value of the NAV, on the last working day of the month, for each fund is

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considered. The data required for the performance evaluation of the mutual fund schemes have been collected from different websites *viz.,* www.indiainfoline.com, www.amfiindia.com,www.mutualfundsindia.com and www.valueresearchonline.com.

- **Benchmark Portfolios:**

Measuring the performance of any mutual fund is nothing else but evaluating if the fund is able to generate abnormal returns or not. In order to identify these abnormal returns, it is important to estimate the normal gains that an investor could earn from investing in the market index itself. It is evident from the past studies that the performance evaluation of a particular fund is sensitive to the benchmark used in order to get an estimation of the market return. For instance, **B.N.Lehmann & D.M.Modest (1987)**[1] argue that the mutual fund rankings are very sensitive to the asset pricing model (such as the Capital Asset Pricing Model) chosen to provide for a proxy of the market portfolio. This implies that selection of a wrong proxy to the portfolio of securities maintained by the mutual fund could result in incorrect results. This is further evident from the study conducted by **Elton *et al.* (1993)**[2], in which he claimed that the positive performance reported in **Ippolito (1989)**[3] was not due to the superior selection ability of the managers of the fund but it was due to the selection of incorrect benchmark that showed abnormal returns. Thus, the selection of the benchmark index in the evaluation of the performance of the mutual funds is a very important issue. Giving high priority to this issue, in this thesis, to evaluate the performance of mutual fund schemes and market timing and stock selection ability of fund managers, the researcher has used the Bombay Stock Exchange of India (BSE 30) and S&P CNX Nifty (Nifty 50) as a surrogate for market portfolio. The data required for these benchmark portfolios have been collected from www.bseindia.com and www.nse-india.com respectively.

(a) Bombay Stock Exchange of India (BSE 30):

BSE 30 provides the most comprehensive and accurate view of the capital markets in India. It is a value weighted index which comprises of 30 stocks being the largest and most actively traded ones, with its base period of 1978-79 and the base value of 100 index points. BSE 30 is calculated using the "Free-float Market Capitalization" methodology, wherein, the level of index at any point of time reflects the free-float market value of 30 component stocks relative to a base period. These stocks represent various sectors of the Indian economy. To make sure that the composition of the index is a good reflector of the current market conditions, the managing authorities

keep modifying it. It must be taken into account that the BSE 30 index comprises mainly of the premium stocks, which effectively produce high returns. And thus, it is very much possible that most of the funds may underperform it, being the benchmark index in the research. It has also been a widely accepted market proxy amongst investment researchers as well as practitioners in India.

(b) S&P CNX Nifty (Nifty 50) :

The Nifty 50 (NSE) is one of the largest and most advanced stock markets in India. The NSE is the world's third largest stock exchange in terms of transactions. Nifty 50 is a well-diversified 50 stock index accounting for 21 sectors of the economy. It is used for a variety of purposes such as benchmarking fund portfolios, index based derivatives and index funds. The base date selected for calculation of Nifty is November 3, 1995. The base value of the index is 1000 and it has a base capital of Rs.2.06 trillion. Nifty is owned and managed by India Index Services and Products Ltd. (IISL), which is a joint venture between NSE and CRISIL. IISL has a consulting and licensing agreement with Standard & Poor's (S&P), who are world leaders in index services. S&P CNX Nifty is based upon solid economic research. The index is calculated using market capitalization weighted method.

- **Risk Free Rate**

There has been a controversy as to what constitutes a risk free asset. Generally, treasury bills of different durations have been used as a surrogate for risk free asset in studies conducted abroad as well in India. The researcher has used 91 days Treasury Bills (T-Bills) Rate as a surrogate for risk free rate for the analysis of the performance of the different mutual fund schemes. The information has been obtained from the Reserve Bank of India's website (www.rbi.org.in). Alternatively, one could also consider the deposit rate of the nationalized banks as considered by **Ajay Shah & Susan Thomas (1994)[4]** in their study as 91.4% of the Indian household believe that the deposit of the nationalized banks are the safest investments. However, this proxy suffers from a limitation which arises due to the flexible deposit rates accepted by different banks according to the individual guidelines provided by the Reserve Bank of India. Most of the researchers' world over has used 91 days T-Bill rates as a surrogate for risk free rate. Thus, in this study also the researcher has used 91 day T-Bills rate as risk free rate.

4.1.4 CHOICE OF FREQUENCY TO EVALUATE PERFORMANCE – MONTHLY

The improvements in technology have made it easier to monitor the performance of fund managers on a high frequency basis: quarterly, monthly or even daily. High frequency monitoring may have the positive effect of reducing perverse manager behavior such as end-of-year window dressing and tournament-induced changes in risk levels. However, more frequent investment performance monitoring also influences the distribution of observed excess returns. So an overly frequent measure of performance is not always the best choice, as has been underlined by some authors. **Di Bartolomeo (2003)**[5] noticed that in recent years it had become more and more common place for investment performance attribution analysis to be carried out with a daily observation periodicity. He explained that the justification given for changing to daily observation frequency from longer periods (such as months) was that these analyses were believed to be better equipped to accurately reflect the actual investment returns on a fund. But, he argued, such beliefs were based on a series of operational, mathematical and statistical assumptions that were demonstrably false. He asserted that applying typical attribution methods to daily data leads to analytical conclusions that were highly biased and unreliable and details this argument. For example, manager evaluation was normally performed using time-weighted returns (TWR) that were computed to remove the effect of cash flows. As the effect of cash flows in the data was removed, daily attribution analysis was not useful to investors in understanding their actual investment results. This argument was also developed by **Darling and MacDougall (2002)**[6], who explained that there was information lost by using a TWR, and the more frequently the TWR was calculated, the more information might be lost. In that case, daily analysis could be regarded as less useful than monthly analysis. Moreover, lack of synchronization over a single day would cause an index fund to exhibit spurious active returns where none actually existed. Most problems of this type disappeared in the case of monthly observation. Another argument against measuring performance with excessively high frequency was related to the imperfections of the assumptions made upon the asset returns (investment returns were normally distributed; time series of returns were identically distributed; there was no serial correlation between investment returns). Academic literature illustrated that the imperfection of the assumptions with respect to quarterly or monthly return data was small, while for daily data these assumptions were rejected.

For example, **Dimson and Jackson (2001)**[7] examined the impact that frequency of performance measurement had on the probability distribution of observed outcomes. With more frequent monitoring of rolling returns, there was a greatly increased probability of observing seemingly extreme observations. They demonstrated that if performance was appraised by focusing on returns to date, it was important to adjust the definition of extreme performance for the frequency with which returns were monitored. Failure to do so might lead to costly actions such as strategy revisions or manager terminations, which increased transaction costs and had detrimental effects on manager incentives. **Marsh (1991)**[8] also pointed out that the danger with high-frequency monitoring was the way it might be used by investors who do not understand how to interpret such figures. Judgments about manager skill might be distorted by frequent monitoring. So it was important that investors recognize the impact of high frequency monitoring on the frequency with which they observed seemingly extreme performance events. Performing industry-standard attribution procedures on a daily basis might lead to analytical conclusions that were likely to be biased and unreliable, leading to inappropriate management actions with respect to investment portfolios.

To determine the periodicity for the purpose of analysis, should it be daily or monthly, the base was derived from series of studies carried out by the scholars in the field Kon (1983)[9], Chang and Lewellen (1984)[10], Henriksson (1984)[11], Lee and Rahman (1990)[12], Grinblatt and Titman (1994)[13], Jaydev (1996)[14], Elton et al.(1996)[15], Khorana (2001)[16], Sapar et al. (2003)[17], Chander (2006)[18], Bhattacharjee and Roy (2006)[19], Rao (2006)[20], Muthappan and Damodharan (2006)[21], Panwar and Madhumathi (2006)[22], Muga et al. (2007)[23], Sehgal and Jhanwar (2007)[24], Deb et al. (2008)[25] etc. had used monthly series of data to evaluate the performance of the mutual fund schemes.

Hence with the above evidence to use monthly data for appropriate results it was decided to use month end value of NAV to evaluate the performance of the mutual fund schemes.

4.2 HYPOTHESES

Based on the selection of secondary data as mentioned in the preceding para the analysis is mainly carried out with reference to (I) the performance evaluation of the

scheme and **(II)** the market timing abilities of the fund managers. For this purpose the following hypotheses are framed:

4.2.1 PERFORMANCE EVALUATION

H_{01}:   There is no significant difference between the average return of the selected sample mutual fund schemes and average return of the benchmark portfolio *viz.*, BSE30 and Nifty50.

H_{02}:   There is no significant difference between the average risk of the selected sample mutual fund schemes and average risk of the benchmark portfolio *viz.*, BSE30 and Nifty50.

H_{03}:   There is no significant difference in the return of the selected sample mutual fund schemes according to their objectives.

H_{04}:   There is no significant difference in the risk of the selected sample mutual fund schemes according to their objectives.

H_{05}:   There is no significant difference in the systematic risk of the selected sample mutual fund schemes according to their objectives.

H_{06}:   There is no significant difference between the average return earned by private sector mutual fund schemes and public sector mutual fund schemes.

H_{07}:   The mutual fund schemes are not reasonably diversified.

H_{08}:   There is no significant difference in the unique risk of the selected sample mutual fund schemes according to their objectives.

H_{09}:   There is no significant difference in the Treynor ratio of the selected sample mutual fund schemes according to their objectives.

H_{010}:   There is no significant difference in the Sharpe ratio of the selected sample mutual fund schemes according to their objectives.

H_{011}:   The RCC derived between Sharpe and Treynor ratio for each group of the selected sample mutual fund schemes according to their objectives is not significant.

H_{012}:   The observed value of Jensen Differential Measure (alpha) for the same sample schemes is not different from zero.

H_{013}:   There is no significant difference in the Appraisal ratio of the selected sample mutual fund schemes according to their objectives.

H_{014}:   There is no significant difference in the Information ratio of the selected sample mutual fund schemes according to their objectives.

H$_{015}$: There is no significant difference in the M^2 measure of the selected sample mutual fund schemes according to their objectives.

H$_{016}$: The RCC is not significant between different types of schemes.

H$_{017}$: There is no significant difference in the performance of sample schemes across the different measurement criteria.

4.2.2 MARKET TIMING ABILITIES OF THE FUND MANAGERS

H$_{018}$: Mutual Fund managers do not display distinct Market timing abilities.

H$_{019}$: The Market timing abilities of Fund Managers of Growth schemes do not differ from those of other schemes.

H$_{020}$: The Market timing abilities of Fund Managers of the bank sponsored mutual fund schemes do not differ from those of Private sector sponsored mutual funds and Institution sponsored mutual fund schemes.

4.3 METHODOLOGY ADOPTED

This part presents the discussion on methodology for calculation of return, risk, performance evaluation of mutual funds schemes, examination of market timing abilities of fund managers and the statistical tools applied to above findings to draw inferences.

4.3.1 METHODOLOGY ADOPTED FOR CALCULATING RETURN

Calculating return, which is simple for an asset or an individual portfolio, becomes more complex when it involves mutual funds with variable capital, where investors can enter or leave throughout the investment period. There are several ways to proceed, depending on the area that one is seeking to evaluate. There is a basic formula for calculating the return on a portfolio and there are also the different methods that allow capital movements to be taken into account, with their respective advantages and drawbacks and their improvements. These are described in the following lines.

4.3.1.1 BASIC FORMULA

The simplest method for calculating the return on a portfolio for a given period is obtained through an arithmetic calculation. To calculate the relative variation of the price of the portfolio over the period, increased, if applicable, by the dividend payment, one can use the following formula to calculate the return of the portfolio:

$$R_p = \frac{P_t - P_{t-1} + D_t}{P_{t-1}} \qquad \text{---------------- (2)}$$

Where,

R_p = the return of the portfolio

P_t = the value of the portfolio at the end of the period

P_{t-1} = the value of the portfolio at the beginning of the period

D_t = the cash flows generated by the portfolio during the evaluation period

However, this formula is only valid for a portfolio that has a fixed composition throughout the evaluation period. In the area of mutual funds, portfolios are subject to contributions and withdrawals of capital on the part of investors. This leads to the purchase and sale of securities on the one hand, and to an evolution in the volume of capital managed, which is independent from variations in stock market prices, on the other. The formula must therefore, be adapted to take this into account. The modifications to be made will be presented below.

4.3.1.2 TAKING CAPITAL FLOWS INTO ACCOUNT

Calculation methods have been developed to take into account the volume of capital and the time that capital is present in a portfolio. The methods that are currently listed and used are (a) the internal rate of return (b) the capital weighted rate of return and (c) the time-weighted rate of return. Each of these methods evaluates a different aspect of the return. These methods are presented in detail below.

• **Capital-weighted rate of return method**

This rate is equal to the relationship between the variation in value of the portfolio during the period and the average of the capital invested during the period. First consider the case where a single capital flow is produced during the period. The calculation formula is as follows:

$$R_p = \frac{P_t - P_{t-1} - C_t}{P_{t-1} + \frac{1}{2} C_t} \qquad \text{-------------- (3)}$$

Where,

R_p = the capital weighted return of the portfolio

P_t = the value of the portfolio at the end of the period

P_{t-1} = the value of the portfolio at the beginning of the period

C_t = the cash flows that occurred at date t

Where, C_t is positive if it involves a contribution and negative if it involves a withdrawal.

This calculation is based on the assumption that the contributions and withdrawals of funds take place in the middle of the period. A more accurate method involves taking

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the real length of time that the capital was present in the portfolio. The calculation is then presented as follows:

$$R_p = \frac{P_t - P_{t-1} - C_t}{P_{t-1} + (T - t)/T\ C_t} \quad \text{-------------- (4)}$$

Where, T is the total length of the period.

Let's now assume that there are n capital flows during the evaluation period. The formula is then generalized in the following manner:

$$R_p = \frac{P_t - P_{t-1} - \sum_{t=1}^{n} C_{ti}}{P_{t-1} + \sum_{t=1}^{n} (T - t_i/T)\ C_{ti}} \quad \text{-------------- (5)}$$

Where, t_i is the date on which the ith cash flow C_{ti} occurs.

This calculation method is simple to use, but it actually calculates an approximate value of the true internal rate of return of the portfolio, because it does not take the capitalization of the contributions and withdrawals of capital during the period into account. If there are a large number of capital flows, the internal rate of return, which is presented below, will be more precise. The advantage of this method, however, is that it provides an explicit formulation of the rate. The capital-weighted rate of returns measures the total performance of the fund, so it provides the true rate of return from the fund holder's perspective. The result is strongly influenced by capital contributions and withdrawals.

- **Internal rate of return method**

This method is based on an actuarial calculation. The internal rate of return is the discount rate that renders the final value of the portfolio equal to the sum of its initial value and the capital flows that occurred during the period. The cash flow for each sub-period is calculated by taking the difference between the incoming cash flow, which comes from the reinvestment of dividends and client contributions, and the outgoing cash flow, which results from payments to clients. The internal rate of return R_I, can be calculated using the following equation:

$$P_{t-1} = \sum_{t=1}^{n} C_{ti} / (1 + R_I)^{t_i} + P_t / (1 + R_I)^{T} \quad \text{-------------- (6)}$$

Where,

T = the length of the period in years (this period is divided into n sub-periods)

ti   = the cash flow dates, expressed in years, over the period

P_{t-1} = the initial value of the portfolio

P_t = the final value of the portfolio

C_{ti} = the cash flow on date t_i, withdrawals of capital are counted negatively and
         contributions positively

As the formula is not explicit, the calculation is done iteratively. The internal rate of return only depends on the initial and final values of the portfolio. It is therefore independent from the intermediate portfolio values. However, it does depend on the size and dates of the cash flows, so the rate is, again, a capital-weighted rate of return. The internal rate of return method allows us to obtain a more precise result than the capital weighted rate of return when there are a significant number of capital flows of different sizes, but it takes more time to implement. The capital-weighted rate of return and the internal rate of return are the only usable methods if the value of the portfolio is not known at the time the funds are contributed and withdrawn.

- **Time-weighted rate of return method**

The principle of this method is to break down the period into elementary sub-periods, during which the composition of the portfolio remains fixed. The return for the complete period is then obtained by calculating the geometric mean of the returns calculated for the sub-periods. The result gives a mean return weighted by the length of the sub-periods. This calculation assumes that the distributed cash flows, such as dividends, are reinvested in the portfolio. Take a period of length T during which capital movements occurs on dates (t_i) $_{1 \le i \le n}$. Denote the value of the portfolio just before a capital movement by P_{ti} and the value of the cash flow by C_{ti}. C_{ti} is positive if it involves a contribution and negative if it involves a withdrawal. The return for a sub-period R_{pi} is then written as follows:

$$R_{pi} = \frac{P_{ti} - (P_{t\,i-1} + C_{t\,i-1})}{P_{t\,i-1} + C_{t\,i-1}} \qquad \text{------------- (7)}$$

This formula compares the value of the portfolio at the end of the period with its value at the beginning of the period, i.e. its value at the end of the previous period increased by the capital paid or decreased by the capital withdrawn. The return for the whole period is then given by the following formula:

$$R_{TWR} = \left[\prod_{t=1}^{T} (1 + R_{pt}) \right]^{1/T} - 1 \qquad \text{------------- (8)}$$

This calculation method provides a rate of return per rupee invested, independently of the capital flows that occur during the period. The result depends solely on the evolution of the value of the portfolio over the period. **Gray and Dewar (1971)[26]** show that the time-weighted rate of return is the only well-behaved rate of return that is not influenced by contributions or withdrawals. To implement this calculation, we need to know the value and the date of the cash flows, together with the value of the portfolio at each of the dates.

The time-weighted rate of return enables a manager to be evaluated separately from the movements of capital, which he does not control. This rate only measures the impact of the manager's decisions on the performance of the fund. It is thus the best method for judging the quality of the manager. It allows the results of different managers to be compared objectively. It is considered to be the fairest method.

For the purpose of analysis Time-weighted rate of return method is employed to calculate fund return as well as benchmark return of the portfolio.

4.3.1.3 EVALUATION OVER SEVERAL PERIODS

Basically there are two methods to evaluate the return over several periods i.e. (a) Arithmetic mean and (b) Geometric mean.

• **Arithmetic mean**

The simplest calculation involves computing the arithmetic mean of the returns for the sub periods, i.e. calculating:

$$R_a = 1/T \sum_{t=1}^{n} R_{pt} \qquad \text{--------------- (9)}$$

Where,

R_a is the arithmetic mean of the returns, R_{pt} are obtained arithmetically and T denotes the number of sub-periods.

We thus obtain the mean return realized for a sub period. This mean overestimates the result, which can even be fairly far removed from the reality when the sub-period returns are very different from each other. The result also depends on the choice of sub-periods. The arithmetic mean of the returns from past periods does, however, have one interesting interpretation. It provides an unbiased estimate of the return for

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the following period. It is therefore the expected return on the portfolio and can be used as a forecast of its future performance.

- **Geometric mean**

The geometric mean (or compound geometric rate of return) allows linking the arithmetic rates of return for the different periods, in order to obtain the real growth rate of the investment over the whole period. The calculation assumes that intermediate income is reinvested. The mean rate for the period is given by the following expression:

$$R_g = [\prod_{t=1}^{T} (1 + R_{pt})]^{1/T} - 1 \qquad\text{------------- (10)}$$

The geometric mean gives the real rate of return that is observed over the whole period, which is not true of the arithmetic mean. In general, the return values for successive periods are not too different, and the arithmetic mean and geometric mean give similar results. However, the arithmetic mean always gives a value that is greater than the geometric mean, unless the R_t returns are all equal, in which case the two means are identical. The greater the variation in R_t, the greater the difference between the two means.

However, to calculate the expected return over the long-term, and not just in the forthcoming period, it is better to consider the geometric rate. According to **Filbeck and Tompkins (2004)**[27], geometric returns were the appropriate measure of historical performance because they accurately capture historic volatility. Assuming that past volatility is a predictor of future volatility, geometric returns provide a reasonable estimate of future returns.

Hence, to calculate fund return as well as benchmark return of the portfolio in this study geometric mean is applied.

4.3.1.4 FUND RETURN

As mentioned in the preceding para this study has used month end value of NAV during the period from January 2000 to December 2009, to evaluate the performance of selected mutual fund schemes and market timing and stock selection ability of the fund manager. NAVs per unit have been adjusted for dividends, bonus and rights for appropriate comparison assuming dividends are reinvested at the ex-dividend NAV. To calculate monthly return of the scheme, following formula is used:

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$$R_{jt} = [(NAV_t - NAV_{t-1}) + D_t + C_t] / NAV_{t-1} \qquad \text{------------ (11)}$$

Where,

R_{jt} = Single period return on fund "j" for t^{th} month

NAV_{t-1} = net asset value at the end of $(t-1)^{th}$ month (i.e. preceding month)

NAV_t = net asset value at the end of tth month (i.e. current month)

D_t = dividend

C_t = bonus/cash distributions

The monthly returns so computed for different single periods have been compounded to get compounded monthly rates of return of mutual fund scheme. The following formula has been used to compute monthly compounded rates of return, R_p, for fund "j" :

$$R_p = (R_{j1} * R_{j2} * R_{j3} * \dots\dots\dots\dots * R_{jn})^{1/n} - 1 \qquad \text{------------ (12)}$$

Where,

R_p = Compounded monthly rate of return of fund "j"

R_{jn} = Monthly rate of return of fund "j" for n^{th} month.

n = Number of months

4.3.1.5 BENCHMARK RETURN

The researcher has used same month end value of both the benchmark indices i.e. BSE 30 and Nifty 50 during the period from January 2000 to December 2009, to get the monthly return on benchmark portfolios. To calculate monthly return of the benchmark indices, following formula is used:

$$R_{mt} = [(I_t - I_{t-1}) / I_{t-1}] \qquad \text{------------ (13)}$$

Where,

R_{mt} = Single period return on benchmark portfolio for t^{th} month

I_{t-1} = Index value at the end of $(t-1)^{th}$ month (i.e. preceding month)

I_t = Index value at the end of tth month (i.e. current month)

The monthly returns on benchmark portfolios so computed for different single periods have been compounded to get compounded monthly rates of return of both the indices. The following formula has been used to compute monthly compounded rates of return, R_m, for both the indices:

$$R_m = (R_{m1} * R_{m2} * R_{m3} * \dots\dots\dots\dots * R_{mn})^{1/n} - 1 \qquad \text{------------ (14)}$$

Where,

R_m = Compounded monthly rate of return of fund "j"

R_{mn} = Monthly rate of return of Indices for n^{th} month.

n   = Number of months

4.3.1.6 RISK FREE RATE

91 days T-Bills rate is applied as surrogate for the risk free rate of return during the period from January 2000 to December 2009. The return on the risk free asset i.e. the monthly yields on 91 days T-Bills are given on an annualized basis on the RBI website, which are converted into monthly basis using the following formula.

$$(1+r)^j = (1+R) \quad\quad\quad\quad \text{-------------- (15)}$$

Where,

r   = Monthly risk-free rate

R   = Annualized risk-free rate.

j   = 12 (because r is the monthly return.)

Having examined various aspects of computation of return, the next part explains the measurement of risk.

4.3.2 METHODOLOGY ADOPTED FOR CALCULATING RISK

The underlying idea of the mutual fund is investing in the different securities in the market. And as noted in the finance literature, these security prices and returns are subject to random fluctuations. The capital market refers these random fluctuations and thereby, uncertain returns as 'risk' of an investment. This is reflected in the Standard Deviation, Beta and Unsystematic Risk.

4.3.2.1 STANDARD DEVIATION: "Standard Deviation is the total variability in the return on the asset or the portfolio, whatever the sources of that variability" **Bhole and Mahakud (2009)**[28]. It is the uncertainty or volatility in return due to both security-specific and economic-wide factors. In simple words, standard deviation is referred to how spread out a particular set of data, under observation, is. Alternatively, Standard Deviation is a mathematical expression that measures the range of possible outcomes from a particular data set. Also, the greater the range of possible outcomes, the higher is the standard deviation of that particular asset class of securities. It acts as a good indicator of the volatility i.e. how dispersed are the values under the study from the mean. Standard deviation is used for the calculations of the total risk of an

individual asset and for the market index. For calculating the Standard Deviation, following formula can be used:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}.$$

-------------- (16)

Where,

σ: Standard Deviation

N: Number of observations

x_i: Fund Returns

μ: Average Returns

4.3.2.2 BETA: "Beta is a measure of relative risk of a security or its sensitivity to the movements in the market" **Bhole and Mahakud (2009)[28].** Beta indicates the extent to which the risk of a given asset is non-diversifiable; it is a coefficient measuring a security's relative volatility. It is also known as "beta coefficient" or "Systematic Risk". If the beta of a portfolio of securities is equal to one, this means that it moves with the market. If the beta is less than one, i.e. it is a low beta stock; this means that the stock or the portfolio moves less than proportionately to the market and vice- versa. Thus, Beta shows how much the share price movement correlated with the movement in the stock market. Beta is used in the capital asset pricing model (CAPM), a model that calculates the expected return of an asset based on its beta and expected market returns. The formula for the beta of an asset within a portfolio is:

$$\beta = \frac{Cov\ (\ R_m\ ,\ R_p\ )}{Var\ (R_m)}$$

-------------- (17)

Where,

R_P = actual return of the portfolio

R_M = the return of the Market

Cov (R_m , R_p) = the covariance between the rates of return of the portfolio and the Market

Var (R_m) = the market variance

4.3.2.3 UNSYSTEMATIC RISK: "The variability in a security's total return that is not related to the overall market variability is called Unsystematic risk" **Bhole and Mahakud (2009)[28].** It is also known as "specific risk", "diversifiable risk", "unique risk" or "residual risk", refers to the organization risk that is inherent in an investment. The unsystematic risk is different for each investment for a company and

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takes into account potential effects on the asset if a specific event occurs that could negatively impact the investment. Unsystematic risk can be reduced by diversifying investments and increasing the overall number of investments. Another term for unsystematic risk is the residual risk for an investment. Unsystematic risk is measured through the mitigation of the systematic risk factor through diversification of your investment portfolio. In more technical terms, it represents the component of a stock's return that is not correlated with general market moves. The following formula can be used to calculate Unsystematic risk:

$$\text{Unsystematic risk} = [\text{Var } (R_p) - \beta^2 * \text{Var } (R_m)]^{\frac{1}{2}} \quad \text{-------------- (18)}$$

Where,

Var (R$_p$)   = Variance of mutual fund scheme return

β   = Beta coefficient of the scheme

Var (R$_m$)   = Variance of market return

4.3.3 METHODOLOGY ADOPTED TO EVALUATE THE PERFORMANCE OF THE MUTUAL FUND SCHEMES

Several measures are available to measure the performance of the mutual fund schemes. In this thesis, the research has used following measures given in Table 4.2 for evaluating the performance of the selected mutual fund schemes: 1) Rate of Return Measure and 2) Risk Adjusted Performance Measures.

Table 4.2 : Performance Measures
1) Rate of Return Measure
2) Risk Adjusted Performance Measures

A) Return per unit of Risk measure (Relative measures of performance)
        a) Treynor ratio (1965)
        b) Sharpe ratio (1966)
    B) Differential return measure (Absolute measures of performance)
        a) Jensen Differential measure (1968)
        b) Sharpe Differential measure
    C) Fama's Components of investment performance measure (1972)
    D) Others
        a) Appraisal ratio (1973)
        b) Information ratio (1994)
        c) M² measure: Modigliani and Modigliani (1997)

4.3.3.1 RATE OF RETURN MEASURE: Rate of return measure involves comparing ex-post-average returns of the mutual fund scheme over the sample period with the returns on benchmark portfolios. Thus, the compounded monthly rate of return for the

scheme is then compared with the compounded monthly rate of return for both the benchmark portfolios and the monthly risk free rate of return of 91 days T-Bills. However, as this approach is based on gross return, it suffers from one serious limitation. That is, it does not take into account the risk of the concerned mutual fund. The higher return earned by the fund manager could be due to a difference in the risk exposure. Thus, it is vital that ex-post return must be adjusted to risk exposure.

4.3.3.2 RISK ADJUSTED PERFORMANCE MEASURES: To measure the performance of Mutual Fund Schemes over a period of time various measures have been developed. The following lines discuss such various Risk Adjusted Performance Measures for Mutual Fund Schemes.

1) **Treynor's Ratio:** Jack Treynor (1965)[29] conceives an index of portfolio performance measure called as *'reward to volatility ratio'*, based on systematic risk. He assumes that the investor can eliminate unsystematic risk by holding a diversified portfolio. Hence his performance measure denoted as T_P is the excess return over the risk free rate per unit of systematic risk, in other words it indicates risk premium per unit of systematic risk.

$$T_P = \frac{R_P - R_F}{\beta} \qquad \text{-------------- (19)}$$

Where,

T_P = Treynor's Ratio for portfolio

R_P = actual return of the portfolio

R_f = return on the risk-free asset

β_P = Beta coefficient for portfolio

The Treynor Ratio for benchmark portfolio is

$$T_M = \frac{R_M - R_F}{\beta_M} \qquad \text{-------------- (20)}$$

Where,

T_M = Treynor Ratio for benchmark

R_M = the return of the Market

R_F = return on the risk-free asset

β_M = Beta coefficient for benchmark (Here β_M =1. As the market beta is 1)

If T_P of the mutual fund scheme is greater T_M, then the scheme has outperformed the market. The major limitation of the Treynor Ratio is that it can be applied to the schemes with positive betas during the bull phase of the market. The results will mislead if applied

during bear phase of the market to the schemes with negative βs. The second limitation is it ignores the reward for unsystematic or unique risk.

2) **Sharpe's Ratio:** One of the most commonly used measure of risk adjusted performance, the Sharpe Ratio, introduced by **William Sharpe (1966)**[30], is drawn from the capital market line. This ratio, initially called the *'reward-to-variability ratio'*, is defined by:

$$S_P = \frac{R_P - R_F}{\sigma_P} \qquad \text{------------ (21)}$$

Where,

S_P = Sharpe Ratio for portfolio

R_P = actual return of the portfolio

R_F = return on the risk-free asset

σ_P = standard deviation of the portfolio returns

The Sharpe Ratio for benchmark portfolio is

$$S_M = \frac{R_M - R_F}{\sigma_M} \qquad \text{------------ (22)}$$

Where,

S_M = Sharpe Ratio for benchmark

R_M = the return of the Market

R_F = return on the risk-free asset

σ_M = standard deviation of the market returns

This ratio measures the return of a portfolio in excess of the risk-free rate, also called the risk premium, compared to the total risk of the portfolio, measured by its standard deviation. Since this measure is based on the total risk of the portfolio, made up of the market risk and the unsystematic risk taken by the manager, it enables the performance of portfolios that are not very diversified to be evaluated. This measure is also suitable for evaluating the performance of a portfolio that represents an individual's total investment. If S_P of the mutual fund scheme is greater than that of the benchmark Portfolio S_M, the fund has out performed the market.

The superiority of the Sharpe ratio over the Treynor's ratio is, it considers the point whether investors are reasonably rewarded for the total risk in comparison to the market. A mutual fund scheme with a relatively large unique risk may outperform the market in Treynor's index and may underperform the market in Sharpe ratio. A mutual fund scheme with large Treynor's ratio and low Sharpe ratio can be concluded

to have relatively larger unique risk. Thus the two indices rank the schemes differently.

The major limitation of the Sharpe ratio is that it is based on the Capital Market Line (CML). The major character of the capital market line is only the efficient portfolios can be plotted on the CML but not inefficient. Hence it is assumed that a managed portfolio (mutual fund scheme) is an efficient portfolio.

Comparison of Sharpe and Treynor: Sharpe and Treynor measures are similar in a way, since they both divide the risk premium by a numerical risk measure. The total risk is appropriate when we are evaluating the risk return relationship for well-diversified portfolios. On the other hand, the systematic risk is the relevant measure of risk when we are evaluating less than fully diversified portfolios or individual stocks. For a well-diversified portfolio the total risk is equal to systematic risk. Rankings based on total risk (Sharpe measure) and systematic risk (Treynor measure) should be identical for a well-diversified portfolio, as the total risk is reduced to systematic risk. Therefore, a poorly diversified fund that ranks higher on Treynor measure, compared with another fund that is highly diversified, will rank lower on Sharpe Measure.

3) **Jensen Differential Measure: Michael C. Jensen (1968)[31]** developed a measure of performance based upon the Capital Asset Pricing Model. Jensen's alpha is defined as the differential between the return on the portfolio in excess of the risk-free rate and the return explained by the market model. It is calculated by carrying out the following regression:

$$R_P - R_F = \alpha_P + \beta\ (R_M - R_F) + \varepsilon_{PT} \qquad \text{-------------- (23)}$$

Where,

R_P = actual return of the portfolio;

R_F = return on the risk-free asset;

R_M = the return of the Market;

α_P = the differential return earned by the scheme;

β = Beta coefficient for portfolio;

ε_{PT} = random error term

The Jensen measure is based on the CAPM. The term $\beta\ (R_M - R_F)$ measures the return on the portfolio forecast by the model. α_P measures the share of additional return that is due to the manager's choices. The parameters of the Jensen measure

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were estimated by using standard regression techniques. Thus, it involved running of regression with excess return earned by the mutual fund scheme (dependent variable) on the market portfolio (independent variable). The excess return for both the mutual fund scheme and the market portfolio were computed with reference to the return on risk-free proxy, i.e., monthly yield on the 91-days T-bills. A positive and significant alpha for the mutual fund scheme would indicate that the portfolio has generated an average return greater than the return on the benchmark portfolio thereby indicating a superior performance. The value of the α has been tested at 5% level of significance using Z statistic, as the number of observations in the study is quite large. Unlike the Sharpe and Treynor measures, the Jensen measure contains the benchmark. As with the Treynor measure, only the systematic risk is taken into account. Jensen measure, unlike the Sharpe and Treynor ratios, does not allow portfolios with different levels of risk to be compared. The value of alpha is actually proportional to the level of risk taken, measured by the beta. The Jensen measure is subject to the same criticism as the Treynor measure: the result depends on the choice of reference index. In addition, when managers practice a market timing strategy, which involves varying the beta according to anticipated movements in the market, the Jensen alpha often becomes negative, and does not then reflect the real performance of the manager. Performance analysis models taking variations in beta into account have been developed by Treynor and Mazuy & by Henriksson and Merton.

4) **Sharpe Differential Measure:** Sharpe's differential return measure is used to know the ability of the fund manager in both security selection and diversifying the portfolio. The difference between the expected return and actual return of the portfolio are called differential returns. The expected return can be obtained by using the following equation:

$$E(R_P) = [R_F + (R_M - R_F) * \sigma_P / \sigma_M] \qquad \text{----------- (24)}$$

Where,

$E(R_P)$ = expected return of the portfolio

R_P = actual return of the portfolio

R_F = return on the risk-free asset

R_M = the return of the Market

σ_P = standard deviation of the portfolio returns

σ_M = standard deviation of the market returns

Differential Returns are computed by applying the following equation:

$$R_P - E(R_P) \qquad\qquad \text{-------------- (25)}$$

Where,

R_P = actual return of the portfolio

$E(R_P)$ = expected return of the portfolio

If a portfolio is well diversified, the two measures (Jensen and Sharpe) should indicate same quantum of differential return. In case the portfolio not fully diversified, the Sharpe differential return would be small in magnitude. The difference can be interpreted as decline in performance resulting from lack of diversification.

5) **Fama's Components of Investment Performance:** Jensen's measure computes excess returns over expected returns based on premium for systematic risk. **Eugene F Fama (1972)**[32] goes a step ahead, he suggests to measure fund performance in terms of excess returns over expected returns based on premium for total risk. In other words, the excess returns are computed based on Capital Market Line (CML). Fama breaks down the observed return into four components:

1. Risk-free return R_F

2. Compensation for systematic risk $\beta(R_M - R_F)$

3. Compensation for inadequate diversification $(R_M - R_F)\{(\sigma p/\sigma_M)-(\beta)\}$

4. Net superior returns due to selectivity $(R_P - R_F)-(\sigma p/\sigma_M)(R_M - R_F)$

The second and third components indicate the impact of diversification and market risk. By altering systematic and unique risk a portfolio can be reshuffled to get the desired return. Fama says the portfolio performance can be judged by the net superior returns due to selectivity. His performance measure denoted by F_P is defined in equation.

$$F_P = \text{Portfolio Return} - \text{Risk Free Return} - \text{Returns due to all risks}$$

$$= (R_P - R_F) - (\sigma p/\sigma_M)(R_M - R_F) \qquad \text{-------------- (26)}$$

Where,

F_P = Fama's measure for portfolio

R_P = the actual return of the portfolio

R_M = the return of the Market

R_F = return on the risk-free asset

σ_M = standard deviation of the market returns

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σ_P = standard deviation of the portfolio returns

β = Beta coefficient

A positive value for F_P indicates that the fund earned returns higher than expected returns and lies above CML, and a negative value indicates that the fund earned returns less than expected returns and lies below CML.

6) **Appraisal Ratio:** The appraisal ratio first suggested by **Treynor & Black (1973)**[33] is similar in concept to the Sharpe ratio. Thus, the appraisal ratio for a managed portfolio can be computed by using the following equation:

$$\text{Appraisal Ratio} = \alpha\ /\ \sigma_e \qquad \text{-------------- (27)}$$

Where,

α = Jensen's alpha

σ_e = Unsystematic risk

The ratio reflects the extra return per unit of unsystematic risk and could be used for ranking purposes to understand the relative performance of managed funds. To calculate the appraisal ratio, the fund's alpha is divided by the unsystematic risk of the funds in which they invested. Calculating the alpha is a complicated process. Its technical definition is the intercept of the security characteristic line, that line being a graph comparison of an asset's risk to the relevant market's risk. It is easier to understand the alpha by looking at what it actually represents. The alpha takes into account how much fluctuation there has been in a particular asset's price and how this compares to fluctuation in the underlying market. The idea is that an asset that has fluctuated more widely in value is more risky and thus more susceptible to luck rather than skill. The alpha itself is a figure showing the return on the asset after adjusting for this comparative risk. The unsystematic risk, otherwise known as non-systematic risk, measures how much fluctuation there has been in the assets chosen by a fund manager, in comparison to the fluctuation of the entire market. The unsystematic risk thus covers issues that relate to those specific stocks, rather than overall market movements. The theory is that unsystematic risk can be lessened by diversification, or investing in a wider range of companies. An appraisal ratio is a method of assessing an investment fund manager's performance. It does not simply measure how high a return he has achieved, but puts this into the context of how risky the investments have been. This means a high appraisal ratio is often taken as a sign of skill rather than luck.

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7) **Information Ratio: Sharpe (1994)**[34] presents the information ratio as a generalization of his ratio, in which the risk free asset is replaced by a benchmark portfolio. The information ratio is defined through the following relationship:

$$IR = \frac{R_P - R_M}{\sigma (R_P - R_M)} \quad \text{---------------- (28)}$$

Where,

R_P = the actual return of the portfolio

R_M = the return of the Market

$\sigma (R_P - R_M)$ = tracking error

The information ratio is defined by the residual return of the portfolio compared to its residual risk. The residual return of a portfolio corresponds to the share of the return that is not explained by the benchmark. It results from the choices made by the manager to overweight securities that he hopes will have a return greater than that of the benchmark. The residual, or diversifiable, risk measures the residual return variations. It is the tracking error of the portfolio and is defined by the standard deviation of the difference in return between the portfolio and its benchmark. The lower its value, the closer the risk of the portfolio to the risk of its benchmark.

Managers seek to maximize its value, i.e. to reconcile a high residual return and a low tracking error. This ratio allows us to check that the risk taken by the manager, in deviating from the benchmark, is sufficiently rewarded. The information ratio is an indicator that allows us to evaluate the manager's level of information compared to the public information available, together with his skill in achieving a performance that is better than that of the average manager. As this ratio does not take the systematic portfolio risk into account, it is not appropriate for comparing the performance of a well-diversified portfolio with that of a portfolio with a low degree of diversification.

8) **M² measure: Modigliani and Modigliani : Modigliani and Modigliani (1997)**[35] showed that the portfolio and its benchmark must have the same risk to be compared in terms of basis points of risk-adjusted performance. So they propose that the portfolio be leveraged or deleveraged using the risk-free asset. They defined the following measure:

$$M^2 = {}^*R_P - R_M \quad \text{-------------- (29)}$$

Where,

$${}^*R_P = [\ R_F * \{1 - (\sigma_M / \sigma_p)\}\ ] + [R_P * (\sigma_M / \sigma_p)\ ] \quad \text{-------------- (30)}$$

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Where,

σ_M / σ_p = the leverage factor

R_P = the actual return of the portfolio

R_M = the return of the Market

R_F = return on the risk-free asset

σ_M = standard deviation of the market returns

σ_P = standard deviation of the portfolio returns

This measure evaluates the Risk Adjusted Performance (RAP) of a portfolio in relation to the market benchmark, expressed in percentage terms. According to Modigliani and Modigliani, this measure is easier to understand by the average investor than the Sharpe ratio. Modigliani and Modigliani propose the use of the standard deviation of a broad-based market index, such as the S&P 500, as the benchmark for risk comparison, but other benchmarks could also be used. For a fund with any given risk and return, the Modigliani measure is equivalent to the return the fund would have achieved if it had the same risk as the market index. The relationship therefore allows us to situate the performance of the fund in relation to that of the market. The most interesting funds are those with the highest RAP value. The Modigliani measure is drawn directly from the capital market line. It can be expressed as the Sharpe ratio times the standard deviation of the benchmark index: the two measures are directly proportional. So Sharpe ratio and Modigliani measure lead to the same ranking of funds.

4.3.4 METHODOLOGY ADOPTED TO EXAMINE THE MARKET TIMING ABILITIES OF THE FUND MANAGERS

As discussed in the literature review of the research paper, market timing ability of the fund managers has a great impact on the performance of the mutual funds. It refers to the ability of the managers to anticipate the major moves in the stock market prices and accordingly adjust the composition of their portfolios. Keeping this important determinant of the mutual fund performance into consideration, two major markets timing ability models, the **Treynor and Mazuy Model (1966)**[36] and **Henriksson and Merton Model (1981)**[37], have been employed in order to identify if the fund managers really have the ability to speculate the market returns. These are also referred to as the "squared regression model". A brief description of these two models is given below:

1) **Treynor and Mazuy Model:** There are several procedures that have been proposed to correct the effect of timing ability on the estimate of beta. The first is a quadratic regression proposed by Treynor and Mazuy in order to detect the market timing abilities of fund managers. This regression is

$$R_P - R_F = \alpha + \beta (R_M - R_F) + \gamma (R_M - R_F)^2 + \varepsilon_{PT} \quad \text{---------------} \quad (31)$$

R_P = actual return of the portfolio;

R_f = return on the risk-free asset;

R_M = the return of the Market;

ε_{PT} = random error term

α , β and γ are parameter of the model.

The parameters in the above model can be estimated by using standard regression methodology. Treynor and Mazuy have argued that estimated value of parameter γ in the above formula act as a measure of market timing skill of the fund manager. If fund managers could able to select the time correctly, the estimated value of γ would be significantly positive. On the contrary if the estimated value of γ should not be significantly different from zero, the fund managers are not be able to select the market timing correctly. The average beta of the portfolio would be constant when the fund manager is not engaged in market timing and only concentrates in stock selection. In this case the fund return and market return would be a linear relationship. Even if the fund manager changed the beta and would not be successful in assessing the market timing, still it shows the linear relationship. Treynor and Mazuy argued that in case the fund manager was able to successfully assess the market direction and changes the portfolio beta, it would find a higher than normal beta. In that situation it implies that the fund is doing better. When the market declines, the fund has a lower than normal beta. In such situations the plots of the fund returns against the market returns would lie above the linear relationship and would give a curvature to the scatter of points.

2) **Henriksson and Merton Model :** Another return-based approach for estimating timing performance is the option approach developed by Henriksson and Merton. The regression used is similar to the Treynor Mazuy regression. In contrast to the linear beta, adjustment of the Treynor and Mazuy framework, the portfolio beta in the Henriksson and Merton study is assumed to switch between two betas. A large

value if the market is expected to do well i.e. when $R_M > R_F$ (up market) and a small value otherwise i.e. when $R_M < R_F$ (down market). Therefore, it is argued that a successful market timer would select a high up market beta and a low down-market beta. Thus such a relationship can be estimated by equation using a dummy variable.

$$R_P - R_F = \alpha + \beta (R_M - R_F) + \gamma [D (R_M - R_F)] + \varepsilon_{PT} \quad \text{--------------- (32)}$$

Where,

D   = Dummy variable that equals 0 for $R_M > R_F$ and -1 otherwise

R_P = actual return of the portfolio

R_F = return on the risk-free asset

R_M = the return of the Market

ε_{PT} = random error term

α , β and γ are parameter of the model.

So that beta of the portfolio is β in a bull or up-market and ($\beta - \gamma$) in a bear or down markets. Parameter γ indicates the difference between the two betas and significant value of γ would indicate market timing ability of the fund managers.

It may be noted here that in both these models, the intercept term α represents the stock selection ability of the fund managers.

4.3.5 STATISTICAL TOOLS

4.3.5.1 SPEARMAN'S RANK COEFFICIENT OF CORRELATION (RANK CORRELATION)

It is technique of determining the degree of correlation between two variables in case of ordinal data where ranks are given to the different values of the variables. The main objective of this coefficient is to determine the extent to which the two sets of ranking are similar or dissimilar.

In order to detect any conflict in performance raking based on different performance measures and across different benchmark criteria, the researcher has applied Rank Coefficient of Correlation.

This coefficient is determined as under:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}. \qquad \text{--------------- (33)}$$

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Where,

d_i = differences between ranks of ith pair of the two variables

n = number of pairs of observations

The value of coefficient of correlation lies between $\pm$ 1. Positive values indicate positive correlation between the two variables (i.e., changes in both variables take place in the same directions), whereas negative values indicate negative correlation (i.e., changes in both variables take place in the opposite directions). A zero value indicates that there is no association between the two variables. When the value is +1, it indicates perfect positive correlation and the value is -1, it indicates perfect negative correlation. The value nearer to +1 or -1 indicates high degree of correlation between the two variables.

4.3.5.2   t- test (C R Kothari (2002)[38]): The t-test provides inferences for making statements about the means of parent populations. This test is based on Student's t statistic. While using t-test one assumes that the population from which sample has been taken is normal or approximately normal, sample is a random sample, observations are independents, there is no measurement error and that in the case of two samples when equality of the two population means is to be tested, one assume that the population variance are equal. For applying t-test, one work out the value of test statistic (i.e. 't') and then compare with the table value of t (based on 't' distribution) at certain level of significance for given degree of freedom. If the calculated value of 't' is either equal to or exceeds the table value, one infer that the difference is significant, but if the calculated value of 't' is less than the table value, the difference is not treated as significant.

In this study, following t-tests were applied:

1) To examine the difference if any between sample mean and population mean with reference to return and risk a widely accepted measure of t-test has been used. For this purpose following formula has been used:

$$ t \ = \ \frac{\overline{X} - \mu}{\sigma \overline{x}} \qquad\qquad \text{---------------- (34)} $$

Where,

$\overline{X}$ = Mean of the sample

μ = Mean of the population

$\sigma\overline{x}$ = Standard deviation of sample

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2) To examine the difference, if any between two sample means, with reference to returns for different group of schemes with reference to objectives, again t-test was applied. For this following formula was used:

$$T = \frac{\overline{X} - \overline{Y}}{S_p \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$ ------------- (35)

Where,

$\overline{X}$ = Mean of sample one

$\overline{Y}$ = Mean of sample two

S_p = Standard error of difference between two sample means worked out as

$$S_p = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}$$ -------------- (36)

and the d.f. = (n_1 + n_2 - 2)

3) To examine the significance of the coefficient of sample correlation again t-test was applied. For this following formula was used:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$ -------------- (37)

Where, r = the coefficient of sample correlation and the d.f. = (n – 2)

4.4 LIMITATIONS OF THE STUDY

The present study has the following limitations:

1. The researcher had to curtail the sample and work with only 137 mutual fund schemes (including growth and dividend options), as researcher has considered only those mutual fund schemes which existed till December,2009 and the mutual fund schemes for which data were available for the entire span of the study period i.e. from January 2000 to December 2009.

2. Initially all mutual fund schemes were directly linked to stock market. In the recent years numerous schemes which are independent of stock market (debt & money market funds) are introduced and such schemes' returns need not have correlation with indices, and the indices are not adjusted for dividends.

3. Banks are free to accept deposits at any interest within the ceilings fixed by Reserve Bank of India and interest rates can vary from client to client. Hence there can be an inaccuracy in the risk-free rates.

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4. The analysis is not free from the limitations of non-identical time periods and unequal sample observations.

5. The study excludes the effect of entry and exit loads of the mutual funds.

SECTION: 2
RESEARCH METHODOLOGY: FOR ANALYSIS OF PRIMARY DATA

This section intends to discuss the research methodology adopted for analysis of Primary Data. The following para discusses - Scope and coverage of the research study, Research Design of the research study, Collection of primary data, Sampling Decision, A brief about structured questionnaire, Hypotheses, Methodology Adopted and Limitations of the study.

A Qualitative Research

Qualitative research, in simple terms can be defines as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" **(Strauss & Corbin, 1990)**[39]. Thus, a qualitative part of research rather than quantifying the data and doing calculations, it tries to understand and estimate the people's ideas and their behavioral patterns. One of the important tools of qualitative research employed in this research is the questionnaire survey.

4.5 SCOPE AND COVERAGE OF THE RESEARCH STUDY

This research study focused exclusively on mutual fund investors having investment in different mutual fund schemes belonging to selected cities in the state of Gujarat *viz.* Ahmedabad, Surat and Baroda. It has attempted to provide information and data on preferences of mutual fund investors drawn from the selected cities of the State of Gujarat.

4.6 RESEARCH DESIGN OF THE RESEARCH STUDY

The research design of this research study was **Referral Sampling Method**. The reasons for selecting this method were:

1. No list of mutual fund investors was available and

2. Many investors were reluctant to divulge their investment details especially the amount of money invested.

4.7 COLLECTION OF PRIMARY DATA

The Primary data were collected by the researcher during the month of June-September, 2010, from the total number of 450 retail investors, i.e. 150 retail investors from each three major cities in the state of Gujarat *viz*. Ahmedabad, Surat and Baroda, who has currently (i.e., as on June-September 2010) invested in any Mutual Fund Scheme/Schemes and who has a knowledge about Financial Markets, Mutual Funds in particular. The primary data were collected using field survey research supported with personal interviews of retail mutual fund investors in order to examine their overall preference and behavior towards mutual fund investment. The survey population was defined as retail mutual fund investors having knowledge about financial market. The researcher had put to use Structured Questionnaire that was administered in person for the collection of primary data from amongst the selected representative sampling units.

Out of the total numbers of 450 respondents, finally total numbers of 400 valid responses were considered for the purpose of Data Analysis and Interpretation i.e. 133 responses from Ahmedabad, 138 responses from Baroda and 129 responses from Surat.

4.8 SAMPLING DECISION

In view of the available time and other constraints being faced by the researcher, it was decided to conduct a sample survey for collecting primary data from those respondents who has currently invested in any Mutual Fund Scheme/Schemes and respondents were screened and inclusion was purely on the basis of their knowledge about Financial Markets, Mutual Funds in particular. The researcher had collected primary data using a field research survey supported with personal interviews of mutual fund investors from amongst the three major cities *viz*., Ahmedabad, Surat and Baroda of the State of Gujarat. The population was defined as mutual fund investors.

4.8.1 POPULATION OF THE RESEARCH STUDY (RESEARCH AREA OF THE STUDY)

The population of study was termed to the extent of the selected three major cities of the Gujarat State as mentioned earlier was decided considering aspects like adequacy; feasibility, and availability of data from amongst identified as mutual fund investors.

4.8.2   SAMPLE SIZE OF THE RESEARCH STUDY

As no list of mutual fund investors was available, the researcher estimated sample size as the total number of 450 retail investors, i.e. 150 retail investors from each three major cities in the state of Gujarat *viz.* Ahmedabad, Surat and Baroda.

4.9   A BRIEF ABOUT STRUCTURED QUESTIONNAIRE

The Structured Questionnaire consisted of 24 Questions designed to collect information and primary data from the retail mutual fund investors. The questionnaire was divided into three parts (i.e. Part A, Part B and Part C).

Part A included questions related to profiling of respondents concerning personal aspects of retail mutual fund investors i.e. Sex, Age, Academic Qualification, Marital Status, Occupation, Annual Income, Annual Savings, Financial responsibility, Their objectives for investments, their preference of Investment Avenue, their basis for investment decision and their financial literacy.

Part B included questions related to attitude towards the financial instruments in the Indian capital market, Sources from where they come to know about mutual fund investment schemes, from how many years they are investing in mutual fund and whether they continue their investment in mutual fund or not, the preference of mutual fund schemes category and type, reasons for preference of investment in mutual funds, importance given by the investor to different qualities for selection of mutual funds/schemes (i.e. Fund Related Qualities, Fund Sponsor Qualities and Investors Related Services), Reasons for withdrawing investment from mutual funds, the preferred communication mode of investors and the most popular Mutual Funds among individual investors.

Part C included questions relating to the views of investors towards mutual funds.

4.10   HYPOTHESES

After having basic analysis of the responses received to the Questionnaire, in this part an attempt is made to test the hypotheses with reference to primary data collection. The following hypotheses are tested:

4.10.1   SRMFIs ATTITUDE TOWARDS FINANCIAL INSTRUMENTS

For examining the association between SRMFIs attitude towards Financial Instruments on the one hand and Gender, Age, Academic Qualification, Marital Status, Occupation, Annual Income, Annual Savings, Financial Responsibility on the other hand the following hypotheses are framed:

H_{01} : Attitude towards Financial Instruments and Gender are independent of each other.

H_{02} : Attitude towards Financial Instruments and Age are independent of each other.

H_{03} : Attitude towards Financial Instruments and Academic Qualification are independent of each other.

H_{04} : Attitude towards Financial Instruments and Marital Status are independent of each other.

H_{05} : Attitude towards Financial Instruments and Occupation are independent of each other.

H_{06} : Attitude towards Financial Instruments and Annual Income are independent of each other.

H_{07} : Attitude towards Financial Instruments and Annual Savings are independent of each other.

H_{08} : Attitude towards Financial Instruments and Financial Responsibility are independent of each other.

4.10.2 PERIOD OF INVESTMENT IN MUTUAL FUND BY SRMFIs

For examining whether there is any association between the period of investment in mutual fund by SRMFIs on the one hand and Gender, Age, Academic Qualification, Marital Status, Occupation, Annual Income, Annual Savings, Financial Responsibility on the other the following hypotheses are framed:

H_{09} : Period of investment in mutual fund and Gender are independent of each other.

H_{010} : Period of investment in mutual fund and Age are independent of each other.

H_{011}: Period of investment in mutual fund and Academic Qualification are independent of each other.

H_{012} : Period of investment in mutual fund and Marital Status are independent of each other.

H_{013} : Period of investment in mutual fund and Occupation are independent of each other.

H_{014} : Period of investment in mutual fund and Annual Income are independent of each other.

H_{015} : Period of investment in mutual fund and Annual Savings are independent of each other.

H_{016}: Period of investment in mutual fund and Financial Responsibility are independent of each other.

4.10.3 SCHEME PREFERRED BY SRMFIs

For examining association between scheme preferred by SRMFIs on the one hand and Gender, Age, Academic Qualification, Marital Status, Occupation, Annual Income, Annual Savings, Financial Responsibility on the other the following hypotheses are framed:

H_{017}: Scheme Preference and Gender are independent of each another.

H_{018}: Scheme Preference and Age are independent of each another.

H_{019}: Scheme Preference and Academic Qualification are independent of each another.

H_{020}: Scheme Preference and Marital Status are independent of each another.

H_{021}: Scheme Preference and Occupation are independent of each another.

H_{022}: Scheme Preference and Annual Income are independent of each another.

H_{023}: Scheme Preference and Annual Savings are independent of each another.

H_{024}: Scheme Preference and Financial Responsibility are independent of each another.

4.10.4 SRMFIs MUTUAL FUND INVESTMENT PREFERENCE IN FUTURE

For examining association between SRMFIs Mutual Fund Investment Preference in future on the one hand and Gender, Age, Academic Qualification, Marital Status, Occupation, Annual Income, Annual Savings, Financial Responsibility on the other the following hypotheses are framed:

H_{025}: Mutual Fund Investment Preference in future and Gender are independent from each other.

H_{026}: Mutual Fund Investment Preference in future and Age are independent from each other.

H_{027}: Mutual Fund Investment Preference in future and Academic Qualification are independent from each other.

H_{028}: Mutual Fund Investment Preference in future and Marital Status are independent from each other.

H_{029}: Mutual Fund Investment Preference in future and Occupation are independent from each other.

H_{030}: Mutual Fund Investment Preference in future and Annual Income are independent from each other.

H_{031}:Mutual Fund Investment Preference in future and Annual Savings are independent from each other.

H_{032}:Mutual Fund Investment Preference in future and Financial Responsibility are independent from each other.

4.11 METHODOLOGY ADOPTED

To test the above hypotheses various statistical tools are applied. The following para discusses the same.

4.11.1 WEIGHTED MEAN VALUE: The Weighted Mean Value (WMV) is similar to an arithmetic mean (the most common type of average); where instead of each of the data points contributing equally to the final average, some data points contribute more than others. If all the weights are equal, then the weighted mean is the same as the arithmetic mean. The term **weighted average** usually refers to a weighted arithmetic mean, but weighted versions of other means can also be calculated, such as the weighted geometric mean and the weighted harmonic mean.

The weighted mean value can be worked out as follows:

$$\bar{x} = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i},$$

-------------- (38)

Or

$$\bar{x} = \frac{w_1 x_1 + w_2 x_2 + \cdots + w_n x_n}{w_1 + w_2 + \cdots + w_n}.$$

-------------- (39)

Where,

$\bar{x}$ = Weighted mean

w_i = weight of ith item x

x_i = value of the ith item x

Therefore data elements with a high weight contribute more to the weighted mean than do elements with a low weight. The weights cannot be negative. Some may be zero, but not all of them (since division by zero is not allowed).

In questionnaire, the researcher has used Likert-type scale in some of the questions. In this weights are assigned as **five** for the highest scale i.e. Highly Favouable/ Highly Imporatant/ Strongly Agree and weights are assigned as **one** for the least scale i.e.Not at all Favourable /Not at all Important/ Strongly Disagree. In order **to assign comparatively important** factors, qualities, or reasons, WMV is calculated.

4.11.2 CHI-SQUARE TEST (C R Kothari (2002)[39]): Chi-square is an important non-parametric test. This test can be applied to multiple situations like goodness of fit or test of independence.

1) As a test of goodness of fit: Chi-square test enables us to see how well does the assumed theoretical distribution fit to the observed data. When some theoretical distribution is fitted to the given data, one is always interested in knowing as to how well this distribution fits the observed data. The chi-square test can give answer to this. If the calculated value of chi-square is less than the table value at a certain level of significance, the fit is considered to be a good one which means that the divergence between the observed and expected frequencies is attributable to fluctuations of sampling. But if the calculated value of chi-square is greater than the table value, the fit is not considered to be a good one.

2) As a test of independence: Chi-square test enables one to explain whether or not two attributes are associated. It may however, be stated that chi-square is not a measure of the degree of relationship or the form of relationship between two attributes but is simply a technique of judging the significance of such association or relationship between two attributes. Chi-square Test proceeds with null hypothesis that the two attributes are independent. On this basis first calculate the expected frequencies and then work out the value of chi-square. It is necessary that the observed as well as theoretical or expected frequencies must be grouped in the same way and the theoretical distribution must be adjusted to give the same total frequency as find in case of observed distribution.

χ^2 is calculated as follows:

$$\chi^2 = \Sigma \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \qquad \text{-------------- (40)}$$

Where,

O_{ij} = observed frequency of the cell in i^{th} row and j^{th} column.

E_{ij} = expected frequency of the cell in i^{th} row and j^{th} column.

If two distributions are exactly alike, chi square is zero, but generally due to sampling errors, chi square is not equal to zero. Whether or not a calculated value of chi square is significant can be ascertained by looking at the tabulated values of chi-square for given degrees of freedom at a certain level of significance. If the calculated value of chi square is equal to or exceeds the table value, the difference between the observed

and expected frequencies is taken as a significant, but if the table value is more than the calculated value of chi square, then the difference is considered as insignificant.

Degrees of freedom (d.f.) play an important part in using the chi-square distribution and the test based on it, one must correctly determine the d.f.

The d.f. is worked out as follows:

$$d.f. = (c-1)(r-1)$$ ------------- (41)

Where,

c = the number of columns

r = the number of rows

To test the independence of two attributes, in the present study **Chi-square test as a test of independence** is applied.

4.11.3 RELIABILITY TESTING (CRONBACH'S ALPHA): Cronbach's α (alpha) is a coefficient of reliability. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees. Cronbach's alpha measures how well a set of items (or variables) measures a single unidimensional latent construct. When data have a multidimensional structure, Cronbach's alpha will usually be low. Technically, Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency).

Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below, for conceptual purposes, we show the formula for the standardized Cronbach's alpha:

$$\alpha = \frac{N \cdot \bar{r}}{1 + (N-1) \cdot \bar{r}}$$ -------------- (42)

Where,

N = the number of items

$\bar{r}$ = the average inter-item correlation among the items.

One can see from this formula that if one increases the number of items, one increases Cronbach's alpha. Additionally, if the average inter-item correlation is low, alpha will be low. As the average inter-item correlation increases, Cronbach's alpha increases as well. This makes sense intuitively - if the inter-item correlations are high, then there is evidence that the items are measuring the same underlying construct. This is really what is meant when someone says they have "high" or "good" reliability. They are

referring to how well their items measure a single unidimensional latent construct. Generally, a reliability coefficient of **0.60** or higher is considered "acceptable" in most Social Science applications. In the present study, for each of the variables used for Factor Analysis, reliability test is performed.

4.11.4 FACTOR ANALYSIS (C R Kothari (2002)[38] and Naresh K Malhotra (2007)[40] and) : Factor Analysis allows us to look at these groups of variables that tend to relate to each other and estimate what underlying reasons might cause these variables to be more highly correlated with each other" **Naresh K Malhotra(2007)[40]**. Factor analysis is by far the most often used multivariate technique of research studies, specially pertaining to social and behavioral sciences. It is a technique applicable when there is a systematic interdependence among a set of observed or manifest variables and the researcher is interested in finding out something more fundamental or latent which creates this commonality. For instance, one might have data, about an individual's income, education, occupation and dwelling area and want to infer from these some factor which summarizes the commonality of all the said four variables. The technique used for such purpose is generally described as factor analysis. Factor analysis, thus seeks to resolve a large set of measured variables in terms of relatively few categories, known as factors. This technique allows the researcher to group variables into factors and the factors so derived may be treated as new variables (often termed as latent variables) and their value derived by summing the values of the original variables which have been grouped into the factor. The meaning and the name of such new variable is subjectively determined by the researcher. Since the factors happen to be linear combination of data, the coordinates of each observation or variable is measured to obtain what are called factor loadings.

FACTOR ANALYSIS MODEL

Mathematically, factor analysis is somewhat similar to multiple regression analysis, in that each variable is expressed as a linear combination of underlying factors. The amount of variance a variable shares with all other variables included in the analysis is referred to as communality. The covariance among the variables is described in terms of a small number of common factors plus a unique factor for each variable. These factors are not overtly observed. If the variables are standardized, the factor model may be represented as:

$$X_i = A_{i1}F_1 + A_{i2}F_2 + A_{i3}F_3 + \ldots\ldots\ldots + A_{im}F_m + V_iU_i \qquad \text{--------------- (43)}$$

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Where,

X_i = ith standardized variable

A_{ij} = standardized multiple regression coefficient of variable i on common factor j

F = common factor

V_i = standardized regression coefficient of variable i on unique factor i

U_i = the unique factor for variable i

m = number of common factors

The unique factors are uncorrelated with each other and with the common factors. The common factors themselves can be expressed as linear combinations of the observed variables.

$$F_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + \ldots\ldots + W_{ik}X_k \qquad \text{--------------- (44)}$$

Where,

F_i = estimate of ith factor

W_i = weight or factor score coefficient

k = number of variables

It is possible to select weights or factor score coefficients so that the first factor explains the largest portion of the total variance. Then a second set of weights can be selected, so that the second factor accounts for most of the residual variance, subject to being uncorrelated with the first factor. This same principle could be applied to selecting additional weights for the additional factors. Thus, the factors can be estimated so that their factor scores, unlike the values of the original variables, are not correlated. Furthermore, the first factor accounts for the highest variance in the data, the second factor the second highest, and so on. Several statistics are associated with factor analysis.

THE KEY STATISTICS ASSOCIATED WITH FACTOR ANALYSIS

Bartlett's test of sphericity: Bartlett's test of sphericity is a test statistics used in examines the hypothesis that the variables are uncorrelated in the population. In other words, the population correlation matrix is an identity matrix, each variables correlates perfectly with itself (r = 1) but has no correlation with the other variables (r = 0).

Kaiser-Meyer-olkin (KMO) measure of sampling adequacy: The Kaiser-Meyer-Olkin measures of sampling adequacy is an index used to examine the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate factor analysis is appropriate. Values below 0.5 imply that factor analysis may not be appropriate.

Correlation matrix: A correlation matrix is a lower triangle matrix showing the simple correlations, **r**, between all possible pairs of variables included in the analysis. The diagonal elements, which are all 1, are usually omitted.

Communality: Communality is the amount of variance a variable shares with all the other variables being considered. This also the proportion of variance explained by the common factors.

Eigenvalues: the eigenvalue represents the total variance a variable explained by each factor. The ratio of eigenvalues is the ratio of explanatory importance of the factors with respect to the variables. If a factor has a low eigenvalue, then it is contributing little to the explanation of variances in the variables and may be ignored as redundant with more important factors. Eigenvalues measure the amount of variation in the total sample accounted for by each factor.

Factor: A factor is an underlying dimension that account for several observed variables. There can be one or more factors, depending upon the nature of the study and the number of variables involved in it.

Factor loading: Factor loadings are simple correlation between the variables and the factors.

Total sum of squares: When eigenvalues of all factors are total, the resulting value is termed as the total sum of squares. This value, when divided by the number of variables, results in an index that shows how the particular solution accounts for what all the variables taken together represent. If the variables are all very different from each other, this index will be low. If they fall one or more highly redundant groups, and if the extracted factors account for all the groups, the index will then approach unity.

Percentage of variance: This is the percentage of the total variance attributed to each factor.

Factor scores: Factor score represents the degree to which each respondent gets high scores on the group of items that load high on each factor. Factor scores can help explain what the factors mean. With such scores, several other multivariate analyses can be performed.

METHODS OF FACTOR ANALYSIS

There are several methods of factor analysis. The two basic approaches are principal components analysis and common factor analysis.

Principal components analysis: In Principal components analysis, the total variance in the data is considered. The diagonal of the correlation matrix consists of unities, and full variance is brought into the factor matrix. Principal components analysis is recommended when the primary concern is to determine the minimum number of factors that will account for maximum variance in the data for use in subsequent multivariate analysis. The factors are also called principal components.

Common factor analysis: Common factor analysis, also called principal factor analysis (PFA) or principal axis factoring (PAF), seeks the least number of factors which can account for the common variance (correlation) of a set of variables. Communalities are inserted in the diagonal of the correlation matrix. This method is appropriate when the primary concern is to identify the underlying dimensions and the common variance is of interest.

Other methods not so widely in use are: methods of unweighted least squares, generalized least squares, maximum likelihood, alpha method, and image factoring.

In this study, **Principal components analysis** method has been applied.

ROTATION METHODS

Rotation serves to make the output more understandable and is usually necessary to facilitate the interpretation of factors.

Varimax rotation: Varimax rotation is an orthogonal rotation of the factor axes to maximize the variance of the squared loadings of a factor (column) on all the variables (rows) in a factor matrix, which has the effect of differentiating the original variables by extracted factor. Each factor will tend to have either large or small loadings of any particular variable. A varimax solution yields results which make it as easy as possible to identify each variable with a single factor. This is the most common rotation option.

Quartimax rotation: Quartimax rotation is an orthogonal alternative which minimizes the number of factors needed to explain each variable. This type of rotation often generates a general factor on which most variables are loaded to a high or medium degree. Such a factor structure is usually not helpful to the research purpose.

Equimax rotation: Equimax rotation is a compromise between Varimax and Quartimax criteria.

Direct oblimin rotation: Direct oblimin rotation is the standard method when one wishes a non-orthogonal (oblique) solution – that is, one in which the factors are

allowed to be correlated. This will result in higher eigenvalues but diminished interpretability of the factors. See below.

Promax rotation: Promax rotation is an alternative non-orthogonal (oblique) rotation method which is computationally faster than the direct oblimin method and therefore is sometimes used for very large datasets.

In this study, **Varimax rotation** method has been applied which is the most commonly used method.

4.12 LIMITATIONS OF THE RESEARCH STUDY

1. This research study was restricted and centered on exclusively only on mutual fund investors in the selected Cities of the State of Gujarat.

2. As no list of mutual fund investors was available representativeness of sample could not be examined.

3. The limitation of threat of the primary data sources employed to the research project does prevail in this research study.

4. The responses given by the mutual fund investors are subject to their personal biases and choices as the case may be.

5. This study has not been conducted at a point hence the findings cannot be applied universally to all situations.

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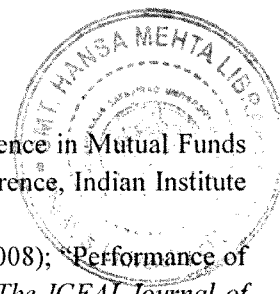
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