Chapter 1

Introduction
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1. Identification of the Research Issue:

Ever since the inception of stock exchange, investors are always on the lookout for systematic trading strategies, which could reward them with super-normal returns. Though in some isolated cases these trading strategies helped shareholders in achieving such goal, but in most of the cases they proved to be of no use in yielding super-normal earnings consistently. A detailed search for this particular phenomenon set the foundation of probably the most interesting and yet controversial topic ‘Random Behaviour of Prices and Efficient Capital Market Hypothesis’.

Though in a perfectly efficient market, no shareholder has any scope of earning above normal returns, degree or level of market efficiency largely depends upon the nature of information incorporated in security prices. As suggested by Fama, while weak form efficiency only ensures incorporation of past price information, semi-strong form validates impoundment of both past and present publicly available information and strong form efficiency implies incorporation of all information - both public and private.

Thus information efficiency of markets casts a shadow over the investors’ attempt to outperform the market. Market efficiency to a large extent makes both Technical as well as Fundamental analysis useless.

Technical analysis uses past patterns of security prices and volume of trading as the basis for predicting future trend. The random walk evidence suggests that prices of securities are affected by information disclosures almost instantaneously. Hence there is hardly any chartist method to predict the market and strategy designed on the basis of chartist method accordingly would fail to earn above normal return for the shareholders in a market which is efficient in the weak form.

Fundamental analysis involves using market information to determine the intrinsic value of securities in order to identify those securities that are undervalued. However semi-strong form of market efficiency suggests that fundamental analysis cannot be used to outperform the market. In an efficient market, equity research and valuation would be a costly task that provides no benefits. The odds of finding an undervalued stock should be random (50/50). Most of the time, the benefits of information and equity research would not cover the costs of doing research.

Thus the success of systematic trading strategies developed by an analyst or an investor mostly depends upon the form of information efficiency actually achieved by the market. As a
result, over more than past hundred years, numerous studies have been conducted across the world to judge the true level of efficiency of stock markets.

In this respect the studies conducted in Indian context over the years indicates that the researchers are not unanimous as regards the actual level of efficiency of Indian stock market. While some are in favour of weak form efficiency, others have strongly rejected such possibility. In additional a few researchers claim it to be even efficient in the semi-strong form. This study, thus, will attempt to look into the validity of such claims regarding the level of efficiency of Indian stock exchanges and will also try to determine the actual form of efficiency prevailing in the stock markets in India. Knowledge of this actual form of efficiency would help both the retail analysts as well as financial analysts to design and implement strategy in relation to their stock market transactions for maximizing the earnings. From that perspective, the proposed study is expected to have immense socio economic significance.

1.2. Literature Review:

Innumerable studies have been conducted in the US, UK and in some other European countries to test the degree of efficiency of leading stock exchanges in the world. Roberts (1959) conducted simulation tests on New York Stock Exchange in order to determine the degree of efficiency of that stock market. The essence of this experiment was to examine the appearance of the actual level of Dow Jones Index expressed both in levels and in terms of weekly changes, and to compare these graphs with a simulated set of graphs. A series of price changes was generated from random number tables and then these changes were converted to graphs depicting levels of the simulated Dow Jones Index. Both figures reveal ‘head and shoulders’ pattern. Because of these similar patterns, the inference is drawn that the actual result may well be the result of random stock price movements which in turn established the weak form efficiency of the market. Cootner (1967) provided a brief summary of early random walk studies of share prices of different leading stock exchanges in the world, and came to the conclusion that share prices behave randomly. In other words, successive or lagged price changes of shares are independent and this validates the weak form efficiency of the stock market.

In the early 70s and late 60s the research studies focused on semi strong efficiency tests. Fama, Fisher, Jensen and Roll (1969) made a major contribution on this issue. They tested the speed of market’s reaction to firm’s announcement of stock splits, and the accompanying reaction with respect to a change in dividend policy. The authors concluded that the market was
efficient with respect to its reaction on information on the stock split and also was efficient with respect to reacting to the informational contents of stock split vis-à-vis changes in dividend policy. Ball and Brown (1968) conducted another test in this area by analyzing the stock market's ability to absorb the informational content of reported annual earnings information. They concluded that about 85% of the informational content of the annual earnings announcement was reflected in stock price movements prior to release of the actual annual earnings figure. This finding reinforced the belief that stock markets are efficient in the semi strong form. Joy, Litzenberger and McEnally (1977) conducted another stock price earning test in this area. In their study the authors tested the impact of quarterly earnings announcement on the stock price adjusting mechanism. Some of their results contradicted the semi strong form hypothesis. In some of their subsets, the authors found that favourable information contained in published quarterly earnings reports was not instantaneously reflected in stock prices. Maurice and Jones (1979) are of the opinion that the majority of the researchers, who have reviewed the semi strong efficiency of the market, strongly supported the semi strong form hypothesis. Most of the reported results demonstrated that stock prices do adjust rapidly to announcement of new information about stocks.

Regarding test of strong form efficiency, very few tests, as compared to tests of weak form and semi strong form efficiency, have been conducted. One test on this area is to compare the performance of top mutual funds with the earnings of a retail investor. The managers of top mutual funds are supposed to possess some of the inside information of the companies due to their wide and efficient network, which a retail investor does not possess. Therefore it is expected that earnings of mutual funds are expected to be higher than that of retail investors. However if it is found that both groups earn the same return then it will be proved that the market is efficient in the strong form as then it will be proved that security prices incorporate both publicly available information as well as privately available information. In other words, as security prices already reflect all the information, so the possession of supposedly private information would not yield any superior return to the shareholders. Dowhies and Dyckman (1973) found that in most cases mutual funds failed to outperform the earnings that has been earned by a retail investor after adjustment of fees levied by the funds from the investors. Jensen (1968) also reached the similar conclusion.
In India the history of research attempts regarding the test of market efficiency is not too old. It started only during late 1970s.

The issue of weak form efficiency has been researched in India over a long period.

In this respect Rao and Mukherjee (1971) attempted to test the random walk model using spectral analysis. They used the weekly average prices of only one company (Indian Aluminium Company) over a 16 year period (1955 to 1970). They first separated the trend component using simple moving averages and then the detrended series was used as the input for spectral analysis. A large number of spectral estimates were found to fall within the appropriate 95% confidence limit. They concluded that the random walk hypothesis held for the company studied. However it may not be right to generalize the results based on a sample which consisted of only one company.

Ray (1976) constructed index series for six industries as well as for all industries and tested the hypothesis of independence on these series. He obtained mixed results, though evidence was more towards rejection of the null hypothesis of independence.

Sharma and Kennedy (1977) compared the behaviour of stock indices of the Bombay, London and New York Stock Exchanges during 1963-73 using run test and spectral analysis. Both run tests and spectral analysis confirmed the random movement of stock indices for all the three stock exchanges. They concluded that “stocks on the BSE obey a random walk and are equivalent in the markets of advanced industrialized countries”.

Kulkarni (1978) investigated the weekly RBI stock price indices for Bombay, Calcutta, Delhi, Madras and Ahmedabad stock exchanges and monthly indices of six different industries by using spectral method. He concluded that there is a repeated cycle of four weeks for weekly prices and seasonality in monthly prices. This study has thus rejected the hypothesis that stock price changes were random.

Barua (1981) analyzed daily price changes of 20 securities and Economic Times index from July 1977 to June 1979. He found no dependency in individual security price changes but the market index exhibited significant serial dependence.

Sharma (1983) analyzed weekly returns of 23 actively traded stocks in BSE over the period 1973-78. The integrated moving average from the random walk model was fitted on the series and was found to be an adequate representation of price changes except for two stocks. These are the stocks for which no adjustment was made for rights and bonus issues.
In a more comprehensive study, Gupta (1985) tested random walk hypothesis using daily and weekly share prices of 39 shares together with the *Economic Times* and *Financial Express* indices of share prices. The study covered the period 1971-1976 and was based on serial correlation tests and runs tests. Gupta concluded that the Indian stock markets might be termed as competitive and 'weakly' efficient in pricing shares.

Ramachandran (1986) tested weekend prices of 60 stocks covering the period 1976-81 for the weak form of EMH. He used filter rule tests in addition to runs and serial correlation tests and found support for the weak form of EMH. For filter tests, he first set filters ranging from 1% to 49% and assumed transaction costs of 2.5% along with carry-forward charges 20% p.a. He assumed that the investor utilizes the carry forward facility. He, then, compared the filter returns from a buy-and-hold strategy and sell-and-hold strategy. He found that the filter rule strategy provided inferior returns.

In a more recent study Rao (1988) examined weekend price data over the period July 1982 to June 1987 for ten blue chip companies by means of serial correlation analysis, runs tests and filter rules. All the three tests confirmed the weak form of efficiency. Serial correlation test was done for lags from 1 to 10 periods. 80 out of 100 coefficients were found to be within the two standard deviation range and only four coefficients are beyond the three standard deviation range. Using filters of 3, 5 and 10% he also found that even without providing for any transaction costs, the buy and hold strategy outperformed the filter rule trading strategy in all cases.

In another study by Pandey and Bhat (1988), the attitudes and perceptions of market participants about the efficiency of the stock market were examined. The participants included preparers and users of accounting information and the survey was conducted through structured questionnaire. The respondents (160 in total) belonging to various groups (chartered accountants, academicians, investors and chief financial executives of companies) did not believe that the Indian stock market had been efficient in any of its three forms. The majority of them considered technical and fundamental analysis and audited accounting information sources to be useful in investment management.

Yalawar (1988) studied the monthly closing prices of 122 stocks listed on the Bombay Stock Exchange during the period 1963-82. He used only the non-parametric tests i.e. Spearman's rank
correlation test and runs test. He found that only 21 out of 122 lag 1 correlation coefficients were significant at 5% level and hence supported the weak form efficiency.

Gupta (1989) used weekend closing prices of 39 shares from January 1971 to March 1976 to test the log random walk model and found adequate support for the weak form of efficiency using serial correlation and runs test.

Obeidullah (1990) used weekly prices covering the period 1985-88 and examined serial correlation and runs. He found significant support for the weak form of EMH.

Choudhury (1991) also tested the log random walk model. But based on his analysis he reached at different conclusions. He used daily price quotations of 93 actively traded shares for the period 1988 to 1990. Though none of the serial correlation coefficients were greater than 0.5, of the total sample size 70 shares were found to have statistically significant for 1 day lag and 17 others were also found significant for a lag of 2 days or more. Based on his findings he rejected the hypothesis of weak form of efficiency. The results were also confirmed by the runs test where the difference between expected and actual no of runs was significant for 49 shares. The difference of the findings from that of earlier research findings was attributed to the shift in market’s pricing efficiency with respect to individual shares.

Sunit Poshakwale (1996) studied the daily prices of BSE National Index for the period 1987-94 to test existence of day of the week effect in BSE. He used K-S Goodness of Fit test, serial correlation test and run test. Based on the analysis he found that weekend effect is evident as the returns achieved on Fridays are significantly higher as compared to the rest of the days of the week and concluded that existence of the day of the week effect on BSE clearly rejects any possibility of weak form efficiency.

Anand Pandey (2003) in his study on NSE indices used the daily and weekly values of three leading indices namely CNX DEFTY, CNX NIFTY and CNX NIFTY JUNIOR for the period 1996-2002. He performed autocorrelation analyses and runs test and concluded that the series of stock indices in the India Stock Market are biased random time series.

In a more recent attempt, P. Srinivasan (2010) studied the daily closing values of CNX NIFTY and the BSE SENSEX for the period 1st July 1997 to 31st August 2010 using more advanced test techniques like ADF test and PP test. The results confirmed that the return series does not contain any unit root and hence the market is not efficient in the weak form.
P.K Mishra (2010) also confirmed the same results on both BSE and NSE as documented by Srinivasan (2010).

Das and Pattanayak (2011), and Gupta & Siddiki also confirmed considerable departure from randomness using advanced test results of a few well known indices.

The issue of semi-strong form of efficiency was taken up for research from mid 1980s. The evidences on this issue, however, are mixed.

Subramaniam (1989) found that in case of political events, the market appeared to respond more efficiently to events whose impact on share values was characterized by low complexity and high clarity. Ramchandran (1985) and Srinivasan (1988) found that the market is by and large efficient in responding to the information content of bonus issue and right issue respectively.

A closely related question is the extent to which share prices reflect (publicly known) fundamentals. Dixit (1986) shows that dividend is the most important determinant of the share prices. However, Barua and Raghunathan (1990), Sundaram (1991), Obaidullah (1991), Sinha (1992) cast doubts on whether the observed price earnings ratios are consistent with the fundamental factors like dividend growth and payout ratios.

Another related question is whether the pricing is consistent with the risk-return parity postulated by the Capital Asset Pricing Model (CAPM). While Verma (1988) and Yalawar (1988) provide evidence in favour of CAPM, Srinivasan (1988) argues that the CAPM relationship holds only in the long run.

Moreover Barua and Raghunathan (1986) provide evidence of the systematic mispricing of the convertible securities in violation of the risk-return parity and argue that this represent an arbitrage opportunity.

On strong form efficiency there is hardly any notable study as Indian stock market can hardly be expected to be efficient in the strong form mainly because of its limited size, less stringent regulations to avoid insider trading mechanisms etc.

Therefore, it appears that researchers are not unanimous in their opinion regarding the level of efficiency in Indian stock exchanges. Thus there exists a research gap in the area of determining the actual level of efficiency of Indian stock markets and with it connected the strategy on the part of shareholders that has the potential of ensuring above average earnings for the shareholders.
1.3. Objective of the Study:

The central objective of the study is to analyze the level of information efficiency across Indian stock exchanges. However, more specifically, the study would try to address the following issues:

1. It will critically analyze the conceptual aspects of ‘efficient capital market’ hypothesis. (Chapter - 2).
2. It will present the current position of Stock Markets in India. (Chapter - 3).
3. It will examine the efficiency level of Bombay Stock Exchange. (Chapter – 4).
4. It will examine the efficiency level of National Stock Exchange. (Chapter – 5).
5. It will conduct a questionnaire based study on the perception of investors regarding the level of efficiency of Indian stock markets. (Chapter – 6)

1.4. Methodology:

Our study is both empirical as well as conceptual. For conceptual parts we depended on the books available in the market, relevant articles published in reputed journals and on relevant websites. As regards empirical part, we have selected two major stock exchanges of the country, namely, Bombay Stock Exchange and National Stock Exchange. Other stock exchanges have been kept out of our purview mainly because market efficiency hypothesis is consistent with large sized stock exchanges where large number of buyers and sellers take active part in day to day trading. Moreover, the time and resource constraints have also contributed to the exclusion of other stock exchanges of India.

For empirical analysis, we depended on secondary data (that is the daily closing index value and stock prices) obtained from stock exchange directories and also from relevant websites.

These data are then processed statistically to arrive at the conclusion. Since weak form efficiency signifies that successive price changes are independent, statistical tests like Serial Correlation Test, Run Test and Unit Root Tests (ADF Test and PP test) and some advanced modeling are used to test such notion. Similarly, as semi-strong form of efficiency suggests instantaneous incorporation of all publicly available information, both past and present, event studies on publicly available information of bonus issue have been conducted. For strong form efficiency, however, no formal tests have been conducted as Indian stock market scenario is still
not conducive to support strong form efficiency. The issue has been taken up theoretically. Details of sample and methodology have been covered under the relevant chapter.

Finally, to analyze the perception of the investors, the necessary information has been collected from the primary source by sending a structured questionnaire and then the response has been analyzed by applying suitable statistical techniques. However no formal qualitative test techniques have been followed.

1.5. Expected Benefits of the Study:

As mentioned earlier, market efficiency has been a subject of study over past hundred years or so. Many research attempts have been made to assess the level of efficiency of stock markets across the world in order to provide meaningful insights to various participants of the market, because at one end such knowledge will benefit the investors in designing a proper strategy in earning above normal return and to another end it will guide the regulators to put in place appropriate regulations to further enhance the efficiency of the stock market.

Our study is likely to serve the same purpose in Indian context. The result of our study will confirm the actual level of efficiency of Indian stock market, especially BSE and NSE. As a result financial analysts and investors will have the necessary insights as to whether the past price series should be further analyzed to identify the scope of future abnormal return (if the market is proved to be inefficient in the weak form) or to base trading strategies on the other publicly available information like bonus announcement, stock split etc. to reap any abnormal benefits (if the market is proved to be inefficient in the semi-strong form). In addition, the results of the questionnaire based opinion survey will reveal the perceptions of investors regarding the efficiency of Indian stock market, which may of good help for the other market participants. Again, since an efficient market can only ensure optimal allocation of limited financial resources of any country to the most profitable avenues, the results of our study will also be of immense help for the regulators as well. Last but not the least, the study will also be a roadmap for any future study on stock market efficiency in Indian context. In short, it will have immense socio-economic significance.

1.6. Plan of work:

In order to accomplish the overall as well as specific objectives of the study, we have segregated the entire study into a number of chapters as follows:
• **Chapter One-Introduction:**
   In this chapter we shall briefly discuss the factors that led to the identification of the research issue and include detail coverage of existing literature in international as well as Indian context. Further we shall incorporate the objectives of the study, methodology, and expected benefits of the study along with the plan of work.

• **Chapter Two- Conceptual Aspects of Market efficiency Theory-A Review:**
   In this chapter we shall try to thoroughly cover all the relevant conceptual issues associated with the theory of market efficiency including alternative concepts, meaning, origin and history, various levels and related tests, conditions as well as the alternative theories of market behaviour.

• **Chapter Three- Present Scenario of Indian Stock Market:**
   In this chapter we shall assess the present scenario of Indian stock market with special emphasis on BSE and NSE based on issues like market growth in terms of turnover, returns, market movements, volatility and liquidity.

• **Chapter Four- Market Efficiency of Bombay Stock Exchange (BSE):**
   In this chapter we shall try to identify the actual level of efficiency of BSE based on various statistical tools.

• **Chapter Five- Market Efficiency of National Stock Exchange (NSE):**
   In this chapter we shall try to identify the actual level of efficiency of NSE based on various statistical tools.

• **Chapter Six- Investors’ Perception Regarding Market Efficiency in India:**
   In this chapter we shall undertake a questionnaire based opinion survey to assess the perception of market participants (mainly investors) regarding the efficiency of Indian stock market.

• **Chapter Seven- Findings and Conclusions:**
   Finally in this chapter we shall summarize the findings of earlier chapters (Chapter Four, Five and Six) and undertake a comparison between BSE and NSE based on the findings. We shall also try to form an overall conclusion on the level of market efficiency achieved by Indian stock market. Moreover we shall incorporate a few suggestions for the improvement of market efficiency in Indian based on our findings and shall also include the limitations of the study and further scope of research in this area.