Chapter – 1

Literature Survey and Indian Share Market
Chapter I

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1.1 Introduction

Since its independence in 1947, a multitude of problems have stood in India's way of realizing its true economic potential. The social and political problems are the recurring fights among various religious sects; an ever-increasing population, archaic bureaucratic procedures, infighting among and within political parties; and the nationalist movements led by a variety of separatist groups. Economic problems include counter-productive tax rates, debilitating customs duties that stymied foreign investments, and the Indian government's socialist approach that kept the economy as well as the stock market closed to foreigners.

Although India continues to struggle with socio-political problems, it has recently made tremendous strides in the economic front via reforms that were introduced by the P.V.Narasimha Rao Administration in the early part of 1991. The most significant reform was perhaps the opening of the economy to foreign investment on very liberal terms and allowing, for the first time in independent India's history, direct and indirect investments by foreign nationals and institutional investors in India's equity markets. These reforms have produced positive results. India's industrial exports and foreign investment today are growing at the country's fastest rate ever. The country's foreign exchange reserves skyrocketed to $20 billion in 1995 from less than $1 billion in June 1991. Similarly, several Indian stocks (Mahindra and Mahindra, and Reliance
Industries Limited for example) are now traded on international markets. Additionally, several closed-end (for example, the India Growth Fund and the India Fund, listed on the NYSE, and the unlisted Magnum Fund) and open-end mutual funds (for example, Morgan Stanley India Fund) are currently available to foreign investors. Also, foreign brokerage houses are now being allowed through joint ventures with Indian investment bankers to participate in primary as well as secondary markets in India.

Given the newfound interest in the Indian stock markets, an intriguing question is how these markets have performed over the years. To answer this question we examine the return generating process of the Bombay Stock Exchange (BSE). The BSE, which dates back to the 19th century, is the largest and most active stock exchange in India, accounting for 65% to 70% of the value of the country's total stock transactions. Time series data over a reasonably long period are available on the BSE. The BSE is also well established emerging equity markets and thus, provides a showcase for other emerging markets in the world.

When we analyze the returns on investment in the share market; the following points should be taken care. These play a vital role in the secondary markets in India. In case of primary market the risk factors are very less but the probability of getting chances in the primary market are very less, because it is based on the loting system. In a secondary market the time of entering and the time of leaving the market are essential. Due to the following reasons, the index may either be increased or decreased drastically.
• The Government instability
• The Government Policy
• Foreign Institutional Investors (FIIs)
• Role of GDP

There are some other reasons also that intervene to change the BSE SENSEX considerably, they are

• Oil and Fuel Price
• Nature of Monsoon level etc.,

These are all directly involved in GDP and there is no need to explain them separately.

1.1.1 THE GOVERNMENT INSTABILITY

The government instability is one of the most significant aspects for increase or decrease in BSE index drastically. When we look into the past records, there are many occasions this has happened. On May 17, 2004, when the Congress coalition government came to power with outside support of left parties, it affected the share market and the index deeply suffered by more than 500 points. Here, we quote some of the points.

i. The stock market crashed by a whopping over 550 points within minutes of its opening on Monday, making it the worst-ever fall wiping out about Rs 1,35,000 crore (Rs 1,350 billion) wealth.
Trading was suspended within minutes after the Sensex dipped by 10 per cent on the Bombay Stock Exchange.

The BSE Benchmark 30-share Index crumbled by 553 points to 4516.58 at 10.17 am after opening at 5020.89 as against last Friday's close of 5069.87.

Brokers said the trading was suspended for one hour as the Sensex reached 10 per cent circuit following all-round selling pressure from investors.

"The BSE has suspended the trading for an hour to deal with sudden volatility and we will review the situation around 11 am again," a BSE official said.

"The market fell by about 550 points on opening and when there is a change of more than 10 per cent, we suspend the trading to deal with volatility," he added.

The carnage was triggered on Friday when the market crashed by 330 points following the anti-divestment statements by the Left parties and Monday's crash was being attributed to the uncertainty on economic policies of the new government.
A market analyst Apoorva Shah of Prabhu Das Leela Dhar Securities estimated the loss in market capitalisation at over Rs 100,000 crore, with in a minute of panic situation.

ii. **Lot of people must have had heart attack.** I think Ambani or someone else has been affected. This shows even, market is not in favor of this government.

Do you think they can survive now?

No one person can fluctuate the market this big, in such a short span of time. Remember the Harshad Mehta days? Even then he did it in a systematic, long-term-frame procedure.

Loosing 2 trillion rupees, that's about $40 billion, in such a short span of time is no one man's job.

iii. The Sensex crashed to 4283 points on disinvestment fears early on Monday. Trading has been halted for another two hours.

iv. Now Congress have issued this statement -- Congress says government will be investment friendly.

v. **Manmohan Singh to make statement**

Lemme take a guess: Disinvestment won't stop, lefties parties won't be calling any shots…..take it easy folks.

vi. The Left parties termed today's (Monday, May 17, 2004) crash of the stock market as not having any link with the economic
fundamentals but the result of the "influence" the foreign institutional investors have on the trading system.

"The loss (over stock market crash) is notional and adjustments keep taking place. There is no direct link of the fall (in Sensex) with the fundamental economic structure of the country," CPI (M) leader Nilotpal Basu said in New Delhi.

Reacting to the Sensex crash by over 800 points in the morning, he said there was an urgent need for capital market reforms to facilitate large-scale entry of small investors in stocks' trading?

This is not only the first incident; this has happened every time if the people or investors think that the government is unstable. The panic occurs, because the small investors sold their scripts and/or the FIIs return their investment money heavily.

1.1.2 THE GOVERNMENT POLICY

The first and second-generation reforms have created a conducive environment for foreign investments in India. Market oriented policies are boosting economic activity, all round development and GDP growth rate. Government procedures are constantly being simplified and paper work being minimized. As the Indian economy gears for competition in the international market, overseas investors clearly see the potential for attractive returns from investments in India, which is also evident from the many FDI success stories already achieved.
1.1.2.1 Industrial Policy

The Indian Government's market liberalization and economic policy reforms programme aims at rapid and substantial economic growth and integration of the country's economy with the global economy. The industrial policy reforms have eliminated the industrial licensing requirements except for certain select sectors, removed restrictions on investment and expansion and facilitated easy access to foreign technology and direct investment.

The Industrial Policy Resolution of 1956 and the Statement on Industrial Policy of 1991 provide the basic framework for the Government's overall industrial policy. The procedures for obtaining government approvals have been progressively simplified and quickened. Normal FDI proposals are cleared within a month. Areas earlier reserved for public sector have mostly been opened for private sector participation also.

1.1.2.2 Foreign Investment Policy

Foreign investment is permitted in virtually every sector, except those of strategic concern such as defence (opened up recently to a limited extent) and rail transport. Foreign companies are permitted to set up 100 per cent subsidiaries in India. No prior approval from the exchange control authorities (RBI) is required, except for certain specified activities. The investment should be in accordance with the prescribed guidelines and the details of the investment should be filed with the authorities within the prescribed time limit. This procedure is applicable only for fresh investments directly in Indian companies.
and not for purchase of shares from the existing shareholders. This investment procedure is commonly known as the "automatic approval route".

1.1.2.3 Foreign Investment Policy for trading activities

Foreign investment for trading is permissible under the automatic route up to 51% foreign equity, and beyond this by the Government through FIPB. For approval through the automatic route, the requirement would be that it conducts primarily export activities and the undertaking concerned is an export house/trading house/super trading house/star trading house registered under the provisions of the Export and Import policy in force. However, under the Government route, 100% FDI is permitted in case of trading activities carried out in certain specified sectors such as hi-tech medical and diagnostic items, items for social sector, exports, bulk imports, to name a few.

FDI up to 100% is also permitted for E-commerce activities subject to the condition that such companies would divest 26% of their equity in favour of the Indian public in five years, if these companies are listed in other parts of the world.

1.1.2.4 Foreign Direct Investment Policy

Most FDI activities permitted for foreign direct investment are placed on the automatic route. Under this the applicant company has only to notify the Reserve Bank of India [Jan W. Kwiatkowski. Neely et al. (1991)] within 30 days of inward remittance of funds and again within 30 days of issuing shares to the non-resident investor. Some salient features of the FDI policy are:
• Original investment as also the returns on investment are fully repatriable

• Payment of fee and royalty to foreign technology provider is permitted including that by a wholly owned subsidiary to its off-shore parent company

• Payment of royalty and use of trade marks and brand name without transfer of technology is also permitted

• FDI is not permitted in the areas of agriculture and plantations other than the tea sector, real estate business other than development of integrated townships and settlements, retail trading, atomic energy, lottery business, gambling and betting sectors.

1.1.3 Foreign Investment Investors (FIIs)

This is one of the most and powerful criteria to affect Indian market index. The panic sufferer part occurs due to FIIs withdraws their amount in the Indian share market. Here is one of the examples.

Much, if not most, of this increase was due to the inflow of equity investments from Foreign Institutional Investors (FIIs) such as investment banks and hedge funds. A large portion of this investment came from the small Indian Ocean Island and tax haven of Mauritius, where FIIs have set up paper companies that masquerade as Mauritius-based firms so they can take advantage
of the double taxation treaty between Mauritius and India and escape paying taxes on their investment gains.

The biggest decline in the Sensex occurred on May 22, 2006 when it plunged 1,111.70 points or more than 10 percent, triggering an automatic hour halt in trading. According to stock analysts, much of the fall on that and preceding days was due to sustained selling by FIIs, especially hedge funds. Such funds are notorious for borrowing massive amounts for speculative investments, which makes them vulnerable to margin calls (a demand for cash by lenders due to falling asset prices).

Following the May 22, 2006 plunge, Indian Finance Minister Chidambaram tried to exude calm: “There was certain nervousness in the market. My message to retail investors is to stay invested. FIIs are here to stay. There is no reason to panic.... [B]anks will provide money to those who want to provide margin calls.”

Fearing that stock market losses might trigger a rash of suicides among ruined small investors, police in several cities, including Mumbai and Ahmedabad, were instructed to closely watch bridges and railway lines. Such suicides did occur in the 1990s when a speculative stock bubble burst.

According to estimates made in mid-June, 2006, the stock market sell-off has nearly halved the net foreign equity investment in India for this year to about $2.7 billion. By contrast, in 2005 there was a net inflow of foreign investment in Indian equities of $10 billion and in 2004 of $8.6 billion.
The share sell-off and associated withdrawal of foreign funds from India affected the exchange rate of the rupee. The **rupee declined to a three-year low** against the US dollar of Rs 46.57, but recovered somewhat after the Reserve Bank of India increased two key interest rates by 0.25 percent.

Ironically, the May 22, 2006 stock market plunge coincided with the second anniversary of the coming to power of the Congress Party-led United Progressive Alliance (UPA) government. During the campaign for the 2004 elections, the Congress made a calibrated appeal to popular anger over mounting economic insecurity and social inequality, while the Bharatiya Janata Party (BJP)-led National Democratic Alliance, reflecting the mood in the corporate elite and the most privileged sections of the middle class, sought re-election under the slogan “India is shining.”

Predictably, the Congress-led UPA, while continuing to spout pro-poor rhetoric, has pursued the same neo-liberal agenda as the BJP, seeking to make India a centre of cheap-labour IT engineering, business-processing, research, and manufacturing for the world market.

The dismantling of barriers to foreign investment in banking, retail and other sectors and government plans to gut restrictions on the layoff of workers and plant closures and divert state funds from income support and public services to developing energy and communication infrastructure have made India a magnet for foreign capital, helping fuel a quickening in the country’s growth rate.
But the 7 percent-plus annual increases in GDP and sizeable per capita income increases of recent years have not translated into any improvement in the socio-economic well-being of the vast majority of Indians. On the contrary, the dismantling of India’s nationally regulated economy, the associated cuts in social spending, including agricultural price supports, and the diversion of state investment away from agriculture towards the infrastructure projects wanted by Indian and foreign capital have produced mounting unemployment in the cities and severe distress in the countryside. According to a recent World Bank report, 35 percent of India’s populations live on less than a dollar a day.

Moreover, the claims of the corporate and political elite that India is on the fast track to becoming a world economic power are based on decades-long extrapolations of current growth rates.

By virtually any measure, and in all but a few sectors, India’s economy remains small and backward. Although home to more than 15 percent of the world’s population, India accounts for barely 1 percent of total world trade. Just as importantly, the claims of India’s irresistible rise ignore fundamental problems and imbalances in both the Indian and world economies.

The dilapidated state of India’s infrastructure is increasingly cited by the information technology sector, a niche in which India has emerged as a significant global player, as a barrier to further investments.

Many economists estimate that for India to achieve an annual growth rate of 8.5 percent, it will require a yearly capital inflow of $50-$60 billion. Even this sum could be an underestimate, as Prime Minister Manmohan Singh told the
39th Annual Meeting of the Board of Governors of Asian Development Bank on May 5 that India’s infrastructure requires an investment of more than $150 billion in the next few years.

With a view to attracting foreign infrastructure investment, the UPA, like the government before it, is planning to turn over key resources, like water, and key economic sectors, like power generation, to partial or even complete private sector control and ownership.

Yet, most of the foreign capital that India has attracted in recent years has been in the form of foreign institutional investment, rather than foreign direct investment. (In 2005, the ratio was 60 to 40 percent). The FII inflow has enabled Indian companies to raise additional capital through new share offerings or by raising loans based on the increase in their valuation. FII investments are by definition highly liquid, as financial institutions are in the business of profiting from short-term variations in share and currency values.

India’s dependence on FII forms a marked contrast with China and Brazil, where FII investment accounted respectively for 26 percent and 30 percent of all foreign investments in 2005.

Should India’s growth rate slacken, foreign investors grow impatient with the pace of neo-liberal reform, or international market conditions deteriorate, India could, as the recent stock market gyrations have shown, be sideswiped by a sudden withdrawal of FII and consequent rupee devaluation.
An article earlier this year on the asiatimes.com web site noted that the India's economy "faces significant risks arising from much higher international oil prices and the impact of higher energy prices on Indian inflation and global economic growth" and warned these risks could lead to the withdrawal of foreign funds from India's equity markets.

"In the past," continued with these aspects, "emerging-markets investment performance that has lived by the accumulation of short-term foreign capital has also died because of sudden foreign capital flight. And India is very vulnerable to this syndrome."

India is running a substantial current account deficit. For the April-December 2005 period, the deficit was $13.5 billion, more than double the $5.9 billion deficit incurred in the corresponding period in 2004. The main reason for the increase in the current account deficit was the ballooning of the trade deficit, which totaled $39.6 billion for the nine months between April and December 2005.

On the fiscal front, both the central and state governments in India are mired in debts with up to 40 percent of revenue set aside for debt repayment. The huge debts are a direct consequence of successive rounds of tax cuts for business and the rich. With combined central and state government debt around 9 percent of GDP, international capital is insisting public spending must be sharply reduced.
In the long run, a confluence of factors beyond the control of the Indian elite could well bring about an economic crisis similar to the one that devastated Southeast Asia in 1997-1998.

1.1.4 THE ROLE OF GDP

This is also one of the serious matters to be taken care of, because GDPs ups and down, indirectly affects the market index. But, this will lead the market index slowly to the worst. This is directly involved with Indian economy. A healthy growth in manufacturing and services sector along with a rebound in the farm sector propelled the Indian economy to 8.4 per cent growth in 2005-06, as compared to 7.5 per cent in the previous fiscal. The following are the some of the impacts of GDP.

By the latter part of the 1980s, the combination of poor fiscal management, excessive protectionism, a restrictive investment regime and adverse external shocks were beginning to have serious negative impact on the Indian economy. By early 1991 India was caught in an economic crisis of exceptional severity. Battered by rising oil prices as the result of the Gulf crisis, the already floundering economy suffered a precipitous decline. As the external balance on current account worsened, the central government's fiscal deficit rose to an unprecedented 9.5 percent of GDP, the inflation rate which had fluctuated within single digits throughout the 1970s and 1980s soared to an unprecedented 17 percent. Moreover, the external debt mushroomed from US$20.6 billion in 1980-81 to over US$70 billion, and the debt-service ratio increased to a debilitating 32 percent of GDP. By the second quarter of 1991 the rapidly
deteriorating fiscal situation resulted in the downgrading of India's credit rating in the international financial markets. This further eroded the confidence of external creditors, including the Non-Resident Indians (NRI's) with sizable deposits in Indian banks - triggering a panic run on the foreign exchange reserves leaving India with a paltry US$ 1.1 billion, an amount barely sufficient to pay for two-weeks of imports (World Bank 1996a). In mid-June, and on the verge of defaulting on its foreign debt, India was given an unexpected reprieve by external creditors, in fact, saved from the humiliation of default by drawing emergency loans from the International Monetary Fund. In July 1991, keeping the structural-reform conditionality and to maintain minimal external financial liquidity and debt-servicing obligations the Reserve Bank of India transferred (on a temporary basis) to the Bank of England a part of the nation's gold stock, something it had never done before despite serious macroeconomic difficulties in the 1950s and mid-1960s.

In the summer of 1991 a deep sense of pessimism pervaded the country. Many seasoned "India watchers" were already writing the country's obituary. If some feared the "Latin Americanization of India", others concluded that the subcontinent was fated to be a perennial economic basket-case, a region intractably mired in "a million mutinies" that it was doomed to be a "caged tiger" -- while India's erstwhile Asian counterparts, particularly, China and the high-performing East Asian NIC's marched triumphantly into the new millennium.

Amidst the "growing crisis of governability" fueled in pan by the sharp economic downturn, the besieged and precariously positioned minority government under Prime Minister P.V. Narashima Rao finally embraced the global consensus on
'neoliberalism' -- a modernist project that rejects the interventionist assumptions of Keynesian and statism, arguing that economic prosperity can only be generated by subjecting the economy to the competitive logic and discipline of the marketplace. In practice, this meant a dramatic break from past policies, ending decades of pervasive regulatory intervention and arbitrary bureaucratic meddling in markets; the "opening" and integrating the "closed" Indian economy to the global economic system, including improving the efficiency and competitiveness of the national economy through deregulation of financial and labor markets, price liberalization, trade and exchange-rate reforms, reduction and unification of tariffs, the privatization of public enterprises, tax reforms, transparency in fiscal or resource allocation and the reliance on technocratic or "expert" decision-making in the economic arena.

In June 1991, the central government unveiled its ambitious market-friendly economic reform program, unpretentiously dubbed "economic liberalization" by its architects. At that time the program was widely viewed as a non-starter since earlier attempts had been failures. Cynics argued that, as in the past, the vagaries of democratic competition would make it impossible for the would-be reformers to resist the "demagogic populist temptation" of engaging in the politically expedient but fiscally irresponsible behavior, thereby gutting the neoliberal project even before it started. Indeed, the prevailing scholarly wisdom informed that "developmental authoritarian states" of the East Asian variety, not competitive and adversarial democratic regimes were a sine qua non for the
implementation and sustainability of the often painful macroeconomic reforms associated with the neoliberal project.

However, less than a year after its implementation, India's economic liberalization program dumbfounded the critics, accomplishing what has been widely regarded as a convincing macroeconomic recovery. To the state elites liberalization quickly became a developmental palliative -- a panacea to growth-depressing statism, fiscal profligacy and the problems of economic stagnation and poverty. Indeed, the overall success of the reform program in irrevocably dismantling the ubiquitous commandist economic structure and abandoning some five decades of commitment to economic nationalism and statism has made "liberalization" an indelible part of contemporary India's developmental idiom.

Yet, as with the earlier developmental strategies (such as ISI, land reforms and the green revolution), the available evidence confirms that the primary beneficiaries of economic liberalization in India have been the upper two deciles of the population, with that all too familiar cruel ironic twist: the widening of income disparities and the accentuation of poverty and destitution

1.2 Indian Capital Market: An Overview

1.2.1 Evolution

Indian Stock Markets are among the oldest ones of Asia. Its history dates back to nearly 200 years ago. The earliest records of security dealings in India are meagre and obscure. The East India Company was the dominant institution in
those days and business in its loan securities were transacted till the close of the eighteenth century.

By 1830's, business on corporate stocks and shares in Bank and Cotton presses took place in Bombay. Though the trading list was broader in 1839, there were only half a dozen brokers recognized by banks and merchants during 1840 and 1850.

The 1850's witnessed a rapid development of commercial enterprise and brokerage business attracted many men into the field and by 1860 the number of brokers increased into 60.

In 1860-61 the American Civil War broke out and cotton supply from United States of Europe was stopped; thus, the 'Share Mania' in India begun. The number of brokers increased to about 200 to 250. However, at the end of the American Civil War, in 1865, a disastrous slump began (for example, Bank of Bombay Share which had touched Rs 2850 could only be sold at Rs. 87).

At the end of the American Civil War, the brokers who thrived out of Civil War in 1874, found a place in a street (now appropriately called as Dalal Street) where they would conveniently assemble and transact business. In 1887, they formally established in Bombay, the "Native Share and Stock Brokers' Association" (which is alternatively known as "The Stock Exchange"). In 1895, the Stock Exchange acquired a premise in the same street and it was inaugurated in 1899. Thus, the Stock Exchange at Bombay was consolidated.
1.2.2 Other leading cities in stock market operations

Ahmedabad gained importance next to Bombay with respect to cotton textile industry. After 1880, many mills originated from Ahmedabad and rapidly forged ahead. As new mills were floated, the need for a Stock Exchange at Ahmedabad was realised and in 1894 the brokers formed "The Ahmedabad Share and Stock Brokers' Association".

What the cotton textile industry was to Bombay and Ahmedabad, the jute industry was to Calcutta. Also tea and coal industries were the other major industrial groups in Calcutta. After the Share Mania in 1861-65, in the 1870's there was a sharp boom in jute shares, which was followed by a boom in tea shares in the 1880's and 1890's; and a coal boom between 1904 and 1908. On June 1908, some leading brokers formed "The Calcutta Stock Exchange Association".

In the beginning of the twentieth century, the industrial revolution was on the way in India with the Swadeshi Movement; and with the inauguration of the Tata Iron and Steel Company Limited in 1907, an important stage in industrial advancement under Indian enterprise was reached.

Indian cotton and jute textiles, steel, sugar, paper and flour mills and all companies generally enjoyed phenomenal prosperity, due to the First World War.

In 1920, the then demure city of Madras had the maiden thrill of a stock exchange functioning in its midst, under the name and style of "The Madras
The Uttar Pradesh Stock Exchange Limited (1940), Nagpur Stock Exchange Limited (1940) and Hyderabad Stock Exchange Limited (1944) were incorporated.

In Delhi two stock exchanges - Delhi Stock and Share Brokers' Association Limited and the Delhi Stocks and Shares Exchange Limited - were floated and later in June 1947, amalgamated into the Delhi Stock Exchange Association Limited.

1.2.4 Post-independence Scenario

Most of the exchanges suffered almost a total eclipse during depression. Lahore Exchange was closed during partition of the country and later migrated to Delhi and merged with Delhi Stock Exchange.

Bangalore Stock Exchange Limited was registered in 1957 and recognized in 1963.

Most of the other exchanges languished till 1957 when they applied to the Central Government for recognition under the Securities Contracts (Regulation) Act, 1956. Only Bombay, Calcutta, Madras, Ahmedabad, Delhi, Hyderabad and Indore, the well established exchanges, were recognized under the Act. Some of the members of the other Associations were required to be admitted by the recognized stock exchanges on a concessional basis, but acting on the principle of unitary control, all these pseudo stock exchanges were refused recognition by the Government of India and they thereupon ceased to function.
Thus, during early sixties there were eight recognized stock exchanges in India (mentioned above). The number virtually remained unchanged, for nearly two decades. During eighties, however, many stock exchanges were established: Cochin Stock Exchange (1980), Uttar Pradesh Stock Exchange Association Limited (at Kanpur, 1982), and Pune Stock Exchange Limited (1982), Ludhiana Stock Exchange Association Limited (1983), Gauhati Stock Exchange Limited (1984), Kanara Stock Exchange Limited (at Mangalore, 1985), Magadh Stock Exchange Association (at Patna, 1986), Jaipur Stock Exchange Limited (1989), Bhubaneswar Stock Exchange Association Limited (1989), Saurashtra Kutch Stock Exchange Limited (at Rajkot, 1989), Vadodara Stock Exchange Limited (at Baroda, 1990) and recently established exchanges - Coimbatore and Meerut. Thus, at present, there are totally twenty one recognized stock exchanges in India excluding the Over The Counter Exchange of India Limited (OTCEI) and the National Stock Exchange of India Limited (NSEIL).

The Table given below portrays the overall growth pattern of Indian stock markets since independence. It is quite evident from the Table that Indian stock markets have not only grown just in number of exchanges, but also in number of listed companies and in capital of listed companies. The remarkable growth after 1985 can be clearly seen from the Table, and this was due to the favouring government policies towards security market industry.
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<td>No. of Stock Exchanges</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>14</td>
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<td>No. of Listed Cos.</td>
<td>1125</td>
<td>1203</td>
<td>1599</td>
<td>1552</td>
<td>2265</td>
<td>4344</td>
<td>6229</td>
<td>8393</td>
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<td>No. of Stock Issues of Listed Cos.</td>
<td>1506</td>
<td>2111</td>
<td>2838</td>
<td>3230</td>
<td>3697</td>
<td>6174</td>
<td>8967</td>
<td>11784</td>
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<td>4</td>
<td>Capital of Listed Cos. (Cr. Rs.)</td>
<td>270</td>
<td>753</td>
<td>1812</td>
<td>2614</td>
<td>3973</td>
<td>9723</td>
<td>32041</td>
<td>59583</td>
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<td>5</td>
<td>Market value of Capital of Listed Cos. (Cr. Rs.)</td>
<td>971</td>
<td>1292</td>
<td>2675</td>
<td>3273</td>
<td>6750</td>
<td>25302</td>
<td>110279</td>
<td>478121</td>
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<td>6</td>
<td>Capital per Listed Cos. (4/2) (Lakh Rs.)</td>
<td>24</td>
<td>63</td>
<td>113</td>
<td>168</td>
<td>175</td>
<td>224</td>
<td>514</td>
<td>693</td>
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<tr>
<td>7</td>
<td>Market Value of Capital per Listed Cos. (Lakh Rs.) (5/2)</td>
<td>86</td>
<td>107</td>
<td>167</td>
<td>211</td>
<td>298</td>
<td>582</td>
<td>1770</td>
<td>5564</td>
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<tr>
<td>8</td>
<td>Appreciated value of Capital per Listed Cos. (Lakh Rs.)</td>
<td>358</td>
<td>170</td>
<td>148</td>
<td>126</td>
<td>170</td>
<td>260</td>
<td>344</td>
<td>803</td>
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Table – 1.1: Growth Pattern of the Indian Stock Market


1.2.5 Trading Pattern of the Indian Stock Market

Trading in Indian stock exchanges are limited to listed securities of public limited companies. They are broadly divided into two categories, namely, specified securities (forward list) and non-specified securities (cash list). Equity shares of dividend paying, growth-oriented companies with a paid-up capital of at least Rs. 50 million and a market capitalization of at least Rs. 100 million and
"Stock Exchange" with 100 members. However, when boom faded, the number of members stood reduced from 100 to 3, by 1923, and so it went out of existence.

In 1935, the stock market activity improved, especially in South India where there was a rapid increase in the number of textile mills and many plantation companies were floated. In 1937, a stock exchange was once again organized in Madras - Madras Stock Exchange Association (Pvt) Limited. (In 1957 the name was changed to Madras Stock Exchange Limited).

Lahore Stock Exchange was formed in 1934 and it had a brief life. It was merged with the Punjab Stock Exchange Limited, which was incorporated in 1936.

**1.2.3 Indian Stock Exchanges - An Umbrella Growth**

The Second World War broke out in 1939. It gave a sharp boom which was followed by a slump. But, in 1943, the situation changed radically, when India was fully mobilized as a supply base.

On account of the restrictive controls on cotton, bullion, seeds and other commodities, those dealing in them found in the stock market as the only outlet for their activities. They were anxious to join the trade and their number was swelled by numerous others. Many new associations were constituted for the purpose and Stock Exchanges in all parts of the country were floated.
The Uttar Pradesh Stock Exchange Limited (1940), Nagpur Stock Exchange Limited (1940) and Hyderabad Stock Exchange Limited (1944) were incorporated.

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1.2.4 Post-independence Scenario

Most of the exchanges suffered almost a total eclipse during depression. Lahore Exchange was closed during partition of the country and later migrated to Delhi and merged with Delhi Stock Exchange.

Bangalore Stock Exchange Limited was registered in 1957 and recognized in 1963.

Most of the other exchanges languished till 1957 when they applied to the Central Government for recognition under the Securities Contracts (Regulation) Act, 1956. Only Bombay, Calcutta, Madras, Ahmedabad, Delhi, Hyderabad and Indore, the well established exchanges, were recognized under the Act. Some of the members of the other Associations were required to be admitted by the recognized stock exchanges on a concessional basis, but acting on the principle of unitary control, all these pseudo stock exchanges were refused recognition by the Government of India and they thereupon ceased to function.
Thus, during early sixties there were eight recognized stock exchanges in India (mentioned above). The number virtually remained unchanged, for nearly two decades. During eighties, however, many stock exchanges were established: Cochin Stock Exchange (1980), Uttar Pradesh Stock Exchange Association Limited (at Kanpur, 1982), and Pune Stock Exchange Limited (1982), Ludhiana Stock Exchange Association Limited (1983), Gauhati Stock Exchange Limited (1984), Kanara Stock Exchange Limited (at Mangalore, 1985), Magadh Stock Exchange Association (at Patna, 1986), Jaipur Stock Exchange Limited (1989), Bhubaneswar Stock Exchange Association Limited (1989), Saurashtra Kutch Stock Exchange Limited (at Rajkot, 1989), Vadodara Stock Exchange Limited (at Baroda, 1990) and recently established exchanges - Coimbatore and Meerut. Thus, at present, there are totally twenty one recognized stock exchanges in India excluding the Over The Counter Exchange of India Limited (OTCEI) and the National Stock Exchange of India Limited (NSEIL).

The Table given below portrays the overall growth pattern of Indian stock markets since independence. It is quite evident from the Table that Indian stock markets have not only grown just in number of exchanges, but also in number of listed companies and in capital of listed companies. The remarkable growth after 1985 can be clearly seen from the Table, and this was due to the favouring government policies towards security market industry.
Table – 1.1 : Growth Pattern of the Indian Stock Market


1.2.5 Trading Pattern of the Indian Stock Market

Trading in Indian stock exchanges are limited to listed securities of public limited companies. They are broadly divided into two categories, namely, specified securities (forward list) and non-specified securities (cash list). Equity shares of dividend paying, growth-oriented companies with a paid-up capital of atleast Rs.50 million and a market capitalization of atleast Rs.100 million and
having more than 20,000 shareholders are, normally, put in the specified group and the balance in non-specified group.

Two types of transactions can be carried out on the Indian stock exchanges: (a) spot delivery transactions "for delivery and payment within the time or on the date stipulated when entering into the contract which shall not be more than 14 days following the date of the contract": and (b) forward transactions "delivery and payment can be extended by further period of 14 days each so that the overall period does not exceed 90 days from the date of the contract". The latter is permitted only in the case of specified shares. The brokers who carry over the outstanding pay carry over charges (cantango or backwardation) which are usually determined by the rates of interest prevailing.

A member broker in an Indian stock exchange can act as an agent, buy and sell securities for his clients on a commission basis and also can act as a trader or dealer as a principal, buy and sell securities on his own account and risk, in contrast with the practice prevailing on New York and London Stock Exchanges, where a member can act as a jobber or a broker only.

The nature of trading on Indian Stock Exchanges are that of age old conventional style of face-to-face trading with bids and offers being made by open outcry. However, there is a great amount of effort to modernize the Indian stock exchanges in the very recent times.
1.2.6 Over The Counter Exchange of India (OTCEI)

The traditional trading mechanism prevailed in the Indian stock markets gave way to many functional inefficiencies, such as absence of liquidity, lack of transparency, unduly long settlement periods and benami transactions, which affected the small investors to a great extent. To provide improved services to investors, the country's first ringless, scripless, electronic stock exchange - OTCEI - was created in 1992 by country's premier financial institutions - Unit Trust of India, Industrial Credit and Investment Corporation of India, Industrial Development Bank of India, SBI Capital Markets, Industrial Finance Corporation of India, General Insurance Corporation and its subsidiaries and CanBank Financial Services.

Trading at OTCEI is done over the centre spread across the country. Securities traded on the OTCEI are classified into:

- Listed Securities - The shares and debentures of the companies listed on the OTC can be bought or sold at any OTC counter all over the country and they should not be listed anywhere else.

- Permitted Securities - Certain shares and debentures listed on other exchanges and units of mutual funds are allowed to be traded.

- Initiated debentures - Any equity holding atleast one lakh debentures of particular scrip can offer them for trading on the OTC.
OTC has a unique feature of trading compared to other traditional exchanges. That is, certificates of listed securities and initiated debentures are not traded at OTC. The original certificate will be safely with the custodian. But, a counter receipt is generated out at the counter which substitutes the share certificate and is used for all transactions.

In the case of permitted securities, the system is similar to a traditional stock exchange. The difference is that the delivery and payment procedure will be completed within 14 days.

Compared to the traditional Exchanges, OTC Exchange network has the following advantages:

- OTCEI has widely dispersed trading mechanism across the country which provides greater liquidity and lesser risk of intermediary charges.

- Greater transparency and accuracy of prices is obtained due to the screen-based scripless trading.

- Since the exact price of the transaction is shown on the computer screen, the investor gets to know the exact price at which he is trading.

- Faster settlement and transfer process compared to other exchanges.

- In the case of an OTC issue (new issue), the allotment procedure is completed in a month and trading commences after a month of the issue closure, whereas it takes a longer period for the same with respect to other exchanges.
Thus, with the superior trading mechanism coupled with information transparency investors are gradually becoming aware of the manifold advantages of the OTCEI.

1.2.7 National Stock Exchange (NSE)

With the liberalization of the Indian economy, it was found inevitable to lift the Indian stock market trading system on par with the international standards. On the basis of the recommendations of high powered Pherwani Committee, the National Stock Exchange was incorporated in 1992 by Industrial Development Bank of India, Industrial Credit and Investment Corporation of India, Industrial Finance Corporation of India, all Insurance Corporations, selected commercial banks and others.

Trading at NSE can be classified under two broad categories:

(a) Wholesale debt market and

(b) Capital market.

Wholesale debt market operations are similar to money market operations - institutions and corporate bodies enter into high value transactions in financial instruments such as government securities, treasury bills, public sector unit bonds, commercial paper, certificate of deposit, etc.

There are two kinds of players in NSE:

(a) Trading members and
(b) Participants.

Recognized members of NSE are called trading members who trade on behalf of themselves and their clients. Participants include trading members and large players like banks who take direct settlement responsibility.

Trading at NSE takes place through a fully automated screen-based trading mechanism which adopts the principle of an order-driven market. Trading members can stay at their offices and execute the trading, since they are linked through a communication network. The prices at which the buyer and seller are willing to transact will appear on the screen. When the prices match, the transaction will be completed and a confirmation slip will be printed at the office of the trading member.

NSE has several advantages over the traditional trading exchanges. They are as follows:

- NSE brings an integrated stock market trading network across the nation.

- Investors can trade at the same price from anywhere in the country since inter-market operations are streamlined and coupled with the countrywide access to the securities.

- Delays in communication, late payments and the malpractice’s prevailing in the traditional trading mechanism can be done away with greater operational efficiency and informational transparency in the stock market operations, with the support of total computerized network.
Unless stock markets provide professionalized service, small investors and foreign investors will not be interested in capital market operations. And capital market being one of the major sources of long-term finance for industrial projects, India cannot afford to damage the capital market path. In this regard NSE gains vital importance in the Indian capital market system.

1.2.8 Technical Analysis of Indian stock market BSE (Bombay Stock Exchange) SENSEX.

The BSE SENSEX (SENSitive indEX) is not only scientifically designed but also based on globally accepted construction and review methodology. First compiled in 1986, SENSEX is a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. The base year of SENSEX is 1978-79 and the base value is 100. The index is widely reported in both domestic and international markets through print as well as electronic media.

The Index was initially calculated based on the "Full Market Capitalization" methodology but was shifted to the free-float methodology with effect from September 1, 2003. The "Free-float Market Capitalization" methodology of index construction is regarded as an industry best practice globally. All major index providers like MSCI, FTSE, STOXX, S&P and Dow Jones use the Free-float methodology.
Due to its wide acceptance by the Indian investors; SENSEX is regarded to be the pulse of the Indian stock market. As the oldest index in the country, it provides the time series data over a fairly long period of time (From 1979 onwards). Small wonder, the SENSEX has over the years become one of the most prominent brands in the country.

The SENSEX is the benchmark index of the Indian Capital Markets with wide acceptance among individual investors, institutional investors, foreign investors and fund managers. The objectives of the index are:

- To measure market movements
- Benchmark for funds performance
- For index based derivative products

1.3 Economic Planning in India

Often, in the economic literature we find that the terms ‘development’ and ‘growth’ are used interchangeably. However, there is a difference. Economic growth refers to the sustained increase in per capita or total income, while the term economic development implies sustained structural change, including all the complex effects of economic growth. In other words, growth is associated with free enterprise, where as development requires some sort of control and regulation of the forces affecting development. Thus, economic development is a process and growth is a phenomenon.
Economic planning is very critical for a nation, especially a developing country like India to take the country in the path of economic development to attain economic growth.

1.3.1 Why Economic Planning for India?

One of the major objectives of planning in India is to increase the rate of economic development, implying that increasing the rate of capital formation by raising the levels of income, saving and investment. However, increasing the rate of capital formation in India is be set with a number of difficulties. People are poverty ridden. Their capacity to save is extremely low due to low level of income and high propensity to consume. Therefore, the rate of investment is low which leads to capital deficiency and low productivity. Low productivity means low income and the vicious circle continues. Thus, to break this vicious economic circle, planning is inevitable for India.

The market mechanism works imperfectly in developing nations due to the ignorance and unfamiliarity with it. Therefore, to improve and strengthen market mechanism planning is very vital. In India, a large portion of the economy is non-monitised; the product, factors of production, money and capital markets is not organized properly. Thus the prevailing price mechanism fails to bring about adjustments between aggregate demand and supply of goods and services. Thus, to improve the economy, market imperfections has to be removed; available resources has to be mobilized and utilized efficiently; and structural rigidities have to be overcome. These can be attained only through planning.
In India, capital is scarce; unemployment and disguised unemployment are prevalent. Thus, where capital is being scarce and labour being abundant, providing useful employment opportunities to an increasing labour force is a difficult exercise. Only a centralized planning model can solve this macro problem of India.

Further, in a country like India where agricultural dependence is very high, one cannot ignore this segment in the process of economic development. Therefore, an economic development model has to consider a balanced approach to link both agriculture and industry and lead for a parallel growth. Not to mention, both agriculture and industry cannot develop without adequate infrastructural facilities which only a state can provide and this is possible only through a well-carved-out planning strategy. The government’s role in providing infrastructure is unavoidable due to the fact that the role of private sector in infrastructural development of India is very minimal since these infrastructure projects are considered as unprofitable by the private sector.

Further, India is a clear case of income disparity. Thus, it is the duty of the state to reduce the prevailing income inequalities. This is possible only through planning.
1.3.2 Planning History of India

The development of planning in India began prior to the first Five Year Plan of independent India, long before independence even. The idea of central directions of resources to overcome persistent poverty gradually, because one of the main policies advocated by nationalists early in the century. The Congress Party worked out a program for economic advancement during the 1920’s, and 1930’s and by the 1938 they formed a National Planning Committee under the chairmanship of future Prime Minister Nehru. The Committee had little time to do anything but prepare programs and reports before the Second World War which put an end to it. But it was already more than an academic exercise remote from administration. Provisional government had been elected in 1938, and the Congress Party leaders held positions of responsibility. After the war, the Interim government of the pre-independence years appointed an Advisory Planning Board. The Board produced a number of some what disconnected Plans itself. But, more important in the long run, it recommended the appointment of a Planning Commission.

The Planning Commission did not start work properly until 1950. During the first three years of independent India, the state and economy scarcely had a stable structure at all, while millions of refugees crossed the newly established borders of India and Pakistan, and while ex-princely states (over 500 of them) were being merged into India or Pakistan. The Planning Commission as it now exists was not set up until the new India had adopted its Constitution in January 1950.
1.3.3 Objectives of Indian Planning

The Planning Commission was set up to achieve the following Directive Principles:

- To make an assessment of the material, capital and human resources of the country, including technical personnel, and investigate the possibilities of augmenting such of these resources are found to be deficient in relation to the nation's requirement.

- To formulate a plan for the most effective and balanced use of the country's resources.

- Having determined the priorities, to define the stages in which the plan should be carried out, and propose the allocation of resources for the completion of each stage.

- To indicate the factors which are tending to retard economic development, and determine the conditions which, in view of the current social and political situation, should be established for the successful execution of the Plan.

- To determine the nature of the machinery which will be necessary for securing the successful implementation of each stage of Plan in all its aspects?
• To appraise from time to time the progress achieved in the execution of each stage of the Plan and recommend the adjustments of policy and measures that such appraisals may show to be necessary.

• To make such interim or auxiliary recommendations as appear to it to be appropriate either for facilitating the discharge of the duties assigned to it or on a consideration of the prevailing economic conditions, current policies, measures and development programs; or on an examination of such specific problems as may be referred to it for advice by Central or State Governments.

The long-term general objectives of Indian Planning are as follows:

• Increasing National Income

• Reducing inequalities in the distribution of income and wealth

• Elimination of poverty

• Providing additional employment; and

• Alleviating bottlenecks in the areas of: agricultural production, manufacturing capacity for producer’s goods and balance of payments.

Economic growth, as the primary objective has remained in focus in all Five Year Plans. Approximately, economic growth has been targeted at a rate of five per cent per annum. High priority to economic growth in Indian Plans looks very much justified in view of long period of stagnation during the British rule.
1.4 What are the 5 Biggest Mistakes Traders & Investors Make!

1. **Trading against the major trend** - Fighting the momentum of the market. Not knowing the direction of the major trend and how to accurately define a change in trend direction. Not knowing how to strategically time market entry and exit.

2. **Holding losing positions too long** - Failure to accept losses as part of the trading process. Associating losses with being wrong or losing. Not knowing when to get out of a market that has signaled a change in trend to limit losses.

3. **Exiting profitable trades too early** - Fear of losing unrealized profits. Trying to outsmart the markets by getting out on a presumed extreme price, then missing the big trends when they occur. Not knowing when to hold a winning position to maximize gains.

4. **Trading too big** - Trying to make too much, too quickly. Allocating too much capital to one position, exposing the account to excessive risk and reducing the protection from balance and diversification. Not knowing or not managing the risk.

5. **Trading too often** - Over-trading or "churning" the account. "Day Trading" falls into this category if the total transaction fees (commissions) are too high relative to your account size. Not controlling the costs in trading.
1.4.1 Why do 90% of all traders make these mistakes?

1. **The mistakes are a result of our human nature** - illogical behavior based on greed, fear, ego, and the attempt to avoid emotional pain or boredom. For example:

   - In trying to avoid the pain of taking losses, most traders hold losing positions too long.
   - In trying to avoid the pain of losing profits on their winning trades, they get out too early and then miss the big trends.
   - Our natural tendency is to take profits too quickly and to hold on stubbornly to losses.
   - To be a successful trader you must condition yourself to do the exact opposite.

2. **Mistakes also result from making trading decisions based on imprecise subjective judgment, information, or advice**; rather than relying on a clear, objective signal from a proven trading system.

We keep all these information in our mind and consequently a question arises that why should we not to develop a **Mathematical Modeling** of those problems by using a non-traditional techniques, called **Soft Computing Techniques**. Since the market index value is fluctuating high (it always uncertain in nature),
the investors mind, the selection of script to invest amount, what percentage amount to invest in each script, how long keep these shares with us, whether we invest the amount in short term or long term, etc. are also uncertain and ambiguity in nature. The future prediction of share market investment is a very big question and test ourselves, whether the traditionally followed techniques like time series analysis, moving averages, sampling test etc., are worthwhile in the present scenario or not. But our conclusion is **NOT SUITED FOR THE PRESENT SCENARIO.** The entire study is based on the secondary market and possibly a long term holding, a minimum period of one year.

### 1.5 OBJECTIVE AND AIM OF THE THESIS

We invest to make money and in this attempt we need to be more careful and calculative. The investments we make are for our general well-being and it is made both for our present and future needs. It is assumed that investors are interested only in the monetary benefits to be obtained from investing, as opposed to such factors as the psychic income to be derived from impressing one’s friends with one’s financial prowess.

An investment can be defined as the commitment of funds to one or more assets that will be held over for some future time period. The field of investments, therefore, involves the study of the investment process. Investments are concerned with the management of an investor’s wealth, which is the sum of current income and the present value of all future income. Investment can cover a wide range of activities and it often refers to investing
money in certificates of deposit, bonds, common stocks or mutual funds. Although the field of investments encompasses many aspects, it can be thought of in terms of two primary functions, namely, analysis and management. But this thesis focuses only on the share market investments.

In the analysis, we study investments in the hope of earning better returns in relation to the risk we assume when we invest. A careful study of investment analysis and portfolio management principles can provide a sound framework for both managing and increasing wealth. Furthermore, a sound study of this subject matter will allow us to obtain maximum value from the many scripts on investments that appear daily in newspapers and magazines, which in turn will increase our chances of reaching our financial goals. This research attempts to make a scientific study on the following areas of share market investments, using Soft Computing Techniques.

- Financial assets available to investors
- Total rate of return versus yield
- Compounding effects and terminal wealth
- Realized returns versus expected returns
- How diversification works to reduce risk
- The shares investment decision
- The significance of market efficiency to investors and so on.
1.5.1 Need for improving the returns of share market investment through Soft Computing Techniques:

In recent years there has been a growing interest in the need for designing intelligent systems to address complex engineering and business problems. One of the most challenging issues for the intelligent system is to effectively handle real-world uncertainties that cannot be eliminated. These uncertainties include the decision making of share market prediction, share price analysis, share investment, to name a few. These uncertainties result in a lack of the full and precise knowledge of the system including its state, dynamics, and interaction with the environment. Applied Artificial Intelligence including Fuzzy Logic and soft computing techniques have shown great potential to solve these demanding, real world problems that exist in uncertain and unpredictable environments. These technologies have formed the foundation for intelligent systems.

Soft computing, unlike conventional computing is tolerant of imprecision, uncertainty, partial truth, and approximation. In effect, the role model for soft computing is the human mind. At this juncture, the principal constituents of soft computing are Fuzzy Logic, Neural Computing, Evolutionary Computation, Machine Learning and Probabilistic Reasoning, with the latter subsuming belief networks, chaos theory and parts of learning theory. It is important to note that soft computing is not a mélange; rather it is a partnership in which each of the partners contributes a distinct methodology for addressing problems in their domain. In this perspective, the principal methodology in soft computing is
complementary rather than competitive. Furthermore, soft computing may be viewed as a foundation component for the emerging field of conceptual intelligence. One of the successful applications of soft computing is the study on the share market investment, because it is always uncertain and speculative in nature and many are of the opinion that it is unsafe to invest in share market.

Neural Networks are used for learning and curve fitting, Fuzzy Logic is used to deal with imprecision and uncertainty, and genetic algorithms are used for search and optimization [Wassennan, P.D., (1989), Rast (1997), Resta (2000a, 2000c and 2000d), Rumelhart (1988), Sharpe (1975), Nunez-Letamendia (2002)]. These technologies often are linked together because they are the most commonly used components of what Zadeh (1992) called soft computing, which he envisioned as being "... modes of computing in which precision is traded for tractability, robustness and ease of implementation".

The technical approach to investment is essentially a reflection of the idea that prices move in trends which are determined by the changing attitudes of investors toward a variety of economic, monetary, political and psychological forces... Since the technical approach is based on the theory that the price is a reflection of mass psychology ("the crowd") in action, it attempts to forecast future price movements on the assumption that crowd psychology moves between panic, fear, and pessimism on one hand and confidence, excessive optimism, and greed on the other [Pring (1991), pp. 2–3].
Trading models are algorithms proposing trading recommendations for financial assets. In our approach we limit this definition to a set of rules based on past financial data. The financial data, which are typically series of prices, enter the trading model in the form of indicators corresponding to various kinds of averages. Although progress has been made in understanding financial markets, there is no definitive prescription on how to build a successful trading model and how to define the indicators. Automatic search and optimization techniques can be considered when addressing this problem. However, optimizing trading models for financial assets without over fitting is a very difficult task because the scientific understanding of financial markets is still very limited. Over fitting means building the indicators to fit a set of past data so well that they are no longer of general value: instead of modeling the principles underlying the price movements, they model the specific movements observed during a particular time period. Such a model usually exhibits a different behavior (or may fail to trade successfully at all) when tested out-of-sample. This difficulty is related to the fact that many financial time series do not show stability of their statistical behavior over time especially when they are analyzed intra-daily. To minimize over fitting during optimization, the optimization process must include the following important ingredients:

- a good measure of the trading model performance.
- indicator evaluation for different time series.
- large data samples.
- a robust optimization technique.
Secondly, the existing statistical tools and procedures are not suited to the present scientific computing era and especially to any said traditional techniques. Non-traditional techniques are mostly suited under these circumferences and these techniques will give us the best possible solutions. When we look into the literature survey [Tan (1997), Tang (1991), Tsaih (1999), Rao (1989), Van et al. (1997), Yao (2000), Zimmerman (1975)], the stock market problems can be dealt with different directions used different tools like Neural networks, Portfolio selection, General optimization, Portfolio optimization, Heuristic optimization, CAPM (Capital Asset Pricing Model), Neural optimization, VaR (Value at Risk), Genetic algorithms, Prospect Theory, Simulated annealing, Technical analysis, Taboo search, Data patterns, Game theory, Bond pricing, Multi-agent simulations, Option pricing, Monte Carlo simulations, Volatility estimations, Time series analysis, SWAP pricing, Fuzzy logic, Arbitrage trading, Fractals and chaos and Term structure.

But all the above said methods and procedures have been concentrating mainly on stock predictions and optimizations, share price movements through time series analysis and moving averages, bond, asset predictions and evaluations, share trading rules and evaluations and so on. Very few papers dealt with the share market investment and those too adapted traditional techniques like moving averages, time series analysis etc., since the share market situation is always ambiguous in nature, traditional techniques will not give the accurate results. Hence the need for the present study which makes an analysis using modern techniques is felt.
1.5.2 Design of a Mathematical Model

The mathematical modeling investigates the following with the help of soft computing techniques.

- If the investors want to invest their amounts in limited scripts, then ranking of those sub-indexes is done according to their return on investment. In this case, the risk factor cannot be analyzed.

- What is the best time to enter the market and quit the market? In this case, the situation wise analyzed and we say that at what stage if the investors enter into the secondary market is more viable than other situations.

- **Mathematical Model**:

  In the financial industry, there are three main approaches to investment: the fundamental approach, where strategies are based on fundamental economic principles, the technical analysis approach, where strategies are based on past prices behavior, and the mathematical approach where strategies are based on mathematical models and studies. The main advantage of technical analysis is that it avoids model specification, and thus calibration problems, misspecification risks, etc. On the other hand, technical analysis
techniques have limited theoretical justifications, and therefore none can assert that they are risk-less, or even efficient.

Consider an unstable financial economy. It is impossible to specify and calibrate models which can capture all the sources of instability during a long time interval. Thus it is natural to compare the performances obtained by using erroneously calibrated mathematical models and the performances obtained by technical analysis techniques. To our knowledge, this question has not been investigated in the literature.

The mathematical modeling is used to investigate the following:

- the best scripts of share market investment
- Risk factors and its weighted values.
- Weighted values for both script selection and its risk factor
- The level of investment, namely high, medium and low by using Fuzzy Inference System.
- The proposed FIS is tested with actual value and find the correlation coefficient between them.
- The generated Fuzzy Inference rule is then smoothened by Artificial Neural Network. The combination of FIS and Neural Network is popularly known as ANFIS (Artificial Neural Fuzzy Inference System).
- Then, the huge volume of the smoothened FIS rules is optimized through Genetic Algorithms.

In this thesis, the contents are arranged in this way.

1.6 Review of Literature Survey

The fuzzy concept is used for ranking various share market investment sub-indexes. This can be achieved through the following four major steps, which are

i. Quantifying various share market sub-indexes

ii. Estimating the return on investment in each sub-indexes

iii. The quantified share market sub-indexes and its return on investment are mathematically converted into two fuzzy matrices, called Del Grande’s fuzzy level and Van Hiele’s fuzzy level. From the above levels, a new matrix, called quantification of qualitative (return on investment) fuzzy relation matrix has been derived.

iv. Using fuzzy weighted similar choice method to the above quantification of qualitative fuzzy relation matrix, the ranking is obtained.

Regarding quantification of various share market sub-indexes (step-1), now-a-days, many of the micro and macro technologies have been discovered. But in general, many of the statistical methodologies are available to measure the quantification of share market sub-indexes and some dedicated government
web sites are also available to get the correct and relevant information about the BSE Index. The original contribution is chapter-2 is mainly in step-3 and step-4.

Van Hiele (1986) in his paper has established the relationship between the students and their geometrical knowledge. Depending on their knowledge, the level can be classified.

Saads and Davis (1997) gave a written test to 25 prospective mathematics teachers in order to determine their Van Hiele levels of geometric thinking in three-dimensional geometry. Van Hiele levels mean the teacher’s quality levels, namely, level-1, level-2, and so on.

Perdikaris (1996a) again contributed a Mathematical way for distinguishing different types of student’s geometrical reasoning processes through Van Hiele levels in fuzzy approach. In the same year, he also gave the system of framework for fuzzy sets in Van Hiele levels theory of geometric reasoning.

Del Grande (1987) contributed in his paper, a method of acquiring spatial perception level in primary geometry. In his paper, he identified the spatial perception levels such as perceptual constancy, figure ground, position in space, visual discrimination, and spatial relation with the following quality levels, namely, blank, inappropriate, insufficient, adequate and precise.
Bishop (1983) explained in his book, space and geometry, the way of acquiring geometrical knowledge about mathematical concepts and process and Hosler (1992) discussed for fuzzy healthy understanding.

Liu and Shi (1995) contributed in their paper, a methodology for ranking a set of alternatives with multiple criteria through weighted fuzzy similar choice method.

Ravichandran et al. (2005a) proposed in their paper that the fuzzy approach to the Del Grande’s categories can be obtained by way of attaining the degree of acquisition of various share market sub-indexes and the return on investment for each sub-indexes can be calculated and estimated through Van Hiele levels. This is accomplished by quantifying the various share market sub-indexes of quantitative degrees (fuzzy) of acquisition of the Del Grande’s share market sub-index categories and then applying the weighted similar choice method on this quantification. Knowledge of the priority ranking of the Del Grande’s share market sub-indexes would be helpful in share market investment especially in BSE Index.

Market forecasting involves projecting such things stock market indexes, like the standard and Poor’s stock index. The role of soft computing in this case is to use quantitative inputs, like technical indices, and qualitative factors, like political effects, to automate stock market forecasting and trend analysis. The
information for the construction of a mathematical formula. In their example, the result of refining the network model was a reduction from the seven features provided in the original financial data to only the two that contribute most to bond rating estimates. The derived formula was found to generalize very well.

One dimension where FL could be applied to bonds was provided by Hosler (1992), who showed how membership functions could be used to describe the risk of call of a security. She noted that randomness is associated with the behavior of market interest rates and that fuzziness arises from the subjective opinion of the investor. The function could be altered to reflect the desirability of the security based upon the call risk.

Wilson (1994) developed a fully automatic stock trading system that took in daily price and volume data on a list of 200 stocks and 10 market indexes and produced a set of risk-reward ranked alternate portfolios. The author implemented a five step procedure: a chaos-based modeling procedure was used to construct alternate price prediction models based on technical, adaptive, and statistical models; then, a SOFM was used to select the best model for each stack or index on a daily basis; then a second SOFM was used to make a short-term gain-loss prediction for each models; then, a trade selection module combined these predictions to generate buy-sell-hold recommendations for the entire list of stocks on a daily basis; and finally, a portfolio management utility combined the trading recommendations to produce the risk-reward ranked portfolios. He
concluded that the stock trading systems could produce better results than index funds and at the same time reduce risk.

Malliaris and Salchemberger (1994) compared the estimated volatility of daily S&P 100 index stock market options using implied volatility, historical volatility, and volatility based on FFNN (13-9-1) with BP. They used the following 13 features: change in closing price, days to expiration, change in open put volume, the sum of the at-the-money strike price and market price of the option for both calls and puts for the current trading period and the next trading period, and four lagged volatility variables. They concluded that the NN was far superior to the historical method.

Lowe (1994) demonstrated the use of NNs in two types of capital market problems: effective portfolio optimization and short-term prediction of multiple equities. Assuming the existence of a market portfolio, his first goal was to find an approximating portfolio that minimized the "risk," defined in terms of the mean squared error between the market portfolio and the approximating portfolio, subject to constraints, which he transformed into an analytic cost function, and resolved using an analog NN. He viewed short-term equities prediction as a problem in nonlinear multichannel time series forecasting, which can be addressed by a FFNN and resolved using a radial basis function. The network then was used to predict the one stock in the approximating portfolio that would gain the most in the next investment period.
Wendt (1995) used a GA to build a portfolio efficient frontier (a set of portfolios with optimal combinations of risk and returns). The underlying data consisted of 250 scenarios of annual returns for eight asset classes. To evaluate the GA process, the final GA output was compared to the efficient frontier created by a sophisticated nonlinear optimizer. After about 50 cycles, the GA found portfolios very close to the efficient frontier generated by the nonlinear optimizer.

Guo and Huang (1996) used a possibilistic linear programming method for optimal asset allocation based on simultaneously maximizing the portfolio return, minimizing the portfolio risk and maximizing the possibility of reaching higher returns. This was analogous to maximizing mean return, minimizing variance and maximizing skewness for a random rate of return.

Frick et al. (1996) investigated price-based heuristic trading rules for buying and selling shares. Their methodology involved transforming the time series of share prices using a heuristic charting method that gave buy and sell signals and was based on price changes and reversals. Based on a binary representation of those charts, they used GAs to generate trade strategies from the classification of different price formations. They used two different evaluation methods: one compared the return of a trading strategy with the corresponding riskless interest rate and the average stock market return; the other used its risk-adjusted expected return as a benchmark instead of the average stock market return. Their analysis of over one million intra-day (during a single
trading day) stock prices from the Frankfurt Stock Exchange (FSE) showed the extent to which different price formations could be classified by their system and the nature of the rules, but left for future research an analysis of the performance of the resulting trading strategies.

Kassicieh et al. (1997) examined the performance of GAs when used as a method for formulating market-timing trading rules. Their goal was to develop a monthly strategy for deciding whether to be fully invested in a broad based stock portfolio, the S&P 500, or a riskless investment, treasury bills. Following the methodology of Bauer (1994), their inputs were differenced time series of 10 economic indicators and the GA used the best three of these series to make the timing (switching) decision. They benchmarked against dollar accumulation given a perfect timing strategy, and concluded that their runs produced excellent results.

Chiang et al. (1996) used a FFNN with back-propagation (BP) to forecast the end-of-year net asset value of mutual funds, where the latter was predicted using historical economic information. They compared those results with results obtained using traditional econometric techniques and concluded that NNs “significantly outperform regression models” when limited data is available.

Kuo et al. (1996) recognized that qualitative factors like political effects, always play a very important role in the stock market environment, and proposed an intelligent stock market forecasting system that incorporates both quantitative
and qualitative factors. This was accomplished by integrating a NN and a fuzzy Delphi model; the former was used for quantitative analysis and decision integration, while the later formed the basis of the qualitative model. They applied their system to the Taiwan stock market.

Chen and Lee (1997) illustrated how Gas, as an alternative to NNs, could be used for option pricing. To this end, they tested the ability of Gas to determine the price of European call options, assuming the exact price could be determined using Black-Scholes option pricing theory. They conclude that the results were encouraging.

Anders et al. (1998) used statistical inference techniques to build NN models to explain the prices of call options written on the German stock index DAX. Some insight into the pricing process of the option market was obtained by testing for the explanatory power of several NN inputs. Their results indicated that statistical specification strategies lead to parsimonious NNs with superior out-of-sample performance when compared to the Black-Scholes model. They further validated their results by providing plausible hedge parameters and

Gottschling et al. (1999) explained financial applications used for artificial neural network and elaborated more on an integral approach.

Kim and Chun (1998) used a refined Probabilistic NN (PNN), called an Arrayed Probabilistic Network (APN), to predict a stock market index. The essential feature of the APN was that it produces a graded forecast of multiple discrete values rather than a single bipolar output. As a part of their study, they
use a "mistake chart", which benchmarks against a constant prediction, to compare FFNN with BP models with a PNN, APN, Recurrent NN (RNN), and case based reasoning. They concluded that the APN tended to outperform recurrent and BP networks, but that case base reasoning tended to outperform all the networks.

As a follow-up study, Kassicieh et al. (1998) used the same GA with different data transformation methods applied to economic data series. These methods were the Singular Value Decomposition (SVD) and principal component NN with 3, 4, 5 and 10 nodes in the hidden layer. They found that the non-standardized SVD of economic data yielded the highest terminal wealth for the time period examined and Jackson (1997) explained more use of genetic algorithms in financial problems.

Aiken and Bsat (1999) use FFNN trained by a Genetic Algorithm (GA) to forecast three-month U.S. TREASURY BILL rates. They concluded that an NN can be used to accurately predict these rates.

Daniels and Kamp (1999) applied NNs to bond rating, with a special emphasis on the flexibility of the NNs and their validity, especially when the number of observations is small. Their aim was to establish a general network construction procedure and, to that end, they discussed how techniques such as cross-validation and monotonicity analysis can be effectively combined to
optimize the NN. A special class of monotonic NNs and a corresponding training algorithm were developed.

Edelman et al. (1999) investigated the use of an identically structured and independently trained committee of NNs to identify arbitrage opportunities in the Australian All-Ordinaries Index. Trading Decisions were made based on the unanimous consensus of the committee predictions and the shape index was used to assess out-of-sample trading performance. Empirical results showed that technical trading based on NN predictions outperformed the buy-and-hold strategy as well as “naïve predictions”. They concluded that the reliability of the network predictions and hence trading performance was dramatically enhanced by the use of trading thresholds and the committee approach.

Thammano (1999) used a neuro-fuzzy model to predict future values of Thailand’s largest government-owned bank. The inputs of the model were the closing prices for the current and prior three months, and the profitability ratios ROA, ROE, and P/E. The output of the model was the stock prices for the following three months. He concluded that the neuro-fuzzy architecture was able to recognize the general characteristics of the stock market faster and more accurately than the basic BP algorithm. Also, it could predict investment opportunities during the economic crisis when statistical approaches did not yield satisfactory results.
Trafalis (1999) used FFNNs with BP and the weekly changes in 14 indicators to forecast the change in the S&P 500 stock index during the subsequent week. In addition, a methodology for pre-processing of the data was devised, which involved differencing and normalizing the data, was successfully implemented. The text walked the reader through the NN process.

Tansel et al. (1999) compared the ability of linear optimization, NNs and Gas to model time series data using the criteria of modeling accuracy, convenience and computational time. They found that linear optimization methods gave the best estimates, although the Gas could provide the same values if the boundaries of the parameters and the resolution were selected appropriately, but that the NNs resulted in the worst estimators. However, they noted that non-linearity could be accommodated by both the Gas and the NNs and that the latter required minimal theoretical background.

Allen Franklin & Risto Karjalainen (1999) investigated genetic algorithm to learn technical trading rules for the S&P 500 index using daily prices from 1928 to 1995. After transaction costs, the rules do not earn consistent excess returns over a simple buy-and-hold strategy in the out-of-sample test periods. The rules are able to identify periods to be in the index when daily returns are positive and volatility is low and out when the reverse is true. They conclude that latter results can largely be explained by low-order serial correlation in stock index returns.
Garliauskas (1999) investigated stock market time series forecasting using a NN computational algorithm linked with the kernel function approach and the recursive prediction error method. The main idea of NN learning by the kernel function is that the function stimulates to changes of the weights in order to achieve convergence of the target and forecast output functions. He concluded that financial times series forecasts by the NNs were superior to classical statistical and other methods.

Allen and Karjalainen (1999) used a GA to learn technical trading rules the S&P 500 index using daily prices from 1928 to 1995. However, after transaction costs, the rules did not earn consistent excess returns over a simple buy-and-hold strategy in the out-of-sample test periods. The rules were able to identify periods to be in the index when daily returns were positive and volatility was low and out of the index when the reverse was true, but these latter results could largely be explained by low-order serial correlation in stock index returns.

Fernandez-Rodriguez et al. (1999) investigated the profitability of a simple technical trading rule based on NNs applied to the General Index of the Madrid Stock Market. They found that, in the absence of trading costs, the technical trading rule is always superior to a buy-and-hold strategy for both “bear” and “stable” markets but that the reverse holds during a “bull” market.

Baba et al. (2000) used NNs and GAs to construct an intelligent Decision Support System (DSS) for analyzing the Tokyo stock exchange prices indexes
(TOPIX). The essential feature of their DSS was that it projected the high and low TOPIX values four weeks in the future and suggested buy and sell decisions based on the average projected value and the then-current value of the TOPIX. To this end, the construct an (8, 15, 2) FFNN using a hybrid weight-training algorithm that combines a modified BP method with a random optimization method. Initially, the buy-sell decision was on an all-or-nothing basis; subsequently, using the GAs, an algorithm.

Chan et al. (2000) investigated financial time series forecasting using a FFNN and daily trade data from the Shanghai Stock Exchange. To improve speed and convergence they used a conjugate gradient learning algorithm and used Multiple Linear Regressions (MLR) for the weight initialization. They concluded that the NN can model the time series satisfactorily and that their learning and initialization approaches lead to improved learning and lower computation costs.

Kim and Han (2000, 2001) used a NN modified by a GA to predict the stock price index. In this instance, the GA was used to reduce the complexity of the feature space, by optimizing the thresholds for feature discretization, and to optimize the connection weights between layers. Their goal was to use globally searched feature discretization to reduce the dimensionality of the feature space, eliminates irrelevant factors, and to mitigate the limitations of gradient descent. They concluded that the GA approach outperformed the conventional models.
Romahi and Shen (2000) developed an evolving rule based expert system for financial forecasting. Their approach was to merge Fuzzy Logic (FL) and rule induction so as to develop a system with generalization capability and high comprehensibility. In this way the changing market dynamics are continuously taken into account as time progresses and the rule-base does not become outdated. They concluded that the methodology showed promise.

Abraham et al. (2001) investigated hybridized Soft Computing (SC) techniques for automated stock market forecasting and trend analysis. They used principal component analysis to preprocess the input data, a NN for one-day-ahead stock forecasting and a neuro-fuzzy system for analyzing the trend of the predicted stock values. To demonstrate the proposed technique, they analyzed the 24 months stock data for the Nastaq-100 main index as well as six of the companies listed therein. They concluded that the forecasting and trend prediction results using the proposed hybrid system were promising and warranted further research and analysis.

Cao and Tay (2001) used Support Vector Machines (SVM) to study the S&P 500 daily price index. The generalization error with respect to the free parameters of SVMs were investigated and found to have little impact on the solution. They conclude that it is advantages to apply SVMs to forecast the financial time series.

Hwarng (2001) investigated NN forecasting of time series with ARMA (P, Q) structures. Using simulation and the performance of the Box-Jenkins
models as a benchmark, it was concluded that FFNN with BP generally performed well and consistently for time series corresponding to ARMA (P, Q) structures. Using the randomized compete block design of experiment, he concluded that overall, for most of the structures, FFNN with BP performed significantly better when a particular noise level was considered during network training.

As a follow-up to Kuo et al. (1996), Kuo et al. (2001) developed a GA-based FNN (GFNN) to formulate the knowledge base of fuzzy inference rules, which can measure the qualitative effect (such as the political effect) in the stock market. The effect was further integrated with the technical indexes through the NN. Using the clarity of buying-selling points and buying-selling performance based on the Taiwan stock market to assess the proposed intelligent system, they conclude that a NN based on both quantitative (technical indexes) and qualitative factors is superior to one based only on quantitative factors.

Mukund Seshadri (2003) demonstrates his Ph.D., thesis has shown that it certainly seems possible to beat the buy-and-hold Strategy of the S&P500 consistently using GP even when considering the rather high transaction costs of 0.5%. This is at odds to previous work where the GP produced rules do not consistently beat the S&P500. This is significant because it suggests that the markets may not as efficient as they are thought to be and it proves that there is value in technical analysis.
Ingber & Mondescu (2003) developed a multivariate, nonlinear statistical mechanics model of S&P futures and cash markets, based on a system of coupled stochastic differential equations. They also constructed a two-stage, recursive optimization procedure using methods of ASA global optimization: An inner-shell extracts the characteristics of the stochastic price distribution and an outershell generates the technical indicators and optimize the trading rules.

N.G. Pavlidis et al. (2005) reported that the results concerning the profitability of a forecasting methodology that employs the UKW (unsupervised k-window) clustering algorithm and FFNNs, acting as local predictors for each cluster, to predict the direction of movement of the daily spot exchange rate of the Euro against the Japanese Yen. The advantages of this methodology are that UKW automatically approximates the number of clusters present in a dataset, and that FFNNs are capable of approximating an unknown nonlinear relationship. The profit generating performance of this methodology compares favorably with that of a single FNN and nearest neighbor regression, which implies that it is capable of capturing more accurately the short run dynamics of the time series.

David de la Fuente et al. (2006) formulated an approach to the issue of stock market speculation from the perspective of when to buy in. Decisions are taken according to the values of certain technical indexes, with a Genetic Algorithm finding the optimum investment.
Ravichandran et al. (2005b) demonstrate that the importance of how the neural networks are used to obtain the minimum number of iterations required attaining the maximum return on investment after back propagation learning algorithm. The Artificial Neural Network (ANN) model is used for this study and the result seems quite encouraging, yielding about 99% correlation between the actual and predicted values.

Ravichandran et al. (2006 a) investigated in Chapter 4 proceeds to discuss about the Strategies for Indian Share Market Investment through ANFIS (Artificial Neural Fuzzy Inference System). Traditionally, technical analysis approach that predicts stock prices based on historical prices and volume, basic concepts of trends, price patterns and oscillators, is commonly used by stock investors to aid investment decisions. Advanced intelligent techniques, ranging from pure mathematical models and expert systems to fuzzy logic have also been used in many financial trading systems for investing and predicting stock prices. In recent years, most of the researchers concentrate their research work towards the future prediction of share market prices by using Artificial Neural Networks. In this chapter a new methodology is proposed that neural network is applied to the investor’s financial decision making to invest in the restricted share (sub-sectors) in a continuous time frame work and further it is extended to establish the fuzzy design rule to design an optimum investment rule that one can earn more return on investment in a share market. Again, the FIS trained through ANFIS and the proposed ANFIS has been tested with stock data obtained from the Indian Share Market BSE (Bombay Stock Exchange) Index. In this chapter,
the design, implementation and performance of the proposed neural network and ANFIS are described.

Ravichandran et al. (2006 b) investigated in Chapter 5 deals with the optimization of FIS can be evaluated through Genetic Algorithm. Predicting stock investments with traditional time series analysis and other statistical methods have proven to be difficult, since the vast amount of data and scripts are handled. Moreover, the data available in the Indian stock trading are not fixed and it always uncertainty and an ambiguity in nature. Therefore, the large number of researchers has been proposed many new methods/models, which are based on the non-traditional tools like Fuzzy Logic, Neural Networks etc., Ravchandran et al.[2006 a] describe the neural network is used to find the optimum number of iterations is required to train FIS rules. Again, for increasing the efficiency of the investing model, we trained these FIS rules by Neural Network (called ANFIS) and using Ravchandran et al. [2006 b] to reduce the scripts by a smaller number of scripts, so that one can manually pick the optimum rule. The disadvantage of this method is that the invested amount goes only to a limited number of scripts, it resulted that it will be automatically increased the risk. In this chapter, all the rules established from ANFIS are taking into account and using genetic algorithm

- To find the order (sequence of preference) in which one can invest the amount, if the investors want to invest their amount in a limited sub-indexes and which is different from [Ravchandran et al. (2006 b)].
• To find the sequence of preference together with the investing amount preference like high, medium, and low. (This cases the investors to invest their amount to the entire sub-indexes with the amount preference).

In this contest, two genetic algorithms are simultaneously executed, one will take care of arranging the sub-index preferences and the other will take care of amount of investment like high, medium, and low. This will help the investors to invest their amount, based on the preference given by genetic algorithm, to all type of sub-indexes. Another advantage of this chapter is to establishing the fitness function, which include the ‘weight value of the sub-indexes’ and the ‘weight value of the risk’. Finally, the designed model is tested and implemented through BSE stock market index.

Finally, the conclusion is given in chapter 6. This Research work investigated different methodologies and mathematical models have been derived and investigated with Indian Share Market Index. From available BSE Index, the fuzzy methodologies applied to rank the various shares under 11 different sub-indexes (Chapter -2) (classified by BSE Index), then Artificial Neural Networks are used to find the correlation between the present trend and the expected future investment trend (Chapter-3). Again, the neural network is used to evaluate the optimum number of iterations needed to get the exactness, so that this will reduce the time when we apply the same concept to fuzzy inference systems. In chapter-4, we design a Fuzzy Inference System and this will guide the people to educate the level of investment, namely high, medium and low in each of the
sub-indexes. For increasing the performance of investment strategies, we use artificial neural fuzzy inference system (ANFIS), and finally to obtain the optimum investment policy by using Genetic Algorithm (Chapter-5). Hence, it is concluded that the soft-computing techniques gave the best investment policy rather than the standard statistical and traditional techniques followed so far.