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Foreword

Greetings!!!

India is now one of the fastest-growing major economies in the world. To sustain India's high growth rate and spread its benefits more evenly, the financial sector has a crucial role to play in mobilizing resources and channelizing them to productive uses. India's efforts to push through financial sector reforms in the last two years have been promising. Some of the important accomplishments include the introduction of an inflation-targeting regime, easing of norms to apply for banking licenses, introduction of an Insolvency and Bankruptcy Code (IBC), and the launch of the Pradhan Mantri Jan Dhan Yojana, to name a few.

However, India has a long, unfinished reform agenda that it needs to pursue with utmost urgency to sustain the high growth rate in the long term. The most pressing issue facing the Indian financial sector is the rising stock of non-performing assets or NPAs in the banking system. It will be difficult for the banking system to support high growth, especially in the industrial sector, if the growth in NPAs is not checked. India has enormous growth potential. To unlock this potential and to maintain an upward growth trajectory, it is crucial that the government pursue financial market development and reforms.

While Bitcoin is still treated with skepticism in India, both the private and government players are adopting its underlying tech - blockchain with open hands. Reportedly, India's largest public sector bank, State Bank of India is looking to create a blockchain-based exchange for Non-Performing Assets (NPA's), to be launched in association with 30 banks, this platform will assist the banks in data-driven price discovery. SBI is also using an enterprise blockchain solution for managing its Know Your Customer (KYC) system. The solution is built on Hyperledger Sawtooth, a modular platform for developing and deploying blockchains, developed by Intel. The new blockchain solution will boost the efficiency of financial institutions without compromising on data confidentiality and transaction security. While utilization of technology has many benefits, it comes with its own cons as well. If not utilized well, it can create serious regulation issues for the banks and the results could certainly affect millions. The idea of introducing a blockchain based solution for doing the price discovery of NPA's is essentially the need of the hour.

With these words, I am glad to introduce the peer reviewed Quarterly publication of the Institute - Research Bulletin, Vol.44, No. 1, April 2018 issue. We are convinced that the book will provide the necessary insight to the readers on the diverse issues it has covered and will prove to be highly advantageous to the researchers and readers by enriching their knowledge base.

I extend my heartfelt thankfulness for the esteemed members of the Editorial Board, the eminent contributors and the entire research team of the Institute for their earnest effort to publish this volume in time.

CMA Sanjay Gupta
*President &
Chairman - IT & Research Committee
The Institute of Cost Accountants of India*

Editor's Note

Warm Regards!!!

With more than 60% of the population of India residing in rural areas, shoring up rural incomes will go a long way in spreading the fruits of growth. Gol has made doubling farm incomes by 2022 a target. To achieve this will require a multi-pronged approach: improving crop productivity, increasing coverage of irrigation, encouraging movement of people towards more productive non-farm sectors, and improving the terms of trade for farmers. Gol's commitment to boost investment is apparent with the Centre's capital expenditure growing at a robust 30% in the first seven months of the current fiscal year. Its focus on infrastructure over the last few years has already borne fruit in sectors such as power, where targets for transmission line addition are being exceeded consistently. The road sector has also been a success story. Around 92% of India's workforce is in the informal sector. Gol is addressing this through the Atal Pension Yojana and expanding the insurance net through the Pradhan Mantri Suraksha Bima Yojana and the Jyoti Jeevan Yojana. A strong social safety net will not only ensure better living standards, but will also reduce the need for precautionary saving, providing a boost to growth via higher consumption expenditure.

The importance of generating enough jobs will be critical for gainfully absorbing an additional 12 million people each year to the workforce over the next 10 years. The labour-intensive MSME sector will play a crucial role, and should be supported by additional measures to increase investment levels and profitability. Policy focus should be on sectors that have greater employment generation capacity such as construction, textiles, manufacturing and leather products. If the India economy managed to be one of the few bright spots in the world last year, here's hoping it'll be a beacon by the end of this one.

This issue highlights some above important issues like - Stock Market, Mutual Fund, Demonetization, Corporate Governance, Entrepreneurship Development, etc. I feel researchers and professionals would be immensely benefitted by going through this volume of Research Bulletin.

We are extremely happy to convey that our next issue of Research Bulletin, Vol.44, No. II will be a Non-the one.

We look forward to enquiries, comments and suggestions for improving quality and coverage of the future issues of the Bulletin; please mail us at: research.bulletin@icmai.in. I express my sincere thanks to all the contributors and reviewers of this important issue and expect our readers get plenty of academic inputs from the articles.

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ANALYSIS OF PRACTICE MULTIPLES - EMPIRICAL EVIDENCE FROM THE INDIAN STOCK MARKET

Shveta Singh
P. K. Jain
Surendra S. Yadav

Abstract:

This paper computes and analyses price multiples (price/earnings (P/E) ratio, price/book (P/B) ratio and earnings per share (EPS) for the Indian stock market. The sample for the study comprises of the NSE 500 companies which represented 96.76 per cent of the free-float market capitalization and 97.01 per cent of the traded value of the stocks listed on the NSE as on December 31, 2013, and the period under study, is spread over the past more 15 years (2001-2014). Hence, virtually, the chosen sample presents a census on equity market price multiples in India.

The Indian economy appears to be led by more than six-tenths of the sample companies, in terms of aggressive (high) P/E ratios. Further, the market response to EPS growth is evident. This can be regarded as a testimony of fundamentals applying in the Indian economy. The aspect that the sample companies also represent value stocks is brought forth by the P/B ratios. In sum, it appears that the Indian stock market provides returns to both fundamental (long-term) and technical (short-term) investors. This is perhaps why the Indian stock market continues to attract domestic as well as foreign capital market investments.

Key Words:

Price/Earnings (P/E) Ratio, Price/Book (P/B) Ratio, Earnings per Share (EPS), Indian Equity Market, Over-Valuation, Under-Valuation



Introduction

This paper has been devoted to the analysis of the price multiples, viz., the price/earnings (P/E) ratio and the price/book value (P/B) ratio, for the Indian sample companies (NSE 500 companies), over the period of the study (2001-2014). This research study attempts to build on the seminal work by Gupta et al. (1998) who reported the Indian P/E ratios, perhaps, for the first time. Reference to their work and relationship with their findings would find recurrence in this paper.

Amongst the most practical ways of determining whether the prevailing share prices are rational, is through P/E ratios. The P/E ratio signifies the price being paid by the buyer of equities for each rupee of annual earnings, whether distributed as dividends or retained in the company. The P/E ratio is also a useful indicator of the investors' (market's) mood and state. It measures the overall reasonableness or otherwise, of the market's valuation.

Theoretically, the P/E ratio is not a perfect measure. The reason is, while the price which an investor pays for a share is really for buying the future stream of earnings, the P/E ratios are actually computed from the past (latest available) earnings per share (EPS). Despite their imperfect nature, the practical usefulness of P/E ratios is widely recognised in the world of investments in stock markets. In fact, analysis of equity investment and returns is incomplete without taking note of the P/E ratio.

The computation of P/E and P/B ratios requires inputs of share price, EPS and book value/price (net worth) per share.

For better exposition, this paper has been divided into five sections. Section I provides a brief literature review of studies related to price multiples. Section II is devoted to presenting broad groups of P/E ratios as per Gupta's work. This section also enumerates guidelines for better interpretation of such ratios. Section III contains the scope and methodology used behind calculating the P/E ratio, the P/B ratio and the EPS growth. Section IV presents the computed P/E ratios and its analysis taking into consideration the P/B ratio and the EPS growth for the sample. Section V contains the summary.

Section I

Literature Review

The literature review focuses on studies carried out/related to price-earnings ratio/multiple and price to book value ratio as well as the factors affecting them.

Sivy (1996) reviewed the companies identified by T. J. Peters and R. H. Waterman in their book, *In Search of Excellence*, in the early 1980s. The majority of the *excellent* companies identified by them underperformed the market during 1981-85. In marked contrast, Sivy noted that the majority of the *non-excellent* companies beat the market, outperforming the S&P index. This could be possible because the investors had bought the shares of *excellent* companies at *non-excellent* (too high) prices and the shares of *non-excellent* companies at *excellent* (low) prices. For the buyers, the buying prices determine the returns. Clearly, shares bought at low P/E ratio (in general) are likely to be more rewarding to the investors vis-à-vis shares bought at higher P/E multiple.



Wong et al. (1990) attempted to provide evidence on the relation between stock returns and the effects of firm size and earnings to price ratio (E/P), with a sample from the stock exchange of Singapore. They observed that stock returns were significantly related to both size and E/P; between the two, the size effect appeared to be of secondary importance. Frankel and Lee (1998) used an analyst-based residual income model and the resulting value-to-price (V/P) ratio to examine issues related to market efficiency and the predictability of cross-sectional stock returns. They proved that the value-to-price (V/P) ratio was a reliable predictor of cross-sectional returns, particularly over longer time horizons.

Lau et al. (2002) examined the relationship between stock returns and beta, size, the earnings-to-price (E/P) ratio, the cash flow-to-price ratio, the book-to-market equity ratio, and sales growth (SG) by studying the data of the Singapore and Malaysian stock markets for the period 1988-1996. They reported a negative size effect and a positive E/P effect on stock returns. Chen and Zhang (2007) have explained how accounting variables are related with cross-sectional changes in stock returns. They noted returns as a function of earnings yield, equity capital investment, changes in profitability, growth opportunities and discount rates.

Morelli (2007) examined the role of beta, size and book-to-market equity as competing risk measurements in explaining the cross-sectional returns of UK securities for the period July 1980 through June 2000. Size was not observed to be a significant risk variable, whereas book-to-market equity was observed to be priced by the

market; in other words, it had been noted as a significant determinant of security returns. Ferreira and Santa-Clara (2011) studied data from 1927 to 2007 and attempted to forecast the components of stock market return. The resultant significant components were dividend-price ratio, earnings growth and price-earnings growth.

Manjunatha and Mallikarjunappa (2012) examined the validity of the five parameter model (the combination of five variables, viz., beta (β), size, E/P, book value/market value (BV/MV) and market risk premium ($R_m - R_f$) on Indian stock returns using cross sectional regression. The results indicated that the combination of β , size, E/P, BV/MV and ($R_m - R_f$) variables explained the variation in security returns.

Section II

P/E Ratios in India

India began to open up its stock market gradually to foreign portfolio investment in the 1980s. This had the effect of raising the Indian P/E ratios to international levels. Further, the Indian government provided fiscal incentives to domestic savers for investing in equities. This pushed up the domestic demand for equities and led to the popularization of equity investment amongst the investing community (in particular the middle class). As a result of all these developments, India experienced a strong and long bullish market for a decade and a half from the early 1980s to the first half of the 1990s (Gupta et al., 1998). In their study, Gupta et al. classified the state of the Indian stock market into four broad categories based on the market's average P/E ratio:



1. Dangerously high average P/E ratio - a P/E ratio of greater than 21, was a symptom of a market bubble. This was a signal of exiting from the market instead of entering into it.
2. High average P/E ratio - a P/E ratio between 18 and 20. Caution was required to be exercised in entering into the market, if at all, in this situation.
3. Reasonable average P/E ratio - a P/E ratio between 13 and 17. The P/E ratio was neither too high nor too low, but was just around an economically justifiable or normal level.
4. Abnormally low market P/E ratio - a P/E ratio of less than 12. This offered a rare opportunity of buying stocks at advantageous prices, an opportunity which occurred once in many years.

The benchmarks suggested above did not apply to individual company P/E ratios but to the market's average P/E ratio only.

Over the past two decades, Indian investors have come to accept a substantially reduced dividend yield, i.e. dividend as a percentage of market price; it is, to a marked extent, also a reflection of the rise in the P/E ratios, especially because the dividend pay-out ratio has remained largely unchanged (Jain et al., 2013). The average dividend yield for the actively traded shares in India declined from around 6.15 per cent at the beginning of 1980s to less than 2 per cent for most of the 1990s (Gupta et al., 1998).

As a logical corollary of the above follows that capital gains constitute relatively more important component of equity returns (and dividends less important). Investors cannot, therefore, expect a regular annual return

from equity investments in most cases because capital gains (or losses) due to equity price appreciation (or depreciation), will always be uncertain in a volatile market like India. In fact, it is a built-in aspect of equity investments.

In India, the use of the P/E ratio was not very common till as late as 1990.

Interpreting the P/E Ratio: A Word of Caution

A high P/E ratio is suggested when the investors are confident about the company's future performance/prospects and have high expectations of future returns; high P/E ratios reflect optimism. On the contrary, a low P/E ratio is suggested for shares of firms in which investors have low confidence as well as expectations of low returns in future years; low P/E ratios reflect pessimism (Khan and Jain, 2014).

Further, the future maintainable earnings/projected future earnings should also be used to determine EPS. It makes economic sense as the investors have access to future earnings only. There is a financial and economic justification to compute forward or projected P/E ratios with reference to projected future earnings, apart from historic P/E ratios. This is especially true of present businesses that operate in a highly volatile business environment. Witness in this context the following: "In a dynamic business world, a firm's past earnings record may not be an appropriate guide to its future earnings. For example, past earnings may have been exceptional due to a period of rapid growth. This may not be sustainable in the future..." (Ramanujam, 2000).



The P/E ratios should, however, be used with caution as the published P/E ratios are normally based on the published financial statements of corporate enterprises. Earnings are not adjusted for extraordinary items and, therefore, to that extent, may be distorted. Besides, all financial fundamentals are often ignored in published data. Finally, they reflect market sentiments, moods and perceptions. Assuming retail stocks have been overvalued/undervalued, this error could, in all probability, be built into the valuation as well (Damodaran, 1996).

In spite of these limitations attributed to the P/E ratio, it is the most widely used measure of valuation. The major reasons are: (i) it is intuitively appealing in that it relates price to earnings; (ii) it is simple to compute and is conveniently available in terms of published data; (iii) it can be a proxy for a number of other characteristics of the firm, including risk and growth (Damodaran, 1996).

Earnings per Share (EPS)

According to corporate finance theory, the EPS is the ultimate source of shareholders' returns, whether by way of capital appreciation or dividends. In practice also, the use of EPS is common among market analysts for the purpose of assessing or estimating the future possibilities of returns from shares (Gupta et al., 1998).

The most important factor behind the growth of EPS is the ploughing back of profits by Indian companies. Every rupee of retained profit represents re-investment on behalf of shareholders. In the case of sound investments, it should result in a higher profit (higher EPS) without increasing the

number of shares. The rate of EPS growth will depend on how efficiently the management employs the retained profits.

The EPS growth, to a marked extent, would depend on the extent to which a company is able to take advantage of the following:

1. technological progress,
2. organizational improvements,
3. economies of scale, and,
4. profitable takeover/merger opportunities.

Relationship between EPS and Prices

On a *priori* basis, there is expected to be positive relationship between EPS and share prices as well as dividends. Of the two companies, other things being equal (say, size, type of business, quality of management, etc.) the one having a higher EPS will normally command a relatively higher market price. Likewise, as a company's EPS grows, the market value of its shares may also exhibit appreciation (may not be in the same proportion).

P/B Ratio

The price to book value/net worth (P/B) ratio is an indication of how the market values the company vis-à-vis its book value/net worth. Hence, a low P/B ratio indicates an undervalued company which translates into a good investment opportunity for the fundamental investor; a higher P/B ratio, *prima-facie*, is reckoned as a signal of the undervaluation of the company (as well as of its shares). An analysis of the P/B ratio would enable us to have insight whether Indian companies have been undervalued/overvalued during the period of the study.



Section III

Scope, Data and Methodology

The research methodology adopted in the paper to compute the P/E ratio, P/B ratio and the EPS growth, has been delineated in this section.

Scope

The sample comprises of the NSE 500 companies. The NSE 500 index of India comprises of the top 500 companies listed on the NSE based on their market capitalization representing 96.76 per cent of the free-float market capitalization and 97.01 per cent of the traded value of all stocks on NSE (Source: National Stock Exchange (NSE) website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

The sample is representative in nature as the NSE 500 companies represent all industry groups. The date of sample selection was March 11, 2013. The period of the study for this paper is 2001-2014.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock based index in 1923 in the United States of America (USA). The transition of the index from market-value weighted to float weighted was made recently, in two steps, the first on March 18, 2005 and the second on September 16, 2005 (Source: Wikipedia website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500) is India's first broad

based benchmark of the Indian capital market. CNX stands for the Credit Rating Information Services of India Limited (CRISIL) and the NSE. These two bodies own and manage the index through a joint venture called the India Index Services and Products Limited (IISL) (Investopedia, 2014).

Secondary Data and Analysis

Definition of P/E Ratios

The numerator 'P' of the P/E ratio stands for the market price of a share and the denominator 'E' for earnings-per-share (EPS). The P/E ratio signifies the price being paid by the buyer of equities for each rupee of annual earnings, whether distributed as dividends or retained in the company. Its inverse (i.e. E/P, known as 'earnings yield') measures corporate profitability in relation to the market value of corporate equity. A company's P/E ratio, although not the only factor, is important for judging whether the prevailing market price of a share is reasonable, i.e. economically justifiable. A market's average P/E ratio (as distinct from the individual company's P/E ratio) is an important market indicator of the general state of the share market.

Computation of P/E Ratios

The yearly P/E ratio of an individual company has been computed by using the year's average share price and the latest reported annual earnings-per-share (EPS). The year's average share price of a company has been derived by averaging the year's high and low prices. Such averaging has been proved to have high reliability.



Computation of P/B Ratios

The yearly P/B ratio of an individual company has been computed by using the year's average share price and the latest reported total assets less the intangible assets, fictitious assets and external liabilities.

P/B ratio = Market Price / Book Value per Share

Computation of EPS Growth

The EPS growth data for each year for a company was taken and then averaged, using their market capitalization as the weight, to arrive at the EPS growth for the sample.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® database, for fourteen years (2001-2014). Descriptive statistical values/positional values, i.e., mean, standard deviation, variance, coefficient of variation, minimum,

maximum, skewness, kurtosis and quartile values have been computed for each year. The period of the study has been divided into two phases, viz., pre-recession (2001-2008) and post-recession (2009-2014) to analyse if there has been any impact on the price multiples due to the recession which originated in the United States in 2008. The paired sample t-test has been administered to test the same. The entire set of data has been analyzed using Microsoft Excel® spreadsheets and the statistics software SPSS®, namely, Statistical Package for Social Sciences.

Section IV

Price Multiples

It is a well-established economic proposition that a high P/E multiple reflects optimism about the future earnings prospects of a corporate and a low P/E multiple of pessimism, suggesting low earnings in future years. Given this premise, Table 1 presents the interpretation of varying values of P/E ratios, in five broad groups (on the pattern of Gupta's work).

Table 1: Interpretation of P/E ratios

P/E Ratio	Interpretation
N/A	A company with no earnings has an undefined P/E ratio. By convention, companies with losses (negative earnings) are usually treated as having an undefined P/E ratio, even though a negative P/E ratio can be mathematically determined.
0-10	Either the stock is undervalued, or the company's earnings are perceived to be on decline. Alternatively, current earnings may be substantially above historic trends or the company may have profited from selling assets. An analysis into the growth in earnings per share (EPS) can indicate whether the stock is a value stock or not.
11-17	For many companies, a P/E ratio in this range may be considered fair value.
18-25	Either the stock is overvalued or the company's earnings are expected to increase. The



	stock may also be a growth stock.
25+	A company whose shares have a very high P/E may have very high expected future growth in earnings, or this year's earnings may be considered exceptionally low, or the stock may be the subject of a speculative bubble.

While the frequency distribution of the P/E ratios has been presented first (Table 2), the descriptive statistics have been presented in Table 3.

Table 2: Frequency Distribution Related to P/E Ratio of Sample Companies, 2001-2014

<i>P/E ratio</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0-5	54.00	53.00	60.00	41.00	30.00	23.00	23.00	19.00	40.00	13.00	11.00	13.00	15.00	14.75
5-10	20.26	19.76	19.78	24.26	18.93	9.82	16.24	19.11	24.81	18.50	19.96	21.43	21.00	17.43
10-20	15.32	15.00	14.16	20.68	29.84	23.31	27.59	27.41	20.77	31.98	33.97	30.89	31.08	27.01
Above 20	9.35	11.71	5.84	13.50	20.37	43.15	32.49	34.36	14.23	36.03	34.93	34.36	32.05	40.23
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Note: Total (100) may not tally due to rounding off.

The Indian economy appears to be led by more than six-tenths of the sample companies, in terms of aggressive (high) P/E ratios of more than 10. These are the *growth* stocks amongst the sample companies. Nearly 15 per cent of the sample companies have a P/E ratio of less than 5 as in 2014. This number has, however, come down substantially from more than 50 per cent in 2001. Another revealing finding that emerges from Table 2 is the fact that the Indian stock market (represented by the sample companies) appears to be over-valued and could be in the state of a bubble, in 2014, with more than 40 per cent of the companies reporting P/E ratios of more than 20.

quartile values, the approach followed treats P/E ratios of less than 5 and more than 25 as outliers. The valid number of companies within the specified ranges has been indicated in column 2 of the table. The paired sample t-test results have been provided after Table 3. Figure 1 presents the average P/E ratios for the sample.

For computing the descriptive statistics of mean, standard deviation, coefficient of variation, skewness, kurtosis, median and



Table 3: Mean, Standard Deviation, Coefficient of Variation, Skewness, Kurtosis, Median and Quartile Values Related to P/E Ratio of Sample Companies 2001-2014

Figures are in percentages)

Year Ending*	Number of companies with P/E ratio < 25 and >5	Mean	Standard Deviation	Coefficient of Variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001	146	10.67	4.71	44.14	0.93	0.10	9.25	6.86	13.16
2002	156	11.20	5.09	45.45	0.81	-0.41	9.81	6.85	14.39
2003	164	10.79	4.96	45.97	0.93	-0.03	9.37	6.70	13.76
2004	243	11.84	5.36	45.27	0.71	-0.49	10.42	7.53	15.46
2005	271	13.01	5.01	38.51	0.38	-0.82	12.75	8.79	16.20
2006	218	14.92	5.45	36.53	0.07	-1.22	14.34	10.28	19.99
2007	280	13.97	5.83	41.73	0.28	-1.11	13.41	9.00	18.52
2008	281	13.05	5.50	42.15	0.46	-0.89	12.10	8.30	17.60
2009	276	12.20	5.68	46.56	0.72	-0.65	10.63	7.50	15.91
2010	315	13.62	5.47	40.16	0.26	-1.00	13.04	8.82	17.60
2011	328	13.51	5.29	39.16	0.31	-0.91	13.06	8.88	17.44
2012	328	13.43	5.63	41.92	0.42	-0.96	12.53	8.82	17.73
2013	321	13.35	5.55	41.57	0.38	-0.95	12.63	8.73	17.81
2014	318	14.91	5.97	40.04	0.04	-1.28	15.24	9.51	20.62
2001-2014	260	12.89	5.39	42.08	0.48	-0.76	12.04	8.33	16.87
Phase 1 (2000-2001 to 2007-2008)	220	12.43	5.24	42.47	0.57	-0.61	11.43	8.04	16.14
Phase 2 (2008-2009 to 2013-2014)	314	13.50	5.50	41.57	0.36	-0.96	12.86	8.71	17.85

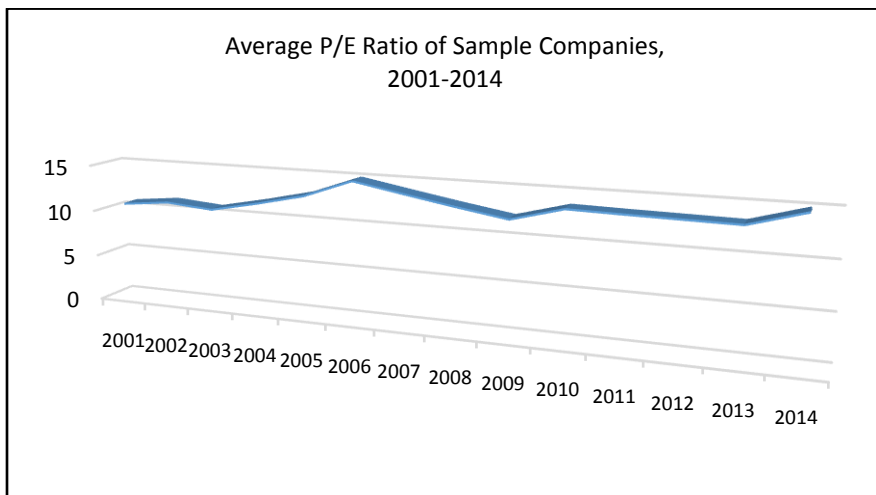
Note: (i) *The Indian financial year begins on April 1 and ends on March 31 of the following year. The same holds true for all subsequent tables and notations.
(ii) Values of more than 25 and less than 5, are excluded.

Paired Samples Test

	Paired Differences					t	df	Significance (2-tailed)
	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Phase 1 - Phase 2	1.43	1.09	0.45	-2.58	-0.29	-3.22	5	0.02

The P/E ratio hovers around 13 for the sample companies, indicating reasonable to high (aggressive) ratios. The coefficient of variation is moderate (40 per cent plus) and has displayed little deviation (the range being 36.53-45.97 per cent) over the period of the study. The skewness and kurtosis values also indicate a near normal distribution of the P/E ratios indicating that the values are spread equally in both directions from the mean value. The quartile values have been stable as well throughout the period of the study. However, in 2014 the quartile 3 is 20.62 indicating a possible bubble in the stock market (Table 2). Further, there is a statistically significant change in the P/E ratios pre- and post-recession, as per the paired t-test, probably due to the lower P/E ratios in the first three years (2001-2003). The lower quartile figure of 8.33 as well as the upper quartile figure of 16.87, reflect the presence of both value stocks and growth stocks in the sample (Table 1).

Figure 1: Mean Values of P/E Ratio for Sample Companies, 2001-2014



On a *a priori* basis, increase in EPS should yield to higher P/E multiple, or vice-versa. What has been the experience of the shares of the sample companies in this regard constitute the subject matter of the remaining part of this section. Empirical analysis shows that the market price usually responds to the growth in EPS at the company level. The same is presented through Table 4. The paired samples t-test has also been administered to ascertain whether there was any statistically significant difference between the EPS growth between the two phases.



Table 4: Growth in EPS vis-à-vis P/E Multiples for Sample Companies, 2001-2014

Year Ending*	Growth in EPS (%)	P/E Multiple
2001	22.04	10.67
2002	-8.06	11.20
2003	50.69	10.79
2004	55.41	11.84
2005	63.46	13.01
2006	176.39	14.92
2007	73.3	13.97
2008	85.55	13.05
2009	-144.58	12.20
2010	41.68	13.62
2011	3.99	13.51
2012	-29.45	13.43
2013	-12.41	13.35
2014	0.08	14.91
2001-2014	27.01	12.89
Phase 1 (2000-2001 to 2007-2008)	64.85	12.43
Phase 2 (2008-2009 to 2013-2014)	-23.45	13.50

Paired Samples Test

	Paired Differences					t	df	Significance (2-tailed)
	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Phase 1 - Phase 2	83.44	83.29	34.00	-3.98	170.85	2.45	5	0.58

In spite of the substantial drop in EPS (-144.58 per cent) in 2009, due to the impact of the recession originating out of the financial crisis, the EPS has grown at an impressive rate of 27.01 per cent over the period of the study for the sample companies, indicating the robust and growing earnings capability of Indian companies (Table 4). Further, the paired samples t-test results also indicate that the change in the EPS over the two phases has not been statistically significant. The P/E ratio increased (albeit gradually, from 12.43 to 13.50) in spite of the fluctuating EPS growth (ranging from -144.58 to 176.39), through the period of the study. Hence, empirical evidence indicates that in cases where the portfolio was acquired at relatively low P/E ratios, the returns were commendable. The opportunity for this was provided by a prolonged rise in P/E ratios so that the earlier period purchases benefitted immensely.



In continuation of the analysis of price multiples, whilst the P/E ratios indicate growth stocks, it is the P/B ratios that provide a further insight into value stocks. For the purpose, the P/B ratios for the sample companies were computed, for the period of the study. Frequency distribution of the P/B ratios for the sample are presented in Table 5. For computing the descriptive statistics of mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values, the approach followed treats P/B ratios of less than 0 and more than 5 as outliers. The valid number of companies within the specified ranges have been indicated in column 2 of Table 6. The paired sample t-test results have been provided after Table 6. Figure 2 presents the average P/B ratios for the sample companies.

Table 5: Frequency Distribution Related to P/B Ratio of Sample Companies, 2001-2014

P/B ratio	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0-0.5	37.00	36.00	40.00	26.00	21.00	19.00	15.00	10.00	22.00	7.00	4.00	6.00	8.00	9.20
0.5-0.8	12.00	13.00	12.00	7.00	3.00	2.00	3.00	3.00	17.00	3.00	6.00	12.00	18.00	12.80
0.8-1.0	4.00	5.00	7.00	5.00	3.00	1.00	4.00	4.00	6.00	5.00	6.00	9.00	5.00	6.80
1.0-2.0	11.00	16.00	16.00	22.00	22.00	16.00	22.00	25.00	26.00	26.00	33.00	27.00	26.00	25.20
2.0-3.0	5.00	4.00	4.00	11.00	15.00	12.00	12.00	15.00	12.00	21.00	18.00	16.00	14.00	13.00
3.0-5.0	3.00	3.00	6.00	10.00	16.00	19.00	18.00	20.00	9.00	19.00	17.00	16.00	14.00	14.00
Above 5	27.00	21.80	13.80	15.80	18.20	30.20	25.20	20.00	6.60	17.40	15.00	12.00	13.00	18.00
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Note: Total (100) may not tally due to rounding off.

The impact of the recession is clearly brought forth in 2009, with more than one-fifth of the sample companies reporting P/B ratios of less than 0.5. Nearly thirty per cent of the sample companies are undervalued in 2014 (Table 5). This figure has come down drastically from more than seventy per cent of undervalued companies in the beginning of the study period, 2001. This gradual decline in the undervalued companies, representing value stocks, is an indication of the market responding to the investment opportunities presented. It is useful to bear in mind that not all undervalued companies have good growth potential; sometimes, there could be something drastically wrong with the company, preventing the market not to value it close to its asset base. According to Table 6, the average P/B ratio has been rising gradually from under 1 in 2001. However, the average of 1.57 still appears to be on the lower side. The measures of dispersion (standard deviation, coefficient of variation, skewness and kurtosis) exhibit a lot of variation, an indication of the volatility in the market. Lower quartile (quartile 1) values have been as low as 0 whilst the upper quartile value (quartile 3) has recorded a maximum of 3.18 during the period of the study, an indication towards lower P/B ratios, overall.

In pre-recession years of 2005-2008, one-third of the sample companies were having P/B ratio of about 3, reflecting that the market price per share (MPS) is three times the book value (BV)/net worth of their shares; there has been a considerable decline in the P/B ratio



in subsequent years. For instance, except in 2010, when the P/B ratio was 2.93, in the other years, the value ranged from 1.86 to 2.70. Hence, the Indian stock market presents positive investment potential in such companies where the P/B ratio is on the lower side, provided of course, they are fundamentally strong. Changes in the pre- and post-recession P/B values are not statistically significant.

Table 6: Mean, Standard Deviation, Coefficient of Variation, Skewness, Kurtosis, Median and Quartile Values Related to P/B Ratio of Sample Companies 2001-2014

(Figures are in percentages)

Year Ending*	Number of Companies with P/B Ratio of >0 and <5	Mean	Standard Deviation	Coefficient of Variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001	359	0.80	0.95	118.75	2.14	5.02	0.48	0.23	1.03
2002	384	0.83	0.92	110.84	1.82	3.66	0.53	0.20	1.20
2003	423	0.88	1.02	115.91	1.75	2.80	0.54	0.14	1.18
2004	410	1.29	1.22	94.57	0.86	-0.05	1.07	0.00	2.03
2005	400	1.74	1.45	83.33	0.44	-0.78	1.62	0.00	2.78
2006	343	1.90	1.57	82.63	0.32	-1.07	1.72	0.00	3.18
2007	370	1.85	1.42	76.76	0.38	-0.85	1.61	0.86	2.95
2008	397	1.99	1.34	67.34	0.38	-0.69	1.82	1.08	3.00
2009	465	1.31	1.09	83.21	1.12	0.73	1.03	0.51	1.86
2010	410	2.08	1.22	58.65	0.25	-0.68	1.97	1.14	2.93
2011	421	2.00	1.18	59.00	0.66	-0.22	1.79	1.11	2.70
2012	435	1.83	1.19	65.03	0.79	-0.23	1.55	0.87	2.54
2013	435	1.71	1.20	70.18	0.90	-0.06	1.38	0.71	2.41
2014	408	1.75	1.21	69.14	0.90	-0.11	1.41	0.77	2.54
2001-2014	404	1.57	1.21	82.52	0.91	0.53	1.32	0.54	2.31
Phase 1 (2000-2001 to 2007-2008)	386	1.41	1.24	93.77	1.01	1.01	1.17	0.31	2.17
Phase 2 (2008-2009 to 2013-2014)	429	1.78	1.18	67.53	0.77	-0.10	1.52	0.85	2.50

Note:

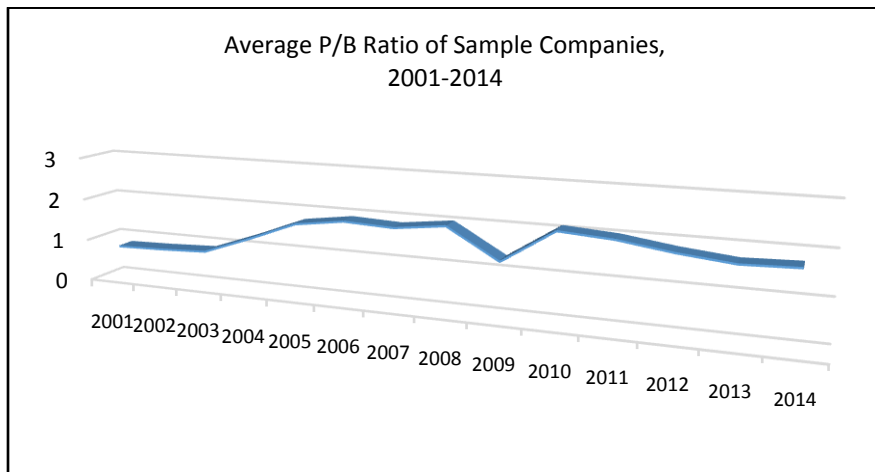
- (i) *The Indian financial year begins on April 1 and ends on March 31 of the following year. The same holds true for all subsequent tables and notations.
- (ii) Values of more than 5 and less than 0, are excluded.



Paired Samples Test

	Paired Differences					t	df	Significance (2-tailed)
	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Phase 1 - Phase 2	-0.54	0.57	0.23	-1.14	0.06	-2.31	5	0.07

Figure 2: Mean Values of P/B Ratio for Sample Companies, 2001-2014



Section V

Summary

The Indian economy appears to be led by more than six-tenths of the sample companies, in terms of aggressive (high) P/E ratios of more than 10. These are the *growth* stocks amongst the sample companies. Nearly 15 per cent of the sample companies have a P/E ratio of less than 5 as in 2014. This number has, however, come down substantially from more than 50 per cent in 2001. Further, the market response to EPS growth is evident. This can be regarded as a testimony of fundamentals applying in the Indian economy. Fundamental investors are doing and are likely to do well to identify the companies which are better than average performers in terms of EPS growth over long periods and map them against their P/E ratios. The equity research should particularly focus on EPS growth of companies, both at individual company level and portfolio level.



Another revealing finding of the analysis is the fact that the Indian stock market (represented by the sample companies) appears to be over-valued and could be in the state of a bubble, in 2014, with more than 40 per cent of the companies reporting P/E ratios of more than 20.

However, the aspect that the sample companies also represent *value* stocks is brought forth by the P/B ratios. Lower P/B ratios through the period of the study are indicative of undervalued companies.

In sum, it appears that the Indian stock market provides returns to both fundamental (long-term) and technical (short-term) investors. It is an indication of the breadth of the Indian stock market, in terms of presenting opportunities of investment to both kinds of investors. This is perhaps why the Indian stock market continues to attract domestic as well as foreign capital market investments.

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ASSESSMENT OF MUTUAL FUND PERFORMANCE USING DISTANCE BASED MULTI - CRITERIA DECISION MAKING TECHNIQUES - AN INDIAN PERSPECTIVE

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Abstract:

With integration of financial market, and many initiatives taken by Govt. of India like Digital India and financial inclusion, the Indian capital market has witnessed significant changes over last few years. Mutual Fund industry has grown significantly in the last decade attracting a large number of customers. However, Mutual Fund's (MF) performance depends on several criteria. From an investor's point of view, it is imperative to assess performance of MFs based on appropriate criteria to form a portfolio. In this study, we have assessed performance of some selected Equity Funds (EF) under a set of criteria based on risk and return in a Multi-Criteria Decision Making (MCDM) framework using two distance-based techniques such as TOPSIS & EDAS. Entropy method has been applied for determining criteria weight. Spearman's rank correlation test has been conducted and it has been found that the rankings by two methods are quite consistent.

Key Words:

Mutual Fund Performance, Equity Fund, Multi-Criteria Decision Making (MCDM), Evaluation based on Distance from Average Solution (EDAS), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Entropy Method for Criteria Weight



1. Introduction

Investment is formally defined as “the current commitments of dollars for a period of time in order to derive future payments that will compensate the investor for (1) the time the funds are committed, (2) the expected rate of inflation during this time period, and (3) the uncertainty of the future payments.” (Reilly and Brown, 2012, pp. 4) A mutual fund is a collection of funds from a large number of investors that are invested across different asset classes, based on a common objective. Amount invested in different securities are spreading across different industries and sectors to minimize the amount of risk.

As a result of growing risk appetite, increased per capita income, Govt. initiatives and spreading awareness, MFs have drawn significant attention from the investors as compared to other instruments like Fixed Deposits (FD), Public Provident Funds (PPF), National Savings Certificates (NSC), and postal savings which otherwise are considered as safe but with comparatively low returns. Over the last two decades, Indian mutual fund industry has grown largely. Under a special act of Parliament, MF industry started its journey in India with the inception of Unit Trust of India (UTI) in 1963. According to the published information by Association of Mutual Funds in India (AMFI), as on February 2018, the Assets under Management (AUM) of the Indian MF Industry has grown to Rs. 22.20 trillion from a level of Rs. 5.05 trillion as on 31st March 2008 while securing 25.38% growth in assets over that of February 2017.

But, here comes the question, which fund to invest in? Hence, it becomes pertinent to study the performance of the Indian mutual

fund industry. As risk is associated with return, the usefulness of MFs depend on understanding the relation between risk and return and analyzing performance for selection of funds. In effect, this will enable to derive maximum possible return on investment at acceptable risk level. Therefore, it necessitates measuring the performance of selected mutual schemes based on risk and return and compare the performance of these selected schemes. In this paper, we analyzed performance of MFs (equity-based schemes) from individual investors' point of view as they hold 50.7% share of industry's assets in February 2018. (Source: AMFI) Hence, this study attempts to address the research question: Based on a set of risk-return criteria do the funds perform similarly? If not, what is the order of funds based on relative performance?

The rest of the paper is organized as follows. In section 2, a brief literature review is presented wherein we discuss about performance assessment of MFs. In section 3, research objectives are stated. Section 4 illustrates the research methodology. In section 5, results are included with discussion on findings. Finally, section 6 concludes the paper with a highlight on future scope of study.

2. Related Work

MFs remain subject matter for research not only for investors but also for academicians over quite a long period of time. Literature is rife with the selection of portfolio by the fund manager to inflate returns and reduce risks. Holding mean return constant at a level, traditional portfolio model surmise that a rational investor tries to upgrade the expected utility of the portfolio while minimizing the risk. Markowitz (1952)



propounded the concept of efficiently diversified portfolios wherein he explained maximization of return at a given level of risk using mean variance analysis. Tobin (1958) further explained the fundamental basis of mean-variance approach. Markowitz (1959) selected semi-variance instead of variance as a measure of risk, which captures only adverse deviations. Jensen (1968), Sharpe (1966) and Treynor (1965) worked on Capital Assets Pricing Model (CAPM) for comparing performance of the funds based on risk-adjusted returns with respect to a benchmark portfolio. Treynor (1965) introduced reward to volatility ratio to measure portfolio performance based on systematic risk wherein he argued that a diversified portfolio could offset the unsystematic risk. In continuation of this work, Sharpe (1966) proposed a new index known as reward to variability ratio for measuring portfolio performance. Treynor and Mazuy (1966) studied around 57 funds during the period 1953-1962 and proposed a

quadratic model for deciding on the time to enter the market from the perspective of fund managers. Jensen (1968) explained evaluation of funds in relation to higher return for the investors from the perspective of the fund managers. He measured the performance as the excess return provided by the portfolio over the expected (as per CAPM) returns. In the study of Carlson (1970), an interesting observation was included. This study reported that the Sharpe ratio and Jensen' alpha beat the Dow Jones benchmark during the study period. However, McDonald (1974) did not see any significant difference between the performance of fund and its benchmark in the study of 123 funds using monthly data for the period 1960-1969. Further to these early phase classical studies, this field had attracted several researchers and practitioners for working on performance assessment. Table 1 summarizes some of such related work.

Table1. Summary of some of the related research on MF performance

Research Area	Author(s)	Description/Conclusion
Fund performance/persistence	Ippolito (1989)	Performance is consistent with optimal trading in efficient markets.
	Grinblatt and Titman (1992)	Persistence is achieved through earning abnormal returns.
Factors influencing MF performance	Guercio and Tkac (2002)	Examined the relationship between asset flow and fund performance. Asset flow or asset under management depends on the performance of the fund.
	Kacperczyk, Sialm, Zheng (2005)	Investment ability is concentrated in few industries.
Performance measures	Barua and Verma (1991)	Examined the performance of 'mastershare', the first close-ended fund in India during 1987-1991 based on Jensen and other measures and observed satisfactory performance of the fund.



Research Area	Author(s)	Description/Conclusion
Performance measures	Kothari and Warner (2001)	Investment skill is related to performance measures
	Pedersen and Rudholm-Alfvén (2003); Eling and Schuhmacher (2007)	Sharpe ratio is a dominant measure
	Redman, Gullett and Manakyan (2000)	Assessed five portfolios of global mutual funds based on the risk-adjusted returns like Treynor ratio, Sharpe ratio, and Jensen's Alpha using panel data
	Plantinga and Groot (2002)	Some measures are demonstrating risk aversion nature while some demonstrate preference based on medium and high degrees of risk aversion.
	Shah and Thomas (1994); Jayadev (1996); Gupta (2000); Tripathy (2004); Chander (2005); Anand and Murugaiah (2006); Sehgal and Jhanwar (2008); Kundu (2009); Kalpesh et al. (2012); Arora (2015)	Evaluation of performance of different MF schemes based on established risk adjusted performance measures like Sharpe ratio, Jensen ratio, and Sortino ratio, alpha, beta, NAV, timing to market, and selectivity skill.
	Anitha (2011)	Volatility is one of the measures.
	Chang et al. (2010)	Sharpe Ratio, Treynor Ratio, Jensen's α and Information Ratio
Approach	Pendaraki et al. (2004); Sharma and Sharma (2006)	Goal programming
	Basso and Funari (2001, 2003, 2005); Wilkens and Zhu (2001); Gregoriou et al. (2005); Chen and Lin (2006); and Lin and Chen (2008)	Data Envelopment Analysis (DEA)
Research Area	Author(s)	Description/Conclusion
Approach	Pendaraki et al. (2005)	Applied UTADIS (UTilités Additives DIScriminantes) method
	Lin et al. (2007)	Followed Multi-Attribute Decision Making
	Gladish et al. (2007)	Fuzzy MCDM and goal programming
	Chang et al. (2010); Alptekin (2009)	TOPSIS
	Wu et al. (2008)	AHP
	Sen and Datta Chaudhuri (2017)	Time series decomposition based approach for assessing fund style and composition



3. Research Objectives

This study attempts to address on what basis a retail investor should buy a mutual fund. In order to select the funds, we have attempted to check the performance of the funds under study based on a mix of risk-return criteria using distance based MCDM techniques. Hence, broad objectives of this study are:

- i. To study the criteria of assessing performance of mutual funds
- ii. To assess and rank mutual funds using MCDM techniques for constructing a portfolio.

4. Research Methodology

4.1 Sample

According to the information provided by AMFI, equity oriented schemes hold 40.8% of the industry's assets in February 2018 as compared to 31.9% in February 2017. Therefore, we have opted to assess performance of equity based MFs. Moreover, compared to large cap funds which show relatively low responsiveness to market change with lower return and small cap funds which are very much susceptible to market change, we have studied mid-cap funds which have relatively moderate response to market change with moderate to high return. In order to select funds, we have used convenient sampling. We refer to www.mutualfundindia.com (maintained by ICRA Online Limited). We have considered top 20 mid-cap equity based mutual funds as rated by them. This funds were assessed by ICRA on the basis of their performance (broadly return) within a particular category (equity based scheme), and for a specific time period (last 1 year). In our study, we have worked on these 20 funds to assess

them based on risk-return criteria and ranked them according to their relative performance. In order to collect fundamental data and returns, we have consulted secondary data source as published by Value Research, Morningstar and AMFI. Table 2 summarizes the funds selected.

Table2. Funds under Study

SL No.	Funds
A1	IDFC Sterling Equity Fund - Regular Plan - Growth
A2	Edelweiss Mid and Small Cap Fund
A3	Edelweiss Economic Resurgence Fund
A4	Aditya Birla Sun Life Pure Value Fund Growth
A5	L&T Midcap Fund Growth
A6	SBI Emerging Businesses Fund Growth
A7	Canara Robeco Emerging Equities Growth
A8	Taurus Discovery Fund
A9	Axis Midcap Growth
A10	Principal Emerging Bluechip Fund
A11	ICICI Prudential Indo Asia Equity Fund
A12	Reliance Close Ended Equity Fund - Series A
SL No.	Funds
A13	Aditya Birla Sun Life Emerging Leaders Fund - Series 3
A14	Aditya Birla Sun Life Emerging Leaders Fund - Series 4
A15	SBI Magnum Global Fund Regular Growth
A16	Invesco India Mid N Small Cap Fund - Growth Option
A17	LIC MF Midcap Fund
A18	Reliance Close Ended Equity Fund - Series B
A19	UTI Mid Cap Fund
A20	L&T Business Cycles Fund



4.2 Evaluation Criteria

As it is evident from the related work that several authors have made exhaustive attempts to assess performance of MFs. In line with those work, in our study, we have considered parameters like Assets under Management (AUM), one year return, mean return, α , β , R-square, σ , Sharpe Ratio, Sortino Ratio, and Treynor Ratio for assessing performance of the funds under study. Following table (Table 3) discusses briefly about the above said criteria along with their nature.

Table3. Description of the criteria

SL No.	Criteria	Description	Nature	Category
C1	Asset Under Management (AUM)	Total market value of the fund. If it increases, the fund normally gives good return and vice-versa.	Higher the better	Beneficial (B)
C2	Return	It is defined broadly as: $\text{Return} = (\text{NAV}_t - \text{NAV}_{t-1}) / \text{NAV}_{t-1}$ Where, NAV means Net Asset Value, t is the current time period.	Higher the better	Beneficial (B)
C3	Mean return	It indicates average return	Higher the better	Beneficial (B)
SL No.	Criteria	Description	Nature	Category
C4	Alpha (α)	It is the fund's performance on risk basis, which is considered as an active return of the fund. It compares its performance with benchmark index. An alpha value of zero is an indication that the fund is tracking perfectly with benchmark index i.e. efficient market holds good. It is the intercept of the security characteristic line (SCL) which is given by: $(R_p - R_f) = \alpha + \beta (R_m - R_f) + e_p$ Where, R_p : Portfolio return; R_m : Market risk; R_f : Risk-free rate; e_p : Unsystematic or diversifiable, non-market or idiosyncratic risk; $\beta (R_m - R_f)$: Non-diversifiable or systematic risk.	Higher the better	Beneficial (B)
C5	Beta (β)	It is a measure of systematic risk or volatility. It indicates how volatile the fund is as compared with the market. A beta value of one indicates	Smaller the better	Non-beneficial (NB)



		that the fund moves with the market whereas, value more than indicates more volatility. In a sense, beta is the co-variance of the asset's return with the market's return/ variance of the market's return.		
C6	R - squared	It is basically the percentage of a fund's movements that can be explained by movements in a benchmark index at market. Higher value indicates that the portfolio is well diversified.	Higher the better	Beneficial (B)
SL No.	Criteria	Description	Nature	Category
C7	Standard deviation (σ)	It measures the volatility in the fund's return in relation to its average. It indicates the deviation of the fund's return from the historical mean return of the fund.	Smaller the better	Non-beneficial (NB)
C8	Sharpe Ratio (SR)	It indicates return per unit of risk. It is related to positive or 'good risk'. Higher value indicates excess return per unit of risk. Sharpe Ratio = (Expected portfolio return - Risk free rate) / Portfolio Standard Deviation	Higher the better	Beneficial (B)
C9	Sortino Ratio (SOR)	It is related to the downward deviation of the investment. It evaluates an investment's return at a given level of 'bad risk'. Higher value indicates more return per unit of bad risk. Sortino Ratio = (Expected portfolio return - Risk free rate) / Standard Deviation of negative asset return	Higher the better	Beneficial (B)
C10	Treynor Ratio (TR)	It measures the risk adjusted performance of the fund. In a sense, it takes into account the systematic risk of the portfolio i.e. it is the 'reward-to-volatility ratio'. Treynor Ratio = $(R_p - R_f) / \beta$	Higher the better	Beneficial (B)



The following table (Table 4) summarizes the values of the above said criteria for the funds under study.

Table 4. Descriptive Statistics

Funds	AUM (In crs)	1 Yr ret	Mean	Alpha	Beta	R - Squared	Std. Dev	SR	SOR	TR
IDFC Sterling Equity Fund - Regular Plan - Growth	2483	35.727	15.17	7.52	0.99	0.66	16.66	0.73	0.95	0.42
Edelweiss Mid and Small Cap Fund	640	33.17	15.53	8.23	0.92	0.67	15.36	0.82	1.13	0.416
Edelweiss Economic Resurgence Fund	39	30.06	12.85	4.83	1.07	0.83	16.06	0.62	0.87	0.4139
Aditya Birla Sun Life Pure Value Fund Growth	3079	29.8637	19.01	10.99	1.07	0.67	17.92	0.9	1.39	0.368
L&T Midcap Fund Growth	2222	29.2964	18.67	11.29	0.94	0.67	15.67	1	1.32	0.4
SBI Emerging Businesses Fund Growth	2420	29.1087	13.15	6.85	0.71	0.56	12.9	0.79	1.23	0.411
Canara Robeco Emerging Equities Growth	3208	28.6651	17.54	9.59	1.06	0.67	17.69	0.82	1.04	0.28
Taurus Discovery Fund	52	27.81	14.66	6.84	1.03	0.71	16.71	0.7	0.99	0.43
Axis Midcap Growth	1301	27.342	10.56	3.72	0.82	0.58	14.73	0.52	0.66	0.409
Principal Emerging Bluechip Fund	1669	27.1	17.01	9.16	1.04	0.74	16.45	0.85	1.27	0.4087
ICICI Prudential Indo Asia Equity Fund	190	26.35	12.39	5.25	0.89	0.66	14.88	0.63	1.02	0.43
Reliance Close Ended Equity Fund - Series A	424	25.99	10.71	3.2	0.96	0.74	15.32	0.51	0.7	0.32
Aditya Birla Sun Life Emerging Leaders Fund - Series 3	28	25.53	17.36	9.14	1.11	0.69	18.35	0.78	1.27	0.42
Aditya Birla Sun Life Emerging Leaders Fund - Series 4	18	25.15	16.85	8.58	1.12	0.66	18.94	0.73	1.27	0.35
SBI Magnum Global Fund Regular Growth	3582	24.8564	9.72	3.92	0.6	0.42	12.71	0.53	0.81	0.34
Invesco India Mid N Small Cap Fund - Growth Option	550	24.6255	13.28	6.04	0.91	0.68	14.98	0.69	0.93	0.38
LIC MF Midcap Fund	270	24.36	14.32	7.47	0.83	0.68	13.64	0.83	1.45	0.33



Reliance Close Ended Equity Fund - Series B	150	24.22	11.28	3.78	0.96	0.71	15.58	0.53	0.75	0.39
UTI Mid Cap Fund	4208	23.75	13.59	6.65	0.84	0.59	14.96	0.71	1.04	0.32
L&T Business Cycles Fund	1066	23.43	11.66	3.72	1.06	0.76	16.56	0.53	0.74	0.36

4.3 Determination of Criteria Weight

Once the criteria are selected, the next step is to determine appropriate weight to be assigned to each criterion. There are several methods available for determining criteria weight such as subjective fixed weight methods like Delphi method, expert survey method, and analytic hierarchy process method (AHP) which consider subjective factors; objective fixed weight methods like entropy method, and CRITIC (CRiteria Importance Through Intercriteria Correlation) which work on the inherent information of the criteria for determining appropriate weights. In our study, we have used objective weight method like entropy in order to avoid any subjective variation. Entropy method calculates criteria weight based on the relative weight of information (Shannon, 1948). In a sense, entropy measures the degree of disorder in system information. According to this method, smaller the value of the entropy, lesser is the degree of disorder of the system. In other words, higher the entropy value, more the criterion contains information. We have followed the work of Li et al. (2011) in order to determine criteria weight. The steps are given below:

Suppose,

a_i : i^{th} alternative where $i = 1, 2, 3, \dots, m$

c_j : j^{th} criterion where $j = 1, 2, 3, \dots, n$

x_{ij} : j^{th} criterion value for the i^{th} alternative

Step1: Standardization of Criteria

This is done in order to eliminate the influence of criteria on the alternatives.

Standardized value of x_{ij} is given by:

$$r_{ij} = \frac{x_{ij}}{\max_j x_{ij}}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad \text{(For beneficial criteria)} \quad \left. \vphantom{\frac{x_{ij}}{\max_j x_{ij}}} \right\} \quad \text{(Eq. 1)}$$

$$r_{ij} = \frac{\min_j x_{ij}}{x_{ij}}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad \text{(For non-beneficial criteria)}$$

After this process, we get a standardized criteria matrix $R = [r_{ij}]_{m \times n}$



Step 2: Calculation of the criterion’s entropy

Entropy of the j^{th} criterion is given by:

$$H_j = - \frac{\sum_{i=1}^m f_{ij} \ln f_{ij}}{\ln m}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \tag{Eq. 2}$$

Where,

$$f_{ij} = \frac{r_{ij}}{\sum_{i=1}^m r_{ij}}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \tag{Eq.3}$$

Step 3: Calculation of the criterion’s entropy weight

Entropy weight of the j^{th} criterion is determined by:

$$w_j = \frac{1-H_j}{n-\sum_{j=1}^n H_j}, \text{ where } \sum_{j=1}^n w_j = 1 \tag{Eq. 4}$$

4.4 MCDM Techniques

In our study, we have applied two distance based Multi-Criteria Decision Making (MCDM) techniques such as Evaluation Based on Distance from Average Solution (EDAS) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). It is evident from the literatures that, TOPSIS and AHP are the two popular techniques applied in MF performance assessment. However, TOPSIS method evaluates the criteria and order them according to their respective distances from the Positive Ideal Solution (PIS) and Negative Ideal Solution (NIS). This method was developed and proposed by Hwang and Yoon (Hwang & Yoon, 1981). According to this method, the alternative which is having shortest distance from PIS and longest distance from NIS, is considered as the best alternative among all other and subsequently is given rank one. In a sense, PIS maximizes the effect of beneficial attributes, minimizing non-beneficial attributes while NIS does the opposite (Wang and Elhag, 2006). PIS indicate maximization of beneficial criteria

while minimizing non-beneficial criteria. In opposite, NIS infers maximization of non-beneficial criteria. In effect, PIS consists of all best values of the criteria while NIS consists of all worst values (Wang, 2008). Unlike TOPSIS, EDAS method (Ghorabae et al., 2015) considers average solution for assessing the alternatives. In real life most often it is unlikely to rank or rate alternatives based on their distances from the ideal solutions. In addition, there may be some conflicting criteria as well which even complicates the situation in the sense that ideal solutions may not be obtained. Moreover, in that case calculating separations from PIS and NIS may not appraise the alternatives in proper way. In EDAS, there are two distances used such as PDA (positive distance from average) and NDA (negative distance from average) taking separation from the average solution (instead of ideal solutions) into consideration. These two measures are calculated based on the category of the criteria, i.e. beneficial and non-beneficial. The alternative, which has higher PDA and/or lower NDA, is treated to be the best



alternative among the other members. Moreover, unlike subjective method like AHP, wherein opinion bias exists, we have

used the objective method known as Entropy method which more or less is free of subjective bias.

4.4.1 TOPSIS Method

Over the years TOPSIS and its different extensions such as M-TOPSIS, Fuzzy TOPSIS etc. have been applied by many researchers in various domains (Behzadian et al., 2012) such as performance evaluation of banks, engineering design, supplier selection, supply chain management, manufacturing, service design selection, marketing, tourism, and others like selection of ERP package (Ghosh & Biswas, 2017a, 2017b). The steps of general TOPSIS method are as follows (Chen and Hwang, 1992; Jahanshahloo et al., 2006):

Suppose there are 'm' alternatives constituting the alternative set $A=(A_1, A_2, \dots, A_m)$, whereas the Criteria set is $C=(C_1, C_2, \dots, C_n)$.

x_{ij} : j^{th} criterion value for the i^{th} alternative. The decision matrix is $X=[x_{ij}]_{m \times n}$.

Step 1: Normalization of the decision matrix

The normalized decision matrix is $R^*=[r^*_{ij}]_{m \times n}$, where,

$$r^*_{ij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^n x_{ij}^2}}, i = 1, 2 \dots m; j = 1, 2 \dots n \tag{Eq. 5}$$

Step 2: Determination of the weighted decision matrix

The weighted decision matrix is given by:

$$v_{ij} = w_j r^*_{ij} \tag{Eq. 6}$$

Step 3: Determination of the ideal solution

The positive ideal solution (PIS) is given by:

$$V^+ = (V_1^+, V_2^+, V_3^+ \dots V_n^+) \tag{Eq. 7}$$

Where, $V_j^+ = \max V_{ij}$ (benefit criteria); $\min V_{ij}$ (cost criteria)

The negative ideal solution (NIS) is given by:

$$V^- = (V_1^-, V_2^-, V_3^- \dots V_n^-) \tag{Eq. 8}$$

Where, $V_j^- = \max V_{ij}$ (cost criteria); $\min V_{ij}$ (benefit criteria)



Step 4: Calculation of the distance

The distance of every feasible solution from PIS and NIS is calculated respectively as:

$$S_i^+ = \sqrt{\sum_{j=1}^n (V_{ij} - V_j^+)^2} \quad (\text{Eq. 9})$$

$$S_i^- = \sqrt{\sum_{j=1}^n (V_{ij} - V_j^-)^2} \quad (\text{Eq. 10})$$

Step 5: Calculation of the relative degree of approximation

The relative degree of approximation is determined by:

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-} \quad (\text{Eq. 11})$$

Where, $0 \leq C_i \leq 1$; $i = 1, 2 \dots m$; $j = 1, 2 \dots n$

The alternative is ranked according to the value of the relative degree of approximation. The bigger the value of C_i is, the better the alternative is.

4.4.2 EDAS Method

This method was proposed by Ghorabae et al. (2015). The steps are as follows:

Step 1: Select best possible alternatives and the most important criteria that describe them.

Step 2: Formulation of the decision-making matrix (X) given as:

$X = [X_{ij}]_{m \times n}$; where X_{ij} denotes the performance value of i^{th} alternative on j^{th} criterion.

Step 3: Determine the average solution

$$AV_j = \frac{\sum_{i=1}^m x_{ij}}{m} \quad ; j = 1, 2, \dots, n \quad (\text{Eq. 12})$$

Step 4: Calculate the positive distance from average (PDA) and the negative distance from average (NDA) matrices according to the type of criteria (beneficial and non-beneficial)

$$PDA = [PDA_{ij}]_{m \times n},$$

$$NDA = [NDA_{ij}]_{m \times n}$$

If j^{th} criterion is beneficial,

$$PDA_{ij} = \frac{\max(0, (x_{ij} - AV_j))}{AV_j} \quad (\text{Eq. 13})$$



$$NDA_{ij} = \frac{\max(0, (AV_j - x_{ij}))}{AV_j} \quad (\text{Eq. 14})$$

If j^{th} criterion is non-beneficial,

$$PDA_{ij} = \frac{\max(0, (x_{ij} - AV_j))}{AV_j} \quad (\text{Eq. 15})$$

$$NDA_{ij} = \frac{\max(0, (x_{ij} - AV_j))}{AV_j} \quad (\text{Eq. 16})$$

Where PDA_{ij} and NDA_{ij} denote the positive and negative distance of i^{th} alternative from average solution in terms of j^{th} criterion, respectively.

Step 5: Determine the weighted sum of PDA and NDA for all alternatives

$$SP_i = \sum_{j=1}^n w_j PDA_{ij} \quad (\text{Eq. 17})$$

$$SN_i = \sum_{j=1}^n w_j NDA_{ij} \quad (\text{Eq. 18})$$

Where w_j is the weight of j^{th} criterion.

Step 6: Normalization of the values of SP and SN for all alternatives

$$NSP_i = \frac{SP_i}{\max_i(SP_i)} \quad (\text{Eq. 19})$$

$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)} \quad (\text{Eq. 20})$$

Step 7: Calculation of the appraisal score (AS) for all alternatives

$$AS_i = \frac{1}{2} (NSP_i + NSN_i) \quad (\text{Eq. 21})$$

Where $0 \leq AS_i \leq 1$. The alternative having highest AS_i is ranked first & so on.

For calculation, we have used Microsoft Excel (Office 10 version) in our study.



5. Results

5.1 Criteria Weights Determined by Entropy Method

Table 5 and 6 demonstrate determination of criteria weights.

Table 5. Normalization table

Criteria/ Alternative	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
A1	0.590067	1	0.798	0.66608	1.65	0.79518	1.31078	0.73	0.65517	0.97674
A2	0.152091	0.92842948	0.81694	0.72896	1.5333	0.80723	1.2085	0.82	0.77931	0.96744
A3	0.009268	0.84138047	0.67596	0.42781	1.7833	1	1.26357	0.62	0.6	0.96256
A4	0.731702	0.83588602	1	0.97343	1.7833	0.80723	1.40991	0.9	0.95862	0.85581
A5	0.528042	0.82000728	0.98211	1	1.5667	0.80723	1.23289	1	0.91034	0.93023
A6	0.575095	0.81475355	0.69174	0.60673	1.1833	0.6747	1.01495	0.79	0.84828	0.95581
A7	0.762357	0.80233717	0.92267	0.84942	1.7667	0.80723	1.39182	0.82	0.71724	0.65116
A8	0.012357	0.77840289	0.77117	0.60585	1.7167	0.85542	1.31471	0.7	0.68276	1
A9	0.309173	0.76530355	0.5555	0.3295	1.3667	0.6988	1.15893	0.52	0.45517	0.95116
A10	0.396625	0.75852996	0.89479	0.81134	1.7333	0.89157	1.29426	0.85	0.87586	0.95047
A11	0.045152	0.73753744	0.65176	0.46501	1.4833	0.79518	1.17073	0.63	0.70345	1
A12	0.10076	0.72746102	0.56339	0.28344	1.6	0.89157	1.20535	0.51	0.48276	0.74419
A13	0.006654	0.71458561	0.9132	0.80957	1.85	0.83133	1.44375	0.78	0.87586	0.97674
A14	0.004278	0.70394939	0.88638	0.75996	1.8667	0.79518	1.49017	0.73	0.87586	0.81395
A15	0.851236	0.69573152	0.51131	0.34721	1	0.50602	1	0.53	0.55862	0.7907
A16	0.130703	0.68926862	0.69858	0.53499	1.5167	0.81928	1.1786	0.69	0.64138	0.88372
A17	0.064163	0.68183727	0.75329	0.66165	1.3833	0.81928	1.07317	0.83	1	0.76744
A18	0.035646	0.67791866	0.59337	0.33481	1.6	0.85542	1.22581	0.53	0.51724	0.90698
A19	1	0.66476334	0.71489	0.58902	1.4	0.71084	1.17703	0.71	0.71724	0.74419
A20	0.253327	0.65580653	0.61336	0.3295	1.7667	0.91566	1.30291	0.53	0.51034	0.83721
Sum	6.558698	15.29389	15.008	12.114	31.55	16.084	24.868	14.22	14.366	17.667

Table 6. H_j table and Criteria Weight (w_j)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
H_j	-0.83088	-0.9978542	-0.9938	-0.9782	-0.9965	-0.9973	-0.9982	-0.9937	-0.9913	-0.9978
w_j	0.092582	0.10102584	0.10082	0.10003	0.101	0.101	0.10104	0.10082	0.1007	0.10102

Where, $\sum_{j=1}^n w_j = 1$



5.2 Ranking of Alternatives Using EDAS Method

As described in the previous section (Section 4.4.2), following tables (7-8) demonstrate assessment of performance of MFs under study and their ranking.

Table 7. Average (AV_j) of the all criteria

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
AV_j	1379.95	27.32024	14.2655	6.8385	0.9465	0.6675	15.8035	0.711	1.0415	0.37983

Table 8. AS_i Scores & Ranking of all alternatives

Alternative	SP_i	SN_i	NSP_i	NSN_i	AS_i	Rank
A1	0.11670	0.020098	0.4222	0.0934	0.664374	7
A2	0.07554	0.049644	0.2733	0.2308	0.521249	8
A3	0.04096	0.173648	0.1482	0.8072	0.170457	16
A4	0.27643	0.026706	1.0000	0.1241	0.937926	2
A5	0.25744	0	0.9313	0.0000	0.965653	1
A6	0.12804	0.024149	0.4632	0.1123	0.675461	6
A7	0.20195	0.024313	0.7306	0.1130	0.808773	3
A8	0.03608	0.110335	0.1305	0.5129	0.308796	13
A9	0.01462	0.15431	0.0529	0.7174	0.167772	17
A10	0.13923	0.014921	0.5037	0.0694	0.717145	5
A11	0.01925	0.134613	0.0696	0.6258	0.221923	15
A12	0.01406	0.210366	0.0509	0.9779	0.036463	20
A13	0.10150	0.131045	0.3672	0.6092	0.378995	11
A14	0.10549	0.139095	0.3816	0.6466	0.367492	12
A15	0.17141	0.169424	0.6201	0.7876	0.416237	10
A16	0.01963	0.09805	0.0710	0.4558	0.307597	14
A17	0.08172	0.085414	0.2956	0.3971	0.44927	9
A18	0.02192	0.215111	0.0793	1.0000	0.039656	19
A19	0.19513	0.032747	0.7059	0.1522	0.776831	4
A20	0.01400	0.171239	0.0506	0.7961	0.127291	18



5.3 Ranking of Alternatives Using TOPSIS Method

As described in the previous section (Section 4.4.1), following tables (9-11) demonstrate assessment of performance of MFs under study and their ranking.

Table 9. Weighted Normalization Matrix

0.026739	0.029347	0.023544	0.023168	0.023383	0.022161	0.023692	0.022724	0.020032	0.024822
0.006892	0.027247	0.024103	0.025356	0.02173	0.022497	0.021843	0.025525	0.023827	0.024586
0.00042	0.024692	0.019944	0.014881	0.025273	0.027869	0.022839	0.0193	0.018345	0.024462
0.033157	0.024531	0.029504	0.033859	0.025273	0.022497	0.025484	0.028016	0.02931	0.021749
0.023929	0.024065	0.028976	0.034783	0.022202	0.022497	0.022284	0.031128	0.027834	0.02364
0.026061	0.023911	0.020409	0.021104	0.01677	0.018803	0.018345	0.024591	0.025936	0.02429
0.034547	0.023546	0.027223	0.029546	0.025037	0.022497	0.025157	0.025525	0.021929	0.016548
0.00056	0.022844	0.022753	0.021073	0.024328	0.02384	0.023763	0.02179	0.020875	0.025413
0.01401	0.022459	0.016389	0.011461	0.019368	0.019475	0.020947	0.016187	0.013917	0.024172
0.017973	0.022261	0.0264	0.028221	0.024564	0.024847	0.023393	0.026459	0.026779	0.024154
0.002046	0.021645	0.01923	0.016175	0.021021	0.022161	0.021161	0.019611	0.021508	0.025413
0.004566	0.021349	0.016622	0.009859	0.022675	0.024847	0.021786	0.015876	0.01476	0.018912
0.000302	0.020971	0.026943	0.028159	0.026218	0.023168	0.026095	0.02428	0.026779	0.024822
0.000194	0.020659	0.026152	0.026434	0.026454	0.022161	0.026934	0.022724	0.026779	0.020685
0.038574	0.020418	0.015086	0.012077	0.014172	0.014102	0.018075	0.016498	0.01708	0.020094
0.005923	0.020228	0.020611	0.018609	0.021494	0.022832	0.021303	0.021479	0.01961	0.022458
0.002908	0.02001	0.022225	0.023014	0.019604	0.022832	0.019397	0.025837	0.030575	0.019503
0.001615	0.019895	0.017507	0.011646	0.022675	0.02384	0.022156	0.016498	0.015815	0.023049
0.045316	0.019509	0.021092	0.020488	0.01984	0.01981	0.021274	0.022101	0.021929	0.018912
0.01148	0.019246	0.018097	0.011461	0.025037	0.025518	0.02355	0.016498	0.015604	0.021276

Table 10. PIS & NIS values

PIS	0.045316	0.029347	0.029504	0.034783	0.014172	0.027869	0.018075	0.031128	0.030575	0.025413
NIS	0.000194	0.019246	0.015086	0.009859	0.026454	0.014102	0.026934	0.015876	0.013917	0.016548

Table 11. Ranking of Alternatives based on relative degree of approximation (C_i)

Alternative	S _i ⁺	S _i ⁻	C _i	Rank
A1	0.029097	0.035958	0.552735	6
A2	0.04215	0.028372	0.402316	9
A3	0.054416	0.019498	0.263792	17
A4	0.020089	0.048824	0.708484	1
A5	0.024644	0.044582	0.644007	4
A6	0.028717	0.036272	0.558127	5
A7	0.02375	0.044345	0.651224	3

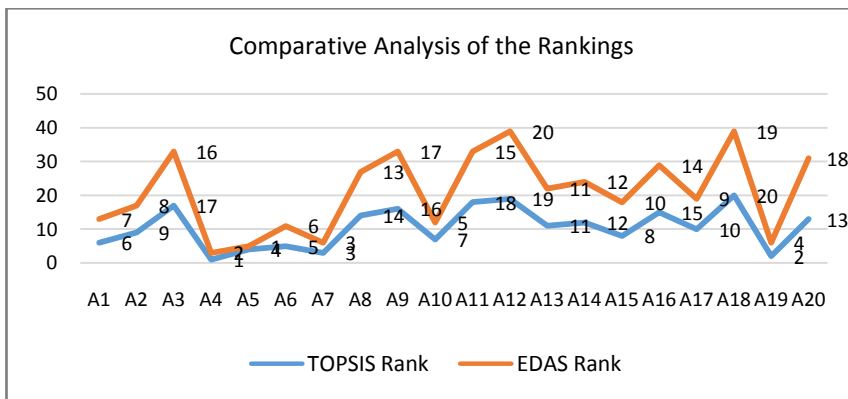


A8	0.051107	0.021657	0.297629	14
A9	0.048491	0.019458	0.286364	16
A10	0.032152	0.035458	0.524449	7
A11	0.051839	0.018553	0.263561	18
A12	0.055963	0.013727	0.196971	19
A13	0.049397	0.029428	0.373332	11
A14	0.050613	0.026336	0.342251	12
A15	0.038244	0.041613	0.521094	8
A16	0.047824	0.019291	0.287431	15
A17	0.046869	0.028238	0.375969	10
A18	0.056754	0.013772	0.195279	20
A19	0.026033	0.04901	0.653093	2
A20	0.050297	0.022848	0.312367	13

6. Discussion

Figure 1 shows the graphical representation of the comparative analysis of the rankings obtained from TOPSIS and EDAS. It is evident from figure 1 that ranks of different funds are quite compatible in nature. Aditya Birla Sun Life Pure Value Fund Growth, UTI Mid Cap Fund, Canara Robeco Emerging Equities Growth, L&T Midcap Fund Growth, SBI Emerging Businesses Fund Growth, IDFC Sterling Equity Fund - Regular Plan - Growth, and Principal Emerging Bluechip Fund constitute top seven MFs with minor variations in ranking based on the results from TOPSIS and EDAS. Among them, Canara Robeco Emerging Equities Growth holds third position as ranked by both the methods. Beside this funds, others also show significantly less variations in ranking, e.g. Aditya Birla Sun Life Emerging Leaders Fund - Series 3, and Aditya Birla Sun Life Emerging Leaders Fund - Series 4 both are having same ranking.

Figure 1. Graphical Representation of the Rankings Obtained from TOPSIS & EDAS



However, in order to check statistical significance of the consistency between the results obtained from both the MCDM methods, Spearman's Rank Correlation test has been performed.

The correlation coefficient is given by:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2-1)} \quad (\text{Eq. 22})$$

Where, d_i is the difference between ranks of two different methods for i^{th} alternative and n is the number of alternatives. We have performed this test using SPSS 20 software and the result is given by the table 12.

Table 12. Spearman's Rank Correlation Test Result

		Rank_TOPSIS	Rank_EDAS	
Spearman's rho	Rank_TOPSIS	Correlation Coefficient	1.000	
		Sig. (2-tailed)	.	
		N	20	
	Rank_EDAS	Correlation Coefficient	.950**	1.000
		Sig. (2-tailed)	.000	.
		N	20	20

** . Correlation is significant at the 0.01 level (2-tailed).

Therefore, it is evident that, the rankings obtained from TOPSIS and EDAS methods are consistent in nature. It is found that, when we consider a mix of risk and return criteria to evaluate performance of MFs, all funds not perform in a manner they could perform based on individual criterion. This is our general learning from this study.

7. Conclusion

In this study, as per the rating of www.mutualfundindia.com, top 20 equity mid-cap funds have been considered for ranking. We have found consistent results in rankings obtained from two different MCDM methods. However, the same can be extended for small-cap and large-cap funds of different schemes. Moreover, more number of funds are required to consider for understanding the framework which we have used in this study at a large scale. In order to check persistency in the performances of mutual funds, it is required to study the funds over a longer period of time, which

limits the scope of this study. Further, in order to understand the behavioral aspects behind any investment, an empirical study can be made. Our study can be further extended for some additional criteria like VaR, Information Ratio, Share holding pattern, fund's existence etc. In our study, we have employed entropy method for assigning weights to different criteria and we considered Euclidean distance. A further study can be made by using other weight determination method like Factor Relationship (FARE) or Best-Worst or CRITIC method. Further study may also take into account different other distance measures like Minkowski Distance, Manhattan Distance



etc. for checking differences in results. Further, our study has broadly ranked different MFs in order to give an indication to the investors for selecting appropriate funds for their portfolio. An extension study can be made on optimization of such portfolios. In addition, in order to incorporate real life situations, fuzzy extensions of the MCDM methods applied here can be thought of. Concluding the discussion, this study is a small scale attempt to understand fund performance based on risk-return criteria using a relatively newer MCDM technique, EDAS and a popular one, TOPSIS. Using this framework, one can assess a large sample of MFs of different kind to rank them, compare sectorial performance, comparative assessment of different fund houses etc.

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CHALLENGES OF PUBLIC SECTOR BANKS TO HANDLE STRESS ASSETS IN THE CURRENT GLOBALISED ECONOMY: A PRAGMATIC STUDY IN MUMBAI REGION

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Abstract:

“Arising tide of bad loans is a warning signal when growth in (Non-Performing Assets) NPAs exceeds that in credit continuously year after year. This threatens the ability of banks to continue their usual business. While there is a swelling of NPAs in PSBs, the problem is generalized for all banks including those in the private sector and foreign banks”. Banking system in India is specifically different from that of other Asian nations because of the country’s unique geographical, social and economic character in the current globalised economy. NPAs normally had tended to move along with the economic cycle. Often loans given during good times stopped performing when conditions turned adverse. Bank as institutions have critical economic and social role to play through mobilization of deposits by ensuring good returns and security to the depositor. Further channeling creates credit fair rates of interest to borrowers whose access to credit will contribute to increase in productivity and welfare to the society. With the event of Global Financial Crisis recently the catchphrase Non-Performing Assets stands as an obstacle to the well-acquitted public sector banks unfortunately affecting the profitability for financial capital. The innovative regulatory framework recommended by Basel Committee aims to promote stronger liquidity in the banking sector and improves its ability to absorb shocks arising from financial and economic stresses tackling bad loans. This study is undertaken in various branches of six topnotch public sector banks in Mumbai region. The research results the power to handle bad



loans of public sector banks through various recovery management measures in particular DRT, Lok Adalats and SARFAESI Act during 2007-08 to 2014-15. This article attempts to examine how the empirical results showed improvement in recovery of NPA contributed mainly by SARFAESI Act and DRTs during the period. For analysis statistical tools such as t-test and mean are used. It is further observed from the study that SARFAESI Act has been largely perceived for generating a time-bound NPA resolution for required momentum in reduction of NPA crisis.

Key Words:

Non-performing Assets, Lok Adalat, DRT, SARFAESI Act, Financial Sector

Introduction

Bad loans in banks could be the weak spot in India's Economy and could risk triggering a future downgrade. Something sounds rather paradoxical to emphasize the importance of public sector in banking in globalised economy which is characterized by pervasive privatization across all the sectors. The present phase of economic globalization beginning with the early 1980s is designed and promoted with a set of policies popularly described as the "Washington Consensus" at the behest of powerful capitalist countries led by the Reagan-Thatcher combine. The national commitment to growth with redistribution ends up as growth that is achieved through the role of state in ensuring redistribution of gains of growth from the citizens to the elite. The dominant character of the present global economic regime is revealed in what is popularly known as 'LPG', i.e., liberation, privatization and globalization. Banks are the backbone of any Country in so far as its upward economic developments are concerned. Galore of NPAs and frauds are rocking banks in India. A well-crafted Banking System supported by proper regulatory mechanism is inevitable for the economic development of a country. The

banking system in India faces critical problems at present. One of such problems is the vast number of Non-Performing Assets on the bank's balance sheet. The story does not end here. For those who are always up in arms against public sector banks, even GNPA's of private and foreign sector banks are too much in NPAs categories. To ensure proper functioning of the banking system in the economy, we need to see that the level of NPAs is kept down. The matter of concern is that the big borrowers (with loan of over Rs 1 Crore) who are defaulting. Defaults in the payments of interests and principal amount by the borrowers pose a very serious problem for the health of banking sector. Non-recovery of the dues affects the profitability of the banks. Banks are forced to maintain reserves and provisions against the non-performing loans. The main objective of banking sector reforms was to promote a diversified, efficient and competitive financial system with the ultimate goal of improving the allocative efficiency of resources through operational flexibility and improved financial viability. Special importance is given on building up the risk management capabilities of Indian banks while measures are initiated to ensure flexibility and operational autonomy. For a healthy banking system, well-crafted

recovery mechanism supported by proper recovery laws is the key factor.

With regard to the enforcement of rights over the immovable properties taken as security, banks face lot of problems. One of such factors is the bottlenecks of the extant civil laws of the Country. The civil laws of the country are too cumbersome that it may take years to get a decree. As far as India is concerned, prior to 2002, there was no option for the banks to recover its dues by enforcing the security other than through a Court/Tribunal. The need for a legislation giving right to the creditor banks to enforce the rights over the secured properties without the interferences of Court/Tribunal was much felt as the NPA of the banks were mounting up day by day. Public sector banks have been at the forefront of the NPA situation as not only are their gross and net NPA ratios higher than industry averages, they have also accounted for about 92% of the restructured advances, RBI said in its annual report. A global regulatory framework for more resilient banks and banking system issued a comprehensive reform package titled Basel III, with the objective to improve the banking sector's ability to absorb shocks arising from financial and economic stress, thereby reducing the risk of spill-over from the financial sector to the real economy. Indian banks either have to increase their capital base or to reduce riskier assets through sound risk management and cut throat recovery system.

Review of Literature

Though many published articles are available in the area of credit management and non-performing assets, which are either bank specific or banking sector specific, there are

hardly any state specific researches. Various researches have been conducted on the profitability of bank in the context of bad loans and factors affecting such loans. Further as our study pertains to the Indian Banks, we have reviewed literature related to performance of the commercial banks in India preferable Public Sector Banks and implementation of capital requirement under Basel norms and its impact on performance of such banks in India.

Hawast and John (1977) in their study concluded that profitability of banks is significantly determined by the cost control methods adopted by a particular bank. They concluded that the high profit earning banks recorded lower operating costs.

Minakshi and Kaur (1990) in their study concluded that the bank rate and reserve requirements ratios have played a significant role in having a negative impact on the profitability of the banks in India.

Christopher and Neill Marshal (1992) conducted a study on Corporate Restructuring in the Financial Services Industry and contended that large firms transmit the dynamics of contemporary restructuring and in turn, establish a symbolic relationship with places. The paper concludes that closer market integration results in divergent organizational forms with district and geographical expressions.

Reena Aggarwal (1999) analyzed the market performance of 131 sample firms emerging from bankruptcy during 1980 to 1993. The study was mainly based on the controlled firm approach indicated that firms emerging from bankruptcy generated abnormal returns varying from 24.6% to



138.8% depending on various expected returns models.

Bhattacharya (2001) rightly points to the fact that in an increasing rate regime, quality borrowers would switch over to other avenues such as capital markets, internal accruals for their requirement of funds. Under such circumstances, banks would have no option but to dilute the quality of borrowers thereby increasing the probability of generation of NPAs.

Ghosh and Das (2005) have shown how the market forces might motivate banks to select high capital adequacy ratios as a means of lowering their borrowing costs. Empirical tests for the Indian public sector banks during the 1990s demonstrated that better capitalized banks had lower borrowing costs. The findings suggested that regulation aimed at creating and sustaining competition among banks can play an important role in mitigating bank's solvency problems.

Rahel Falk (2005) studied the sickness in the Indian manufacturing industry and tested the theoretical model which has addressed the political economy of industrial sickness in India. According to this study politicians benefit from, and accordingly pay for sickness. More so he has concluded that sickness law certainly provides several ways for the firm/stake holders to find advantages in sickness and thereby to get rid of their financial responsibility.

Financial liberalization covers various dimensions of financial sector that as noted by **Shehzada and Haan (2008)** includes measure relating to (i) credit controls and reserve requirements, (ii) interest rate controls, (iii) entry barriers, (iv) state

ownership in the banking sector, (v) capital account restrictions, (vi) prudential regulation and supervision of the banking sector, and (vii) securities market policy.

Raghavan (2008) reviewed the relevance of Basel II norms for Indian Banks. The study concluded that Basel II principles should be viewed more from the angle of fine tuning one's risk management capabilities through constant mind searching rather than as regulatory guidelines to be complied with.

Prof. Dr. Mohi-ud-Din Sangmi and Dr. Tabassum Nair (2010) in their research study, analyzed through the CAMEL approach, that both the Punjab National Bank and Jammu & Kashmir Bank have adopted prudent policies of financial management and both banks have shown significant performance as far as asset quality is concerned.

Dash and Kabra (2010) supported the view that NPA has resulted in bank failures and financial crises in both developing and developed countries.

Jing-xin and Wei (2010) underlined that the large number of nonperforming assets in financial institutions is an important reason for causation and deterioration of financial crisis.

Dhanda and Rani (2011) examined Capital Adequacy Ratios (CAR) of different categories of scheduled commercial banks in India and also ascertained the impact of application of Basel II norms on Capital Adequacy Ratio (CAR) for the period 1998-99 to 2008-09. However, the impact of Basel II on CAR of banks was studied for the financial year 2008-09 only. The finding was that Basel II norms had not adversely

affected the CAR of banks in India. The comparative analysis of CAR calculated on the basis of Basel I norms and Basel II norms for the financial year 2008-09 for the selected banks under different categories clearly indicates that the ratio will be improved if calculated as per Basel II norms. So, application of Basel II norms has not adversely affected the CAR of banks in India.

Chandan Chatterjee, Jeet Mukherjee and Dr. Ratan Das (IJSSIR Vol. 1 Issue 11, Nov 2012) in their research study titled “Management of Non-Performing Assets - A Current Scenario” examined that the NPAs have a negative influence on the achievement of capital adequacy level, funds mobilization and deployment policy, banking system credibility, productivity and overall economy. On one hand, the Public Sector Banks which are said to be a focal point of the Indian Banking system are in trouble with excessive governmental equity, excessive NPAs and excessive manpower, while on the other hand the private sector banks are merging themselves through adoption of most up-to-date expertise and technological systems. Consequently, considerable efforts are required at RBI, Ministry of Finance and all the banks level to control menace of NPAs.

Objectives of the Study

The paper aims at the following objectives:

- I. To make a pragmatic study of Bad Loans of public sector banks, private sector banks and foreign banks.
- II. To understand the recovery of NPAs through various methods.
- III. To understand the relationship between NPAs, Net Profit and Advances.
- IV. To estimate regulatory capital requirements of PSU Banks under Basel III, as a necessity of survival in the present economic scenario.

- V. To analyze the impact of securitization on Recovery of NPAs of banks.

Research Methodology

This research work has been carried out with exhaustive investigation by applying various scientific concepts, statistical tools and techniques.

The Universe of the Study is Mumbai Region.

The present study covers a period of ten years for secondary data from 2005-06 to 2014-15 for study purpose. The data have been collected up to 2014-15 through the field work and accordingly data up to 2014-15 have been used in analysis. This may not be fully relevant to the later period.

There are about 26 nationalized banks, 19 private sector banks and 43 foreign banks operating in India with varying degrees of exposure to various sectors. Public sector banks have lion's share of the banking market in India specially Mumbai Region due to various factors. It is also the fact that fast growth of Private Sector and Foreign banks has thrown tough competition in the fast transformation of Indian Banking Market scenario. Mumbai being Financial Capital of India the study assumes much importance.

The following Public Sector, Private Sector and Foreign Banks have been selected as sample for the purpose of this study.

Public Sector Banks: State Bank of India (SBI), Bank of Baroda (BoB) and Bank of India (BoI)

Private Sector Banks: ICICI Bank, Axis Bank and HDFC Bank

Foreign Banks: Hongkong & Shanghai Banking Corporation (HSBC), Citibank N.A. and Standard Chartered Bank

The primary data in this pilot study are collected through questionnaires from Bank Officials handling Bad Loans/ SMA (Special Mentioned Accounts). The questionnaire has been prepared in consultation with the experts.

In this present study, an attempt has been made to examine the operational performance of Public Sector Banks to handle Bad Loans in India since 2006. The study is confined to the specific areas such as Loans and Advances, Growth in Gross NPAs, Amount recovered by SCBs through various recovery channels and Capital requirement of PSU Banks in India to comply with Basel III norms.

Tools of Statistical Analysis

In order to achieve the objectives stated above, the data collected are entered, arranged and presented using SPSS. All information collected for the purpose of the study has been arranged in cross sectional tables, depending upon the requirements of the analysis. The tabulation encompasses absolute figures supported with simple percentage and subjected to statistical analysis using Average, Standard Deviation, F-test using One-way ANOVA technique.

Hypotheses of the Study

1) H_0 : There is significant difference in recovery of Non-Performing Assets post implementation SARFAESI Act 2002 as compared to Lok Adalats, One-time Settlement/ Compromise Settlement and Debt Recovery Tribunals (DRTs).

2) H_1 : There is no significant difference in recovery of Non-Performing Assets post implementation SARFAESI Act 2002 as compared to Lok Adalats, One-time Settlement/ Compromise Settlement and Debt Recovery Tribunals (DRTs).

Analysis of the Study and Interpretation

Clamping down on bad loans in the banking sector can severely affect the economy in many ways. If NPA's are not properly managed, it can cause financial and economic degradation which in turn signals and adverse investment climate. Nonperforming Asset is an important constraint in the study of financial performance of a bank as it results in declining margin and higher provisioning requirement for doubtful debts. Various banks from different categories together provide advances to different sectors like SSI, agricultural, priority sector, public sector and others. These advances need to be done pre-sanctioning evaluation and post-disbursement control to contain rising non-performing assets in the Indian Banking sector. The decline of NPA is essential to improve profitability of banks and fulfill with the capital adequacy norms as per the Basel Accord.

Comparison of Gross Non-Performing Assets among above specified sample Public Sector Banks, Private Sector Banks and Foreign Banks as a percentage of Scheduled Commercial Banks (SCBs)

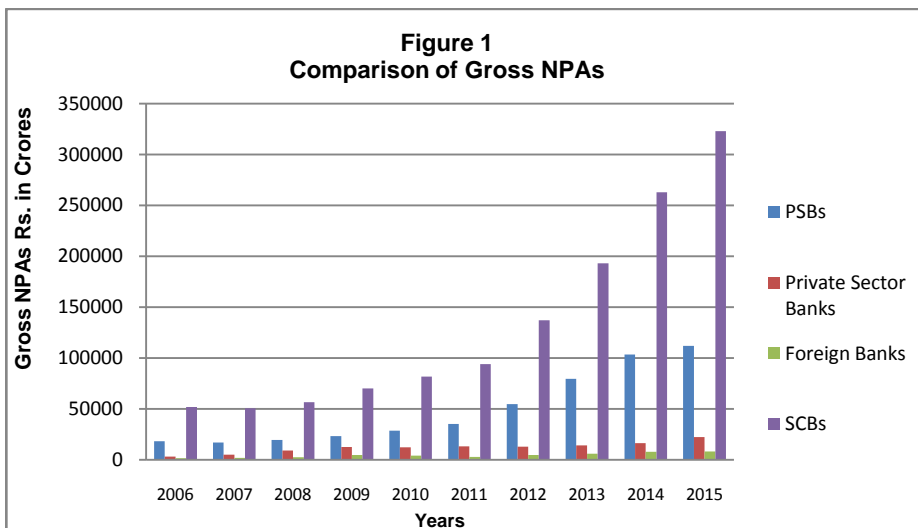
NPA is double edged weapon that tells on bank's profitability. On one hand banks cannot recognized income from NPA account and on the other, profit earned from other sources is diverted towards making provision for losses on NPAs. The government could carve out NPAs from being restructured, replace bad assets with government bonds on balance sheets and have NPAs managed by an asset management company to fix the problems. Existence of high NPAs in one sector can lead to drying up of credit flow to others. This obviously leads to a contagion effect on the economy as a whole.

TABLE 1

Gross NPAs among above specified sample Public Sector Banks, Private Sector Banks and Foreign Banks as a percentage of Scheduled Commercial Banks (SCBs) (Rs in Crores)

Year	PSBs	Private Sector Banks	Foreign Banks	SCBs	(2) % of 5	(3) % of 5	(4) % of 5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2006	18168.93	3093.37	1529.54	51884.88	35.02	5.96	2.95
2007	16874.00	5182.00	1889.00	50634.00	33.33	10.23	3.73
2008	19393.00	8970.00	2431.00	56668.00	34.22	15.83	4.29
2009	23427.64	12523.71	4684.50	70063.42	33.44	17.87	6.69
2010	28507.83	12370.01	4054.33	81812.99	34.85	15.12	4.96
2011	35282.85	13063.27	2981.99	94084.23	37.50	13.88	3.17
2012	54745.50	12827.70	4778.70	137095.70	39.93	9.36	3.49
2013	79526.30	14027.30	5879.60	193194.10	41.16	7.26	3.04
2014	103561.00	16282.60	7939.20	263015.20	39.37	6.19	3.02
2015	111963.10	22227.40	8228.50	322916.10	34.67	6.88	2.55
Total	491450.15	120567.36	44396.36	1321368.62			
Mean	49145.02	12056.74	4439.64	132136.86			
SD	36556.13	5418.48	2360.16	96546.30			
CGR	19.94	21.80	18.32	20.06			

Source: Department of Banking Supervision, RBI





The Table 1 analyzes that the sample Public Sector Banks' gross NPAs to Scheduled Commercial banks' decreased from 35.02 per cent to 34.67 per cent during 2006-2015. When it is compared with private sector banks, sample private sector banks' gross NPAs share increased from 5.96 per cent to 6.88 per cent. The average non-performing asset of public sector banks from the Table indicates that it is Rs 49,145.02 crores with a standard deviation of 36556.13. The annual compound growth rate is 19.94 percent for public sector banks as compared to 21.80 percent towards private sector banks during the analysis period.

Deterioration in Asset Quality in Recent Times

TABLE 2

Gross NPAs Growth vis-à-vis growth in Gross Advances among Public Sector Banks, Private Sector Banks and Foreign Banks

PUBLIC SECTOR BANKS (Amount in Rs)

Year	Gross Advances of PSBs	Gross NPA PSBs	Gross NPA as a % of Gross Advances PSBs	Growth in Gross Advance PSBs (%)	Growth in Gross NPA PSBs (%)
(1)	(2)	(3)	(3) % of 2	(5)	(6)
2006	507015.77	18168.93	3.58		
2007	660267.00	16874.00	2.56	30.23	7.13
2008	822985.00	19393.00	2.36	24.64	14.93
2009	1037447.91	23427.64	2.26	26.06	20.80
2010	1041713.36	28507.83	2.74	0.41	21.68
2011	1239786.13	35282.85	2.85	19.01	23.77
2012	1430418.90	54745.50	3.83	15.38	55.16
2013	2044661.90	79526.30	3.89	42.94	45.27
2014	2388665.20	103561.00	4.34	16.82	30.22
2015	2568175.50	111963.10	4.36	7.52	8.11

Source: Report on trend and progress of Indian Banks

PRIVATE SECTOR BANKS (Amount in Rs)

Year	Gross Advances of Private Sector Banks	Gross NPA Private Sector Banks	Gross NPA as a % of Gross Advances Private Sector Banks	Growth in Gross Advance Private Sector Banks (%)	Growth in Gross NPA Private Sector Banks (%)
(1)	(2)	(3)	(3) % of 2	(5)	(6)
2006	205498.78	3093.37	1.51		
2007	282602.00	5182.00	1.83	37.52	67.52
2008	353823.00	8970.00	2.54	25.20	73.10
2009	405980.56	12523.71	3.08	14.74	39.62



2010	360389.29	12370.01	3.43	11.23	1.23
2011	450006.83	13063.27	2.90	24.87	5.60
2012	529207.60	12827.70	2.42	17.60	1.80
2013	738623.20	14027.30	1.90	39.57	9.35
2014	884673.50	16282.60	1.84	19.77	16.08
2015	1050858.50	22227.40	2.12	18.78	36.51

Source: Report on trend and progress of Indian Banks

FOREIGN BANKS (Amount in Rs)

Year	Gross Advances of Foreign Banks	Gross NPA Foreign Banks	Gross NPA as a % of Gross Advances Foreign Banks	Growth in Gross Advance Foreign Banks (%)	Growth in Gross NPA Foreign Banks (%)
(1)	(2)	(3)	(3) % of 2	(5)	(6)
2006	66182.34	1529.54	2.31		
2007	87128.00	1889.00	2.17	31.65	23.50
2008	103111.00	2431.00	2.36	18.34	28.69
2009	107753.32	4684.50	4.35	4.50	92.70
2010	103854.82	4054.33	3.90	3.62	13.45
2011	119307.65	2981.99	2.50	14.88	26.45
2012	141933.80	4778.70	3.37	18.96	60.25
2013	153691.00	5879.60	3.83	8.28	23.04
2014	171993.00	7939.20	4.62	11.91	35.03
2015	183431.40	8228.50	4.49	6.65	3.64

Source: Report on trend and progress of Indian Banks

The period since 2006 - 2009 was marked by a sustained improvement in the asset quality of Public Sector Banks as compared to Private and Foreign Banks. However, with the turn of the year, the signs of asset quality impairment soon came to the fore with the reversal in the declining trend in NPA ratio. The gross NPA ratio (gross NPAs as a percent of gross advances) in the case of Public Sector Banks witnessed a sequential decline from 3.58% as at the end of March 2006 to 2.26% as at the end of March 2009. Thereafter, the NPA ratio rose to 4.36% as the end of March 2015.

During the period 2006 - 2015, two distinct phases are discernible in terms of growth in gross advances and growth in gross NPAs.

- (a) **First Phase: 2006 to 2009:** This period was marked by a sharp increase in the growth of gross NPAs and gradual decline in the growth of credit in the case of Public Sector Banks. Whereas, in case of Private Sector Banks there has been a sharp spurt decline in the growth of NPAs and growth of credit. Foreign Banks registered a boom in

growth of NPAs during the same period and massive decline in growth of credit.

Several factors, such as increased financial deepening, increased competition and rapid product innovations contributed to the minimum decline in credit expansion as per as Public Sector Banks in concerned. Infrastructure, SMEs, farm credit and retail sectors primarily powered the minimal decline in the growth of Public Sector Banks credit during this period. Banks and other financial institutions were impacted by the indirect spillovers of the crisis during 2008-09. Indian banks faced the stress because foreign investors pulled out of the economy and created a liquidity crunch. There was suddenly less money available to borrow or lend. The tight global liquidity situation in the period immediately following the failure of Lehman Brothers in the mid-September 2008, coming as it did on top of a turn in the credit cycle, increased the risk aversion of the financial system and made banks cautious about lending. Irrespective of the facts Public Sector Banks enormous efforts to sustain and perform during bad times, shows the adaptability.

negative impact with only 0.80% positive growth for Public Sector Banks, wherein negative for Private Sector and Foreign Banks in 2010. Private and Foreign Banks typically stay away from high risk lending and focus primarily on low risk retail lending, short-term working capital for top rated firms and thus, keep their books clean. However, by the end March 2013, there was a sharp contrast in the movement of both, with credit growth witnessing a contraction in the case of Foreign Banks as compared to Public and Private Sector Banks. The growth of NPAs had also witnessed a sharp decline for Public and Foreign Banks but not in the case of Private Banks which showed a rise from (-1.80% to 9.35%). NPAs grew at around 8.11% as at the end of March 2015, outpacing credit growth of around 7.52% for Public Sector Banks. This divergence in the growth of credit and NPAs has implications for the asset quality in the near term.

The decline in the credit growth during this period could be attributed to the general economic slowdown that set in as a result of combination of domestic and global factors.

- (b) **Second Phase: 2010 to 2015:** During this period, growth in credit showed a

TABLE 3

Amount recovered by Public Sector Banks, Private Sector Banks and Foreign Banks through various recovery channels (Rs in Crores)

	One-time Settlement/ Compromise Settlement	Lok Adalats	DRTs	SARFAESI Act 2002
2005-06				
No. of cases referred (1)	10,262	2,68,090	3,534	41,180



Amount involved (2)	772	2,144	6,273	8,517
Amount recovered (3)	608	265	4,735	3,363
3 % of (2)	78.75	12.36	75.48	39.48
2006-07				
No. of cases referred (1)	14,996	1,60,368	4,028	60,178
Amount involved (2)	821	758	9,156	9,058
Amount recovered (3)	571	106	3,463	3,749
3 % of (2)	69.55	13.98	37.82	41.39
2007-08				
No. of cases referred (1)	17,443	1,86,535	3,728	83,942
Amount involved (2)	874	2,142	5,819	7,263
	One-time Settlement/ Compromise Settlement	Lok Adalats	DRTs	SARFAESI Act 2002
Amount recovered (3)	428	176	3,020	4,429
3 % of (2)	48.97	8.22	51.90	60.98
2008-09				
No. of cases referred (1)	19,780	5,48,308	2,004	61,760
Amount involved (2)	982	4,023	4,130	12,067
Amount recovered (3)	377	96	3,348	3,982
3 % of (2)	38.39	2.39	81.06	33.00
2009-10				
No. of cases referred (1)	22,337	7,78,833	6,019	78,366
Amount involved (2)	1084	7,235	9,797	14,249
Amount recovered (3)	248	112	3,133	4,269
3 % of (2)	22.88	1.55	31.98	29.96
2010-11				
No. of cases referred (1)	25,184	6,16,018	12,872	1,18,642
Amount involved (2)	1196	5,254	14,092	30,604
Amount recovered (3)	146	151	3,930	11,561
3 % of (2)	12.21	2.87	27.89	37.78
2011-12				
No. of cases referred (1)	27,882	4,76,073	13,365	1,40,991
Amount involved (2)	1349	1700	24100	35300
Amount recovered (3)	116	200	4100	10100
3 % of (2)	8.60	11.76	17.01	28.61
2012-13				
No. of cases referred (1)	30,229	8,40,691	13,408	1,90,537
Amount involved (2)	1477	6600	31000	68100
Amount recovered (3)	105	400	4400	18500



3 % of (2)	7.11	6.06	14.19	27.17
2013-14				
No. of cases referred (1)	32,676	1636957	28258	194707
Amount involved (2)	1629	23200	55300	95300
Amount recovered (3)	96	1400	5300	25300
3 % of (2)	5.89	6.03	9.58	26.55
2014-15				
No. of cases referred (1)	35,244	9131199	171113	1241086
Amount involved (2)	1731	88700	378900	470500
Amount recovered (3)	118	4300	53100	115200
3 % of (2)	6.82	4.85	14.01	24.48

Source: Report on trend and Progress of Banking in India, Various Issues, RBI.

Table No: 3 presents the Data pertaining to the recovery of NPAs by Public Sector, Private Sector and Foreign Banks through various channels like Lok Adalats, DRTs (Debt Recovery Tribunal) and SARFAESI Act (Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act) 2002.

SARFAESI Act facilitated recovery of NPA accounts better than other modes of recovery, as may be observed from the mentioned table. Bankers in India often complained about the legal impediments for

recovery of NPA accounts. This is addressed by enactment of SARFAESI Act 2002. During the study period, an average of Rs.20,045.30 crores were recovered using SARFAESI Act, while DRT and Lok Adalat enabled recovery of Rs.8,852.90 crores and Rs.720.60 crores respectively. During the study period, SARFAESI Act enabled highest recovery of NPA accounts, totaling Rs.2,00,453 crores, while recovery through DRT and Lok Adalat stands Rs.88,529 crores and Rs.7,206 crores respectively.

TABLE 4 (ANOVA SUMMARY)

	N	Mean	Standard Deviation (S.D.)	Standard Error (S.E.)
Lok Adalats	10	7.01	4.149	1.312
DRTs	10	36.09	23.428	7.408
SARFAESI	10	34.94	12.887	4.075
One-time Settlement/ Compromise Settlement	10	29.91	25.735	4.697
Total	40	26.987	25.3748	4.6327



TABLE 5 (ANOVA RESULTS)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5217.431	3	2608.714	10.688	.002
Within Groups	8787.022	36	325.4453		
Total	14004.453	39			

TABLE 6 (Tuckey HSD POST HOC test)

(X) NPA Measures	(Y) NPA Measures	Mean Difference (X - Y)	Standard Error	Sig.
Lok Adalats	DRT	-29.08*	6.9869	.008
	SARFAESI	-27.93*	6.9869	.003
	One-time Settlement/ Compromise Settlement	-22.90*	6.9869	.006
DRTs Mean	Lok Adalats	29.08*	6.9869	.008
	SARFAESI	1.15	6.9869	.914
	One-time Settlement/ Compromise Settlement	6.18	6.9869	.001
SARFAESI	Lok Adalats	27.93*	6.9869	.003
	DRTs	-1.15	6.9869	.914
	One-time Settlement/ Compromise Settlement	5.03	6.9869	.029
One-time Settlement/ Compromise Settlement	Lok Adalats	22.90*	6.9869	.006
	DRTs	-6.18	6.9869	.001
	SARFAESI	-5.03	6.9869	.029

*The mean difference is significant at the 0.05 level

It can be seen in Table - 4 that Lok Adalat is numerically associated with smallest mean level of percentage recovery of Non-Performing Assets to total amount involved i.e. Mean Lok Adalat= 7.01 and SARFAESI Act associated with numerically second highest

mean level of percentage recovery of Non-Performing Assets to Total Amount involved i.e. Mean SARFAESI = 34.94. Whereas DRT's is associated with numerically in between Mean DRT's = 36.09 level to compare with Lok Adalat, One-time Settlement/



Compromise Settlement and SARFAESI Act. Further One-time Settlement/ Compromise Settlement is associated with numerically third highest mean level of percentage recovery of Non-Performing Assets to Total Amount involved i.e. Mean One-time Settlement/ Compromise Settlement = 29.91. In order to test hypothesis i.e to evaluate the relationship between effectiveness in recovery mechanisms of Lok Adalat, DRT's, SARFAESI Act and One-time Settlement/ Compromise Settlement One way ANOVA is performed. There is a statistically significant difference between groups as determined by one way ANOVA in Table - 5 i.e. $F_{STAT}(3, 36) = 10.688 > F_{CRITC} = 4.472$. Significance is $0.05 > 0.002$. Therefore, null hypothesis that there is significant difference in recovery of Non-Performing Assets post implementation SARFAESI Act 2002 as compared to Lok Adalats and Debt Recovery Tribunals (DRTs) is accepted. Alternative hypothesis that there is no significance difference is rejected. To evaluate the nature of difference between four means further, the statistically significant ANOVA was followed up with Tuckey Post hoc test in Table - 6. Table-6 explains difference between the recovery mechanism of Lok Adalat, One-time Settlement/ Compromise Settlement, SARFAESI and DRT's. Lok Adalat and DRTs is significantly different i.e. $Sig\ 0.05 > p = 0.008$. Similarly, difference between the recovery mechanism of Lok Adalat and SARFAESI Act is significantly different i.e. Significance $0.05 > p = 0.003$. Lok Adalat and One-time Settlement/ Compromise Settlement is significantly different i.e. $Sig\ 0.05 > p = 0.06$. Finally, difference between the recovery mechanism of SARFAESI Act and DRT's is not significantly different i.e. Significance $0.05 < p = 0.914$. Thus in order to find out highly effective mechanism, it

can be seen in Table - 4 the Mean Lok Adalat = 7.01 is lower than Mean DRT's = 36.09 Mean One-time Settlement/ Compromise Settlement = 29.91 and Mean SARFAESI = 34.94. Hence, it can be concluded that there is no significant difference between effectiveness of DRT's and SARFAESI act. Further between these two tools SARFAESI 2002 is more effective rather than Lok Adalat and One-time Settlement/ Compromise Settlement in recovery of NPA. The result of the table concluded that recovery of NPAs in the (Scheduled Commercial Banks) SCBs improved after the enactment of the SARFAESI Act 2002.

Impact of Non- Performing Assets in the era of globalization

- a. **Impact on Performance:** Strictly speaking the criteria for evaluation for public sector banks which are mandated to perform commercial banking with the social purpose should be different from that of the purely profit seeking private banks. But what is laudable is that even by convention criteria the performance of public sector banks are much better than the private banks, except part in stressed assets which are largely due to political pressures and administrative laxity in punishing defaulters.
- b. **Impact on Income Generation:** While "innovative products" and aggressive pursuit of all kinds of risky sources of quick profits is the order of the day in the financial sector, public sector banks have been adhering to more cautious

approach to income generation by depending more on the interest earned than on other 'products'. Public sector banks have been quick to adopt new methods of banking and diversify into less risky and more pecuniary areas of new products like credit card business, other alternate channel developments, their diversification has not deviated much from the traditional sound commercial banking norms.

to maintain a minimum Pillar I Capital to Risk-weighted Assets Ratio (CRAR) of 9% on an on-going basis (other than capital conservation buffer and countercyclical capital buffer etc.). The RBI will take into account the relevant risk factors and the internal capital adequacy assessments of each bank to ensure that the capital held by the bank is commensurate with the bank's overall risk profile.

- c. **Impact on Public Sector Banks Image and Basel 3 development:**
Under Basel III, Banks are required

Banks are required to compute the Basel III capital ratios in the following manner:

Common Equity Tier I Capital Ratio	Common Equity Tier 1 Capital Credit Risk RWA* + Market Risk RWA + Operational Risk RWA
Tier 1 Capital Ratio	Eligible Tier 1 Capital Credit Risk RWA* + Market Risk RWA + Operational Risk RWA
Total Capital (CRAR #)	Eligible Total Capital Credit Risk RWA* + Market Risk RWA + Operational Risk RWA

*RWA = Risk Weighted Assets;
#Capital to Risk Weighted Asset Ratio

With the full implementation of capital ratios and CCB (Capital Conservation Buffer) the capital requirements would be as follows:

	Regulatory Capital	As % to RWSs
1	Minimum Common Equity Tier 1 Ratio	5.50
2	Capital Conservation Buffer (comprised of Common Equity)	2.50
3	MCE Tier 1 Ratio + CCB	8.00
4	Additional Tier 1 Capital	1.50
5	Minimum Tier 1 Capital Ratio (1 + 4)	7.00
6	Tier 2 Capital	2.00
7	Minimum Total Capital Ratio (MTC) {5 + 6}	9.00
8	MTC + CCB {7 + 2}	11.50



The Reserve Bank of India extended the deadline for Indian Banks to meet capital requirements under Basel III norms by 31.03.2019, offering relief to an industry burdened by bad loans in the face of slower economic growth. Weak economic growth, high interest costs and stalled projects that crimped cash flows have made it difficult for many corporate borrowers to repay their debts, prompting them to seek debt restructuring or default in payments.

More time to achieve Basel III requirements means that the capital burden of banks, both in terms of bad loans provisioning and mandatory capital requirements, will be eased a bit. Hopefully, within the extended time frame, the public sector banks and private sector banks will get over the asset worries too. The government has plans to infuse Rs 11,200 crores which is nearly half of what is required by the sector to meet Basel III requirements. The problems have been compounded by the rise in bad loans. The combination of bad and restructured loans termed as stressed assets roughly accounts for around 11% of total credit deployed. Sectoral exposure of PSU Banks suggests that PSU banks have higher concentration on corporate segments with big ticket loans, as compared to retail loans which is just reverse in the case of Private Sector Banks. Therefore based on the circumstances and remedy measures Public Sector Banks need to focus on strengthening risk management system for maintaining stable and stronger assets portfolio. Long term view for capital budgeting is required to be taken and additional equity and non-equity to be infused well in time to consolidate capital position.

Concluding Remarks

To control the NPAs, some remedial measures are suggested as follows:-

- A number of personal visits after sanction and disbursement of credit and close monitoring of the operations of the accounts of borrowed units.
- Banks have to take decisions regarding filing of suits expeditiously and effectively follow-up the filed and decreed cases.
- There must be an effective and regular follow-up with the customers and need to watch is there any diversion of funds. This process can be taken up at regular intervals.
- Managers in charge of non-performing assets should have dynamism and zeal in their work. But many of them are worried due to accountability fixed arbitrarily. Many managers say that “we do not fear to negotiate but we do not negotiate out of fear. Such fear leads to arbitrary negotiation, which fails.
- Between the Bankers - borrower a healthy relationship should be developed. Many instances reported that the banks use force in recovery of loans, which is unethical.
- Priority sector lending involves more risk and less return. Hence the priority sector lending benchmark of 40 percent of net bank credit should be redefined.
- Assisting the borrowers in developing his/her entrepreneurial skill will not only establish a good



relation between the borrowers but also help the bankers to keep a track of their funds.

- RBI need to take necessary actions against defaulters like, publishing names of defaulters in Newspapers, broadcasting media, which is helpful to other banks and financial institutions.
- Frequent discussions with the staff in the branch and taking their suggestions for recovery of NPAs make them feel responsible.
- The banks and financial institutions should be more pro-active to adopt a pragmatic and structured non-performing assets management policy where prevention of non-performance assets receives priority.

Suggestions

Some suggestions are made below for further improvement in this matter.

- Sound credit appraisal on well-settled banking norms with emphasis on reduction in Gross NPAs rather than Net NPAs.
- Position of overdue accounts is reviewed on a weekly basis to arrest slippage of fresh account to NPA.
- Half yearly balance confirmation certificates should be obtained from the borrowers.
- Banks should ensure credibility of the borrower.
- Banks should critically examine and analyze the reasons behind time overrun.

- The banks should ensure that latest technology is being used by the borrower, to avoid obsolescence.
- The banks should ensure that the assets are fully insured.
- Recovery competition system should be extended among the staff members. The recovering highest amount should be felicitated.
- The recovery process is very slow; as such the Government needs to update the process which is fast and effective.
- Banks should ensure that there is no diversion of funds disbursed to the borrower.
- While advancing loans, the three principles of bank lending viz., Principle of Safety, Principle of Liquidity and Profitability need to be adhered to.
- Banks should get the Non-Encumbrance and Valuation of the primary and collateral securities done.
- Securitization if not regulated strongly can lead to the dilution of loan appraisal norms and diligence by the lenders.
- Framing reasonably well documented loan policy and rules.

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DEMONETIZATION, CORPORATE ADAPTION AND FINANCIAL POLICY

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Abstract:

Initially there was a speculation that demonetization would leave a great negative effect on corporate performance. This study unfolds that corporate sector, except some selected industries, was marginally affected by the demonetization drive. Rally of BSE Sensex from 26,000 in November 2016 to 36,000 in January 2018 confirms the truth. It has been observed that, instead of standing as onlookers, the corporate houses immediately began adopting strategies to combat the shock resulting from the demonetization drive. Besides introducing some changes in the methods of doing business they reaped the advantage of the resulting scenario. The authors have used both primary and secondary data to trace the resulting developments and the strategies the corporate houses adopted to cope with the challenges and shocks caused by demonetization drive of 2016. Methodology used is basically horizontal analysis of financial statements. The findings of the study can be counted as a generalized lesson useful for successful management of a firm in the event of systematic shocks caused by monetary interventions initiated by the government of the country.

Key Words:

Demonetization, Corporate Performance, Electronic Transactions



1. Introduction

As per systems approach (Daniel Katz and Robert Kahn, 1966) an organization is an open system drawing resources from the environment, processing the resources into products and services and putting them back into the system. Hence, strategies to cope with the challenges resulting from some unfavorable changes taking place in the economic environment of business. The focus of environmental scanning is on taking stock of the changes taking place in the business environment and assist the managers reap the advantages and reduce the threats arising from favourable and unfavourable changes. This current study is devoted to examining how the corporate houses in India reacted to recent demonetization programme and what financial strategies they adopted to face the consequences resulting from the programme.

Demonetization programme, launched by the government on 8th November 2016, indeed, produced an enormous shock on the economic system. Currency notes of denomination of Rs 500 and Rs 1000 were declared defunct. Other than depositing these defunct currency notes in holder's bank account, real worth of these high denomination notes were stripped off. Pronouncements of monetary economists and media stories created a popular feeling that the programme was about to cause a severe negative consequence on manufacturing sector and induce a downturn. Those predictions were partly based on restrictive models of monetary economics and partly based on panic caused by uncertainty. In 2018 after elapse of two years of the ambitious programme, while the whole consequence of demonetization is

any change in the environment is likely to cause a tangible effect on the efficiency and profitability of the business firms.

Around 90s of the last century corporate houses started creating a separate strategic department entrusted with the task of environmental scanning and recommending fully manifested and absorbed, it would be appropriate to make an investigation and explore the economics at work.

Economic changes pose both opportunities and threats (Donnelly, Gibson and Ivancevich, 1984). This paper is focused on finding the opportunities and threats created by demonetization. The subsequent objective is to examine how the corporate houses did react to the changes caused by the demonetization programme to protect the shareholders' wealth. It also aims at finding what strategies the corporate houses adopted to stay safe from the negative consequences. The findings may contribute to the lessons useful in handling the adverse consequences resulting from monetary interventions.

2. Money and Demonetization

Money plays the central role in the determination of income and employment (Dornbusch, Fischer and Startz, 2001). Demonetization is an alternative measure for effecting necessary correction in the monetary system and curbing the shadow economy infested with stockpile of illicit black money. Recent demonetization exercise taken up by the union government in November 2016 is characteristically a surgical strike on illegal hoarding of black money; the other compulsions for taking up demonetization are to prevent circulation of counterfeit currency, stop terror financing



and discourage all sorts of corruption from the fabrics of economic life of the country. Prime Minister Narendra Modi (2017) asserted that the programme was intended to help the honest citizens of India to defeat the menace of black money and corruption.

The demonetization programme in fact compelled common people to deposit their currencies in hand into their bank accounts. To meet the short-term problem of currency shortage, some restrictions were imposed on withdrawals by Reserve Bank of India. In general sense a program like this does not make a person poor and reduce his consumption and savings. This only makes a household to postpone consumption of less essential consumer durables (white goods) to a future date. Industry effect of demonetization reflected only this fact. For example, automobile industry faced a great negative effect immediately. Automobile sales declined by 18.7% in January 2017. However, soon after the system was back to normal, sales of automobiles registered a considerable jump in May 2017 and trend continued for a long time.

In general terms demonetization is primarily an economic exercise designed to administer a monetary correction in the economy. However, some illicit hoarders of black money, after getting adversely affected by the demonetization drive, may call it political. After all, a programme of short duration cannot be counted as political, because politics is not so short-lived like demonetization.

From the economic stand-point demonetization was an imperative, because in October 2016 currency in circulation in the economy was hovering around 12% of GDP, of which high denomination notes of

Rs 500 and Rs 1000 constituted around 86%. This very high percentage of currency in circulation appeared much higher than the globally accepted level of 5%. While New Zealand and UK can stand as developed countries with limited currency circulation of 3% to 4% of GDP, why India should bear the huge cost of currency in circulation of 12% of GDP? If currency in circulation can be reduced, then the cost of printing, storing and handling can be minimized. In addition to that, cash related crimes would automatically reduce. If the credit cards are counted, which represent credit permitted, instead of money deposited with a bank, the size of actual money supply is again going to be much higher than the figures of money supply formally published in RBI Bulletin. Secondly, popularity of plastic money is gradually rendering the printed currency notes almost defunct and inconvenient means of payment.

In India share market trading in electronic mode began in 1996. Conversion of physical shares into electronic shares added a momentum to Indian capital market. Surveillance and supervision conducted by SEBI on electronic transactions have reduced the incidents of corruption in stock market. On the similar line, if electronic payment mechanism could be introduced into the economy, the crimes associated with cash transactions could be reduced greatly. After all, quick delivery, limited handling costs and no fear of theft could be additional privileges.

3. Literature Survey and Research Background

After announcement of demonetization launched by the Government of India on 8th November 2016, a handful of papers have



been published. Majority of the papers are of descriptive nature, confined to narrating the intended purpose and projected consequences. Dasgupta Dipankar (2016) used highly theoretical IS-LM framework to project the consequences of demonetization. The scholar voiced the concern of Robert Lucas (1997) that sudden monetary contraction could induce economic depression. For short and medium terms he projected a slowdown. Ghosh Ambar (2017) developed a macro-theoretic model to capture the likely impact of demonetization on the economy of India. This paper showed that demonetization was likely to result in contraction of output in the un-organized sector at the beginning and subsequently the negative consequence would be spread to organized sector. The scholar pointed that the poorest segment of the population would be badly hurt by demonetization. These two scholarly works are based on highly restricted assumptions and models; outcomes projected by them are required to be empirically verified.

RBI team (2017) made a mid-term analysis of the macro-economic effect of demonetization on Indian economy with sectoral analysis and post-mortem of growth rate over subsequent quarters after announcement of demonetization. Authors like Singh and Thimmaiah, (2017), Gaur Ashutosh D and Pandiya Jasmin (2017), Shah AayashYousuf (2017), Muthulakshmi et al (2017) and Uke Lokesh(2017) conducted similar studies. The scholars re-iterated that sudden demonetization of lion's share of the currency in circulation would create a liquidity crisis; however, negative shock resulting from demonetization would be short-lived. They opined that government's determination to fight corruption would boost investors' confidence and engender a

long-run growth effect on the economy. They tabulated macro-economic data to support their observations. Rani Seema (2016) narrated the mechanism the hoarders of black money used to convert their hoardings of black money into white money. The author pointed that one of the aims of government's demonetization drive was targeted to maintaining total surveillance over the economic activities taking place in the country and trace illicit activities to stop creation of black money.

The authors noted above have used compiled data to validate their arguments; however, no scientific analysis of economic data was made by the scholars in support of their observations. Secondly, given the scale of demonetization, where 86% of currency in circulation was demonetized, the effect on macroeconomic growth was limited to miniscule growth rate decline of around half per cent to one percent. It indicates that theories of monetary economics alone cannot explain the consequences of demonetization. It needs some empirical studies to unearth the mystery why BSE Sensex increased to 36,050 in January 2018 from 26,818 in November 2016, when demonetization generated a panic? It seems that economic units like firms and households might have adopted some economic adjustments and changes that almost pacify the downward shock of demonetization.

Research questions that arise in the mind of researchers are -i) what opportunities and threats did the demonetization programme of 2016 create for the corporate houses? ii) How did the corporate houses respond to the developments? What happened to corporate Balance Sheets after announcement of demonetization? To find



answer to this question this research work has been undertaken.

4. Objectives of the Study

- a) To verify if the negative consequences of demonetization is purely temporary or prolonged one persisting over a long time.
- b) To understand the corporate opportunities and challenges resulting from the demonetization drive initiated in November 2016.
- c) To examine how the economic entities like corporate houses adapted to the developments resulting from demonetization.
- d) To examine if the announcement of demonetization resulted in increased use of electronic payment system.

5. Methodology

Review of theories of economics and survey of contemporary research studies are counted to be essential for developing the background for the research work. Part - A of the study has been designed to examine the economic rationale of demonetization. This part is earmarked for identifying the negative and positive consequences of demonetization on corporate sector. To meet this objective quarterly macroeconomic data and industry data relating to growth, money supply and black money have been reviewed and horizontally compared.

Part - B of the study has been designed to examine the developments taking place in the economic strategies of the firms.

Sample for the study has been defined as top fifty companies included Nifty Index of National Stock Exchange. Horizontal analysis of the Balance Sheets and Income Statements of the companies has been undertaken. The focus has been on pinpointing the characteristic change in the financial practice of the corporate houses taking place after announcement of demonetization. Balance Sheet and Income Statements of NIFTY companies have been downloaded from moneycontrol.com.

Changes in the electronic modes of payment system have been studied in Part - C. As the access to cash account being essential, a convenient sample of companies located in the adjoining area of Siliguri in West Bengal has been drawn. The companies surveyed are of large and medium size renowned companies of the region. Cash books of the sample companies have been scrutinized to find the characteristic change in the mode of cash payments and e-payments. Different modes of non-cash payments like NEFT payments and card payments have been counted and compared with their corresponding previous figures to see how the corporate houses are adapting to the developments resulting from demonetization.

6. Part - A: Demonetization: Exploring the Economic Rationale

In India 'currency in circulation' to 'GDP' ratio reached to the level of 12.1% (Singh, Singh 2017) in October 2016, which appeared excessively higher than accepted level of 5% to 6%. High denomination notes constituted 86% of currency in circulation, which are grossly used for storing black money instead of using them as medium of transaction. This is confirmed from the

record of very low soil rate of high denomination notes. The soil rate of Rs 1000 currency notes. It gives a clear signal that these high denomination notes were not mainly used for transaction purposes; instead, these were used for storing black money of Rs. 730,000 crore in idle iron safe.

Studies revealed that high value notes are associated with corruption (Sands 2016;

denomination is 11%, compared to 33% normal soil rate of lower denomination Summers 2016; Rogoff, 2016). Currency in circulation as a percentage of GDP has correlation with level of corruption. Therefore to arrest corruption in economic affairs of life demonetization emerged as a necessity.

Table 1: Relationship between Growth and Currency in Circulation

Year	2013-14	2014-15	2015-16
Currency in circulation (Rs crore) EPW	110090	147250	215150
Growth in Currency in circulation	-	34%	46%
GDP growth	6.54	7.18	7.93
Capital Market: BSE Sensex	22386	27957	25342

Source: EPW and Ministry of Statistics and Programme Implementation

Table 1 given above is aimed at studying the relationship between growth and 'currency in circulation'. Currency in circulation grew at 34% in 2014-15 and 46% in 2015-16, yet growth rate of GDP remained stagnant at 8%. In the conventional literature of monetary economics a mistaken belief is highly preached that there is a positive relationship between economic growth and currency in circulation. Researchers mostly try to demonstrate this relationship by presenting a graphical relation between the rate of GDP growth and rate of money supply growth. The relationship is required to be re-examined from an analytical standpoint of contemporary economics.

Academicians mostly tested the relationship on the basis of the absolute size of currency in circulation and size GDP, using time series data. This methodology is suffering from certain limitations such as multicollinearity. To remedy the mistake

the authors have analyzed the causal relationship, which is captured by estimating the relation between ΔM and ΔY , where M stands for money supply and Y stands for GDP. The methodology may be termed as Sensitivity Analysis as well. Using SPSS package on the data relating to money supply and GDP for the period from 1966-67 to 2016-17, a very weak measure of relationship between ΔM and ΔY is obtained, which is 17% only. This phenomenon is rightly getting reflected during the period of recent demonetization. While enormous volume of 86% currency in circulation was demonetized, growth rate of GDP got affected only marginally. This macroeconomic outcome validates the findings of the authors of this paper.

Finally, the money deposited in bank accounts came mostly from affluent section, which has very low propensity to consume. Hence, it has very low multiplier effect and

low contribution to growth. What has been intelligently done is that idle money stored in iron chests has been put into economic flow, which has consolidated a growth momentum manifested in the form of share market rally. On 11th November 2016 BSE Sensex was 26,818, after registering gradual rise, on 25th January 2018 Sensex reached the level of 36,050. It reflects that besides negative consequences, demonetization did induce some positive consequences on the economy.

6.1: Part - B: Demonetization, Corporate Adaptation and Financial Strategy

Liquidity crisis resulting from demonetization was projected to hurt industry very adversely. In the light of this projection it seemed necessary that a study may be undertaken to examine the actual effect of demonetization on corporate performance. Secondly, there is a need to explore how the corporate houses adopted financial strategies to respond to challenges of demonetization. To conduct this study, companies included in Nifty Index have been selected as the sample. As the accounting year of some companies has been different other than 31st March, final sample size has to be reduced to 44. A comparative analysis of the Income Statements and the Balance Sheets of those companies for the year 2016 and 2017 has been undertaken. Different elements of Balance Sheet and Profits and Loss Account have been scrutinized to trace the developments taking place in financial practices of the corporate houses. Annual accounts of the sample companies were downloaded from MoneyControl.com. The important findings have been presented in the following paragraphs. The period of study is from October 2016 to June 2017.

6.1: B1: Demonetization and Corporate Sales Performance

As cash is a medium of transaction, with announcement of demonetization programme there was an anticipation that sales of the companies would decline. On an average the study unfolds corporate sales in aggregate did not decline. 36 companies maintained their track records of rising sales, while only 8 companies faced marginal declines. The summary results of sales analysis has been shown in Table 2 given below:

Table 2: Demonetization and Corporate Sales Performance

Sales Performance	Number of Companies
Rising Sales Record	36 companies
Falling Sales Record	8 companies

Source: moneycontrol.com; Compiled and edited by the authors

The highest sales decline, in value terms, of only one company out of the sample 44 companies studied, was within the limit of 2% only. Sales decline of remaining other seven companies with the record of falling sales was less than one percent.

6.1: B2: Demonetization and Corporate Profit Performance

Discarding all the apprehensions that demonetization will adversely affect the profit performance of the corporate sector, 36 companies out of the sample of 44 companies maintained the track record of steady profit performance. Only three companies incurred losses; see Table 3. It

needs to be noted that the losses reported in three companies is not due to systematic risk of demonetization. Those are due to some extra-ordinary transactions undertaken by the companies. Economic Outlook published by CMIE supports the findings of this study.

Table 3: Demonetization and Corporate Profitability

Profit Performance	Number of Companies
Earning Profit	41
Rising Profit record	36
Incurring Loss	3
Total Number of companies	44

Source: moneycontrol.com; Compiled and edited by the authors

6.1: B3: Demonetization and Corporate Borrowing

Soon after demonetization, banks became loaded with enormous deposits. To offload the deposits to industrial houses banks began to reduce the lending rate. Indeed it happened that following the demonetization drive, the most of the commercial banks have reduced the interest rate; it shows that demonetization unfolded an opportunity to the corporate borrowers; Table 4 shows the effect of demonetization on corporate borrowing.

Table 4: Demonetization on Corporate Borrowing

Borrowing Records	Rs crore
Sum of Increased Borrowing of 23 companies	1,29,416
Reduced Borrowing of 11 companies	63,511

Total Rise of absolute borrowing	65,905
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Aggregate final borrowing by industrial houses enlisted under NIFTY increased by the amount of Rs 65,905 crore. 'The table given below' shows that large number of companies listed under Nifty have increased their borrowing. This is likely to give them an opportunity to expand their production base and increase production in future.

6.1: B4: Demonetization, Working Capital and Credit Management

Following table shows the data relating to absolute size of creditors shown in the Balance Sheets of the companies. After excluding the banking companies, data of only 37 companies could be studied for this section.

Table 5: Effect of Demonetization on Absolute Size of Creditors

Changes in the absolute size of creditors	Number of companies
Rising	31
Reduced	6
Total Number of companies	37
Aggregate Increase in value terms	Rs. 40,496 crore

Source: moneycontrol.com; Compiled and edited by the authors

The data shown in the table above indicates that while there was liquidity crisis, firms used increased credit options to ensure smooth supply of their materials inward. It indicates that demonetization does not stand as a barrier to corporate purchase and supply.



6.1: B5: Summary: Demonetization and Corporate Adaptation

It is untrue that demonetization exposed corporate houses to some negative consequences only. The programme unfolded some opportunities to the corporate houses as well. Following the demonetization, incidentally interest rates declined to a record low level. It facilitated increased corporate borrowing and internal expansion. Stock market incorporated this information into the stock prices, which pushed the BSE Sensex to record high level of 36,050 in January 2018.

Liquidity crisis following demonetization compels the consumers to postpone consumption of some durables. As a consequence of this, sales of automobiles and computers did decline. To cope with this problem the companies follow the practice of diversification, which recommends investing in the array of products and industries, instead of investing the entire capital in a single industry or single product. It is seen that ITC has diversified its product portfolio to a range household consumption goods to offset the negative impacts of tobacco business.

The researchers observe that while an individual industry is getting affected, the Indian blue chip companies enlisted under the NIFTY are going almost safe. This is so, because most of the companies have already tried the formula of diversification in their product and investment portfolio. They could offset loss of one product against the profits of another product. The findings unfold a message that diversification is a good strategy to face an economic or monetary shock.

The study leads the researchers to infer that while there is a shock, business houses don't stand as onlookers and let their business to perish. Instead, the business houses go on adopting different strategies and financial policies in order to combat the crisis. The findings of the study reveal that firms resort to more credit purchases to tackle the crisis of cash crunch; secondly, they resort to borrowing for taking advantage of cheaper fund, which usually occurs immediately after demonetization. These benefits offset a great portion of negative effect resulting from liquidity crisis caused by demonetization. This is the reason why, even after demonetization, the Indian blue chips could keep their steady track record unaffected.

7. Part C: Demonetization and Electronic Payment System: A Field Survey

Before 1996 traders in stock markets used to buy and sell physical shares printed in papers. After inauguration of Central Securities Depository Limited and National Securities Depository Ltd all physical securities have been converted into electronic shares. Subsequent launching of electronic trading platforms of NSE and BSE, trading mechanism has become totally electronic one. Due to revolution of information technology there is a phenomenal growth in e-commerce and electronic payment. If the electronic versions currency in hand be credited to holders' account, then the need for physical currency notes in circulation could be totally eliminated. This part of the paper is dedicated to present a picture of electronic payment system presently used in corporate sector. With a survey of cash transactions as recorded in cash book of the companies surveyed, the authors try to explore the

characteristic changes occurred in the mode of transactions of the firms after demonetization. For conducting this study a small sample of 11 companies were drawn from Siliguri, West Bengal. After making thorough scrutiny of the entries in the

accounts, it has been noticed that corporate houses have drastically shifted to the electronic payment system instead of conventional cash payment. The findings of the survey have been shown in Table 6 and Table 7.

Table 6: Modes of Payment in terms of Number: Results of a Survey

Study Period	CASH (i)	NEFT (ii)	CHEQUE (iii)	Total (i)+(ii)+(iii)	% of cash Transactions (i) ÷ [(i)+(ii)+(iii)]
December 2015	139	99	557	795	17%
December 2016	181	105	620	906	19%
June 2017	148	210	490	848	17%

Source: Field Survey; Compiled and edited by the authors

Table 7 shows composition of cash transaction in value terms. It shows that cash transactions have share of 2% to 3% only. While reading Table 6 and Table 7 simultaneously it reveals that in terms of number of transactions around 18% transactions are cash transactions. However, in value terms cash transactions have drastically fallen to 2% to 3% only. Naturally, cash crunch following demonetization is likely to leave only limited negative effect on the financial performance of the companies. This is a truth. While the authors were studying sales records of companies under NIFTY index, there was no drastic decline in sales of the companies. Only eight companies faced falling sales record, which was within the limit of 1% only.

Table 7: Composition of Modes of Payments (in value terms) over 2015-16

	Cash	NEFT	Cheque
December 2015	3.80%	76.6%	19.4%
December 2016	2.30%	72.7%	25.0%

Source: Field Survey; Compiled and edited by the authors

Singh, Brijes and Thimmaiah, N. Babitha (2017) pointed that the necessity of cashless economy was felt with digitization and modernization of Indian payment system. It leads to reduction in the cost of banking services as well as reduction in security risks. It is also assumed that the introduction of cashless policy in India would help to reduce the amount of bills and notes circulating in the economy. This should therefore reduce handling cost incurred on circulation of conventional paper currency notes as well as reduction in cash related crimes.



8. Conclusion

When an equipment of a factory is put to overhauling or a machine is rebuilt, productivity is likely to get hampered temporarily; however, when machine is again redeployed into the system after overhauling, productivity is sure to pick up. Likewise after demonetization when currency in circulation will be normalized, the economy will back to its usual growth trend. All the changes in the macro fundamentals and corporate performance taking place in 2017 and 2018 are confirming this fact. Economic Outlook as published by CMIE reflects that profit performance of corporate sector is rising steadily. As the economic entities like corporate sector and households are gradually shifting to electronic methods of payment and adopting strategies to combat the shocks, demonetization can be safely adopted to fight corruption and black money.

The study of the Balance Sheets of top fifty companies reveals that along with the eventual liquidity crisis, demonetization unfolded some opportunities too for the corporate houses. These opportunities helped companies to offset the negative effects of liquidity crisis. Corporate houses developed their strategies to exploit the opportunities and minimize the shocks. The companies with well diversified product portfolio could stay immune from the negative shock of demonetization.

Enormous deposits of defunct currencies loaded the banks with loanable fund, which they were eager to offload by reducing lending rates. This opportunity of cheaper capital unfolded the potentials of corporate expansion, which gets reflected in the form

of share market rally. Sensex increased to 36,050 in January 2018 from 26,818, which was recorded on 11th November 2016.

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DOES A CORPORATE GOVERNANCE ASPECT MATTER FOR BUSINESS RESPONSIBILITY REPORTING READABILITY?

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Abstract:

Study empirically investigates the impact of corporate governance attributes on companies' reading ease choice to disclose Business Responsibility (BR) Report information since corporate governance ensures transparent, fair, credible and responsible corporate behaviors to its stakeholders. The corporate governance attributes used in the study are board size, board committee, board independence, female on board. BR readability measure and corporate governance variables are measured and extracted from a checklist of items based on SEBI's BRR suggested framework 2012 and for BR report readability, Flesch K reading ease has been calculated from selected companies annual BR reports and websites respectively.

Empirical evidence on the link between corporate governance and BR report readability of top listed companies is scarce or unavailable. Given the positive impact corporate governance attributes have on the extent of BR disclosure readability (reading ease); their role can be further strengthened in terms of overseeing quality of information disclosed. Stakeholders and regulators will need to develop greater awareness of firm BR disclosure biases associated with ownership and more carefully scrutinize firm's foggy and smoggy BR information's that firms are reporting on. Readability analysis of BR reports disclosure has been a strong research theme in the fields of corporate governance and business communication.

Key Words:

BR Report (BRR), Readability, Corporate Governance Attribute, Content Analysis, Global Reporting Initiative (GRI), Securities and Exchange Board of India (SEBI)

Introduction

“Business responsibility is part of the social governance disclosure contract that we must abide by. It shows that we are accountable to society as a whole and are committed to work towards its wellbeing. Although we have made definite progress in our social imperatives, I believe there is a lot more that can be done in this area. We will continue to innovate with all our stakeholders to strengthen our business responsibility paradigm”.

This quote came from the BR Report page of an Indian top listed company’s annual report [in Pursuant to the Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015]. Company’s BR report also has statistics about what the firm is doing to plan for sustainable growth in the future and how they are changing to become more ESG responsive. Additionally, publish statistics detailing various governance issues, environmental and social performance indicators relative to their industry. The SEBI has mandated inclusion of BR Report (“BR report”) as part of the annual report for 500 listed entities based on market capitalization under Regulation 34(2) (f) of SEBI (LODR) regulations 2015. It also provides a suggested format for BR reports containing a list of five sections including nine key principles and various core elements under each principle to assess compliance with ESG norms. Listed companies are required to prepare policies based on these nine key principles and core elements, put in place a framework to integrate and embed the policies into business activities and a mechanism to measure and report the achievements as BR

report. The SEBI (LODR) Regulation 2015¹ provides comprehensive BR disclosure framework that companies will be compelled to comply with in order to maintain their status as listed company. Common frameworks that firms are using to report on their BR initiatives include the Global Reporting Initiative (GRI) and SEBI’s suggested format for BR reports to discharge the accountability of an organisation to its stakeholders. BR reporting has been characterised by a dearth of neutral, authenticity, reliability and objective information such that the advocates of BRR recommend that it be made compulsory. The objective of study sets out to explore how realistic this scenario actually is, in view of the conflicting interpretations in the literature on this subject.

Justification for Research

This study will be expanding on the literature, by including the BR reporting readability variable and analysing with corporate governance data set. This will further study the mixed finding in the connection between corporate governance and BR Report readability. Testing the hypothesis questions designed to develop evidence to supporting my research objectives. This data set will be collected from Indian top listed companies with 165 observations. The factors that will be considering are independent directors, board size, board meetings, female board members and BR Report reading ease as readability measure. Study will collect all the information from CMIE’s Prowess

¹ https://www.sebi.gov.in/legal/regulations/sep-2015/sebi-listing-obligations-and-disclosure-requirements-regulations-2015-last-amended-on-march-06-2017-_34610.html



database and readability calculator, using regression analyse to determine if there is any correlation between the different factors and the BR Report reading ease. Study will then use relevant theory to explain findings, and explain why corporate governance aspects are correlated to the BR Report reading ease.

Literature Review

The BR information set available to the stakeholders is expanding and multiplicative. BR reporting and disclosures as per framework is relatively new and has not been full researched in Indian context, however there has been lots of research in annual report and its segment disclosure.

Readability research enquiry has been used to examine if relations exist between levels of readability complexity and basic corporate attributes, such as profitability, size, leverage and industrial classification. In addition, the possibility exists that management uses readability obfuscation as a technique to mask *bad* or enhance *good* news. However, obfuscation does appear to be associated with the reporting of *bad* news, and there is an inference that it is used as a technique of impression management (Courtis, 1998).

Jones and Shoemaker (1994) examined the accounting-oriented readability literature broadly, and shortly afterward Courtis (1995) added a Western versus Asian perspective. They provide a review of 32 studies in the fields of accounting, business communication and management on the readability of annual report narratives (26 studies), tax law (3 studies) and accounting textbook (3 studies). Most of these studies attempt to assess the readability of the

annual report and its components. However, many investors, creditors and those with special interests in particular corporations are likely to have attained adequate educational levels and also likely possess strength of interest in what they read. Hence, many of those comprising the sub-population of actual readers are likely to understand all but the most technical of narratives.

For instance, regulators like SEC have constantly attempted to formulate top company prospectuses more readable and easier to comprehend. In several Securities Act Releases after the Securities Act 1933, an advanced level of clarity in the reporting documents was encouraged - highlighting on not compromising adequate and transparent disclosure (Firtel, 1999). In 1967, the SEC constituted an internal study group in order to examine and make recommendations for improving its disclosure regime. This study resulted in the “Wheat Report 1969” discussed that the average investor could not readily understand the complicated prospectuses; the report therefore recommended that companies avoid unnecessarily complex, lengthy or verbose writing. In October 1998, the SEC issued new plain English disclosure guidelines that encouraged the use of plain English in the drafting and formatting of all prospectuses in registered public offerings by domestic and foreign issuers. The SEC’s Investor Ed Office published and posted the following on its website: “A plain English handbook: how to create clear SEC disclosure documents” in order to provide practical tips for drafting disclosure documents. When drafting the front and back cover pages, the summary and the risk factors sections, an issuer must comply with the following six basic principles: short



sentences; definitive, concrete, everyday language; the use of the active voice; tabular presentation or bullet lists for complex material whenever possible; no legal jargon or highly technical business terms; and no double negatives. More recently, the SEC has taken several steps in making the disclosure of mutual funds more readable (Glassman, 2005).

Corporate Governance

The corporate governance plays an important role in the development of the management structure, improving cash flow and reducing the cost of capital of a company. Corporate governance is defined by Dalei et al. (2012, p.196) as the “ way of bringing the interests of investors and managers into line and ensuring that firms are run for the benefit of investors”. This demonstrates how important a company’s approach to corporate governance can be to the stakeholders, or potential investors. The majority of the prior literature on the connection between reporting and readability and corporate governance demonstrates that better corporate governance can be associated with a better reporting and readability. The implementation of a good corporate governance structure can have a positive effect on the firm’s reporting and readability (reading ease). The main empirical research of corporate governance use similar variables to characterize how well the corporate governance is implemented (Tian and Twite 2011) suggest the main four are; managerial compensation, shareholders rights, ownership structure and board characteristics.

Independent Directors: The board of directors is considered to be a crucial instrument for supervising the organisations management, so the independency of board members has become a much debated issue. An independent director is a member of a board of directors that do not have any financial association with the company, so they do not own shares in the company (Eng and Mak, 2003).

Board size: There are multiple board characteristics that can be considered, the literature has identified a focus on the board size, board meetings, female directors and independent directors. There has been lots of research into the influence of the board size; as the board size increases the board control management decreases and problems develop in communication and coordination.

BR Report Readability: Researchers in accounting and finance are increasingly using readability indices to examine the relationship between the readability or reading ease used in corporate disclosures and other variables of interest. These readability results means that the indicator bars give a visual guide for the meaningfulness, understanding and textual statistics of the BR Report of listed companies. The readability tools have been used in order to measure the meaningfulness, understanding has been extracted from 165 BR Report. The reporting clarity of the BRR disclosure is a determinant of the reading ease of its narrative disclosures further influences the comprehension, accuracy and speed by which content can be interpreted. The potential for missing and mistaking intended messages is greater when the BR report disclosed at a reading ease level that is



beyond the fluent comprehension of readers. Readability effectiveness is viewed as the transmission of the desired message to the intended user in an accurate and understandable way. Despite the limitations of the formula approaches they continue to remain quick, simple, understandable, widely used and cost effective in accounting-based readability research, and they provide some information about the degree of difficulty of narrative disclosures. As BR reports of listed companies for consecutive years, have been compared, different readability tools have been used through widely known readability test tool platform,² to measure report through most widely used readability indicators and gives a readability score. Readability calculation tools have been used to measure the BR Report readability.

measures of readability ⁴	
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Flesch Kincaid Reading Ease: The major credible methods of analysing readability use test readers or readability formulas. Readability formulas provide an easy, objective and reliable alternative. However, there is an abundance of such formulas. The main features of the various formulas were carefully evaluated and the revised Flesch index, Flesch was found most suitable for this study due to its reliability, validity and practicability. In case of the Flesch Kincaid Reading Ease readability measure, a high score means that the text is easier to read. Low scores suggest that the text is more complicated and thus difficult. For more information about these readability measures, see <http://www.plainlanguage.com/Resources/readability.html>.

Table. 01: Measures of Readability and Textual Statistics

In this regard, Once US SEC chairman stated “We will soon looking to the Gunning-Fog and Flesch-Kincaid models to judge the level of compliance in Business Reports ³ (Christopher Cox, Chairman SEC). Readability calculation tool made use of popular	Measures of Readability
	1. Flesch Kincaid Reading Ease
	2. Flesch Kincaid Grade Level
	3. Gunning Fog Index
	4. SMOG Index
	5. Coleman Liau Index
	6. Automated Readability Index

Link between Business Responsibility Report and Corporate Governance

The governance processes and practices embedded into the culture of the organisation ensure that the interests of all the stakeholders are taken into account in a balanced and transparent manner. Company should believes that good corporate governance emerges from the application of best management practices and compliance with the laws coupled with the highest standards of integrity, transparency, accountability and business ethics. Further, continues to strengthen its governance

²www.read-able.com

³SEC Chairman Christopher Cox, speech at USC Marshall School of Business, March 23, 2007

⁴Yong Gao, Nathalie J.(2009) Advances in Artificial Intelligence: 22nd Conference on Artificial Intelligence, Canadian AI 2009, Kelowna, Canada, May 25-27, Proceedings, Springer, Pg. 42-43

principles to generate long term value for its stakeholders on sustainable basis thus ensuring ethical and responsible leadership both at the board and at the management levels. A Report on compliance with the corporate governance provisions has been prescribed under the SEBI (LODR) Regulations, 2015 (“Listing Regulations”). Reliable corporate governance includes a vigilant board of directors, sensible disclosure and adequate reporting of meaningful information about the board and management process. This SEBI directive has been applicable to the listed companies from April, 2016 and remaining companies will come under its ambit in a phased manner. BR reporting has come a long way from most prior ‘National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business’ framed by the Ministry of Corporate Affairs (MCA) for ESG Reporting (MCA. Gol, 2011)⁵ to mandatory BR Report in annual report. This implies that top 100 National Stock Exchange (NSE) listed companies have considerable experience as early mandatory adopters of BR Reporting rather than on a voluntary basis. On the other hand, India witnessing a change in the ownership structures of companies listed on their stock exchanges as a result of privatizing/disinvestment in government owned enterprises. All these lends support to carrying out this study in order to investigate the linkage and impact of corporate governance aspects for best practices on the levels of compliance with BR Reporting in scrutinised listed companies.

Objective: To examine the relationship between corporate governance aspects linkages with the BR Reporting readability.

This study has been designed to test the following hypothesis:

H01: There is no significant relationship between readability scores of BR Reports and the board size, board meetings.

H02: There is no significant relationship between BR readability scores and the number of independent directors.

H03: There is no significant relationship between BR readability scores and the number of women directors.

H04: There is no significant relationship between BR readability scores and the board structure/size.

Research Methodology

This research will be using secondary data for a quantitative empirical analysis. The data has been collected from the Prowess, CMIE database; using MS excel to download the data into the model so that it can be entered into the E views software easily because it is the most accurate and convenient way to collect the 275 observations. The data should be reliable as it was collect form a secondary source Prowess, CMIE, this will reduce the chances of getting incorrect results. The data has been usually collected over the study period FY 2014-15 to 2016-17 for the sample companies and then a regression is run over. The reliability of results also tends to improve due to better coverage. Since this study of BR reporting practices by top NSE listed Indian companies. Over these three

⁵http://www.mca.gov.in/Ministry/latestnews/National_Voluntary_Guidelines201112jul2011.pdf.

years (2014-15 to 2016-17), panel data models are used for regression and estimation. The classical regression (ordinary least squares) results have been estimated using SPSS Software Version 20

Hence; No specific test had to be carried out. Correlation matrix for various independent variables has been estimated for aggregate as well as company wise sample.

Analysis and Discussion

Table: 03. Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
BRR_DiscScore	165	66	76	71.56	.148	1.901	-.051	.189	-.394	.376
BOD_Structure	165	8	23	12.15	.217	2.786	1.188	.189	2.230	.376
BOD_COM	165	4	17	7.64	.234	3.004	.876	.189	.070	.376
BOD_Meet	165	3	20	7.81	.255	3.274	1.256	.189	1.621	.376
BOD_IND	165	0	11	5.78	.131	1.683	-.130	.189	.623	.376
FE_BOD	165	0	8	1.40	.075	.968	2.677	.189	12.946	.376
Flesch Reading_Ease	165	14.60	67.20	34.1473	.64431	8.27635	1.401	.189	5.877	.376
Fog_Index	165	4.70	17.90	13.2418	.16428	2.11023	-1.015	.189	3.806	.376
SMOG_Index	165	6.00	15.40	11.5455	.12286	1.57818	-.545	.189	1.886	.376
Valid N (listwise)	165									

The descriptive statistics included in the output are the number of subjects (*N*), the **Range**, **Minimum** (lowest) and **Maximum** (highest) scores, the **Mean** (or average) for each variable, the **Std.** (the standard deviation), the **Variance**, the **Skewness** statistic, and the **Std. error** of the skewness. Note, from the bottom line of the outputs, that the **Valid N (listwise)** is 165. There are several ways to check this assumption in addition to checking the skewness value. The distribution is approximately normally distributed, as the mean, median, and mode, which can be

obtained with the frequencies command, are approximately equal.

The average size of BR report disclosure score is 71.5 for study period. Variable view indicating minimum and maximum BRR disclosure scores among sample companies are 66 and 76 which show that most of the listed companies have started disclosing as per the SEBI's mandatory BRR guidelines. The average score of Flesch Kincaid Reading Ease is 34.14 whereas minimum and maximum values range among 14.60 to 67.20 for the BR Report during the study period. It is important to check new

computed variables for errors, confirmed minimum and maximum scores for each variable to see if they lie within the acceptable range of values. The above table presents the descriptive statistics of selected BR Reporting and Readability

variables for the period. The mean values BRR_DisclosureScore and readability measures' indicating the average size and standard deviation has been used to analyses variations in the variables taken in this study.

Table. 04: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.301 ^a	.091	.062	8.01533	2.034

a. Predictors: (Constant), FE_BOD, BOD_Meet, BOD_IND, BOD_Structure, BOD_COM

b. Dependent Variable: Flesch_K_Reading_Ease

Table. 05: ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1018.633	5	203.727	3.171	.009 ^b
	Residual	10215.038	159	64.246		
	Total	11233.671	164			

a. Dependent Variable: Flesch_K_Reading_Ease

b. Predictors: (Constant), FE_BOD, BOD_Meet, BOD_IND, BOD_Structure, BOD_COM

Table. 06: Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	34.007	3.759		9.047	.000	26.583	41.431		
BOD_Structure	-.505	.260	-.170	1.941	.054	-1.018	.009	.746	1.341
BOD_COM	.342	.258	.124	1.327	.186	-.167	.851	.653	1.531
BOD_Meet	.377	.256	.149	1.472	.143	-.129	.884	.556	1.798
BOD_IND	-.209	.426	-.042	-.490	.625	-1.050	.633	.761	1.313
FE_BOD	1.370	.659	.160	2.080	.039	.069	2.671	.964	1.037

a. Dependent Variable: Flesch_K_Reading_Ease

Interpretation: The model summary output table shows that the multiple correlation coefficient (R), using all the predictors

simultaneously, is .301 and the Adjusted R² is .091, meaning that 9% of the variance in BR Report Reading Ease

(Flesch_K_Reading_Ease) can be predicted from the combination of corporate governance aspects. Note that the adjusted R^2 is lower than the unadjusted R^2 which is, in part, related to the number of variables in the equation. As one can see from the coefficients table, only corporate governance aspects (Female Board members) are significant, but the other variables add a little to the prediction of BR Report Reading Ease. Study shows the regression results for the association between all BR readability and disclosure indices with BR reading ease. This model shows regressions of readability indices (Flesch_K_Reading_Ease) on corporate governance aspects and test whether FE_BOD, BOD_Meet, BOD_IND, BOD_Structure, BOD_COM are significantly associated with BR Report reading ease in Model. The significance value of .009 in ANOVA table indicates that the combination of these variables significantly predicts the BRR_Reading ease.

Findings

The results in models support hypothesis that reading ease is positively associated with corporate governance aspects among companies during the study period. Overall, the study shed light on some interesting trends.

1. Similar to prior research the readability measures over the sample period is not modest; there is variation within study period. There is significant variation in the reading ease among listed companies, despite similarities in the underlying governance aspects among sample companies. According to study,

discernible reading ease patterns are shown to be present.

2. The adjusted R^2 is lower than the unadjusted R^2 which is, in part, related to the number of variables in the equation. As one can see from the coefficients table, only female board members are significant, but the other variables add a little to the prediction of BR Report Reading Ease. R^2 of .091 means that 9% of the variation.
3. Regression results show that BR Report reading ease is significantly associated with Board meeting, Independent directors, board structures, board committees, female board members in Models. However, all of the variables need to be included to obtain this result, because the overall F value was computed with all the variables in the equation. These results suggest that companies with worse reading ease are more likely to have less-vigorous corporate governance aspects. The results in models support hypothesis that poor reading ease is associated with low corporate governance aspects by top listed companies.

Conclusion and Suggestions

Due to the confluence of regulatory changes and resultant push by the government, along with an increasing recognition on part of businesses that disclose BR actions, performance and is no longer a *good to have* - Now, BR reporting has been on a compulsorily increase in India. Basically, BR Reporting framework provides an impartial

and realistic representation touching all business functions of a company - Finance, human resources, production process, sourcing, operations, legal etc. including both negative and positive contributions. Specifically BRR indicators includes general corporate information, organisational profile, financial information, BR policy, management approach, performance indicators, ethics/transparency and accountability, labour practices & decent work, human right issues, product responsibility, fair operating practices, regulatory issues, CSR/sustainability issues, environment, social and stakeholder's issues, and community involvement and development legal etc., putting together such a compiled report helps companies define what "BR Reporting" means for their organization and that each items has a role to play. Sample companies with more autonomous corporate governance policies have much higher BR report reading ease than companies with weaker governance policies. In sum, study indicate that the higher BR report reading ease has produced a measurable impact on the behavior of investors and board of directors and their decisions making. As a caution, a less-reading ease signify obfuscation. Study observes that obfuscation and foggy disclosure or intentional manipulation in BR reporting, occurs by using more complex syntax, discussing government initiatives, repetitive data and technical jargons, which is difficult to read and understand, to amaze stakeholders and hide poor BR performance.

A number of researchers opined that longitudinal studies allow a deeper study of the reading ease variables than cross-section research and have suggested that more emphasis should be given on understanding accounting in the context in which it operates. The benefit of this study is its possible insights into the nature of readability, and into the governance factors that significantly influence it. At the same time this study suggests that

the readability of the BR report has improved marginally. In order to avoid a serious communication breakdown between the providers and users of BR information, standardisation must be accompanied by more understandable, readable accounts. If this does not happen, and BR reports remain largely unreadable, they will remain largely unread. From study it cannot be discerned whether average investors are better off because they invest more with more transparent disclosures. Improved readability approach does not cause listed firms to have enhanced corporate governance, but is an interesting artifact of shareholder-centric companies. A concluding subject is whether investors and firms who improved their BR reading ease style are better off, traditional readability measures overrate the impact of familiar reading ease on a reader's ability to comprehend disclosures.

Limitations of the Study

However the study is subject to following limitations:

1. The area of the study is limited to top 50 NSE listed Indian companies. Hence the sample may have the limitations hence the data may represent only to the selected companies. The study conducted during the FY 2014-15 to 2016-17, during study period SEBI guidelines on BR Report subsequently mandate being expanded from 100 listed companies to the top 500 listed companies, the study may have impact of this.
2. Though the disclosed data in BR Report is maintained in standard format on annual basis, the limitations of data are bound to creep in due to the accounting practices or policies employed and adopted by various

companies in the calculation of profit and valuation differ within same industry.

3. Study explores the key aspects of BR Report, also in context to corporate governance practices by listed Indian companies with readability aspects related to BRR but besides this there are also other aspects which are essential for the effective compliance and understanding of BR Reports. There are no reliable standard metrics for measuring the BR Report.
4. Readability formulas do not solve problems. At most, they alert the writer to a potential impediment in communication that might impact on investor behavior. Readability research using formulas is only one methodological approach; disclosures and discourse analysis and other linguistic or textual approaches may be more suitable.

Scope for Further Study

1. The study is concentrated on top NSE listed companies only. An extensive study can be conducted with increased sample listed companies as per BRR compliance.
2. This study has only concentrated on BR Report, regulated as per listing agreement. But other forms could be also considered for the further study to present more precise result regarding the implications of corporate governance on the BR reporting.
3. Comparative study on BR Reporting practice among different sectors also can be done with reference to their BR disclosure pattern. Such study will be

helpful to recognize sector specific common BR disclosure items which would get wide acceptance and utility. Additionally it would assist it tracing out uncommon items in BR Report.

4. We urge other researchers to undertake such investigation, using readability formulas, viable research opportunities would include a longitudinal study of one country's listed companies annual report readability. This would determine the relative levels of reading ease and whether they have improved or deteriorated over time.

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IS IMPLIED VOLATILITY FORWARD LOOKING? EVIDENCE FROM INDIA

Neelam Rani

Abstract:

This study investigates informational content of implied volatility about future volatility. Implied volatility is expected to be forward looking i.e. it captures market expectation rather than the past information. The study re-examines the relationship between implied volatility and realized volatility. The study investigates the informational content of implied volatility about future volatility in post-crisis period. The study utilizes implied volatility estimate from the contract with highest volumes. The rationale for such a selection is that a highly traded contract reflects an unbiased picture of market expectation. The study also compares information content of historical volatility and implied volatility about future volatility. It further tests whether implied volatility have incremental information about future volatility i.e. information over and above captured by historical volatility. The results reveal that implied volatility is not a significant predictor of future volatility.

Key Words:

Stock Market Volatility, Option Pricing, Implied Volatility, Realized Volatility, Historical Volatility, Future Volatility



1. Introduction

Prediction of stock market volatility is of great importance for investors and corporations as it enables them to formulate appropriate hedging strategies (Frijns et al., 2010) and helps them take timely financial decisions (Dumas et al., 1998). Future volatility can be estimated by two ways, one way is to rely on past volatility and the other way is to calculate market expectations of future volatility or implied volatility. The limitation of the former approach is that it is backward looking as it is solely based on past asset behavior. The latter approach is superior, as being a forward looking approach, it yields enough information about the market sentiment of volatility, even though it doesn't provide knowledge about direction of future volatility in the market. This approach computes future volatility by feeding market price of an option into an option pricing model. This study re-examines the relationship between implied volatility and realized volatility. The study investigates the informational content of implied volatility about future volatility in post-crisis period.

The paper organized as follows. Section 2 discusses the relevant theory and defines implied volatility. The section covers basics of option pricing and provides idea about Black Scholes formula. Section 3 presents literature review on relationship of implied volatility and realized volatility. Research in Indian context being scarce, the focus of this literature review is across the world. Section 4 mentions details about data and the methodology employed. The results are summarized in section 5. Section 6 concludes the research and discusses implications of the findings and limitations.

2. Theoretical Background & Literature Review

An option is an agreement between a buyer and a seller that gives the buyer a right to exercise the option. It is to be noted that the buyer of the contract has no obligation to exercise the option. The writer of the contract has the obligation to fulfill the contract in case the option is exercised. The buyer of the option pays a premium to the writer of the option in order to obtain the right to exercise at a later date, called maturity date. The option has an underlying asset associated with it, and the buyer acquires the right to purchase (sell) the asset at a predetermined price from (to) the writer (Hull, 2006).

A call option gives the buyer a right to buy the underlying asset at a predetermined price, whereas a put option gives the buyer a right to sell the underlying asset at a predetermined price. The predetermined price on the contract is called strike price. A person would exercise the option contract only when it is profitable to do so. One would exercise a call option only when on the maturity date the spot price of the underlying asset is higher than the strike price. On the other hand, it would be profitable to exercise a put option only when on the maturity date the spot price of the underlying asset is lower than the strike price. An option is said to be in the money when it is profitable to exercise the option (Hull, 2006).

A person would enter into option contract (call or put) based on his expectations about future price of the underlying asset. If an investor expects the price of the underlying asset to shoot up in future, he would buy a call option to secure his position. A person



with opposite expectations, who fears the downside in the price of the underlying asset, would buy a put option. Option contracts are widely used by firms to reduce risk related to price volatility of the underlying asset (Smith and Stulz, 1985). Option contracts are also used for speculative purposes (Shimko, 1994). A speculator is able to take on a large exposure with purchase of an option contract. He would exercise the option only if it is profitable.

An option is beneficial to the buyer. How to value this benefit? What should be price of the option? Louis Bachelier, a mathematician, arrived at the first option pricing formulae in his thesis (Merton, 1973). He assumed that that the stock prices follow Brownian motion. Black and Scholes (1973) deduced the option pricing formulae popularly known as Black and Scholes formula. The Black and Scholes formula calculates price of a European option¹. Black and Scholes (1973) assumed that the price of the underlying asset follows Brownian motion² i.e. a stochastic process. A stochastic process is a random process where a collection of random variable represents evolution of a system over time (Hoel et al., 1986). A Markov process is a special case of stochastic process. A Markov process is memory less i.e. only current realization of the random variable is relevant to predict future realizations (Hoel et al., 1986). Markov property implies that all the past information is incorporated in present realization. Brownian motion is a markov

process. Volatility is unobservable. Price of the option (call or put) is observable in the market (Hull, 2006; Nilsson and Okumu, 2014). Volatility can be solved for using option pricing formula. This calculated volatility is called as implied volatility. Implied volatility has expectation of the market regarding future volatility of the underlying asset. As option prices contain information about market prices, volatility can be recovered using an option pricing formula (Dumas et al., 1998).

Implied volatility has market expectations about future price behaviour of the underlying asset. Christensen and Prabhala (1998) show that implied volatility has more information content about the volatility in coming period than realized volatility. When volatility forecasting methods are compared, it is often found that, particularly for the US indices, methods based on option prices provide more accurate estimates than historical methods (Taylor et al., 2010). Although implied volatility has been used by extant studies to estimate future volatility (Beckers, 1981; Canina and Figlewski, 1993; Christensen and Prabhala, 1998; Dumas et al., 1998; Blair et al., 2010; Busch et al., 2011; Nilsson and Okumu, 2014), several other studies provide contradictory views. Andersen and Bollerslev(1998) show that standard volatility models provide accurate forecasts of future volatility. Canina and Figlewski (1993) conclude that implied volatility does not contain information about future volatility. Koopman et al. (2005) present similar results. Balir et al. (2010) find weak relationship between implied volatility and future volatility. There is plethora of research that contradict above findings. Jorion (1995) finds that implied standard deviation is significant predictor of future

¹A European option can only be exercised on maturity date

²Brownian motion is also known as Weiner process. I use both terms interchangeably.



volatility. Applying methodology similar to that of Christensen and Prabhala (1998) to CNX NIFTY index for the period 2002-2006, Kumar (2008) concluded that implied volatility has information content about future volatility in Indian markets.

This study examines information content of implied volatility about future realized volatility in Indian market. The hypothesis is tested on CNX NIFTY data during post-crisis period i.e. from 2009 to 2015. Kim et al. (2008) concluded that Asian markets such as Philippines, Malaysia, Singapore, Thailand and Korea have improved market efficiency in the post crisis period. Thus, it would be interesting to investing if information content of implied volatility improved in the post-crisis period.

Christensen and Prabhala (1998) concluded that implied volatility contains information about future realized volatility. The authors further proved that implied volatility is an unbiased and efficient estimator of realized volatility. At the same time, Andersen and Bollerslev(1998) independently showed that standard volatility models provide accurate forecasts of future volatility. Szakmary et al. (2003) supported the above findings and concluded that implied volatility is a better predictor of future volatility than historical volatility.

Canina and Figlewskis (1993) studied informational content of implied volatility for S&SP 100 index. The study concluded that implied volatility does not predict future volatility. It means that implied volatility has no information about realized volatility. Balir et al. (2010) found weak relationship between implied volatility and realized volatility, in-line with Canina and Figlewski (1993).

One can notice that the above studies do not provide any unanimous conclusion about forecasting ability of implied volatility. Most of the studies examining informational content of implied volatility is based on developed markets. I could find one study investigating the issue in Indian context. Kumar (2008) studies the relationship between implied volatility and realized volatility for CNX NIFTY index. The study concluded that implied volatility is a rational forecast of future volatility. Kumar (2008) performed analysis for a period of 4 years, 2002-2006.

Extant research has been performed on informational content of implied volatility regarding future volatility (Canina and Figlewski, 1993; Jorion, 1995; Christensen and Prabhala, 1998; Dumas et al., 1998; Szakmary et al., 2003; Koopman et al., 2005; Balir et al., 2010; Nilsson and Okumu, 2014). The past research exhibit mixed findings and is unable to conclude on informational content of implied volatility.

The limited research on Indian context encouraged us to re-examine the relationship between implied volatility and realized volatility. The study investigates the informational content of implied volatility about future volatility in post-crisis period. The analysis is performed on CNX NIFTY options for a period of 7 years, 2009-2015. In post-crisis period, implied volatility should exhibit strong correlation with realized volatility as markets are expected to be more efficient during post-crisis period (Lim et al., 2008).



3. Data

In this study, implied volatility for CNX NIFTY options is calculated. The data required i.e. S_0 , K , r , T and c is collected from NSE. Informational content of implied volatility is analyzed for a period of 28 months, January, 2014 - April, 2016. Similar to Kumar (2008), the study uses non-overlapping near month option contracts with time to maturity of 30 days. For a contract that expires on 28th January, we move 30 days back and compute implied volatility. The process is repeated for each contract and implied volatility series is constructed. Realized volatility is computed using daily log returns for the same period, i.e. 30 days, as in case of implied volatility. The realized volatility series is annualized to make it comparable with implied volatility series.

We are interested in the informational content of implied volatility in the post-crisis period. (1) Existing studies examine the pre-crisis period; (2) Comparing with those studies, we can know if the informational content is higher in the post-crisis period; (3) Another reason to skip the crisis period is very high volatility at that time.

4. Hypotheses

Implied volatility contains information about future volatility of the underlying asset (Christensen and Prabhala, 1998). Implied volatility obtained through an option pricing model is like a forecast of future volatility. The hypotheses mentioned are adapted from Kumar (2008) and Nilsson and Okumu (2014). Kumar (2008) tested the hypothesis on CNX NIFTY while Nilsson and Okumu (2014) tested the hypothesis on S&P 500 and

OMXS30. This study investigates relevance of implied volatility as a predictor of future volatility in Indian context. Specifically, Following hypotheses are tested on CNX NIFTY 500 data:

H1: Implied volatility has informational content about future volatility

H2: Implied volatility predicts realized volatility better than past-realized volatility

H3: Implied volatility has incremental information content that is not captured by historical volatility

5. Methodology

Implied volatility is calculated by inverting Black and Scholes formula. The Black and Scholes formula is discussed in theory section. Equation 4 and 5 provides theoretical prices of call and put option as per the Black and Scholes formula. The model presented in equation 4 and 5 is used to price European option with a non-dividend paying underlying asset. There is high likelihood that the underlying stocks in CNX NIFTY options pay dividends. The challenge is to adjust the formula for expected future dividends. Kumar (2008) suggests that a minor adjustment of substituting S_0 with $S_0 \cdot e^{-dt}$, where d is the continuous dividend rate, in the non-dividend paying Black and Scholes formula will compute implied volatility effectively. Poteshman (2001) recommend using spot-futures parity to compute $S_0 \cdot e^{-dT}$. Spot futures parity is stated as:

$$F = S_0 \cdot e^{(r-d)T}$$

Here, F is the futures price and other terms

have the meaning as defined before.

There are many option contracts available for same expiration date but with different strike prices. Inverting the Black and Scholes formula will result in different implied volatility estimates for each of the option contract. A particular type of contract has to be chosen to obtain implied volatility estimate. In this study, we considered the options with highest trading volume for estimating implied volatility. The rationale behind obtaining implied volatility estimate from an option contract with high trading volume is that a highly traded option will contain and reflect the market expectation more effectively. The volatilities are estimated for both put and call options. (Canina and Figlewski, 1993).

Table 1: Volatility measures and symbols

Volatility Measure	Symbol
Realized volatility	σ_R
Historical volatility	σ_H
Implied volatility from put option	σ_P
Implied volatility from call option	σ_C

Realized volatility σ_R is computed as annual standard deviation of continuously compounded returns from the first trading date of the option to the expiration date (Kumar, 2008).

$$\sigma_R = \sqrt{\left(\frac{252}{T-1} \sum_{T=1}^{T=30} (R_T - \bar{R})^2\right)}$$

Where, R_T is the daily log return and T is the time to maturity

Historical volatility is also computed using 30 days of continuously compounded daily returns. It is computed during a window of -60 to -31 days relative to expiration date of the option. It is also annualized using square root of time rule. Following section provides accounts of regression equations specific to the proposed hypotheses.

Hypothesis 1: Implied volatility has informational content about future volatility

Regression Equation: The regression proposed by Canina and Figlewski (1993) is used to test the above hypothesis. The regression is referred to as “rationality test” by Canina and Figlewski (1993).

$$\sigma_R = \alpha_1 + \beta_1 \cdot \sigma_{C \text{ or } P} + \varepsilon \quad [6]$$

A significant value of β would indicate that implied volatility has significant informational content about future volatility.

Hypothesis 2: Implied volatility predicts realized volatility better than past-realized volatility

Regression Equation: In order to compare predictive power of implied volatility and historical volatility, one needs to perform a regression similar to equation 6 but with σ_H as the independent variable. The following equation is used:

$$\sigma_R = \alpha + \beta \cdot \sigma_H + \varepsilon \quad [7]$$



The two regression models can be compared using Root Mean Square Error (RMSE). A lower value of RMSE will correspond to the better predictor. RMSE is measured as follows:

$$RMSE = \sqrt{\left(\frac{1}{N} \sum_{N=1}^N (\widehat{\sigma}_R - \sigma_R)^2\right)}$$

Where, σ_R is realised volatility and $\widehat{\sigma}_R$ is an estimate of realized volatility

Hypothesis 3: Implied volatility has incremental information content that is not captured by historical volatility

Regression Equation: The incremental information hypothesis can be verified by including both historical volatility and implied volatility in the regression model. The regression is termed as “encompassing regression” by Canina and Figlewski (1993).

$$\sigma_R = \alpha + \beta_{C \text{ or } P} \cdot \sigma_{C \text{ or } P} + \beta_H \cdot \sigma_H + \varepsilon$$

A significant coefficient of implied volatility even after controlling for historical volatility will confirm incremental information hypothesis.

6. Result

Table 2 displays descriptive statistics for σ_R , σ_H , σ_C and σ_P . The mean of σ_R and σ_H is close to mean of σ_C and σ_P . However standard deviation of σ_R and σ_H is less than standard deviation of σ_C and σ_P . It can also be noticed that implied volatility series, has much greater Skewness and kurtosis than realized volatility series. Further Jarque-Berra statistics shows that realized volatility and historical volatility series are normally distributed while implied volatility series are not normal.

Table 2: Descriptive statistics

	σ_R	σ_H	σ_C	σ_P
Mean	0.15	0.15	0.14	0.18
Std. Dev	0.04	0.04	0.05	0.05
Skewness	0.75	0.80	2.45	2.00
Kurtosis	0.42	0.48	6.74	3.73
JB Test	3.43 (0.17)	4.01 (0.13)	96.40 (0.00)	41.86 (0.00)

Table 3 shows result for stationarity tests. The null hypothesis in both ADF test and KPSS test is that time series is stationary. The results are contradictory. ADF test finds that all the volatility series are not stationary. While the KPSS test finds that realized and historical

volatility are stationary and implied volatility series are not stationary. One of the reason, for non-normality and non-stationary nature is small sample size. We would get over this limitation in future work, but for now we decided to proceed with the analysis.

Table 3: Stationarity Test

Lag	σ_R	σ_H	σ_C	σ_P
ADF	-3.13 (0.13)	-3.15 (0.12)	-2.78 (0.27)	-2.53 (0.36)
KPSS	0.55 (0.03)	0.55 (0.03)	0.09 (0.1)	0.16 (0.1)

The regression results for hypothesis 1 are tabulated in table 4. The results reveal that coefficient for implied volatility in both the cases i.e. calculated using put option and call option is insignificant. It means that implied volatility does not contain any significant information about realized volatility.

Table 4: Regression Result, $\sigma_R = \alpha_1 + \beta_1 \cdot \sigma_{C \text{ or } P} + \varepsilon$

Independent Variable		α_1	β_1	R^2
σ_C	Coefficient	0.129	0.125	0.021
	t-statistic	5.192	0.761	
	p-value	0.000	0.453	
σ_P	Coefficient	0.114	0.187	0.067
	t-statistic	4.512	1.375	
	p-value	0.000	0.180	

Table 5 displays the result of regressing historical volatility on realized volatility. The findings reveal that historical volatility is not a significant predictor of realized volatility. However, it is to be noted that the p-value is close to 10% level of significance. Insignificance of historical volatility in predicting realized volatility indicate absence of volatility persistence.

Table 5: Regression Result, $\sigma_R = \alpha + \beta \cdot \sigma_H + \varepsilon$

Independent Variable		α	β	R^2
σ_H	Coefficient	0.103	0.304	0.092
	t-statistic	3.637	1.631	
	p-value	0.001	0.114	

Model with implied volatility and historical volatility are not significant in predicting realized volatility. Still, I compare the above models to test the second hypothesis. RMSE indicates

that historical volatility has more explanatory power to predict realized volatility when compared to implied volatility.

Table 6: RMSE for different estimators

Independent Variable	RMSE
σ_H	0.0361
σ_C	0.0375
σ_P	0.0366

Table 7 shows result for the regression which includes both historical volatility and implied volatility as independent variable. Such an arrangement tests whether implied volatility has incremental informational content over historical volatility in predicting realized volatility.

This regression is redundant after observing results from the first two models. As expected the both the independent variable are not significant predictors of realized.

Table 7: Regression Result, $\sigma_R = \alpha + \beta_{C \text{ or } P} \cdot \sigma_{C \text{ or } P} + \beta_H \cdot \sigma_H + \varepsilon$

Independent Variable		α	β_H	$\beta_{C \text{ or } P}$	R^2
$\beta_H + \beta_C$	Coefficient	0.092	0.288	0.087	0.103
	t-statistic	2.683	1.506	0.537	
	p-value	0.012	0.144	0.596	
$\beta_H + \beta_P$	Coefficient	0.094	0.234	0.109	0.110
	t-statistic	2.996	0.212	0.712	
	p-value	0.006	0.281	0.483	

7. Conclusion

This paper investigates informational content of implied volatility and historical volatility in predicting realized volatility. The study analyses data from CNX NIFTY 50 from January 2014 to April 2016. Implied volatility is calculated using option price of most traded contract on first trading day of the expiration month. Most traded contract is assumed to contain most information regarding future volatility. The results are consistent with earlier research (Canina and Figlewski, 1993; Koopman et al. 2005) that show that implied volatility do not have significant information about future volatility. The study is useful to the practitioners as well as the policy makers. The practitioners may use implied volatility for better predictions. The utility of the study for policy makers is that they can think of reducing barriers in F&O segment to make market more efficient. One of the limitations of the study is small sample size. The results need to be tested on a larger sample to have a definitive and well-grounded conclusion.



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OPTIMAL INVENTORY POLICIES FOR A STOCHASTIC INVENTORY MODEL WITH CAPITAL INVESTMENT

Jhuma Bhowmick

Abstract:

In this paper, a continuous review stochastic inventory model is developed with random yield. The lead time demand and lead time both are considered as random variables and are assumed to follow normal distributions. Shortages occurring in the model are partially backlogged and the backorder rate is a nonlinear function of expected shortage amount. Backorder price discount is considered as a decision variable in this model. The advantages of capital investment are analyzed in the model for reducing the set-up cost and yield randomness. The optimal ordering policies are determined which minimize the expected total annual cost of the proposed model. The model is further illustrated with the help of numerical examples and graphs.

Key Words:

Stochastic Demand, Random Yield, Random Lead Time, Logarithmic Investment Cost Function



Introduction

Good production systems in leading organizations require addressing three fundamental issues in operations management. These are eliminating waste, removing variability/yield randomness, and improving throughput. Any activity that does not add value in the eyes of the customer is a waste. Overproduction/excess inventory, queues, defective products resulting in returns, warranty claims, rework, and scrap are wastes and increase operating costs of the inventory system significantly. Variability is defined as any deviation from the optimum process that delivers perfect product on time, every time. In modern production and manufacturing systems the yield variance can be reduced by capital investments for implementing technologically improved production systems/machines and employing trained workers/empowerment of workers or by choosing better suppliers with low variance yield distributions. Reducing yield randomness and setup cost are excellent ways to reduce inventory costs and improve productivity.

The random yield production or procurement problem has become an important research topic in the modern inventory systems. Silver [12] established the reorder quantity model when the quantity received is uncertain. Kalro and Gohil [5] discussed an inventory model with random yield and partial backlogging. Various related papers on yield randomness were developed by Gerchak et al. [2], Gerchak [3], Hofmann [4] in their works. Gerchak [2] presented a variable yield lot size reorder point model with stochastic demand and included the backorder case which is an extension of continuous review reorder point model.

Gerchak and Parlar [3] determined suitable capital investments for reducing the yield variance in a lot size problem. A periodic review production inventory model with stochastic demand, random yield, and variable capacity was analyzed by Wang et al. [15]. But, the above papers did not consider capital investments for reducing setup cost in the proposed inventory models.

Quick setups are an important element of JIT manufacturing system. Also reduced set up times are associated with smaller lot sizes in inventory, shorter lead times, high quality products and lower per unit production costs. Lower setup cost can be achieved by investing in the production/procurement process. Porteus [11] investigated the effect of capital investments in EOQ model to reduce the setup cost. Hoffman [4] investigated the relationship between capital investments and reduced setup cost. Vijayashree et al. [13] developed a vendor-buyer integrated production inventory model under quality improvement investment and setup cost reduction such that the total profit is maximized. Vijayashree et al. [14] explored the setup and order processing cost reduction in the single vendor and single buyer integrated production inventory model.

In most inventory problems lead time is considered as deterministic and hence a prescribed constant. Lead time usually consists of the following components: order preparation, order transit, supplier lead time, delivery time and setup time. In the last few years, Ouyang et al. [9] have included a fixed backorder cost in their model. Pan et al. [10], discussed inventory models with backorder discounts and variable lead time. Lin [8] considered a

continuous review inventory model which involves controllable lead time, partially backlogged defective items and capital investment to reduce lost sales rate. Yang et al. [16] developed an inventory model using a source with random yields and stochastic demand and followed a newsvendor approach. Recent papers investigating random yield inventory models/ controllable setup cost and lead time are developed by Keren [6], Erdem [1].

In the present paper, an inventory system with random lead time, random demand, and joint investments has been considered to reduce the yield variability and setup cost. Logarithmic investment functions were used to reduce the yield standard deviation and setup cost. These functions were used in previous researches by Porteus [11]. It has been shown that the expected annual cost function with capital investment is strictly convex with respect to the decision variables. This paper is an extension of Lin et al. [7] who investigated capital investment to reduce yield variability and set up cost in an inventory system with constant lead time and complete backorder in case of stock out.

The remainder of this paper is organized as follows. In the next section, the assumptions and notations used in the paper are stated. Then the proposed inventory model is developed and analyzed. After that numerical examples are given and the results are compared with the traditional model without capital investment. Finally conclusions are made with suggestion for future research works in related areas.

Notations and assumptions

To establish the mathematical model, the notations and assumptions of the model are as follows:

Notations

D	average demand per year
Q	order quantity (a decision variable)
s	the reorder point (a decision variable)
Y_Q	quantity received given that Q units are ordered (a random variable)
K_0	original set-up cost per set-up
K	nominal set-up cost per set-up (a decision variable)
σ_0	original yield standard deviation
σ	nominal yield standard deviation (a decision variable)
$\rho_K(K)$	capital investment required to reduce set-up cost from K_0 to K
$\rho_\sigma(\sigma)$	capital investment required to reduce yield s.d. from σ_0 to σ
a	1/a denotes the fraction of reduction in K per dollar increase in $\rho_K(K)$
b	1/b denotes the fraction of reduction in σ per dollar increase in $\rho_\sigma(\sigma)$
r	fractional opportunity cost of capital/\$/year
$E(Y_Q) = \mu Q$	expected value of Y_Q given that Q units are ordered
μ	$\mu = E(Y_Q)/Q$, represents the expected amount received as a proportion of the amount ordered (bias factor)



$\sigma_y = \sigma_0 Q$	standard deviation of Y_Q given that Q units are ordered
h	inventory holding cost per item per year
L	length of lead time (in days) (a random variable)
l	value of the r.v. L
$g(l)$	the probability density function followed by L
X	lead time demand which follows normal distribution
x	value of the random variable X
$f(x/l)$	the conditional probability density function followed by X given $L=l$
β	fraction of the demand back-ordered during the stock-out period, $\beta \in [0,1]$
π_0	gross marginal profit per unit
π_2	back-order price discount offered by the supplier per unit, $0 \leq \pi_2 \leq \pi_0$ (a decision variable)
δ, ϵ	the back-order parameters, $0 \leq \delta \leq 1, 0 \leq \epsilon < \infty$
$B(s)$	the expected shortage quantity at the end of the cycle
$\Phi(z)$	the standard normal cumulative distribution function (c.d.f.)
$\varphi(z)$	the standard normal probability density function (p.d.f.)
m_1	the expected value of demand per day during lead time
σ_1	the standard deviation of demand per day during lead time
m_2	the expected value of lead time (in days)
σ_2	the standard deviation of lead time (in days)
l_1	minimum non-negative value of l

$$f(x/l) = \frac{1}{(\sigma_1 \sqrt{l} \sqrt{2\pi})} e^{-\frac{(x-m_1 l)^2}{2\sigma_1^2 l}}$$

$$g(l) = \frac{1}{(\sigma_2 \sqrt{2\pi})} e^{-\frac{(l-m_2)^2}{2\sigma_2^2}}$$

Assumptions

1. This is a single item inventory model.
2. Inventory level of the item is continuously reviewed. Replenishments are made whenever the inventory level falls to the reorder point s .
3. The reorder point $s = m_1 l + \text{safety stock} = m_1 l + z \sigma_1 \sqrt{l}$ where z is the safety factor and is assumed to have a nonnegative value.
4. The lead time L is a random variable.
5. The relationship between setup cost reduction and capital investment can be described using a logarithmic investment cost function viz.

$$\rho_K(K) = a \ln \left(\frac{K_0}{K} \right) \quad \text{for } 0 < K \leq K_0$$

Similarly, the relationship between the yield standard deviation σ and the capital investment to reduce the value of σ is given by

$$\rho_{\sigma}(\sigma) = b \ln\left(\frac{\sigma_0}{\sigma}\right) \quad \text{for} \quad 0 < \sigma \leq \sigma_0$$

Where $\frac{1}{a}$ and $\frac{1}{b}$ are fractions of the reduction in K and σ per dollar increase in investment, respectively.

- The backorder rate β which represents the fraction of the demand back-ordered during the stock-out period ($\beta \in [0, 1]$) is assumed to be dependent on expected shortage amount B and the backorder price discount π_2 . It increases as backorder price discount π_2 increases and decreases otherwise. When expected shortage B is very large, β becomes very small and finally tends to zero as $B \rightarrow \infty$. It is therefore assumed to be of the form

$$\beta = \delta \frac{\pi_2}{\pi_0} e^{-\epsilon B}$$

where δ, ϵ are the back-order parameters ($0 \leq \delta \leq 1, 0 \leq \epsilon < \infty$)

Model Formulation

The expected total annual cost with no option of investment is composed of setup cost, holding cost and backorder cost. Here z can be considered as a decision variable instead of s.

Therefore the expected total annual cost of the proposed model is given by

$$\begin{aligned} \text{ETC}_1(Q, z, \pi_2) &= \frac{KD}{\mu Q} + \frac{hQ}{2\mu} (\sigma^2 + \mu^2) + h\{H + (1 - \beta)B(z)\} \\ &\quad + \frac{D}{\mu Q} \{\pi_2\beta + (1 - \beta)\pi_0\} B(z) \end{aligned} \quad (1)$$

$$\begin{aligned} \text{where} \quad B(z) &= \iint_s^{\infty} (x - s) f(x/l) g(l) dx dl \\ &= \sigma_1 \int_{l_1}^{\infty} \sqrt{l} \{\varphi(z) - z(\Phi(z))\} g(l) dl \end{aligned}$$

$$H = \iint_0^s (s - x) f(x/l) g(l) dx dl$$

$$= \sigma_1 \iint_u^z \sqrt{l} (z - t) \varphi(t) dt g(l) dl$$

$$\text{and} \quad z = \frac{(s - m_1 l)}{\sigma_1 \sqrt{l}} \geq 0, \quad \varphi(t) = \frac{1}{(\sqrt{2\pi})} e^{-\frac{t^2}{2}}, \quad \Phi(z) = \int_z^{\infty} \varphi(t) dt, \quad u = -\frac{m_1 \sqrt{l}}{\sigma_1}$$

$0 < l_1 < l < \infty$.

The expected total annual cost, when the investment function is included is as follows:

$ETC_2(Q, z, \pi_2, K, \sigma)$

$$= \frac{K D}{\mu Q} + \frac{h Q}{2 \mu} (\sigma^2 + \mu^2) + h\{H + (1 - \beta)B(z)\} + \frac{D}{\mu Q} \{\pi_2 \beta + (1 - \beta)\pi_0\} B(z) + r \left\{ a \ln \left(\frac{K_0}{K} \right) + b \ln \left(\frac{\sigma_0}{\sigma} \right) \right\} \quad (2)$$

It is easy to see that ETC_2 in equation (2) above is strictly convex w.r.t. K and σ .

To find the minimum cost, the partial derivatives of $ETC_2(Q, z, \pi_2, K, \sigma)$ with respect to K , and σ are computed and are equated to zero to obtain the following first order equations

$$\frac{\partial ETC_2}{\partial K} = \frac{D}{\mu Q} - \frac{r a}{K} = 0$$

$$\frac{\partial ETC_2}{\partial \sigma} = \frac{h Q \sigma}{\mu} - \frac{r b}{\sigma} = 0$$

Solving the above equations, the optimal values of K and σ , denoted by K^* and σ^* are obtained as

$$K^* = \frac{r a \mu Q}{D} \quad \text{and} \quad \sigma^* = \sqrt{\frac{\mu r b}{h Q}}$$

Substituting the values of K^* and σ^* in the expected total annual cost function ETC_2 , we get

$$ETC_3 = r a \left\{ 1 + \ln \left(\frac{D K_0}{r a \mu Q} \right) \right\} + r b \left\{ \frac{1}{2} + \ln \left(\sigma_0 \sqrt{\frac{h Q}{\mu r b}} \right) \right\} + h \left(\frac{\mu Q}{2} + H + (1 - \beta)B(z) \right) + B(z) \frac{D}{\mu Q} \{\pi_2 \beta + (1 - \beta)\pi_0\} \quad (3)$$

In equation (3) $(r a)$ denotes the optimal annual setup cost and $(r b/2)$ is the extra holding cost since the amount received is uncertain. Generally, we have $a > b/2$ i.e., $(2a - b) > 0$

We first compute the first order partial derivatives of expected total cost ETC_3 with respect to the decision variables Q , z , and π_2 . Setting these equations equal to zero and solving for Q , z , and π_2 we get the optimal values Q^* , z^* and π_2^* respectively.

When there is no option of capital investment for setup cost and yield standard deviation, we set $K^* = K_0$ and $\sigma^* = \sigma_0$. The minimum value of the expected total annual cost in this case can be obtained by solving equation (1).

Numerical Example

The following data is taken to illustrate the proposed inventory system:

$D= 600$ units/year, $K_0 = \$100$, $h=\$10$, $\pi_0= \$40$, $m_1= 3$ units/day, $\sigma_1 = 1$ units/day, $m_2 =14$ days, $\sigma_2= 4$ days, $l_1=7$ days, $\sigma_0= 0.30$, $\mu = 1.2$, $a = 1500$, $b = 50$, $r = 0.15$ /\$/year, $\delta = 1$, $\epsilon = 10$ in appropriate units.

The following optimal solutions are obtained for Model I and Model II:

Table 1

Model	Optimal order quantity Q^*	Optimal safety factor z^*	Optimal backorder price discount π_2^*	Optimal total cost ETC*	Optimal set up cost K^*	Optimal yield variation σ^*	Optimal backorder rate B^*
Model I (without investment)	89.3851	1.7069	20.8939	1192.4	100.0 $K^*=K_0$	0.30 $\sigma^*=\sigma_0$	0.2730
Model II (with investment)	38.5822	2.0181	20.3858	931.2	17.3620	0.15	0.3807

From the numerical result it can be seen that in case of Model II i.e. with capital investment the optimal order quantity Q^* decreases by 56 % approximately, the expected total annual cost $ETAC^*$ decreases by 21% approximately. Also the backorder rate B^* increases by 39% and the backorder price discount π_2^* decreases by 2.43%. The safety factor z^* increases by 18.23%. Therefore it can be concluded that in case of capital investment significant cost savings can be done.

Graphs of the above optimal solutions of Model I and Model II are shown using MATHEMATICA.

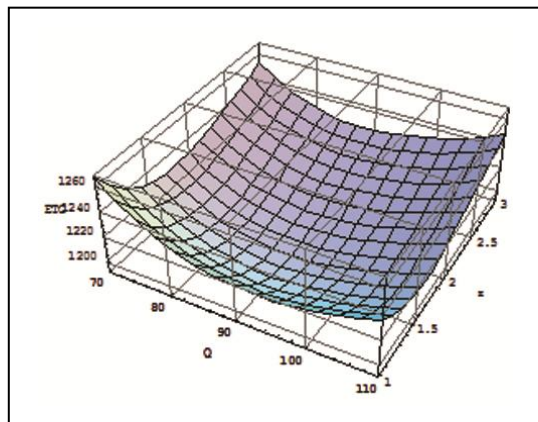


Figure 1: Expected total cost of Model I as a convex function of Q and z

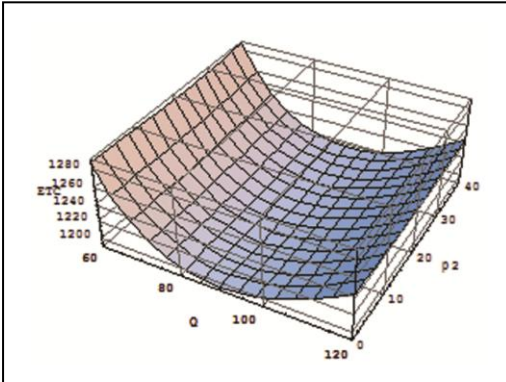


Figure 2: Expected total annual cost of Model I as a convex function of Q and π_2

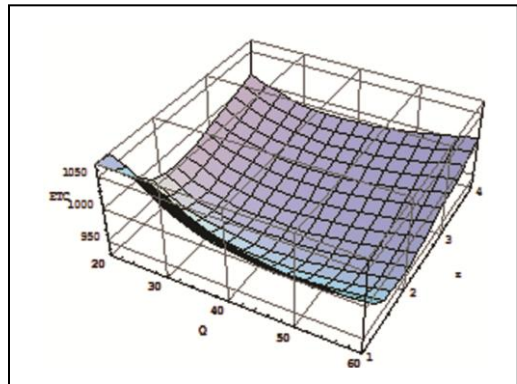


Figure 3: Expected total annual cost of Model II as a convex function of Q and z

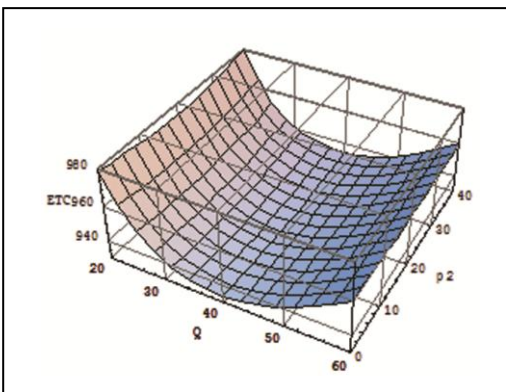


Figure 4: Expected total cost of Model II as a convex function of Q and π_2

Figures 1 - 4 show that the expected cost functions for Models I and II are strictly convex functions with respect to the order quantity Q , the safety factor z and the backorder price discount π_2 .

Now for $\delta = 0.0$ the following same optimal solution is obtained for any value of ϵ .
 $Q^* = 38.6483$, $z^* = 2.08345$, $\pi_2^* = 10.0$, $ETC^* = 909.984$ and $B^* = 0.0$.

The following figures represent the percentage change in the optimal solution for different values of $\epsilon = \{0, 0.5, 1.0, 10, 20, 40, 80, 100\}$ corresponding to $\delta = 0.2$ (0.2) 0.6.

Figure 5: Percentage change in the optimal solution for values of ϵ corresponding to $\delta = 0.2$

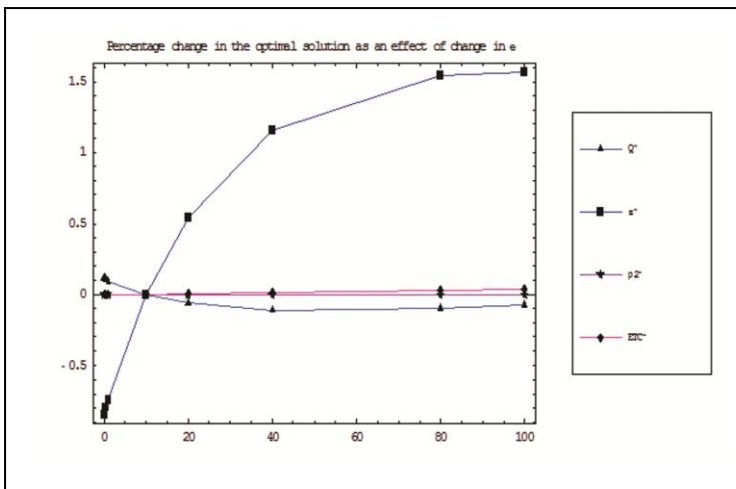
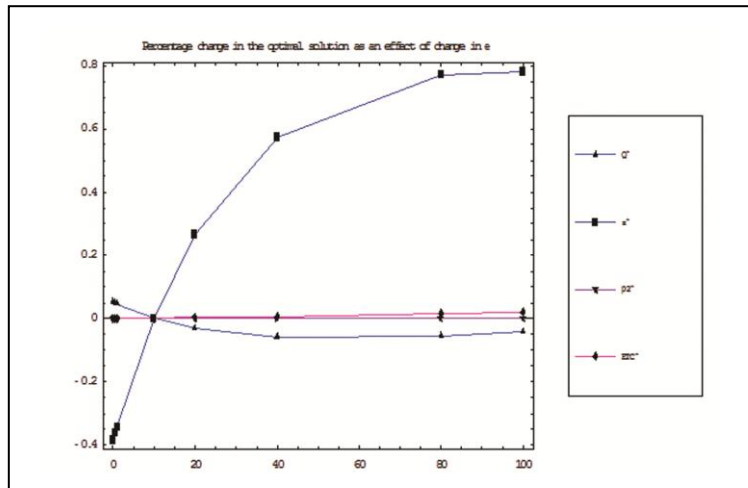


Figure 6: Percentage change in the optimal solution for values of ϵ corresponding to $\delta = 0.4$

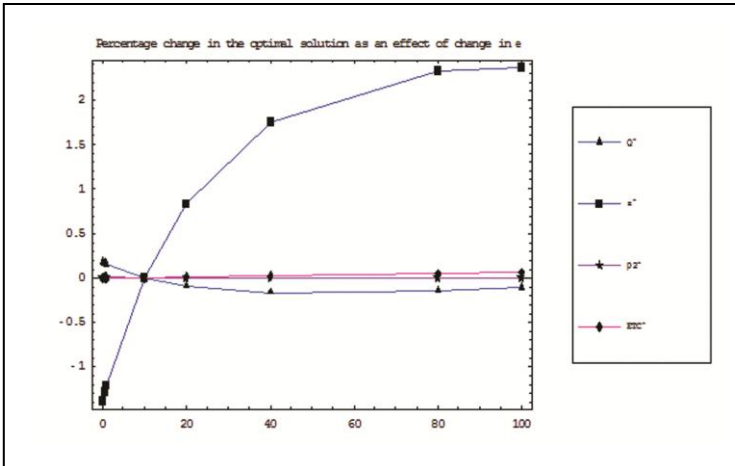


Figure 7: Percentage change in the optimal solution for values of ϵ corresponding to $\delta = 0.6$

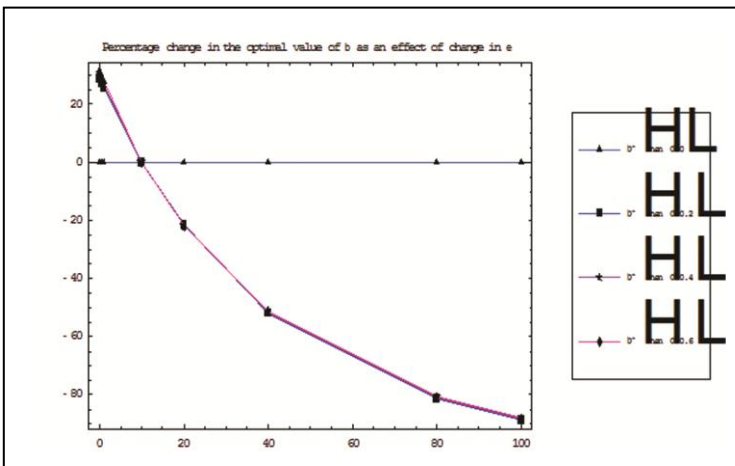


Figure 8: Percentage change b^* for values of ϵ corresponding to $\delta = 0.0(0.2)0.6$

The figures 5 - 7 indicate that the optimal safety factor z^* is highly sensitive and the optimal order quantity Q^* is slightly sensitive respectively with respect to the backorder parameter ϵ . The other variables are less sensitive with respect to ϵ .

The figures 5 - 7 also indicate that the optimal safety factor z^* is highly sensitive and the other variables of the proposed inventory model are insensitive respectively with respect to the backorder parameter δ .

Figure 8 shows that the optimal backorder price discount B^* is highly sensitive with respect to the parameter ϵ but insensitive with respect to the backorder parameter δ . Therefore proper care should be taken while estimating the parameters ϵ and δ .

Conclusion

In this paper, optimal inventory policies and optimal capital investments are determined in an inventory system with random lead time, random lead time demand and yield randomness. Partial backlogging and backorder price discount are also considered in the model. A logarithmic investment function is used in the proposed model to reduce the set up cost and yield standard deviation, which are important strategies in the modern production/manufacturing industries. This is consistent with the JIT (Just In Time) manufacturing system encouraging small lot-size/batch of high quality products which has evolved in the last few decades. It has been shown that the expected total annual cost of the system is less when capital investments are made relative to the case when there is no investment option and hence significant cost savings can be achieved in the previous case. An interesting research topic in the related area may be to consider a general investment function.

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THE ROLE OF BUSINESS INCUBATORS IN ENTREPRENEURSHIP DEVELOPMENT - A BRIEF REVIEW OF LITERATURES

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Chandrani Dutta

Abstract:

The article reviews some major works depicting the role played by the business incubators in creating an enabling environment for the entrepreneurs to innovate, nurture their ideas and commercialise the same. The article highlights the different types of business incubators and their distinct objectives especially focusing on the roles of technology based incubators or technology incubators and business incubators tied up with universities and research institutes. The article, also, points out the concept of science and technology parks in this connection and the constraints affecting the performance of the business incubators and the remedies available to remove them.

Key Words:

Anchor Universities, Business Incubators, Industrial Business Incubators, Mixed Incubators, Technology Based Incubators, University Technology Based Incubators, Science and Technology Parks



I) Introduction

India, a nation in the Central and Southern Asian region belonging to the Lower Middle Income group, has 66th position in the Global Innovation Index (GII) ranking among 142 countries of the world in the year 2013. The global ranking of India dropped to 76 as per GI index among 143 countries in the year 2014. Again, in the year 2015, the global ranking of India further dropped to 81 among 141 countries of the globe. However, in the year 2016, the ranking improved to 66th position among 128 nations of the world. Hence, it is observed that a country like India with a population of 1311.1 million and a GDP of 2090.7 billion in US dollars approximately in the year 2016, has recently taken a turnaround in terms of innovation among her peers in spite of deteriorating ranking previously (Cornell University, INSEAD & World Intellectual Property Organisation (WIPO), 2013, 2014, 2015 and 2016).

II) Concept of Business Incubation

An entrepreneur has an idea but the idea needs some period of nurturing before it can be transformed into a reality and launched in the market to face the different challenges from peers as well as big corporate houses. It is at this stage, a business incubator steps in and create an enabling environment for the entrepreneur so that he/she may proceed with the idea. At the preliminary stage, a start-up needs an accommodation at nominal rate, requires an array of services at a reasonable price, tries to network with the financiers, tries to participate in various entrepreneurship related events and wants assistance in developing business plans, marketing strategies and legal support, etc. All these

services are provided by the business incubators that help the start-ups to graduate as fully flown enterprises to face the market competition. In India, the government is taking initiatives to strengthen the entrepreneurship climate of the nation. The business incubators in India are government sponsored like the 10000 start-up programme of the NASSCOM, independent in nature like the Khosla Labs, corporate in nature like the PayPal and most importantly, academic in nature where the research institutions like the IIMs, IITs, etc. play a proactive role in commercialisation of the research idea and mentoring of the start-ups through alumni support. Thus, a favourable ground is attempted to be created where industry-academia partnership can successfully take place in India.

Adegbite (2001), in the research article, states that the business incubators act as an one stop facilitator providing space, common services like training, product development, marketing, etc., monitoring the growth of the businesses against their business plans, networking with outsiders for provision of risk capital and extending advice regarding research and development. Aernoudt (2004) observes that business incubation is a dynamic process encompassing not only the shared office space, shared devices but also extending management support, legal advice, networking with the angel investors, market advice, etc. (National Business Incubation Association (NBIA), 1997 as cited in Aernoudt, 2004). The author critically reflects that the success of the business incubators depend on criteria like sufficient number of new tenant start-ups with the ability to grow, optimum rotation rate and rolling of the tenant firms through entry and



exit from the incubators, survival rate of the start-ups leaving the business incubators, creation of entrepreneurial attitude among the people, strong connection with the industry, universities, research institutes and maintenance of networking with the financiers (Aernoudt, 2004). Manimala & Vijay (2012) have underlined the concept of Business Incubators through the different services provided by them namely, flexible lease option in exchange of space facility, a collection of support services shared by the tenant incubatees thereby leading to the reduction of the overhead costs, variety of managerial and professional mentorship and enabling access to different venture capitalists and others to collect the required capital (Brooks, 1986 as cited in Manimala & Vijay, 2012). The authors have conceptually drawn the differences between business incubators and science and technology parks where the incubators play a very significant role in the commencement stage of the start-ups whereas the science and the technology parks offer several services to varied types of organisations in different stages of their growth and survival. According to the authors, the three major roles that are played by the incubators are selection of the entrepreneurs, offering various business support services and enabling the start-ups to access the resources they require (Manimala & Vijay, 2012).

III) Objectives of Study

The present study is undertaken to attain the following objectives.

1. To identify the different types of Business Incubators as identified in the different literatures,

2. To understand the role played by the Business Incubators in general in entrepreneurship development from different literatures,
3. To highlight the importance of the Technology Business Incubators (TBIs) and the University TBIs in fostering entrepreneurship development,
4. To make a comparative study of the roles played by the Science Parks and TBI in general,
5. To analyse the issues that require consideration as given in different literatures for betterment of the role of the Business Incubators.

IV) Types of Business Incubators

Adegbite (2001) distinguishes between two types of incubators in Nigerian context namely Industrial Business Incubators and TBIs. Aernoudt (2004), in the research article, has made a conceptual analysis of the different types of incubators and the importance of considering the type of incubator for judging the impact of incubation on entrepreneurship development and growth of start-ups. The author has vividly stated that incubation is becoming an 'umbrella term' nowadays and is encompassing incubators catering to the needs of varied entrepreneurs ranging on low technology based to high technology based. The research paper highlights five different types of incubators namely mixed incubators, economic development incubators, technology incubators, social incubators and basic research incubators. Mixed Incubators incubate all types of enterprises ranging from low tech to high tech and meeting the needs of manufacturing and services oriented enterprises. The traditional incubators, especially the oldest one situated in USA,



were of this nature. Gradually another concept of incubation emerged in the UK and in the USA where incubators are considered as a tool for diversifying the regional industrial base and improve the competitiveness at the regional level namely economic development indicators. It was at this juncture, that there was a pressing need to collaborate with the universities, public research institutes to cater to the requirements of high technology based enterprises. This led to the evolution of TBIs. Apart from these three types of conventional incubators, there are two more varieties of recent origin. Social Incubators are one of them whose primary objective is to support, assist the businesses and companies employing people with low employability i.e., unskilled labourers, disabled workers, etc. Lastly, the Basic Research Incubator is set up with the primary intention to nurture the research ideas in the laboratories and finally creating an intellectual property out of it after the incubation. Such intellectual property right is licensed to entities, commercial partners and so on (Aernoudt, 2004). According to Aernoudt (2004), the different countries in Europe have distinct objective behind business incubation. While differentiating the approaches, the author classifies them into three categories namely Anglo-Saxon approach, German approach and Latin Approach. UK and Finland follow the Anglo-Saxon approach. In the UK, the incubation idea centered around good quality houses, good restaurants, hotels and closeness to international airports rather than establishing connection with the universities. The incubators in the UK are profit oriented and the space is mostly occupied by the accountants, insurance companies and financial services providers. In Finland, the business incubators have

three variants namely mixed type incubators, technology incubators and economic development incubators. The author points out that among the mixed type incubators, incubators in the field of art and tourism are remarkable. The technology incubators are found to maintain strong connection with the university research. Moreover, the incubators in Finland have played a proactive role in transforming the attitude of the people towards entrepreneurship. In Germany, innovation centres would include both business incubators and technology and innovation centres that provide with office space, specialised consulting for start-ups, technical and technological advices and assistance. (United Nations, 2000 as cited in Aernoudt, 2004). The basic intention behind the innovation centres is to reduce the regional disparities, focus on the neglected sectors of the economy, boost the technology transfer and creation of employability. The business incubators in Germany are non-profit making in nature, incubation period range between 3 to 7 years and the survival rate of the graduates is also satisfactory. In Austria, the business incubators are virtual in nature and they try to save the construction costs and provide the same to the incubatees in the form of seed capital. The business incubators provide online support in the areas of fiscal advice, technical and managerial assistance, etc. As per the French perception, business incubators would indicate provision of office space, shared common services, hands-on support to the start-ups during the launching phase and effective follow up of the same. Hence, the author observes that the variety of approaches behind incubation in Europe is termed as 'Incubatio' with the variety in roles and objectives (Aernoudt, 2004).



Manimala and Vijay (2012) have extensively discussed the major classifications of the incubators. On the basis of their specialisation and the areas they cater to, they may be classified as mixed use incubators, technology based incubators, manufacturing based, service based and speciality based incubators. On the other hand, they may be segregated on the profit oriented motive like non-profit oriented incubators and profit oriented incubators. Technology Based Firms (TBFs) face the same challenges of being new to the field and challenges associated with small size of their business but they are required to face some additional risks and uncertainties. The authors point out the uncertainty of using a new technology, high dependence on skilled labour force, lack of barrier for entry of new competitors, greater degree of global competition, regulatory obstacles and ambiguity, etc. (**Schoonhoven & Eisenhardt, 1990** and **Manimala, 1994** and **Qian & Li, 2003** as cited in **Manimala & Vijay, 2012**). It is for these factors, the TBFs focus more on planning activities, acquisition of resources than on marketing in the initial start up phase (**Liao and Welsch, 2003** as cited in **Manimala & Vijay, 2012**). Hence, the authors feel that the significance of TBIs in offering specialised assistance, mentoring to TBFs has increased. The TBIs have not only led to the commercialisation of technology developed by the Research and Development Institutions and laboratories but they have also minimised the regional disparities by providing networking support to the budding entrepreneurs from remote locations and have also proliferated job creation (**Phillips, 2002** and **Phan, Siegel & Wright, 2005** as cited in **Manimala & Vijay, 2012**).

V) Role of Business Incubators In General

Business Incubators play a crucial role for the development of the Small and Medium Enterprises (SMEs) as pointed out by **Adegbite (2001)**. The business incubators perform certain roles like reduction in the failure rate of the start-ups, carrying out various outreach programmes to reach to the SMEs at the grass root level, foster innovation in the technology, mobilise the human and material resources for the development of entrepreneurship, etc. In the context of the Nigerian national economy, **Adegbite (2001)** observes that business incubation will lead to the developing of the industrial base of the country, reduction of the dependence on foreign intellectual capital due to the commercialisation of technological innovations, broadening of the variety of the industries like information technology, agro-allied industries, generation of employment opportunities, etc.

The research paper covers a survey of seven business incubators of Nigeria. Out of seven incubators in Nigeria, four of them are industrial business incubators catering and nursing to large variety of manufacturing enterprises. The basic objective for setting up industrial business incubators is to support the domestic entrepreneurial talents for roughly three to five years so that they develop the ability to build their own factory premises in the industrial layouts of the state governments and carry on their activities independently. But the survey depicts that the four industrial business incubators have failed to achieve the primary objective since most of the incubatees do not leave the incubators even after 20 years of stay in the same. This is mainly due to the inability of the respective



state governments to provide them with convenient location and very nominal rental price charged by the incubators. On the other hand, the industrial business incubators suffer from weak, bureaucratic management and for their dependence on government's subsidies as they are not self financing in nature (**Adegbite, 2001**).

In another working paper, **Hackett (2004)**, has tried to understand the intricacies of the incubation process and has made an attempt to investigate the relationship between the incubation process and the business outcomes of the entrepreneurial ventures in terms of growth and profitability. The author tries to develop a model, test and validate the same so that the elements of the incubation process can be used as a predictor of the business outcomes of the start-up ventures. Hackett points out that the business outcomes can be inferred from the developmental state at which the incubatees are taking exits from the incubators and there can be five mutually exclusive possible outcomes. They are Profitable and Growing state, Growing and On a Path to Profitability state, Marginal Company, Quick Cheap Death state and Expensive Death state. The study undertaken by the author extensively draws from the literatures that the incubation process revolves around three major roles like the proper selection of the start-ups for admission to the incubators, coaching and monitoring them and filtering out those which are expected to be unsuccessful ventures and acting as a network to give the incubatees access to different resources so that eventually they emerge independent in the market. The author fits the Real Option theory to the process of business incubation and used statistical tools like ANOVA, multiple regression analysis for testing of

hypotheses but no statistically significant relationship was obtained between the business incubation process and the outcomes of the start-up ventures. In spite of insignificant statistical relationship, the author argues that the importance of the business incubation process cannot be undermined. The author observed that the variables namely selection based on managerial characteristics of the start-ups and monitoring and assistance exhaustiveness and quality were having comparatively high correlation with the business outcomes than other variables. Hence, this made the author to conclude that these variables independently may foster improved business outcomes.

The author concludes that the study provides us with deep insights that business outcome is not the function of only three variables but there is a need to identify other factors that influence the growth and profitability of the start-ups. The author feels that the real options based theoretical approach in the business incubation context holds true since there are only 45 expensive deaths out of 1057 incubatees of the 53 incubators taken for the purpose of this study (**Hackett, 2004**).

Aernoudt (2004) observes that it is pertinent to understand the interaction between three major aspects namely entrepreneurship, incubation and the business angel networks. The author observes that entrepreneurship culture is not so common in Europe and this has an effect on the inflow of the projects to the incubators and their possibility to qualify as graduates and self sustain after they take an exit from the incubators. Most of the incubators focus on regional development and should emphasise on start-ups



possessing high potential in job and value creation. The author states that the predominant obstacle in the growth of the business angel network is the inadequacy of entrepreneurship, regular flow of projects and absence of formal seed money providers helping them to exit. The paper presents a graphical illustration to identify the relationship between incubators, entrepreneurship and business angel networks. Incubators are the creators of real entrepreneurship which is given further impetus through the business angel networks. The business angel networks invest their money in the projects lying with the incubators. Increased level of entrepreneurship results in the formation of TBEs. As a result of this, the regional development automatically takes place. The author states that based on American evidence, the growth of TBEs will consequently lead to the growth of entrepreneurship again and will increase the flow of projects to the incubators, will improve the rotation ratio of the incubators and hence, will maintain a good link between the tenants and the graduates (Organisation for Economic Co-operation and Development (OECD), 1997 as cited in Aernoudt, 2004).

VI) Role of TBI and University TBI

According to the survey conducted by Adegbite (2001) on the three technology business incubators in Nigeria, the author observes that they focus on innovative, unique technology oriented start-ups, have incorporated stringent entry and exit norms for the tenant start-ups, provide managerial assistance, office and administrative support services and most importantly, enable networking with research institutes, universities and financial institutions. The

research article depicts that the TBIs face similar problems like the conventional industrial business incubators.

Aernoudt (2004) highlights the status of business incubation in USA where the majority of the incubators are of mixed type followed by TBIs and half of such TBIs are affiliated with universities (NBIA, 1997 as cited in Aernoudt, 2004). One notable observation is that the TBIs depend hugely on subsidies and the managers of the TBIs have to devote their primary time in ensuring financial stability and self sustainability in the long run. In reality, provision of services to the TBEs takes a backseat in this situation (Sarfranz, 1998 as cited in Aernoudt, 2004). In spite of this, the contributions of the TBIs outperform the other two conventional types in terms of employment creation by the tenants, jobs created by the graduates and survival rate of the start-ups. Moreover, TBIs and the Mixed Incubators in the USA achieve the rank 1 in the criteria of retaining the graduates in the regional community. Networking both inside and outside the incubators are of vital importance and the author observes that the tenants maintain networking with the co-tenants and the graduates also maintain business relation with the tenants. The TBIs encourage the graduates to offer advice to the tenant start-ups but few of them have incorporated proper policy to involve the graduates formally in the system of mentoring. Though the equity financing is a feasible option in USA, majority of the incubatees depend on external financing due to non availability of seed capital or angel capital (Sarfranz, 1998 as cited in Aernoudt, 2004).

According to Manimala & Vijay (2012) there are four theories to justify the presence of



the TBIs such as the structural support theory, cluster theory, networks support theory and resource based view. The authors have depicted that one way of classification of the TBIs is based on the sector they assist like information technology and electronics, bio-medical applications, etc. Another aspect of classification is based on the sponsorship of the TBIs such as University based, Private, Hybrid, etc. Though, theoretically, University TBIs (UTBIs) are considered to be very effective as they are capable for the commercialisation of the technology developed by the universities, the authors claim that many studies have pointed out contradictory results where the incubatees develop the technology independently (Phillips, 2002 as cited in Manimala & Vijay, 2012). Manimala and Vijay (2012) point out that some studies reveal that relationship between academia and the incubators can be enriched if informal exchanges and relationships are built between the two (Rothschild & Darr, 2005 as cited in Manimala & Vijay, 2012). Other factors are legal and contractual constraints, university regulations and failure of the incubatees to pay adequate royalty for transfer of technology for restricted interaction between the universities and the incubators (Phillips, 2002 as cited in Manimala & Vijay, 2012). Sometimes, the paucity of the interests of the entrepreneurs has resulted in low interaction between the start-ups and the university as found in a study on science park (Manimala, 1994 as cited in Manimala & Vijay, 2012). TBIs are considered to have links with research centres, laboratories, universities, technology transfer agencies and it is always advisable that they should get established in close proximity to these institutions as TBIs are entrusted with commercialisation of technology. TBIs are

also required to meet the region specific challenges as well (OECD, 1997 as cited in Manimala & Vijay, 2012). The services provided by the TBIs include facilities like basic infrastructure facilities, research and development related facilities, financing facilities and administrative services (Tamsy, 2007; Phillips, 2002 as cited in Manimala & Vijay, 2012). Over and above the basic services, there are some sector specific services for the incubatees operating in certain technological sectors. According to the authors, TBIs have been successful in terms of greater employment of the tenant start-ups, higher employment generated by the entrepreneurs once they exit from the TBI programmes, better survival rate for the start-ups as per the previous studies (Aernoudt, 2004).

The authors not only draws the differences of TBIs from different aspects between the developed and developing countries but also makes a lucid comparison of the TBI experiences of different developing economies like China and India. In the developed nations, the author points out that TBIs are closely connected with the universities and the research institutions and that is complemented with a sound legislative structure that fosters the transfer and commercialisation of technology like the Bayh-Doyle Act, 1980 of the United States (US) <http://www.oecd.org/dataoecd/52/16/40208619.pdf> as cited in Manimala & Vijay, 2012). The authors state that the Chinese incubation industry is the third largest in the world and the largest among the developing countries (Lalkaka et al., 2000; Harwitt, 2002 as cited in Manimala & Vijay, 2012). The authors point out the transformation in the policy environment of China where initially, economic growth was aspired through gathering of capital. Gradually, the



approach changed to an increased concentration on betterment of technology that led to the growth of the TBIs in China. In line with this approach, **Manimala and Vijay (2012)** feel that the Torch programme of China implemented in 1988 has considered TBIs as the major source of commercialisation of technology (**Economic and Social Commission for Asia and Pacific (ESCAP), 2004 as cited in Manimala &Vijay, 2012**). Undoubtedly, the Chinese TBIs have been very successful in the context of the number of tenant incubatees, incubatees graduating, sales turnover of the tenants, amount of resources involved in the incubation programmes, tax revenue generation, creation of employment opportunities and so on. But the authors critically observe that majority of the Chinese incubators are government controlled and therefore they lack the market inclination and suffer from lack of financial self dependence. Moreover, they critically claim that TBIs have bureaucratic management and have very inadequate representation of women and minorities. The major points of distinction between the TBIs of the US and China are that the former are both for profit and non-profit objective and are connected to the universities whereas the latter are for non-profit objective and are based in state owned huge buildings (**Chandra et al., 2007 as cited in Manimala &Vijay, 2012**). Lastly, the authors draw the readers' attention to the TBIs in the context of India and state that incubation has been in the forefront in terms of the government's favouring policies. According to the **ESCAP (2004) (as cited in Manimala &Vijay, 2012)** report, TBIs and the Science and Technology Parks serve as better investment opportunity for the government in the form of taxes as returns and creation of job opportunities.

In another study conducted by **Qian & Rao (2017)**, the role played by the research universities in US to promote entrepreneurship and to create a better entrepreneurial ecosystem in the college towns has been emphasised. The authors have conducted a regression analysis to study whether the university and location oriented factors are leading to new venture creation. They have also conducted case studies to make a comparison of two college towns where one is more entrepreneurially inclined and another one is less entrepreneurially inclined. The authors state that initially, a very narrow view was taken on the role played by the research universities where they are only engaged in building individuals as entrepreneurs and employees of the startup ventures and are engaged in providing spaces for entrepreneurship oriented events. But the view has widened where the universities are considered in taking more proactive role in commercialisation of university research through start up activities. Start-ups connected with research in the universities are of four types like start-ups formed by the faculties and university staffs, ventures undertaken by the research scholars and the students, start-ups created solely with the intention of transfer of the technology of the university and new ventures jointly conducting research with the universities (**Bercovitz and Feldman , 2006 as cited in Qian and Rao, 2017**). Moreover, universities can provide entrepreneurship degrees and diplomas and can also act as a business consultant to guide the start-ups in the preliminary phase (**Kuratko, 2005 and Lendel & Qian, 2016 as cited in Qian and Rao, 2017**).

The authors conduct regression analysis to statistically test the causal effect of the



anchor universities on the start up rate and entrepreneurship rate in the college towns of the USA. The research is based on the hypothesis that universities play a more crucial role in high tech entrepreneurship than to general entrepreneurship. The authors use entrepreneurship rate and high tech entrepreneurship rate as the dependent variables. Some of the university related explanatory variables include entrepreneurship degree, incubator, land grant, graduation rate, STEM research and development and so on. Regional explanatory variable include establishment size, human capital, etc. The paper depicts that the land grant university explanatory variable is statistically significant in encouraging the general start up creation rate whereas in case of high tech start up rate, there is no significant causal factor. The authors have discovered through the analysis that the traditional regional factors are statistically more significant to both entrepreneurship and high tech entrepreneurship than university oriented factors. The study is based on the causal variables for a time period of 2010-11 but the authors have carried out a similar and extended study on the causal variables for the time period of 2011-12 and the prior results were obtained with one exception i.e., there exists a statistically significant negative association between the graduation and entrepreneurship. The research paper highlights two case studies based on the role of University of Colorado in Boulder in the regional entrepreneurship ecosystem and the University of Iowa in the Iowa City. Case studies are based on the responses obtained by the researchers on interviewing different groups of the ecosystem namely entrepreneurs, entrepreneurship support organisations, faculties and staffs of the universities and so on. The research paper

highlights the similarities and differences between the two ecosystems and the two universities' efforts in promoting entrepreneurship. Both the ecosystems suffer from the lack of finance to meet the needs of early stage and growth stage of the start-ups, experience dearth of technical talent to meet the needs of the human capital of the start-ups, absence of centralised repository of data where all the information regarding the ecosystems can be made systematically available for meeting the needs of the entrepreneurs, improper representation of women and minorities, etc. The differences that exist between the two cities are in the areas of expert mentorship, availability of venture capital firms, potential of the cities in attracting the human talent and so on. However, the two universities share some similarities in the nature of entrepreneurship programmes, certificate courses, etc. that they offer. According to the authors, both the universities also have their shares of the common weaknesses. Both of them do not provide incentive to the faculties for commercialisation of research and starting their own start-ups, both suffer from bureaucratic nature of handling the requests of the entrepreneurs, inability to provide adequate support from the alumni network, inability to supply proper technical talent to meet the needs of the start-ups. The authors reflect that there is diversity in the roles played by the two universities in their respective ecosystems due to geographical and environmental considerations wherein University of Iowa is compelled to play a more proactive role in building entrepreneurship. Moreover, the article draws another point of distinction where the programmes at the University of Iowa are more centrally controlled and maintained and hence, they are better coordinated than



the programmes at the University of Colorado (Qian & Rao, 2017).

VII) Science ANE Technology Parks and TBI

It is known to us that TBIs are primarily focused on technology transfer and commercialisation of technology developed by researchers, academicians. They have a wide range of services and facilities for the incubatees which are not limited to the provision of rental space. Technology park is a property oriented initiative which gives the start-ups a high quality location having close proximity with an university, research institution. Generally, it is observed that the enterprises nurtured in the TBIs are housed in the Technology Parks in the later stage of their development. Since there exists a close interconnection between the two, it is preferable to have both the institutions in close proximity with one another (UNIDO, 1999).

The roles played by them are likely to be different because of their distinct intentions but there may be some common services between them. TBIs usually extend space, common services like fax, telephone, enterprise counselling, technology counselling, provision of finance and networking facilities both inside and outside the TBIs. On the contrary, the Technology parks are located near to the airports, railway stations, highway systems to provide good access facilities to the unit located in the parks. Technology Parks are expected to extend excellent infrastructure in the form of conference rooms, data networks and should be located near a pool of skilled labour base. Technology Parks should also give the opportunity to the start-ups for future development in the form of reasonably priced land/building or should

give financial incentive schemes like lease, etc. Lastly, they should be located near the research institutions like the Cambridge Science Park, Oxford Science Park, etc (ibid.).

To establish the fact of interconnection between the TBIs and the Technology Park, an example of University of Twente in Netherlands may be cited. The university has played a proactive role in the rejuvenation of the industrial climate of the region after the fall of the textile industry. The university collaborates with an incubator namely Business and Technology Center that incubates small scale knowledge intensive units requiring space close to the university. Business and Science Park, a technology park was created near to these institutions to facilitate transfer of knowledge and technology to the market (ibid.). Macdonald and Joseph (2001) have tried to make an evaluation of the TBIs and the Science and the Technology Park in Philippines in a research paper which had been existing there for five years. The authors critically analyse that there existed uncertainty in clearly defining the terms 'TBI' and 'Science and Technology parks'. Confusion also existed in understanding the primary objective of establishing these two institutions i.e., whether the incubation of the new business or transfer of technology was the primary goal. Moreover, there was no assignment of targets to these institutions which could lead to effective monitoring and hence, the monitoring was only limited to financial and administrative aspects.

The National Science and Technology Entrepreneurship Development Board (NSTEDB) was formed in 1982 under the umbrella of Department of Science and



Technology in India with an objective to promote and develop knowledge based and technology oriented start-ups. The institute aims at transforming the job seekers into job generators through the involvement of science and technology (<http://www.nstedb.com/index.htm>).

NSTEDB has taken initiatives to create Science and Technology Entrepreneurs Parks (STEPs) to create a favourable climate for innovation, research, information exchange, sharing of experience, knowledge and facilities between different groups like students, academicians, researchers, industrial managers, etc. They focus on collaborations between academicians and researchers on one hand and industrial people on the other hand. STEPs are autonomous bodies registered under Societies Registration Act. STEPs provide nursery sheds, precision tool room, central workshop, data bank, library, documentation facilities, etc. and extend training, technical support and similar services as well. The department has established 15 STEPs in different corners of the nation that have supported 788 units approximately generating an annual turnover of Rs. 130 crores and creating jobs of more than 5000 people. STEPs have organised different skill development programmes that have catered to more than 11,000 persons. The enterprises supported by STEPs have come out with more than 100 new products and technologies (<http://www.nstedb.com/institutional/step.htm>).

VIII) Issues for Consideration

In the Nigerian perspective, **Adegbite (2001)** brings out the major issues that should be taken care of if the business

incubators are made to perform a proactive role in entrepreneurship development and innovation in technology. Some of the predominant issues are addressing the need of suitable location for the start-ups after taking exit from the business incubators, improving the commercial viability of the incubators, encouraging more private participation in the field of business incubation, making the admission criteria transparent and fair, framing a consistent policy for the development of the business incubation and proper financing of them, setting an achievable target to be reached by the business incubators over a definite time period by the policy makers. But, it is found that the business incubators are not engaged in providing variety of services like financial assistance and seed capital financing, management training and mentoring, technical guidance, marketing facilities, networking with different research institutes, universities, etc.

The author feels that the distinct roles played by the Federal, State and Local Governments should be clearly spelt out. Moreover, the author recommends that private ownership and sponsorship and the universities should be motivated for establishing business incubation centres. The author suggests that the incubator centres should incubate roughly twenty to fifty tenant start-ups and should maintain some connectivity with the industrial estates to reduce initial costs. The article reflects that provisional allotment of lands should be made to the start-ups at the time of admission to the business incubators in order to comply with the exit criteria, adhering to the strict entry and exit criteria, making the incubators self sustaining in nature by relying on its own generated fund after the expiry of the break even period, charging



market rates as rents after the expiry of the initial periods from the start-ups to enable them to face the realities of the world and extending the option of purchase of the incubator units to the tenant start-ups at market rates in the event of their resistance to exit from the incubation centres and consequently generation of funds for extending the incubation facilities to the other prospective start-ups in the due course. In another study done by **Hackett (2004)**, the author feels that quick cheap failure of the start-up is a good business outcome as it gives the learning experience to both the start-ups and the incubators, provides opportunity for recovery of the venture and again repositioning itself in the competitive market scenario. The paper tries to highlight some of the challenges that are faced in managing the incubators namely unbalanced demand for their services, difficulty in mentoring and coaching some incubatees due to their lack of awareness of the market, improper utilisation of the resources provided to the entrepreneurial ventures. Some incubators have been found to coach the prospective incubates prior to their admission in the incubators. The paper reflects that there may be two different orientations of incubator manager such as the social orientation approach where incubation is considered pivotal for social welfare and market orientation approach where incubation is taken to prepare the start-ups for facing the market challenges. The research paper shows the path to the future researchers in the form of modification of the business outcomes from the growth and the profitability of the incubatees to the ability of the incubators to kindle entrepreneurial activities in the community level. Moreover, the provision of the shared office space by the incubators to the tenant companies should be

incorporated as a part of its role in encouraging the budding entrepreneurs. **Aernoudt (2004)** observes that two issues that should be addressed in the European context are creation of dynamic business environment and development of entrepreneurial spirit and risk taking culture.

Manimala & Vijay (2012) have classified the factors into socio-cultural factors, economic factors and political factors that act as barriers in the way of innovation and entrepreneurship in the developing economies. They explicitly state that if the societal norm treats entrepreneurship with suspicion, then it hinders the growth of entrepreneurs. The economic factors relate to the favourable policies that create conducive environment for the development of entrepreneurship. The limiting factors generally include under developed financial markets, lengthy and time consuming procedures in the banks, venture capitalists' inability to encourage investment of the small businesses and value intellectual property, instability in the legal and regulatory regime are some of the many inhibitions that affect the entrepreneurship. The political factors include short lived governments' unpredictable regulations, over-reliance of the businesses on the government system dampening their managerial and leadership spirit, etc.

The paper concludes finally with raising some issues regarding the success and concern factors of the TBIs. It has been stated that no statistical significant relationship has been found between the assistance of the TBIs and the growth in sales or revenue of the tenant companies (**OECD, 2007 as cited in Manimala & Vijay, 2012**). The paper highlights from the



literatures that instead of creating spirit of exploration and innovation among the entrepreneurs, the incubation system is probably motivating the exploitative spirit of the entrepreneurs on the known resources (Hite and Hesterly, 2001 as cited in Manimala & Vijay, 2012). The authors, also, mentions that increased dependence on the government has led to decreased self dependence and proper perspective towards the market among the start-ups (Chandra et al, 2007 as cited in Manimala & Vijay, 2012). Though networking is believed to be the primary advantage of the incubation system, it is evident that arrangement of physical space becomes the predominant objective of the incubator managers since it is easier to provide than effective networking. The article reflects that there has been a unanimous consent that TBIs has helped in the tenant firms' survival rate. But the authors vividly point out that it is very difficult to measure the success, effectiveness of the TBI since there are many varieties of parameters to gauge their success (Bøllingtoft & Ulhøi, 2005 as cited in Manimala & Vijay, 2012). Moreover, sometimes the TBIs, themselves face financial instability which increase their dependence on the government grants and they focus more on their own financial planning and management than that of the incubatees. The article distinguishes two practices implemented by the incubators namely the task environment and the general environment where the former helps the entrepreneurs to enter the business world and the latter induces creation of innovative and enterprising individuals who can sustain in the competitive environment. (Manimala & Vijay, 2012).

Qian & Rao (2017) concludes with the general discussion of the roles played by the

universities in entrepreneurship development in different college towns where the universities are the most important assets. Firstly, the paper states that the anchor universities meet the labour and human resource demands of the local entrepreneurial ecosystem (Feld, 2012 as cited in Qian and Rao, 2017). But, they should take more care in retaining the talents to meet the demands of the local start-ups and should have some flexibility in restructuring the curriculum to meet the type of skills demanded by the local start-ups. Secondly, the universities should use and provide access to the nationwide available resources that are required for entrepreneurship support programmes. Moreover, the universities play a major role as brokers linking and bringing together different elements of the ecosystem. The authors advise the universities to collaborate formally and informally with the other support organisations and effectively utilise the alumni entrepreneurs for the mentorship of the teaching and student aspiring entrepreneurs. The research paper explains that the universities can take a more proactive role by establishing the start-up ecosystem in the campus itself but connected with the regional ecosystem.

IX) Conclusion

Business Incubators definitely play multifaceted role in entrepreneurship development. In order to improve their efficiency and effectiveness, it is required to make them self-sustaining in nature and reduce their dependence on government's subsidies and support. The management of the business incubators should deviate from the bureaucratic lines and the incubator managers should develop networking with the alumni, angel investors, etc. to extend



the adequate support to the tenant firms. After the brief review of literatures, it is understood that it is necessary to classify the business incubators according to their objectives or other parameters to evaluate the success or failure of the same and efforts should be directed for involvement of universities, research institutes in business incubation on an enhance scale.

X) Scope for Further Research

After making a brief review of literatures, it is observed that future research can be conducted to analyse the roles of TBIs and University TBIs in the Indian context, making a comparative study of their roles in the cities acting as leaders, aspirants and emerging in building the start-up ecosystem. Another direction of the research can be to explore how the University TBIs can play a proactive role in inculcating entrepreneurship focussed curriculum.

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QUALITY OF INTELLECTUAL CAPITAL DISCLOSURE IN INDIA: A STUDY OF KNOWLEDGE - BASED AND TRADITIONAL SECTOR

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Abstract:

This paper has made a modest attempt to examine the intellectual capital (IC) disclosure practices of Indian firms from four sectors, two from knowledge based sector (KBS), namely, pharmaceutical sector and engineering sector and two from traditional sector (TS), namely, steel sector and textile sector for a period of five years from 2010-11 to 2014-15. Content analysis has been used to examine the annual reports of the sample firms and a four point scale (0-3) has been used to score the items. Using a comprehensive IC disclosure framework encompassing six components: human capital, IT, R& D and Inn, Strategy, relational capital, and Processes, it has been observed that for both the sectors, the mean scores have increased over the years. However, the disclosure scores have been observed to be higher for knowledge intensive firms as compared to traditional firms. Further, the component wise scoring revealed that, research development and innovation is the most disclosed component from the KBS while human capital is the most disclosed category from the TS. However, relational capital was observed to be the least reported component for both the sectors.

Key Words:

Intellectual Capital Disclosure, Knowledge Based Sector, Traditional Sector, Indian Firms



1. Introduction

The importance of intangible resources increased from the twentieth century, a period which is primarily known as the information age. The shift from industrial capitalism which is characterized by dependence on physical and tangible assets, to a knowledge economy wherein knowledge resources play a key role in value creation has changed the orientation of the present business scenario. The source of economic value in this new economy is no longer the production of material goods, but the creation of knowledge resources or intellectual capital (Edvinsson and Malone, 1997). However, under the traditional accounting system the value of such intangibles are not reflected in the balance sheet of firms. Investors, on the other hand, are not looking for information provided in mere financial statements and there lies a substantial gap between what they really want and what is portrayed in financial statements (Eccles and Mavrinac, 1995; Eccles *et al.*, 2001). Arguing in similar vein, the Organisation for Economic Cooperation and Development (OECD, 1999) reported that corporations have begun to invest a considerable amount on building employee competencies, research and development activities, customer relations, and computer and administrative systems as compared to physical and financial investments. Intellectual capital comprises of individual competencies, knowledge, information technology, patents, organizational structure, and customer relationships (Stewart, 1997; Edvinsson and Malone, 1997).

The need for IC disclosure has been justified by the researchers with the aid of certain relevant theories. For instance, it has been

contended that disclosure of IC can reduce information asymmetry, mitigate agency problems and reduce the associated costs (Garcia-Meca *et al.*, 2005). The legitimacy theory propounds that societal compliance is necessary to legitimise a company's position and disclosure is considered as an important mechanism for firms to legitimise their status. Similarly, it is argued that a firm can signal its strength to the market and differentiate itself from its competitors by disclosing IC related information (Anam *et al.*, 2011). Additionally, such type of disclosure also enhances the relationship of the firm with all its stakeholders. The resultant effect of IC disclosure is expected to enhance the market value of firms (Abdolmohammadi, 2005; Anam *et al.*, 2011; Uyar and Kilic, 2012).

Several initiatives were witnessed in the form of major research projects to spearhead reporting on intellectual capital. Research projects such as OECD, 1991; DATI, 1998; Work life, 2000 and MERITUM, 2001 introduced guidelines and developed frameworks to facilitate reporting on IC. Consequently, researchers such as Sveiby (1997), Guthrie and Petty (2000), Bontis (2003), Bukh *et al.*, (2001) and Schneider and Samkin (2008) constructed IC disclosure framework to analyse IC reporting practices. These frameworks have been used by several researchers to examine the extent of reporting in IC (April *et al.*, 2003; Abeysekera, 2008; Khan and Ali, 2010; Low *et al.*, 2015). Similar attempts have been made in India as well, wherein reporting on IC has been examined (Kamath, 2008; Joshi and Ubha, 2009). However, the use of binary coding in content analysis has been a prevalent practice in both Indian and international studies. Nonetheless, there are few studies which have used a scale for



analyzing IC related information. However, in the Indian context, the scaling scheme has not been used. Additionally, the restriction of sample selection to knowledge based sector has been a common practice, but, the strategic role of IC cannot be confined to a particular type of sector. Furthermore, most of the studies have used the frameworks of Sveiby (1997), Guthrie and Petty (2000) and Bontis (2003). These frameworks have used restricted number of items some of which are overlapping and ambiguous in nature.

In light of the above issues this study has three primary objectives. Firstly, the study intends to examine the quality of IC disclosure in India using a four point scale. The main benefit of this scaling system is that we can move from subjective disclosure to objective disclosure, and there is no study, to the best of our knowledge, which have adopted the scaling system to examine reporting practices in India. Secondly, the study contributes to the extant literature by examining the IC disclosure practices of both knowledge based and traditional sector. The absence of inclusion of traditional firms in India and the scanty number of studies at an international level has motivated us to take this issue. Thirdly, the use of a comprehensive disclosure framework developed on the basis of Bukh et al., (2001) categorization to analyze IC disclosure which is also a new arena in the Indian context.

2. Review of Literature

2.1 IC reporting practices: Empirical evidence

Guthrie and Petty (2000) analysed top 20 Australian listed companies on the basis of Sveiby (1997) framework wherein the IC

variables were categorised under three headings: internal capital, external capital and human capital. The results revealed external capital as the most reported component followed by internal capital and human capital. Using the same framework, April et al., (2003) examined the annual reports of 20 largest listed companies in South Africa and observed that the disclosure score for external capital was the highest, while the scores of internal and human capital were very close to each other. Similar results were observed by Goh and Lim (2004) in the case of Malaysian firms, Abeysekera and Guthrie (2005) for companies listed in Colombo Stock Exchange, Sri Lanka and Wong and Gardner (2005) in the case of select companies in New Zealand. In contrary, Khan and Ali (2010) conducted a study on private banks in Bangladesh and reported human capital as the most disclosed category and internal capital as the least disclosed category.

Bontis (2003) examined the disclosure trend of Canadian companies using a comprehensive list of 39 items. The observed disclosure level was found to be low. Kamath (2008) examined the annual report of knowledge-based companies listed on the Bombay Stock Exchange using Bontis (2003) framework. The results revealed low disclosure of IC. Using the same framework, similar results were observed by Joshi and Ubha (2009) and Ubha and Sidhu (2011) in the case of IT companies.

Using Bukh (2001) framework, wherein a total of six components are used to measure IC information, namely, human, IT, research development and innovation, strategy, processes, and customers, Garcia-Meca and Martínez, (2005) analysed IC information of firms listed in Spanish capital market. The

results revealed that Customers, Strategy and Technology were the most reported category. In another similar study by Gracia-Meca et al (2005), strategy, customer and processes were found to be the most reported category. Using the same framework, Rashid et al., (2012) examined IC information provided in the Malaysian initial public offering (IPO) prospectus. R&D was observed to be the most reported component and process and strategy were the second and third most reported component, followed by customers and lastly IT. Branswijck et al (2012) in the case of firms listed in Belgium and Netherlands observed that human capital and strategy were the most reported category.

Apart from examining the category wise disclosure, few studies also analysed the pattern of IC disclosure over the years. Vandemaële et al (2005) examined top 20 listed companies from Netherland, Sweden and UK for the years 1998, 2000 and 2002. An increase in IC disclosure over the years was observed and external capital was reported to be the most disclosed category. Abeysekera and Guthrie (2005) examined the intellectual capital disclosure of the Sri Lankan companies listed on the Colombo Stock Exchange. The study revealed an increase in intellectual capital disclosures in Sri Lanka but the increase was found to be statistically insignificant. Among the components, external capital was found to be the most disclosed subcategory followed by human capital. In another study, Oliveras *et al.* (2008) explored the level of IC disclosures in the annual reports of Spanish companies. The results showed a significant increase in the level of disclosure over the three-year period and external capital was observed to be the most disclosed component. Abeysekera (2008) investigated

the IC disclosure practices of Sri Lanka and compared the results with unpublished work undertaken in Singapore. The study found that the intellectual capital disclosures in Singaporean firms increased significantly during that period while such increase was not significant in Sri Lanka. The study reported human capital as the most disclosed subcategory in Singaporean firms while external capital was found to be the most disclosed subcategory in the Sri Lankan firms. Mitchell and Williams (2001) examined the annual reports of 31 randomly selected listed UK companies from 1996-2000 and observed a continuous upward trend of IC reporting during the study period.

On careful scrutiny of the extant literature it has been observed that a majority of the studies have adopted binary coding of 0 and 1, where an item is assigned a value of 0 if the item is not disclosed and 1 if the item is disclosed (Guthrie and Petty, 2000; Brennan, 2001; Williams, 2001; April et al., 2003; Joshi and Ubha; 2009). In this system of scoring the information content is analysed on the basis of the presence or absence of an item which results in a subjective assessment of IC information. The specification of the information content can be analysed by scaling the items in which scoring of items vary on the basis of the description or narration and numerical or quantitative assessment. The binary coding system gives a view of the quantity of reporting or frequency of reporting. The use of a scale, on the other hand, aids to examine the quality of reporting. To overcome the limitation of binary coding and to get a more objective assessment few researchers have adopted the scaling scheme to examine IC reporting. For instance, Bozzolan et al (2003), Vandemaële et al., (2005), Whiting and Miller (2008) and

Oliveras et al., 2008 used a three point scale (0-2) where '0' stands for not disclosed, '1' for qualitative disclosure and '2' stands for quantitative disclosure. However, not all items under IC can be described qualitatively, such as organisational culture, strategy, relationships and so on. This implies that the maximum score of 2 will be allotted only to numerical assessment of terms which is a shallow way of scoring. Similarly, Guthrie et al., 2006 adopted a four point scale (0-3) wherein a maximum score of 3 was allotted to terms that were quantified in dollar (currency) terms. There are several IC attributes that cannot be expressed in monetary terms. Hence, giving more weightage to some information that can be expressed in monetary value indeed eradicates the essence of IC disclosure. In some studies a six point scale was used (0-5), for instance, Shareef and Davey (2005) and Yi and Davey (2010) gave a maximum score of 5 to items that were quantitative/monetary. The intangible nature of intellectual capital cannot directly correspond to a quantitative or monetary term. The qualitative information or information relating to non financial aspects is also essential for investors and other stakeholders. In this regard allotting maximum scores to only financial information or quantitative information cannot be considered to be an appropriate means of scoring IC related items. Arguing in similar vein, Martson and Shrivs (1991) stated that a number cannot be considered to be worth more than a comment. Similarly, Botosan (1997) opined that the usefulness of qualitative information is more as compared to quantitative information.

In this study we have used a four point (0-3) scaling scheme, which to some extent, has curtailed the limitations of the above

studies. Additionally, we have also examined the trend of IC reporting for both knowledge based and traditional sector.

3. Data & Methodology

3.1 Data & Study period

We have selected four sectors in our study, two from knowledge based sector and two from traditional sector. From the knowledge based sector, pharmaceutical sector and engineering sector have been considered. While from the traditional sector, textile sector and steel sector have been included in this study. The total sample from knowledge based sector consisted of 254 firms and from traditional sector 152 firms. Accordingly, 30% of the sample firms from knowledge-based industries (30% of 102 firms) and 30% from traditional industries (30% of 152 firms) have been considered for this study. Thus, the final sample of 76 firms constitutes of 30 firms from knowledge based sector and 46 firms from traditional sector.

The use of annual report for analysis of disclosure practices has gained considerable support in the extant literature. Several studies have used annual reports for examining IC reporting practices (Wong and Gardner, 2005; Yi and Davey, 2010; Wang et al., 2016). The widespread use of annual report is primarily because annual reports are an important medium through which firms communicate financial as well as non financial information and connect with all the stakeholders. In this study, the annual reports of the sample firms have been examined for a period of five years from 2010-11 to 2014-15.



3.2 Intellectual Capital Disclosure (ICD) framework

In this study we have framed an IC disclosure framework on the basis of Bukh et al., (2001) classification, which is more comprehensive and includes all the attributes of IC and overcomes the limitation of some restricted frameworks like Sveiby (1997) and Bontis (2003). Bukhet al., (2001) framework encompasses the classical categorisation of Edvinsson and Malone (1997) wherein IC is divided into five components: human Capital, customer capital, organisational capital, innovation capital and process capital. The use of five components facilitates appropriate categorisation of items into its specific components. The framework of Bontis (2003) is a prevalent framework that has been adopted in several Indian studies (Kamath, 2008; Joshi and Ubha, 2009; Joshi et al., 2012). However, in this framework there are several items that are overlapping and ambiguous in nature.

The framework used in this study has been framed through careful scrutiny of three studies, namely, Bukh et al., (2005); Gracia-Meca et al., (2005) and Branswijck and Everaert (2012) in which Bukh et al., (2001) classification has been adopted for analysing IC related information. Additionally, certain indicators from the MERITUM guidelines have also been adopted for development of the framework. The MERITUM project was one of the most celebrated endeavour in which six European countries participated to establish guidelines for reporting on IC. The IC disclosure framework incorporated in this study consists of a total of 49 items encompassing six components: human capital (18), IT (4), R& D and Inn (10), Strategy (6), relational capital (16), and

Processes (5). We have eliminated, added as well as clubbed certain items on the basis of the nature of the study, extant literature on IC and on the basis of our own understanding of the concept. The items have been categorised and divided to capture narrative statements and description to facilitate scaling of items. The IC disclosure framework has been presented in appendix-1.

3.3 Measurement of IC disclosure

Content analysis of the annual reports has been conducted in order to extract the IC related information provided in the annual reports. Content analysis is a “*research technique for making replicable and valid inferences from data according to their context*” (Krippendorff, 1980). In order to carry out the task of content analysis three things are vital - source of information, content of analysis and unit of analysis (i.e. basis of coding). In the present context, published annual report is used as the source of information. Content of analysis is the IC disclosure framework which has been developed in this study based on the extant literature (appendix- 1). Finally, for unit of analysis, as suggested by Guthrie et al. (2004), we have adopted uniform coding system in order to enhance the reliability of the content analysis. For scoring of items we have used a four point scale to examine the quality of IC disclosure. In this study we have scored the items on the following basis:

- ‘0’ if the item is not disclosed
- ‘1’ if the item is partly disclosed
- ‘2’ if the item is fully disclosed in descriptive form
- ‘3’ for fully disclosed precisely in descriptive or quantitative form

After obtaining item wise score based on quality, total disclosure score for IC and its six components have been computed by employing the following formula:

$$ICD_{jt} = \frac{\sum_{i=1}^n X_{ijt}}{N_j} \quad \dots (i)$$

Where, ‘n_j’ is the maximum score for each category (or overall), ‘j’ is the company, ‘i’ is the items and ‘t’ is the time. ‘X_{ij}’ assumes the code 0-3. Using the formula (i), initially we have computed the disclosure score of all the sample firms in each year and for computing year wise disclosure score we have taken the average value of all the firms in a particular year.

There are certain items in the framework that cannot be expressed in quantitative form, such as organisational structure, organisational culture, statement of image and brands, business vision, relationship with stakeholders, environmental programs and so on. For such items a maximum score of 3 is allotted if the information content is clear and precise. If the items are disclosed partially a score of 1 is given. However, if the items are disclosed in description or narration but lacks precision than a score of 2 is given.

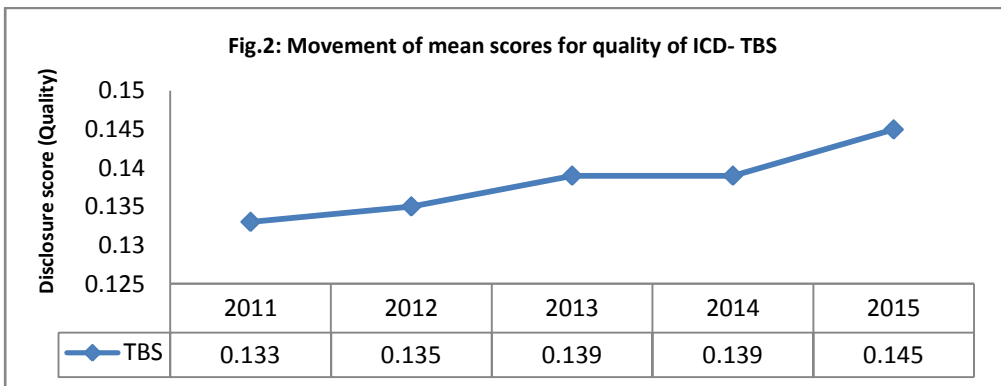
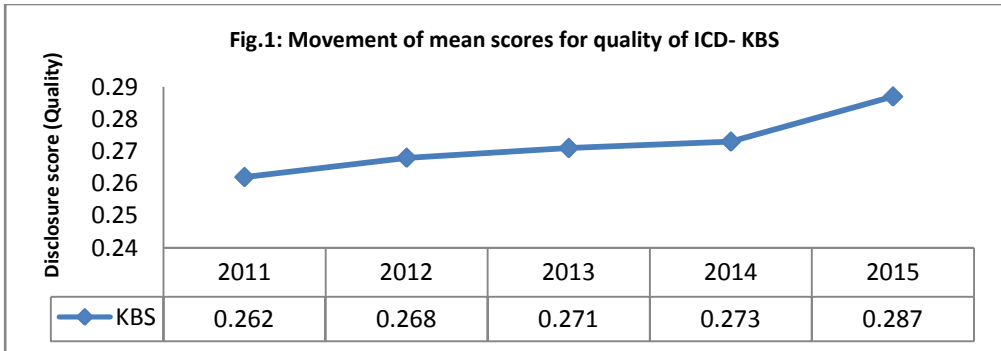
4. Results and discussions

4.1 Quality of IC disclosure

Figure 1 and 2 present the movement of mean scores relating to quality of IC disclosure for sample firms from knowledge based sector (KBS) and traditional sector (TS) respectively for a period of five years from 2010-11 to 2014-15. For both the sectors, the graphs reveal an increasing pattern with respect to IC reporting during

the sample period. For instance, in case of KBS, the disclosure score increased from 26.2% in 2011 to 28.7% in 2015. Similarly, for TS, the disclosure score increased from 13.3% in 2011 to 14.5% in 2015. This finding is in line with the results observed by Williams (2001) for companies listed in UK; Vandemaele et al., 2005, for firms listed in Netherland, Sweden and UK and Oliveras et al (2008) in the case of Spanish firms wherein an increase in IC reporting was reported over the years. A cursory look into the disclosure scores reveals that the mean score for KBS are higher than the mean scores of TS. Similar results were reported by Bozzolan et al., (2003) and Sonnier, (2008) that disclosure by high tech companies was more than that of traditional firms.

It is anticipated that knowledge intensive firms are likely to disclose more information on IC as increased information can reduce investor’s uncertainty and lower the associated risk premium (Cooke, 1989). Additionally, firms rich in IC generally try to legitimise their status by disclosing more IC related information (Guthrie et al., 2006). In line with the same, the signalling theory purports that firms rich in intellectual resources are likely to disclose more information which acts as a positive signal to the market and attracts potential investors.



4.2 IC Disclosure of Firms with High and Low VAIC

To gauge deeper into the understanding of IC reporting practices, the sample firms were further classified into two groups: firms with high IC and firms with low IC. Intellectual capital (IC) has been measured by using the Value Added Intellectual Coefficient (VAIC) model developed by Pulic (2000). As per this model, VAIC is the composite sum of three components, namely, Human capital efficiency (HCE), Structural capital efficiency (SCE) and Capital employed efficiency (CEE). The first

step in the computation of VAIC is the calculation of VA. VA is the difference between output (OUT) and input (IN). OUT is the total revenue generated by a firm in a year and IN is the summation of all operating expenses incurred by the firm in earning revenue except employee cost which is considered as value creating factor and not as an expense (Clarke et al, 2011).

Algebraically, VA can be expressed as: $VA = EBIT + D + A + EC$

Consequently, human capital efficiency is computed as:



$HCE = VA/HC$; where, HC is the overall salary expenditure of a company and is considered as an investment of the company (Nazari and Herremans, 2007).

Structural capital efficiency is computed as:

$SCE = SC/VA$; where, SC is defined as the difference between VA and HC, i.e., $SC = VA - HC$.

And, Capital employed efficiency is calculated as:

$CEE = VA/CE$; where, CE is the book value of capital employed of the company.

Therefore, $VAIC = HCE + SCE + CEE$.

The attempt here is to examine whether there is any difference in the level of reporting among the firms within a particular sector (knowledge based or traditional) when they are categorised on the basis of high and low VAIC. Alternatively, the aim is to examine whether firms with high intellectual capital base disclose more IC related information as compared to firms with low intellectual capital. For this purpose, the 30 knowledge based firms were ranked on the basis of VAIC and the first 15 firms were categorised as firms with high VAIC and the remaining 15 firms were categorised as firms with low VAIC. Similar procedure was followed for the 46 traditional firms, in which the top 23 firms were categorised as firms with high VAIC and the remaining 23 as firms with low VAIC.

Figure 3 shows the movement of ICD scores for knowledge based firms with high and low VAIC from 2010-11 to 2014-2015. For both the group of firms an increasing disclosure

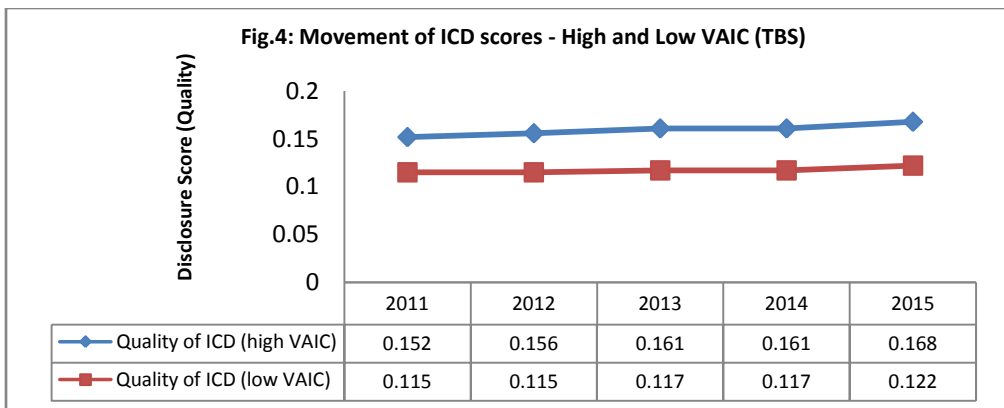
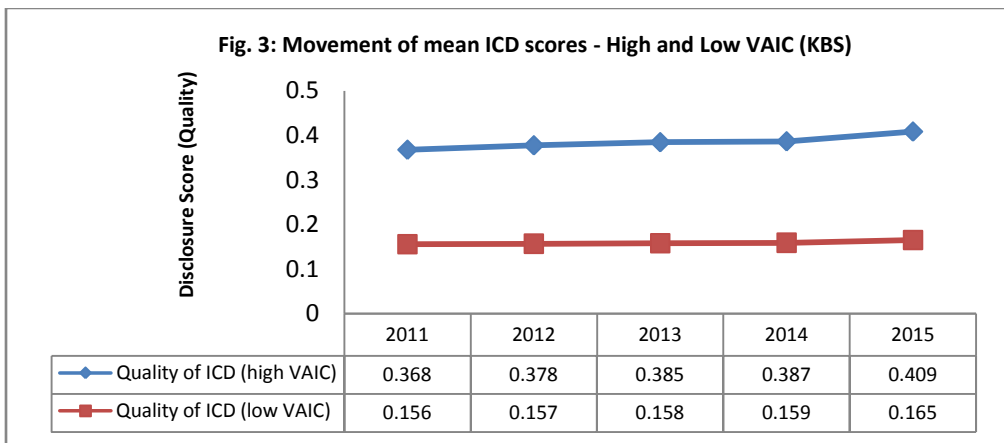
pattern has been observed. However, the increase in disclosure score has been observed to be more vivid in the case of firms with high VAIC, wherein the disclosure score has increased from 36.8% in the year 2011 to 40.9% in 2015 as compared to firms with low VAIC wherein the score increased from 15.6% in 2011 to 16.5% in 2015. Additionally, the disclosure scores have been observed to be higher in the former case than the latter.

Similarly, in the case of traditional sector, as shown in figure 4, for both firms with high and low VAIC a marginal increase in the scores over the years has been observed. With respect to high VAIC firms, the score increased from 15.2% in 2011 to 16.8% in 2015. While, for firms with low VAIC the disclosure score increased from 11.5% in 2011 to 12.2% in 2015. Additionally, as evident from Figure 4, for traditional firms also, the disclosure scores are considerably higher for the high VAIC group than the low VAIC group.

Researchers in most of the cases have categorised sample companies based on market capitalization (Williams, 2001; Husin et al., 2012). This classification into high and low VAIC is meaningful as in the extant literature it has been mentioned that, generally for voluntary disclosure practices (such as corporate governance reporting, social and environmental reporting) it is assumed that firms that comply with governance guidelines and social and environmental norms are likely to disclose more on such information, because such endeavour reflects about a firms accountability towards its stakeholders. However, in the case of IC disclosure, there are two possibilities. Firstly, firms that are rich in intellectual resources may disclose

more IC related information to signal its strength, facilitate transparency and attract potential investors. Secondly, in contrary, it is also assumed that firms may not be willing to disclose certain crucial information on IC that can lead to competitive disadvantage. The observed results reveal that, Indian

firms, both knowledge based and traditional firms that have high IC base disclose more IC related information as compared to firms with low IC. That is by disclosing on IC, firms signal their strength, legitimize their status, reduce information asymmetry and meet the needs of all the stakeholders.





4.3 Descriptive Statistics

The above graphs have revealed about the average IC disclosure scores for the two sectors. The descriptive statistics shown in table 1 present the mean scores of each component of IC for KBS and TS. This can give an idea about the component that has received more importance in the annual reports of the sample Indian firms for two different categories of sectors.

In the case of knowledge based firms, the mean scores of each component reveal that out of the six components the mean score of research and development (including innovation) is the highest (37.77%) followed by strategy (31.43%), processes (30.59%), information technology (28.96%), human capital (25.11%), and relational capital (11.33%). This implies that research and development is the most disclosed category while relational capital is the least disclosed category. Similar findings were reported in a study by Bukh et al., (2005) wherein the number of information reported in the category of research and development and strategy were found to be predominantly more than that of the other categories. Similarly, in a study by Arvidsson (2003) it was observed that items under the category of innovation were highly disclosed. In another study, Gracia-meca et al., (2005) observed that strategy, information technology and processes were three categories in which disclosure was high. Consequently, relational capital was observed to occupy the fourth rank in a study by Gracia-meca et al., (2005).

In the case of traditional sector, the mean scores of each component reveal that out of the six components, the average score of human capital (16.81%) is the highest,

followed by processes (16.31%), information technology (15.12%), strategy (14.96%), research and development (13.84%) and relational capital (6.21%). This implies that reporting under the components of human capital, processes and information technology are relatively higher than that of the other components. The highest rank of human capital sheds light on the importance of knowledge workers in a traditional sector. This finding is in line with the results observed by Yi and Davey (2010) and Wang et al., (2016) wherein human capital was reported to have the highest mean score with respect to quality of IC disclosure. Additionally, a careful scrutiny of the scores reveals that, for traditional firms as well, relational capital is the least reported component.

Disclosure with respect to the items under the category of relational capital is low, owing to the absence of numeric specification of certain items such as *number of customers, sales breakdown by customers, customers per employee, values added per customer* which are generally not reported in the annual reports. Additionally, other items under relational capital as well are generally reported in a limited narrative form.

In contrary, using the framework derived from Sveiby (1997), several studies have reported external or relational capital as the most disclosed IC component (Guthrie and Petty, 2000; Bozzolan et al., 2003; Wong and Gardener, 2005; Guthrie et al., 2006; Oliveras et al., 2008). As per Sveiby's (1997) framework, items like *brands, business collaborations, favourable agreements* and *research collaborations* have been categorised under external (relational) capital. However in the Bukh (2001)

framework, the items related to brands, business collaborations, favourable agreements or business and strategic alliance of some kind have been categorised under the component of strategy, while research related items have been categorised under the item of research and development. Similarly items like *company*

names (Guthrie and Petty, 2000) and *financial contact* (Bozzolan et al., 2003) have not been included in the framework used in this study. The items that have been included under relational capital in this framework strictly adhere to information relating to customers, distribution networks and relationship with stakeholders.

Table 1: Descriptive Statistics

COMPONENTS	STATISTICS	KBS	TS
HUMAN CAPITAL	MAXIMUM	0.5555	0.5000
	MINIMUM	0.1111	0.0555
	MEAN	0.2511	0.1681
	SKEWNESS	1.136	2.097
INFORMATION TECHNOLOGY	MAXIMUM	0.6666	0.5555
	MINIMUM	0.0000	0.0000
	MEAN	0.2896	0.1512
	SKEWNESS	-0.019	1.187
RESEARCH & DEVELOPMENT	MAXIMUM	0.9166	0.6666
	MINIMUM	0.0000	0.0000
	MEAN	0.3777	0.1384
	SKEWNESS	0.156	1.314
STRATEGY	MAXIMUM	0.7179	0.5128
	MINIMUM	0.0256	0.0256
	MEAN	0.3143	0.1496
	SKEWNESS	0.493	1.714
RELATIONAL CAPITAL	MAXIMUM	0.4444	0.2963
	MINIMUM	0.0000	0.0000
	MEAN	0.1133	0.0621
	SKEWNESS	0.854	2.170
PROCESSES	MAXIMUM	0.6666	0.4666
	MINIMUM	0.0666	0.0666
	MEAN	0.3062	0.1631
	SKEWNESS	0.304	3.015

5. Conclusion

In this study a modest attempt has been made to analyse IC reporting practices of 76 Indian firms, categorised into two groups, knowledge based sector and traditional sector for a period of five years from 2010-11 to 2014-15. A content analysis of the annual reports using a four point scale (0-3) has been used to examine the IC related information. Additionally, a disclosure framework on the basis of Bukh (2001) classification has been developed and used in this study.

The results revealed an increase in mean disclosure score over the five year period for both knowledge based and traditional sector. Nonetheless, the disclosure scores of knowledge based firms were more than that of traditional firms. This implies that, though both the categories of sector are disclosing on IC, this practice is more prevalent in knowledge intensive firms. Similarly, the firms from both the sectors were categorised further on the basis of the VAIC score, into high and low VAIC firms. The results revealed that for both the sectors, firms with high IC base disclosed more than firms with low IC base. This finding is in line with signalling theory and legitimacy theory which states that firms signal their strength to the market by disclosing about them, consequently, through disclosure they also legitimise their position to the market.

The descriptive statistics shed light on the component wise disclosure scores for both knowledge based and traditional sector. In the case of knowledge based sector, research development and innovation has been observed to be the most reported category. However, for traditional sector,

human capital is found to be the most reported component. This reflects on the importance of research activities in a knowledge intensive firm and the importance of knowledge workers in a traditional sector. Relational capital is found to be the least disclosed component for both the sectors owing to absence of numeric specification of several items.

This study can be extended in two ways: firstly, as the extant literature has stressed on the effect of IC disclosure on market value of firms, the association between IC disclosure and market value of Indian firms can be examined for both knowledge based and traditional sector. Secondly, the sample size can be increased by inclusion of more sectors in the study.

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Appendix- I	
Intellectual Capital Disclosure Framework	
SL. NO	Indicators (Items)
I	HUMAN CAPITAL
1	Staff breakdown by age, experience, level of education
2	Staff breakdown by department, job function
3	Staff turnover, rate of staff turnover, comments on staff turnover
4	Employee health and safety provisions and expenses, fire safety mechanism, medical assistance, staff welfare expenses, training programme on safety and precaution.
5	Competence development, education & training, career opportunities, job rotation opportunities, description of competence development programme and activities, policies on competence development
6	Remuneration & incentive system, description on salary, pension, insurance, gratuity, PF, compensated absences other benefits, policies on remuneration system
7	Recruitment Policy, description on specific sources of recruitment.
8	Key employees, number of key employees, sales or profit per employee.
9	HRM department functions
10	Employee productivity, value added or income per employee or output, description on employee productivity.
11	Employee participation in decision making
12	Employee Survey, number of employees surveyed, cost of survey, average satisfaction of employees with training activities, remuneration and incentive systems, safety measures/audit
II	INFORMATION TECHNOLOGY
1	Investment in IT
2	Existing IT system and facilities.
3	IT knowledge or literacy, statements on current IT literacy of firms, description including type/level, technical study and consultancy.
III	RESEARCH & DEVELOPMENT AND INNOVATION
1	Statement of policy on R&D activities, objectives, strategies to be implemented, future prospects regarding R&D
2	R&D expenses, total, per unit of sales, amount invested in basic research, in product design/development
3	Existing company patents, licenses, number of patents filed in a year, information on patents pending
4	Other intellectual properties, information on company trademarks, information on copy right
IV	STRATEGY
1	Description of new products & technology, statement, Product/technology description, expenses/investment



2	Description of strategic alliances, objectives & reasons for SA, type of Strategy (joint ventures, mergers etc)
3	Brand building, sub brand, brand strategies, product awards, brand image
4	Best Practices followed by firms, adherence to corporate governance practices, ISO certification
5	Organisational structure
6	Utilisation of resources, description on raw materials, energy, other input goods
7	Environmental investment, description on steps taken to improve environmental concerns, green initiatives.
8	Information on CSR activities
9	Employee contracts/contractual issues
10	Investment in new business
11	Business vision, mission and culture, objectives & consistency of strategy
12	Marketing strategies, Information on market, pricing policy, market share by segment or by product, description on strategies formed and implemented
13	Corporate quality performance, product and services quality
V	RELATIONAL CAPITAL
1	Description on customers, old & new customers, sales breakdown by customers, annual sales per segment, customer per employee
2	Dependence on key customers
3	Customer involvement, repurchase, relationship, awareness.
4	Description of market share
5	Customer survey, feedback, customer satisfaction.
6	Network of suppliers, description on prevailing and new networks formed.
7	Community involvement
8	Distribution channels, delivery system, advertising and promotion
9	Relationship with other stakeholders
VI	PROCESSES/ PROCESS CAPITAL
1	Information and communication within the company
2	Efforts related to the working environment, process improvement and development, process optimisation
3	Internal sharing of knowledge & information, internal audit and internal control system
4	Process failures, loss of production due to faulty techniques, machines, technological breakdown and time overrun resulting in loss of demand, steps taken to deal with process loss.
5	Environmental programs, environmental requirement incorporated in plant design from preliminary stage of a process, environmental clearances.

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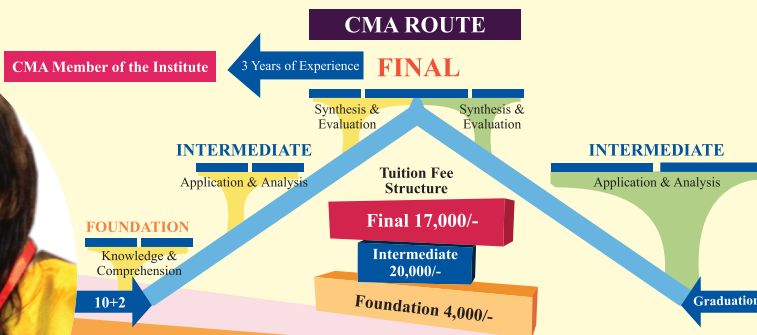
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