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A Dynamic DEA Model for Indian Sectoral Equity Funds

Ram Pratap Sinha*

The performance of mutual funds is generally evaluated in the context of a risk-return framework. Traditionally, ratio analysis was used for such evaluation. Of late, quite a number of studies have used stochastic frontier analysis/non-parametric benchmarking techniques for evaluating the performance of mutual funds. However, a major drawback of such studies is the estimation of return-risk frontiers specifically for each time period under observation and this makes inter-temporal comparison of performance a difficult proposition. Against this backdrop, the present paper attempts to show how, using a Dynamic DEA Model suggested by Tone and Tsutsui (2010), it is possible to extend benchmarking over successive time periods and find out which funds are efficient and which are not.

Keywords : Unit Trust of India, Mutual Fund; First Order Stochastic Dominance; Endogenous Benchmarking; Dynamic Slacks Based Measure Model.

Introduction

Mutual funds enable common investors to take exposure at the equity market and thus generate decent returns in a regime of falling interest rates. Thus, the performance exhibited by mutual funds is of paramount importance for the various stake holders. Since investment portfolios generate both return and risk, the performance of mutual funds is evaluated in the context of a risk-return framework. Consequent of the introduction of CAPM (Capital Asset Pricing Model), ratio analysis was used for such evaluation where the numerator included a measure of return and the denominator is a measure of risk.

Since the introduction of frontier analysis, quite a number of studies have used stochastic frontier analysis/non-parametric benchmarking techniques for evaluating the performance of mutual funds. In this Indian context, several studies [Sinha (2014, 2015), Dhar and Sinha (2015, 2016)] compared fund performance based on such extended risk-return models using non-parametric evaluation techniques. However, a major drawback of such studies is the estimation of return-risk frontiers specifically for each time period under

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observation and this makes inter-temporal comparison of performance a difficult proposition. Against this backdrop, the present paper attempts to show how, using a Dynamic DEA Model suggested by Tone and Tsutsui (2010), it is possible to extend performance benchmarking of mutual funds over successive time periods. The sample used in the study comprises of 26 sectoral funds for the period July-2010 to June-2013.

The paper is organized into five sections and proceeds as follows. Section-1 gives an overview of mutual fund industry. Section-2 discusses briefly the extant literature related to the portfolio benchmarking paradigms. Section-3 outlines the methodological issues regarding performance benchmarking in a dynamic setting. Section-4 provides the framework of study and the results. Section-5 concludes.

Section-1 : A Primer on Mutual Funds

It is common knowledge that mutual funds are essentially investment trusts which pool resources from small investors and create investment portfolio using the principle of diversification. The earliest form of mutual fund was created by Adriaan Van Ketwich in the Netherlands in 1774 in the form of an investment trust. In 1822, King William I of Netherlands established

closed ended investment companies. Similar vehicles of investments were created in Switzerland in 1849 and also in Scotland in 1880s. In 1893, the Boston Personal Property Trust was established in the United States which was a closed ended fund. This was followed by the establishment of the Alexander Fund in Philadelphia in 1907. By 1929, 700 closed ended and 19 open ended funds were created in the US market. While the market was affected severely during the '*Great Depression*', it recovered afterwards and had spectacular growth in the post second world war phase.

In the Indian market, the first mutual fund was created when the Unit Trust of India (UTI) was established in 1963 which was set up by the Reserve Bank of India. Up to 1986, UTI was the sole operator in the Indian market. In 1987, limited competition was infused in the Indian mutual fund industry with the establishment of a few mutual funds under the aegis of public sector banks and insurance companies. However, the true deregulation of the Indian mutual fund sector took place in 1993 with the entry of private sector mutual funds which led to a rapid transformation of the industry. As on 30th September 2017, the Asset Under Management of the Indian mutual fund industry stood at ₹20.4 Lakh crores.

In the present market scenario, open ended schemes dominate the Indian market because of their liquidity. For investors who are interested in good capital appreciation over the long term, equity oriented schemes (having 90-95 per cent equity exposure) are the favourites. In the recent past, sectoral equity schemes (which concentrated exposure to select high growth sectors) have performed better than diversified (among all sectors) funds during bullish market conditions for obvious reasons.

Section-2 : The Related Literature

2.1 The Modern Portfolio Theory

The earliest rigorous conceptualization of portfolio benchmarking was by Markowitz (1952) and Tobin (1958) who formalized the process in terms of mean-variance criterion. The underlying idea behind the mean-variance approach is that the optimal portfolio for an investor is a balanced portfolio which provides the investor with the best combination of return and risk where return is measured by the expected pay off from the portfolio and risk is measured by the variance of the probability distribution of portfolio return. The decision rule which originates from the M-V efficiency criteria is as follows: Given two discrete return distributions $f(x)$ and $g(x)$, investors will

prefer $F(x)$ over $G(x)$ if $\mu_F \geq \mu_G$ and $\text{Var}_F \leq \text{Var}_G$. The M-V criterion thus enables us to decompose the entire set of portfolios into efficient and dominated subsets. However, decision-making on the basis of mean and variance criteria requires either the utility function to be quadratic or the return distribution to be normal.

The seminal contributions of Sharpe (1964) and Linter (1965) in the form of the Capital Asset Pricing Model established the relationship between the required return from a portfolio with the market portfolio and this enabled comparison of actual (risk-adjusted) return earned by the portfolio against the benchmark suggested by CAPM. While the Sharp ratio provided a measure based on excess return to volatility, the Treynor ratio provided a measure based on excess return to systematic risk.

2.2 Use of Stochastic Dominance in Portfolio Benchmarking

The use of volatility indicator (standard deviation or variance) came for criticism from several quarters. Roy (1952) conceptualized an investor who would be guided by the safety of principal first when dealing with risk and his contribution was instrumental in the development of downside measures of risk. He stated that the investor would prefer the investment with the smallest

probability of going below the target return. By maximizing a reward to variability ratio, $(r_c - t)/s$, the investor will choose the portfolio with the lowest probability of going below the target level, t , given a expected mean return, r_c , and a standard deviation, s .

Hadar and Russell (1969) pointed out that excepting some special cases (like the quadratic utility function), the specification of distributions in terms of their moments is not likely to yield strong results. This is because if the utility function is unknown then information about the moments cannot be used efficiently for the purpose of ordering uncertain prospects. In this context, Hadar and Russell proposed two decision rules based on stochastic dominance (ordering) which are stronger than the moment method (first and second order stochastic dominance). Bawa (1975), however, was the first to define lower partial moment (LPM) as a general family of below-target risk measures as he provided a proof that the LPM measure is mathematically related to stochastic dominance for risk tolerance values of 0, 1 and 2. This model was later further generalised by Fishburn (1974,1978) who formulated the conditions for identifying optimal and dominated choice sets i.e. Conditional Stochastic Dominance which enables the decomposition of the choice set in to optimal and dominated

sets. For linear programming algorithms based on Fishburn see, and Bawa, Bothurda Jr., Rao and Suri (1985).

2.3 More Recent Approaches to Portfolio Benchmarking

Lai (1991) pointed out in the presence of skewness, portfolio selection involves the accommodation of competing and conflicting objectives like maximization of expected returns and skewness and minimization of risk for investors exhibiting Decreasing Absolute Risk Aversion (DARA). The paper showed how a polynomial goal programming model can be constructed by incorporating investor preferences from which a portfolio selection with skewness is determined.

Murthi, Choi and Desai (1997) forwarded a portfolio performance measurement method based on DEA in 1997, called DEA portfolio efficiency index (DPEI), with standard deviation and transaction loads as inputs, and excess return as output, to investigate performance of 2,083 mutual funds in the third quarter of 1993. In the first phase of empirical analysis, they compared the DPEI measure with traditional measures of performance corresponding to 731 mutual funds belonging to seven categories: aggressive growth, asset allocation, equity-income, growth, growth-income, balanced and

income. In the second phase, they used all 2,083 mutual funds for computing DPEI for each fund. They also used a regression analysis to test for the source of variation in efficiency.

Basso and Funari (2001) evaluated the performance of Italian mutual funds for 1997-1999 on the basis of both conventional and stochastic dominance indicators of performance. In a study on 257 Australian mutual funds, Galagedera and Silvapulle (2002) used data envelopment analysis (DEA) to measure the relative efficiency of, and logistic regression for examining the dependence of efficiency on fund attributes, management strategy and the operating environment. The study investigated the sensitivity of DEA efficiency to various input-output variable combinations. In general, the study revealed that the overall technical efficiency and the scale efficiency are higher for risk-averse funds with high positive net flow of assets.

Sengupta (2003) developed a set of non-parametric tests which includes the convex hull method and the stochastic dominance criteria for evaluating the performance of mutual fund portfolios. His study focused on four major groups of funds. The empirical results supported the hypothesis that some groups of funds based on new technology tend to outperform the others.

Santos et.al. (2005) evaluated the performance of 307 Brazilian stock mutual funds employing stochastic frontiers. The study showed that a positive relationship of fund efficiency and management skill to beat the market. The study also found that portfolios with low volatility tend to be more efficient. Gregoriou, Sedzro, Zhu (2005) used DEA to appraise the performance of 168 hedge funds for the period 1997-2001. They initially used the BCC model to classify the hedge funds into efficient and inefficient categories. Then they used cross efficiency and super-efficiency models to further analyse the efficiency of funds.

Daraio and Simar (2006) evaluated the performance of six categories of mutual funds (asset allocation, aggressive growth, balanced, equity income, growth and growth income) in terms of conditional input oriented order-m efficiency, Free Disposal Hull (FDH) method and DEA, Jensen's α and Sharpe Index. The results indicated that while indicators based on non-parametric and robust approaches (DEA, FDH, order-m) are highly positively correlated, they are weakly correlated with the traditional indicators (Sharpe ratio & Jensen's alpha). Briec, Kerstens and Jokung (2007) introduced a mean-variance-skewness portfolio optimisation model using the shortage function that

looks for possible increases in return and skewness and decreases in variance. The study also established a link to an indirect mean-variance-skewness utility function. The framework makes it possible to differentiate between portfolio efficiency and allocative efficiency and a convexity efficiency component. Zhao, Wang and Lai (2011) proposed two quadratic-constrained DEA models for evaluation of mutual funds performance, from a perspective of evaluation based on endogenous benchmarks. They decomposed two vital factors for mutual funds performance, i.e. risk and return, in order to define mutual funds' endogenous benchmarks and give insights and suggestions for managements. Pendaraki (2012) evaluated the performance of 43 domestic equity funds in Greece for the period January 2007 to December 2010 using BCC model of data envelopment analysis. The study applied input oriented DEA model twice for analyzing the effect of inclusion of higher moments as variables in the performance risk – return framework. In the first run, standard deviation is considered as input, and returns and assets as outputs (mean-variance framework). In a second run, the kurtosis is included as a second input and skewness as the third output variable (higher moment framework).

Section-3 : The Methodological Issues

3.1 The Benchmarking of a Productive System

In the context of a multi-input multi-output production system, Shephard's (1953,1970) distance function provide a functional characterisation of the structure of production technology. The input set of the production technology is characterised by the input distance function which gives the maximum amount by which the producer's input vector can be radially contracted. The output set, on the other hand, is characterised by the output distance function which gives the minimum amount by which the producer's output vector can be deflated and yet remain feasible for a given input vector.

Farrell (1957) laid the foundation for new approaches to efficiency and productivity studies at the micro level, providing invaluable insights on two issues: defining efficiency and productivity, and the calculation of the benchmark technology and the efficiency measures.

The USP of the Farrell measure of efficiency has been to offer a decomposition of overall efficiency into technical and allocative components. The radial contraction/expansion connecting inefficient observed points with (unobserved) reference points on the production

frontier as the basis for the measures is the hallmark, and due to fundamental duality between production– and cost functions identical measures can also be defined using the latter.

Farrell’s definitions of efficiency had close connections with the concepts of distance function since the reciprocal of the input distance function can be considered as the radial measure of input oriented technical efficiency whereas the radial measure of output oriented technical efficiency coincides with the output distance function.

Charnes, Cooper and Rhodes (1978) provided a generalization of Farrell’s Single input single output technical efficiency measure to the multiple output-multiple input case and their contribution resulted in the genesis of Data Envelopment Analysis (DEA). The methodology was originally developed by Charnes, Cooper and Rhodes (1978) and was subsequently further extended by Banker, Charnes and Cooper (1984). DEA enables the construction of a production frontier in the context of a multiple input-output framework with very few prior assumptions on input-output relationship.

The DEA approach constructs the efficiency frontier of productive units from piece-wise linear stretches leading to a convex production possibility set.

In the DEA frontier, efficient observations are selected on the basis of the criteria that for these observations, no other decision-making unit or linear combination of units has as much or more of every output (given inputs) or as little or less of every input (given outputs). It provides tightest envelopment of data sets.

3.2 Radial vs Non-radial Measures of Efficiency

The CCR (1978) and BCC (1984) DEA models provide us a radial measure of technical efficiency. However, a major weakness of the radial approach is that it cannot reflect all identifiable potential for expansion of output and contraction of input. A firm is not efficient in the economic (Paretian) sense if output can be increased (without increasing input usage) or input usage can be reduced (without affecting output). When positive output and input slacks are present at the optimal solution of a Charnes, Cooper and Rhodes (1978) or Banker, Charnes and Cooper (1984) linear programming problem, the corresponding radial projection of an observed input-output combination is unable to meet the criterion of Pareto optimality and will not qualify as an efficient point. This weakness led to the development of non-radial DEA models.

3.3 The Slacks Based Measure Model

Tone (2001) introduced the Slacks Based Measure model which a non-radial method of estimation of efficiency. The slacks-based measure of efficiency has an additive structure i.e., it removes input and output slacks through addition and subtraction from their respective inequalities.

In the Slacks Based Measure model, the efficiency of DMU with activity indicated by (x^0, y^0) is estimated by the following fractional linear program :

$$\text{Min } \Omega = (1 - 1/m \sum s^- / x_i^0) / (1 + 1/n \sum s^+ / y_k^0) \quad \dots(1)$$

$$\text{s.t. } x^0 = X\lambda + s^-$$

$$y^0 = Y\lambda - s^+$$

$$\lambda \geq 0, s^- \geq 0, s^+ \geq 0$$

$X^0 = (X^0_1, X^0_2, \dots, X^0_r)$ and $Y^0 = (Y^0_1, Y^0_2, \dots, Y^0_m)$

The slacks based measure of inefficiency can be interpreted as a product of output and input inefficiencies. For this, we write (1) as :

$$\Omega = \frac{1}{m} [\sum \{(x_i^0 - s^-) / x_i^0\}] \times 1/n [\sum \{(y_i^0 + s^+) / y_i^0\}]^{-1} \quad \dots(2)$$

The first term on the right hand side i.e. $1/m [\sum \{(x_i^0 - s^-) / x_i^0\}]$ can be interpreted evaluates the relative reduction

rate of input i and hence the first term corresponds to the mean reduction rate of inputs i.e. input inefficiency. In an analogous manner, the second term in equation (2) $\frac{1}{n} [\sum \{(y_i^0 + s^+) / y_i^0\}]^{-1}$ measures output inefficiency.

3.4 Dynamic DEA Models

The methodologies cited above compute technical efficiency on a standalone basis implying that the benchmarks used for the evaluation of efficiency are period specific. The contributions of Klopp (1985) and Fare et.al. (1994) permitted researchers to consider intertemporal efficiency changes. However, neither of the two aforementioned approaches could connect the activities of successive time periods through link variables. The first formal attempt to consider inter-connected activities in a dynamic DEA framework was by Fre and Grosskopf (1996). Subsequent notable contributions in this field include Nemoto and Goto (2003), Emrouznejad and Thanassoulis (2005), Sueyoshi and Sekitani (2005) and Park and Park (2009).

In 2010, Tone and Tsutsui (2010) introduced a slacks based measure model for dynamic DEA which by incorporating carry over activities in to the model is capable of linking the activities of successive time period. In the present study a less general version

of the Tone and Tsutsui (2010) model is considered. Accordingly, a truncated version of their model is provided below (see Figure-1 for a graphical presentation).

Let us consider n DMUs (decision-making units) for a period of T years ($t=1,2,\dots,T$). For each year DMUs have common m inputs, s outputs and a bad link variable z linking the time periods ($t=1,2,\dots,T$).

The production possibilities are defined by the following inequalities :

$$x_{oit} \geq \sum_{j=1}^n x_{ojt} \lambda_{jt} \quad (i=1,2,\dots,m; t=1,2,\dots,T)$$

$$y_{oit} \leq \sum_{j=1}^n y_{ojt} \lambda_{jt} \quad (i=1,2,\dots,s; t=1,2,\dots,T)$$

$$z_{oit} \geq \sum_{j=1}^n z_{ojt} \lambda_{jt} \quad (i=1,2,\dots,n; t=1,2,\dots,T)$$

In the case of variable returns to scale- $\sum \lambda_{jt} = 1$.

The continuity of link variables between time periods t and $t+1$ can be guaranteed by the following condition :

$$\sum_{j=1}^n z_{ijt} \lambda_{it} = \sum_{j=1}^n z_{ijt} \lambda_{it+1}$$

$$\lambda_{it} \geq 0, s_{it}^- \geq 0, s_{it}^+ \geq 0, s_{fit} \geq 0$$

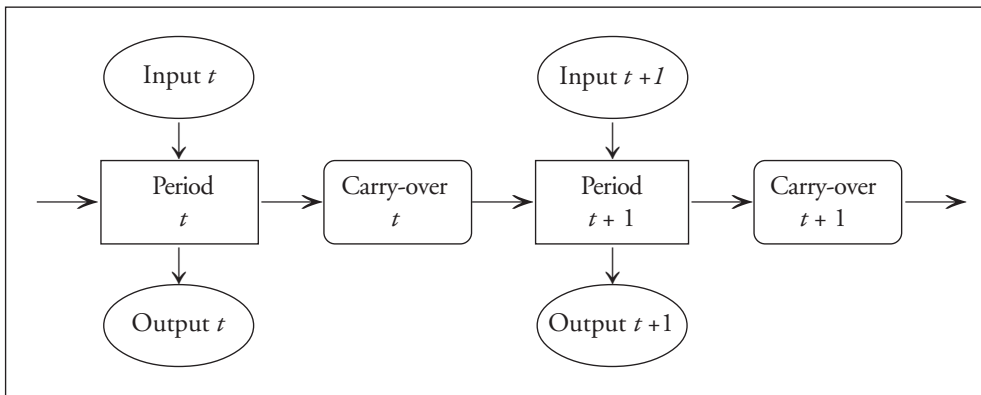
We assume that the goal of an observed DMU is to make inter-temporal optimisation. Thus given the production possibilities set, in the output oriented case, the objective of an observed DMU is :

$$\text{Max } \mu_o = \frac{1}{T} \sum_{t=1}^T w^T \left[1 + \frac{1}{s+n} \sum_{i=1}^n \frac{w_i^+ s_{it}^+}{y_{iot}} \right]$$

The output oriented overall technical efficiency $\theta^o = 1/\mu_o$

Similarly, in the input oriented case, the observed DMU proceeds with the objective :

Figure-1 : Dynamic Characterization of Productive System



$$\text{Min } \mu_i = \frac{1}{T} \sum_{t=1}^T w^T \left[1 - \frac{1}{s+n} \sum_{i=1}^n \frac{w_i^+ s_{it}^-}{x_{iot}} \right]$$

The input oriented overall technical efficiency $\theta^i = \mu_i$

Finally, in the non-oriented case the DMU minimizes ω :

$$\text{Min } \omega = \frac{1}{T} \sum_{t=1}^T w^T \left[1 - \frac{1}{s+n} \sum_{i=1}^n \frac{w_i^+ s_{it}^-}{x_{iot}} \right] / \frac{1}{T} \sum_{t=1}^T w^T \left[1 + \frac{1}{s+n} \sum_{i=1}^n \frac{w_i^+ s_{it}^-}{y_{iot}} \right]$$

Section-4 : Data, Results and Discussion

4.1 Input-Output Correspondence and Data Source

In a slacks based dynamic benchmarking model, it is essential to specify input, output and link variables. In the present study, we take value at risk (with 99 per cent confidence level) as the input for the six time periods (months), mean return and first order stochastic dominance (FSD-the probability of getting excess return over mean return as the two outputs and standard deviation (a proxy for volatility) as the bad free link. Estimation of efficiency is made

using input oriented, output oriented and non-oriented approaches.

As indicated earlier, the present study is based on 26 sectoral equity funds. The requisite information about daily NAV for the in-sample mutual fund schemes have been collected from AMFI website and the calculations regarding mean return, probability of excess return over mean return, value at risk and standard deviation have been made by the author.

4.2 Descriptive Statistics of Efficiency Scores

Tables 2-4 provide the descriptive statistics of the technical efficiency scores computed under the three orientations (output oriented, input oriented and non-oriented) for the four quarters corresponding to the years (2010-11, 2011-12 and 2012-13 respectively). Figures 2-4 provide graphical presentations depicting mean score movements through the observed quarters. Readers would also be interested in the fund wise inter-temporal performance and accordingly the Fund wise quarter-wise scores (for the 26 in-sample funds) are provided in Appendix tables.

Table-1: Input, Output and Link Variable

Input	Outputs	Link Variable
Value at Risk (99%)	Mean Return, FSD	Standard Deviation

Table-2 : Mean Technical Efficiency Scores (2010-11)

Particulars	July-Sept 2010	Oct-December 2010	Jan-March 2011	April-June 2011
Input Oriented Efficiency	0.9155	0.8812	0.8634	0.9736
Output Oriented Efficiency	0.9608	0.9765	0.9192	0.9826
Non-oriented Efficiency	0.8954	0.8815	0.8516	0.9622

Source : Calculated.

Figure-2 : Movement of Mean Technical Efficiency Scores Through the Quarters (2010-11)

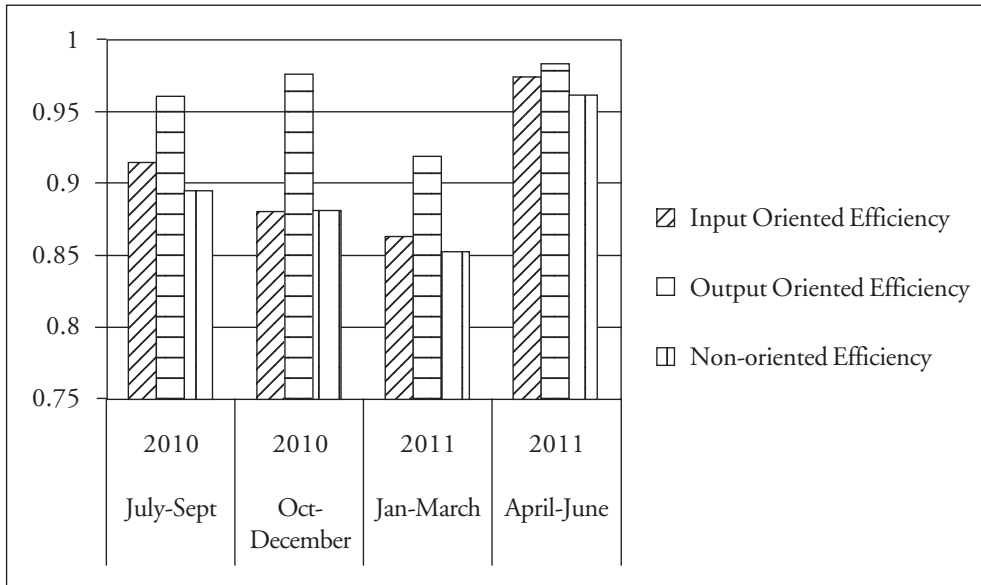


Table-3 : Mean Technical Efficiency Scores (2011-12)

Particulars	July-Sep 2011	Oct-Dec 2011	Jan-March 2012	April-June 2012
Input Oriented Efficiency	0.9681	0.8757	0.8775	0.873
Output Oriented Efficiency	0.9571	0.9712	0.9768	0.9754
Non-oriented Efficiency	0.9591	0.8706	0.8647	0.8677

Source : Calculated.

Figure-3 : Movement of Mean Technical Efficiency Scores Through the Quarters (2011-12)

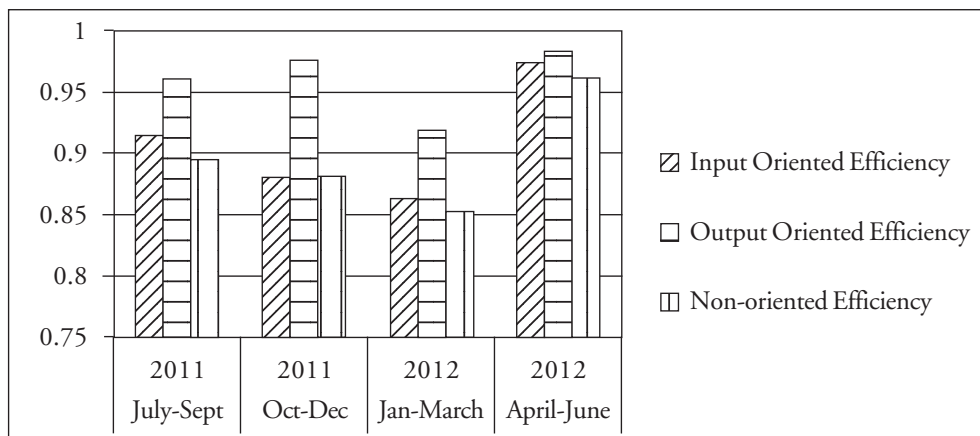
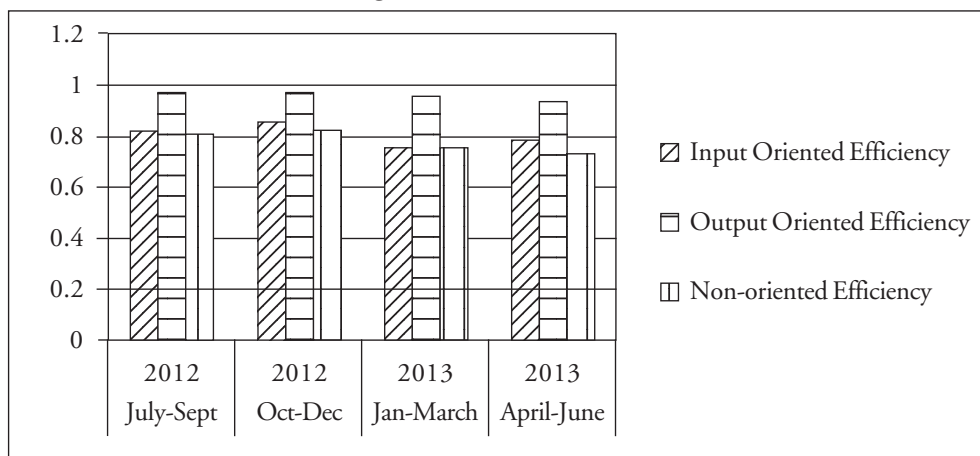


Table-4 : Mean Technical Efficiency Scores (2012-13)

Particulars	July-Sep 2012	Oct-Dec 2012	Jan-March 2013	April-June 2013
Input Oriented Efficiency	0.8327	0.8536	0.7664	0.7846
Output Oriented Efficiency	0.9702	0.9667	0.9637	0.9372
Non-oriented Efficiency	0.82	0.8245	0.7657	0.7312

Source : Calculated.

Figure-4 : Movement of Mean Technical Efficiency Scores Through the Quarters (2012-13)



4.3 Projected and Efficient Funds

Tables-5-7 provide summary information regarding the number of funds which were found efficient for the observed quarters. The Tables are based on computations under three orientations (input oriented, output oriented and non-oriented approaches) and provide the information as to how many funds were found to be on the frontier and how many (the remaining ones)

required projection. Note that the funds which are on the frontier are the efficient funds and the remaining funds are lying below the frontier. In the output oriented approach the inefficient funds can be made efficient by adding output slacks, in the input oriented method they can be lifted to the frontier by subtracting input slacks. In the non-oriented approach, both kinds of adjustments are made.

Table-5 : Efficient-Inefficient Decomposition of In-Sample Funds (2010-11)

Model Orientation	No. of Funds	July-Sept 2010	Oct-Dec 2010	Jan-March 2011	April-June 2011
Input oriented	Efficient	10	12	10	14
	Projected	16	14	16	12
Output oriented	Efficient	9	11	10	12
	Projected	17	15	16	14
Non-oriented	Efficient	9	12	10	12
	Projected	17	14	16	14

Source : Calculated.

Table-6 : Efficient-Inefficient Decomposition of In-Sample Funds (2011-12)

Model Orientation	No. of Funds	July-Sept 2011	Oct-Dec 2011	Jan-March 2012	April-June 2012
Input oriented	Efficient	17	11	11	11
	Projected	9	15	15	15
Output oriented	Efficient	11	11	11	11
	Projected	15	15	15	15
Non-oriented	Efficient	12	11	10	10
	Projected	14	15	16	16

Source : Calculated.

Table-7 : Efficient-Inefficient Decomposition of In-Sample Funds (2012-13)

Model Orientation	No. of Funds	July-Sept 2011	Oct-Dec 2011	Jan-March 2012	April-June 2012
Input oriented	Efficient	10	10	8	7
	Projected	16	16	18	19
Output oriented	Efficient	10	7	6	5
	Projected	16	19	20	21
Non-oriented	Efficient	10	7	7	6
	Projected	16	19	19	20

Source : Calculated.

4.4 Sources of Inefficiency

We are interested to know the sources of inefficiency for the in-sample mutual funds. In a slacks based measure model, it is possible to decompose the overall inefficiency in to input side inefficiency and output side inefficiency. Tables-8 through 10 provide the relative efficiency of each input/output relative to the benchmark for the in-sample funds as a whole. Thus from the Tables it is possible to infer about the degree of inefficiency present in each input/outputs. For the input (value at risk), partial efficiency is measured as the ratio of projected value to observed value. On the other hand, for the two outputs, partial efficiency is measured as the ratio of observed value to projected value. Table 8-10 present the results for the input oriented, output oriented and non-oriented approaches.

Section-5 : The Concluding Observations

In the present study we have used the dynamic slacks based measure model for the purpose of benchmarking of sectoral mutual fund schemes by extending the currently used methodology to a dynamic setting. Since a non-parametric framework has been used, it was not necessary for the study to assume a parametric mathematical or statistical relationship between the outputs, input and the link variable. Further, the procedure enabled us to generate data-driven endogenous benchmarks for the purpose of fund performance. Finally, the dynamic DEA methodology permitted inter-temporal comparison of performance which is not possible under the extant procedures. The study reveals that while the mean efficiency scores for 2010-11 and 2011-12 were

Table-8 : Partial Efficiency Indicator-Input Oriented Approach

Period	Return	FSD	Value at Risk
July-September 2010	0.9999	0.9543	0.8947
October-December 2010	0.9997	0.9937	0.8571
January-March 2011	0.9996	0.9899	0.8144
April-June 2011	0.9999	0.9730	0.9375
July-September 2011	0.9997	0.9765	1
October-December 2011	0.9994	0.9908	0.8605
January-March 2012	0.9998	0.9714	0.8415
April-June 2012	0.9997	0.9918	0.8511
July-September 2012	0.9998	0.9559	0.84
October-December 2012	0.9998	0.9743	0.8214
January-March 2013	0.9985	1	0.7004
April-June 2013	0.9994	0.9586	0.7623

Source : Calculated.

Table-9 : Partial Efficiency Indicator -Output Oriented Approach

Period	Return	FSD	Value at Risk
July-September 2010	0.9997	0.9146	0.9934
October-December 2010	0.9996	0.9395	0.9496
January-March 2011	0.9999	0.7869	0.9621
April-June 2011	0.9999	0.9557	0.9583
July-September 2011	1	0.9197	0.9999
October-December 2011	0.9996	0.9340	0.9796
January-March 2012	0.9993	1	1
April-June 2012	0.9998	0.9346	0.9656
July-September 2012	0.9999	0.9289	1
October-December 2012	0.9993	0.9284	0.9286
January-March 2013	0.9985	0.9056	0.8692
April-June 2013	0.9999	0.9014	0.9414

Source : Calculated.

Table-10 : Partial Efficiency Indicator –Non-Oriented Approach

Period	Return	FSD	Value at Risk
July-September 2010	0.9999	0.941338	0.8947
October-December 2010	0.9997	0.9903	0.8655
January-March 2011	0.9998	0.9040	0.8485
April-June 2011	0.9991	0.9681	0.9375
July-September 2011	0.9999	0.9281	1
October-December 2011	0.9993	0.9838	0.8639
January-March 2012	0.9997	0.9685	0.8380
April-June 2012	0.9997	0.9847	0.8511
July-September 2012	0.9993	0.9503	1
October-December 2012	0.9996	0.9584	0.7704
January-March 2013	0.9985	1	0.7215
April-June 2013	0.9993	0.9503	0.7099

Source : Calculated.

more or less similar, the same has declined for 2012-13. This implies that funds have diverged in terms of performance during the concerned period. Table-11 provides an year-wise comparison of mean technical efficiency for 2010-11 (July to June), 2011-12 (July to June) and 2012-13 (July to June). The study also identifies the sources of

inefficiency-i.e. whether inefficiency emanates from the input side or from the output side which significantly facilitates fund management.

However, in the absence of adequate information about idiosyncratic features of the in-sample funds, explanation of fund performance in terms of

Table-11 : Year-wise Comparison of Mean Technical Efficiency

Particulars	2010-11	2011-12	2012-13
Input oriented efficiency	0.9084	0.8986	0.8093
Output oriented efficiency	0.9598	0.9701	0.9595
Non-oriented efficiency	0.8977	0.8905	0.7854

Source : Calculated.

contextual variables has remained outside the scope of this paper and this is a limitation of the present study. It is expected that such an in depth study could well be an integral part of future research agenda concerning Indian mutual fund sector.

(Note : The present research paper is based from the outcome of an ICSSR sponsored research project titled “Endogenous Benchmarking of Indian Mutual Funds”. Financial assistance from ICSSR for carrying out the research is gratefully acknowledged.)

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Appendix : Fund-wise Performance Across the Quarters

The following Tables (A-1 to A-9) provide the fund-wise efficiency scores over the quarters corresponding to the three observed years : 2010-11, 2011-12 and 2012-13. Estimation has been made for the three approaches : input-oriented and non-oriented.

Table-A.1 : Fund-wise Performance (Input-oriented) for 2010-11

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.8652	0.7611	0.6828	0.9861
BOI AXA Focused Infrastructure Fund	0.6785	0.7295	0.6726	0.9294
Canara Robeco Infrastructure	1	1	1	1
DSP BlackRock World Energy Fund	0.9805	1	1	1
DSP Black Rock World Gold Fund	0.8180	0.7206	0.9415	0.9193
DSP Black Rock World Mining Fund	1	1	0.8800	0.9155
DWS Global Agribusiness offshore Fund	0.9520	1	1	1
HDFC Core and Satellite Fund	0.8652	0.9992	0.9640	1
HDFC Infrastructure Fund	1	0.7808	0.6916	0.9955
ICICI Prudential Banking and Financial Services Fund	1	0.6627	0.7340	0.9602
ICICI Prudential Exports and Other Services Fund	0.9200	1	1	1
ICICI Prudential Technology Fund	0.7993	0.7963	0.9246	0.8082
IDFC Strategic Sector (50-50) Equity Fund	0.8315	0.8758	0.7277	0.9386
ING Global Commodities Fund	1	1	0.8565	1
JP Morgan India Smaller Companies Fund	0.8983	1	0.9159	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.7494	0.9537	1	1
LIC NOMURA MF Infrastructure Fund	0.8353	0.7914	0.7116	0.9815
Mirae Asset Global Commodity Stocks Fund	1	1	1	1
Pine Bridge Infrastructure & Economic Reform Fund	1	1	1	1
Pine Bridge World Gold Fund	1	1	1	1
Reliance Banking Fund	1	0.6686	0.5917	1
SBI Infrastructure Fund	0.9401	0.8673	0.7163	0.9257
Sundaram Energy Opportunities Fund	0.7604	0.6965	0.7087	0.9733
Tata Growing Economies Infrastructure Fund Scheme A Plan A	0.9285	1	1	1
UTI Banking Sector Fund	0.9805	0.6076	0.7295	0.9802

Source : Calculated.

Table-A.2 : Fund-wise Performance (Output-oriented) for 2010-11

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.8844	0.9416	0.8483	0.9966
BOI AXA Focused Infrastructure Fund	0.9738	0.9931	0.7728	0.9937
Canara Robeco Infrastructure	1	1	1	0.9743
DSP BlackRock World Energy Fund	0.9639	1	1	1
DSP Black Rock World Gold Fund	0.9627	0.9944	0.9099	0.9514
DSP Black Rock World Mining Fund	1	1	0.9564	0.9679
DWS Global Agribusiness offshore Fund	0.9901	1	1	1
HDFC Core and Satellite Fund	0.8509	0.9661	0.8845	1
HDFC Infrastructure Fund	1	0.9621	0.8530	0.9830
ICICI Prudential Banking and Financial Services Fund	1	0.9480	0.8792	0.9361
ICICI Prudential Exports and Other Services Fund	0.9585	0.9980	1	1
ICICI Prudential Technology Fund	0.9512	0.9780	0.8189	0.9542
IDFC Strategic Sector (50-50) Equity Fund	0.9232	0.8532	0.9262	0.9537
ING Global Commodities Fund	1	1	0.9335	1
JP Morgan India Smaller Companies Fund	0.9532	1	0.8416	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.9141	0.9489	1	1
LIC NOMURA MF Infrastructure Fund	0.9544	0.9790	0.8063	0.9845
Mirae Asset Global Commodity Stocks Fund	1	1	1	1
Pine Bridge Infrastructure & Economic Reform Fund	1	1	1	1
Pine Bridge World Gold Fund	0.9802	1	1	1
Reliance Banking Fund	1	0.9585	0.8742	0.9640
SBI Infrastructure Fund	0.9308	0.9770	0.8613	0.9681
Sundaram Energy Opportunities Fund	0.8619	0.9622	0.8315	0.9672
Tata Growing Economies Infrastructure Fund Scheme A Plan A	0.9612	1	1	1
UTI Banking Sector Fund	0.9668	0.9289	0.9023	0.9540

Source : Calculated.

Table-A.3 : Fund-wise Performance (Non-oriented) for 2010-11

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.8011	0.7816	0.6666	0.9860
BOI AXA Focused Infrastructure Fund	0.7081	0.6844	0.6508	0.9154
Canara Robeco Infrastructure	1	1	1	0.9765
DSP BlackRock World Energy Fund	0.9643	1	1	1
DSP Black Rock World Gold Fund	0.8132	0.7235	0.9410	0.8782
DSP Black Rock World Mining Fund	1	1	0.8742	0.8833
DWS Global Agribusiness offshore Fund	0.9520	1	1	1
HDFC Core and Satellite Fund	0.8094	0.9898	0.9276	1
HDFC Infrastructure Fund	1	0.8458	0.6935	0.9611
ICICI Prudential Banking and Financial Services Fund	1	0.6728	0.7150	0.9003
ICICI Prudential Exports and Other Services Fund	0.9184	1	1	1
ICICI Prudential Technology Fund	0.7960	0.7908	0.8921	0.7716
IDFC Strategic Sector (50-50) Equity Fund	0.7929	0.7777	0.6937	0.9525
ING Global Commodities Fund	1	1	0.8505	1
JP Morgan India Smaller Companies Fund	0.8588	1	0.8393	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.6878	0.9546	1	1
LIC NOMURA MF Infrastructure Fund	0.8200	0.8344	0.6553	0.9815
Mirae Asset Global Commodity Stocks Fund	1	1	1	1
Pine Bridge Infrastructure & Economic Reform Fund	1	1	1	1
Pine Bridge World Gold Fund	0.9804	1	1	1
Reliance Banking Fund	1	0.6721	0.6067	0.9787
SBI Infrastructure Fund	0.8972	0.8702	0.6867	0.9273
Sundaram Energy Opportunities Fund	0.6126	0.7381	0.7177	0.9633
Tata Growing Economies Infrastructure Fund Scheme A Plan A	0.9107	1	1	1
UTI Banking Sector Fund	0.9577	0.5837	0.7322	0.9413

Source : Calculated.

Table-A.4 : Fund-wise Performance (Input-oriented) for 2011-12

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.9137	0.6719	0.6917	0.6838
BOI AXA Focused Infrastructure Fund	0.9168	0.5567	0.5738	0.8481
Canara Robeco Infrastructure	1	1	1	1
DSP BlackRock World Energy Fund	1	1	1	0.8920
DSP Black Rock World Gold Fund	1	0.8612	0.9688	1
DSP Black Rock World Mining Fund	1	1	1	0.5755
DWS Global Agribusiness offshore Fund	1	1	0.9385	1
HDFC Core and Satellite Fund	0.8595	0.9996	0.8789	0.9896
HDFC Infrastructure Fund	1	1	1	0.9452
ICICI Prudential Banking and Financial Services Fund	1	0.9827	1	1
ICICI Prudential Exports and Other Services Fund	0.9654	0.9831	1	1
ICICI Prudential Technology Fund	1	1	0.8012	1
IDFC Strategic Sector (50-50) Equity Fund	0.8878	0.8162	0.7424	0.9129
ING Global Commodities Fund	1	1	0.9591	0.5325
JP Morgan India Smaller Companies Fund	1	0.8716	1	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.8524	0.7153	0.7896	0.7459
LIC NOMURA MF Infrastructure Fund	0.9369	0.6470	0.6835	0.6261
Mirae Asset Global Commodity Stocks Fund	1	0.7616	0.8284	0.9229
Pine Bridge Infrastructure & Economic Reform Fund	1	0.8636	0.8200	0.9066
Pine Bridge World Gold Fund	1	1	1	1
Reliance Banking Fund	0.9374	0.7953	0.8559	0.8082
SBI Infrastructure Fund	0.8996	0.5013	0.5591	0.7405
Sundaram Energy Opportunities Fund	1	0.7410	0.7231	0.5681
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	1	1	1	1

Source : Calculated.

Table-A-5 : Fund-wise Performance (Output-oriented) for 2011-12

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.9281	0.9420	0.9815	0.9595
BOI AXA Focused Infrastructure Fund	0.9127	0.9000	0.9729	0.9639
Canara Robeco Infrastructure	0.8797	0.9733	0.9805	0.9461
DSP BlackRock World Energy Fund	1	1	1	0.9982
DSP Black Rock World Gold Fund	1	0.9981	0.9198	1
DSP Black Rock World Mining Fund	1	1	1	0.9306
DWS Global Agribusiness offshore Fund	1	1	1	1
HDFC Core and Satellite Fund	0.9331	1	0.9823	1
HDFC Infrastructure Fund	0.9643	1	1	0.9805
ICICI Prudential Banking and Financial Services Fund	0.9359	0.9549	1	1
ICICI Prudential Exports and Other Services Fund	0.9230	0.9905	1	1
ICICI Prudential Technology Fund	0.9492	1	0.9479	1
IDFC Strategic Sector (50-50) Equity Fund	0.9661	0.8980	0.9708	0.9908
ING Global Commodities Fund	1	1	0.9232	0.9633
JP Morgan India Smaller Companies Fund	1	0.9478	1	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.9267	0.9662	0.9446	0.9664
LIC NOMURA MF Infrastructure Fund	0.8565	0.9376	0.9400	0.9020
Mirae Asset Global Commodity Stocks Fund	1	0.9742	0.9657	0.9041
Pine Bridge Infrastructure & Economic Reform Fund	1	0.9465	0.9828	0.9791
Pine Bridge World Gold Fund	1	1	1	1
Reliance Banking Fund	0.9021	0.9528	0.9871	0.9894
SBI Infrastructure Fund	0.9234	0.9370	0.9581	0.9421
Sundaram Energy Opportunities Fund	0.9255	0.9315	0.9398	0.9439
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	0.9585	1	1	1

Source : Calculated.

Table-A-6 : Fund-wise Performance (Non-oriented) for 2011-12

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.9410	0.6791	0.6917	0.6838
BOI AXA Focused Infrastructure Fund	0.9499	0.5589	0.5738	0.8481
Canara Robeco Infrastructure	0.8887	0.8996	0.9334	0.9400
DSP BlackRock World Energy Fund	1	1	1	0.8944
DSP Black Rock World Gold Fund	1	0.8606	0.9068	1
DSP Black Rock World Mining Fund	1	1	1	0.5564
DWS Global Agribusiness offshore Fund	1	1	0.9343	1
HDFC Core and Satellite Fund	0.9331	1	0.8664	0.9907
HDFC Infrastructure Fund	0.9643	1	1	0.9449
ICICI Prudential Banking and Financial Services Fund	0.9434	0.9534	1	1
ICICI Prudential Exports and Other Services Fund	0.9248	0.9855	1	1
ICICI Prudential Technology Fund	0.9492	1	0.7812	1
IDFC Strategic Sector (50-50) Equity Fund	0.8742	0.7641	0.7270	0.9129
ING Global Commodities Fund	1	1	0.9117	0.5323
JP Morgan India Smaller Companies Fund	1	0.8712	1	1
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.9321	0.7299	0.7707	0.7459
LIC NOMURA MF Infrastructure Fund	0.8565	0.6655	0.6626	0.5970
Mirae Asset Global Commodity Stocks Fund	1	0.7504	0.8116	0.8921
Pine Bridge Infrastructure & Economic Reform Fund	1	0.8634	0.8200	0.9063
Pine Bridge World Gold Fund	1	1	1	1
Reliance Banking Fund	0.9021	0.8089	0.8492	0.8082
SBI Infrastructure Fund	0.9181	0.5031	0.5447	0.7403
Sundaram Energy Opportunities Fund	1	0.7408	0.6966	0.5680
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	0.9585	1	1	1

Source : Calculated.

Table-A-7 : Fund-wise Performance (Input-oriented) for 2012-13

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.6074	0.7257	0.5841	0.6343
BOI AXA Focused Infrastructure Fund	0.6991	0.8240	0.7209	0.7172
Canara Robeco Infrastructure	1	1	1	1
DSP BlackRock World Energy Fund	0.8223	1	1	1
DSP Black Rock World Gold Fund	1	1	1	1
DSP Black Rock World Mining Fund	0.5362	0.4926	0.6256	0.4290
DWS Global Agribusiness offshore Fund	0.9065	0.7916	1	0.9583
HDFC Core and Satellite Fund	0.7814	0.7261	0.5414	0.6975
HDFC Infrastructure Fund	0.7589	0.7742	0.9924	1
ICICI Prudential Banking and Financial Services Fund	1	1	0.6280	0.6684
ICICI Prudential Exports and Other Services Fund	0.8892	0.9212	1	1
ICICI Prudential Technology Fund	1	1	1	0.7440
IDFC Strategic Sector (50-50) Equity Fund	0.7169	0.8866	0.5938	0.6843
ING Global Commodities Fund	0.5236	0.6036	0.8859	0.7077
JP Morgan India Smaller Companies Fund	1	1	0.7434	0.9446
Kotak PSU Bank ETF	1	1	0.5086	0.5895
L&T Infrastructure Fund	0.6881	0.7748	0.6107	0.7632
LIC NOMURA MF Infrastructure Fund	0.5764	0.7740	0.6771	0.6760
Mirae Asset Global Commodity Stocks Fund	0.9625	1	0.7710	0.7734
Pine Bridge Infrastructure & Economic Reform Fund	1	0.7865	0.7584	0.8694
Pine Bridge World Gold Fund	1	1	1	1
Reliance Banking Fund	0.8056	0.7770	0.6130	0.6634
SBI Infrastructure Fund	0.6933	0.6572	0.5615	0.6573
Sundaram Energy Opportunities Fund	0.6825	0.7999	0.5782	0.6779
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	1	0.8782	0.5321	0.5441

Source : Calculated.

Table-A-8 : Fund-wise Performance (Output-oriented) for 2012-13

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.9330	0.9277	0.9460	0.9522
BOI AXA Focused Infrastructure Fund	0.9492	0.9141	0.9624	0.9526
Canara Robeco Infrastructure	1	0.9541	0.9950	0.9757
DSP BlackRock World Energy Fund	0.9852	0.9860	1	1
DSP Black Rock World Gold Fund	1	1	1	1
DSP Black Rock World Mining Fund	0.9750	0.9338	0.9362	0.9707
DWS Global Agribusiness offshore Fund	0.8803	0.9974	1	0.0001
HDFC Core and Satellite Fund	0.9990	0.9622	0.9331	0.9748
HDFC Infrastructure Fund	0.9017	0.9929	0.9796	1
ICICI Prudential Banking and Financial Services Fund	1	1	0.9535	0.9760
ICICI Prudential Exports and Other Services Fund	0.9719	0.9773	1	1
ICICI Prudential Technology Fund	1	1	1	0.9515
IDFC Strategic Sector (50-50) Equity Fund	0.9589	0.9728	0.9353	0.9962
ING Global Commodities Fund	0.9136	0.9130	0.9008	0.9977
JP Morgan India Smaller Companies Fund	1	1	0.9344	0.9708
Kotak PSU Bank ETF	1	1	0.9784	0.9802
L&T Infrastructure Fund	0.9515	0.9794	0.9584	0.9865
LIC NOMURA MF Infrastructure Fund	0.9489	0.9461	0.9679	0.9578
Mirae Asset Global Commodity Stocks Fund	0.9739	1	0.9783	0.9861
Pine Bridge Infrastructure & Economic Reform Fund	1	0.8979	0.9403	0.9681
Pine Bridge World Gold Fund	1	0.9678	0.9752	0.9156
Reliance Banking Fund	0.9317	0.9557	0.9805	0.9645
SBI Infrastructure Fund	0.9653	0.9624	0.9498	0.9632
Sundaram Energy Opportunities Fund	0.9852	0.9480	0.9098	0.9751
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	1	0.9452	0.9419	0.9525

Source : Calculated.

Table-A-9 : Fund-wise Performance (Non-oriented) for 2012-13

Fund Name	July-Sept	Oct-Dec	Jan-March	April-June
Baroda Pioneer Infrastructure Fund	0.5879	0.7004	0.5837	0.6270
BOI AXA Focused Infrastructure Fund	0.6712	0.7861	.7203	0.7089
Canara Robeco Infrastructure	1	0.9488	0.9358	0.9199
DSP BlackRock World Energy Fund	0.8278	0.9860	1	1
DSP Black Rock World Gold Fund	1	1	1	1
DSP Black Rock World Mining Fund	0.5360	0.4746	0.6248	0.4286
DWS Global Agribusiness offshore Fund	0.8402	0.7914	1	0.0001
HDFC Core and Satellite Fund	0.7824	0.7135	0.5410	0.6972
HDFC Infrastructure Fund	0.6997	0.7739	0.9920	1
ICICI Prudential Banking and Financial Services Fund	1	1	0.6277	0.6684
ICICI Prudential Exports and Other Services Fund	0.8891	0.9156	1	1
ICICI Prudential Technology Fund	1	1	1	0.7439
IDFC Strategic Sector (50-50) Equity Fund	0.6941	0.8752	0.5934	0.6842
ING Global Commodities Fund	0.4875	0.5696	0.8510	0.7070
JP Morgan India Smaller Companies Fund	1	1	0.7429	0.9395
Kotak PSU Bank ETF	1	1	1	1
L&T Infrastructure Fund	0.6699	0.7692	0.6102	0.7630
LIC NOMURA MF Infrastructure Fund	0.5649	0.7416	0.6767	0.6718
Mirae Asset Global Commodity Stocks Fund	0.9623	1	0.7705	0.7731
Pine Bridge Infrastructure & Economic Reform Fund	1	0.7749	0.7578	0.8691
Pine Bridge World Gold Fund	1	0.5641	0.5964	0.2740
Reliance Banking Fund	0.7520	0.7493	0.6133	0.6631
SBI Infrastructure Fund	0.6723	0.6498	0.5610	0.6571
Sundaram Energy Opportunities Fund	0.6823	0.7997	0.5778	0.6776
Tata Growing Economies Infrastructure Fund Scheme A Plan A	1	1	1	1
UTI Banking Sector Fund	1	0.8527	0.5319	0.5379

Source : Calculated.

Performance Comparison of PSU, Nifty, and Gold Exchange Traded Funds (ETFs)

Jaspal Singh* & Prabhdeep Kaur**

Government of India (GoI) opted for a new disinvestment route in March 2014 when it decided to divest its holdings in public sector enterprises through Exchange Traded Funds (ETFs). Although ETFs have been in existence for more than a decade now, the product is yet to gain popularity among the investment community. In the present study, an attempt has been made to compare the performance characteristics of PSU ETFs against Nifty ETFs and gold ETFs from 4 April 2014 to 31 December 2016 using various performance metrics such as tracking efficiency, Sharpe ratio, Treynor ratio and Jensen's alpha. The study found that amongst all the ETFs under analysis, CPSE (Central Public Sector Enterprises) ETF outperforms in terms of lowest tracking error, highest Sharpe ratio, Treynor ratio and Jensen's alpha. The fund turns out to be the sole performer in terms of generating significant excess returns with Jensen's alpha reported to be 3.024 per cent. NIFTYBEES and QNIFTY are also found to have an edge over other ETFs in terms of tracking their respective benchmark indices and generating wealth for stakeholders. On the contrary, PSUBNKBEES, KOTAKPSUBK, KOTAKNIFTY, M50, NIFTYWIN and all gold ETFs failed to generate returns even above the risk free return. The results shall have important implications for investors, fund managers and financial community. Investors can diversify their portfolio through investment in a single ETF or diversify their portfolio amongst the three categories based on their investment objective. Fund managers can gain an insight on the relative tracking efficiency of their respective funds. Though ETFs offer investors a cost-effective measure to gain exposure to a wide variety of asset classes, the market for ETFs in India remains underdeveloped on account of illiquidity, unawareness and limited participation on part of both retail and institutional investors.

Keywords : PSU ETFs, Nifty ETFs, Gold ETFs, Tracking Error, Sharpe Ratio, Treynor Ratio, Jensen's Alpha.

Introduction

Stocks of government-owned companies attract special attention from the investment community on account of their strong fundamentals and government

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backing. Also, stable government and sound economic policies further tend to enhance the performance of public sector undertakings (PSUs) (The Indian Express, 2014, March 3). In India, PSUs are classified as amongst the largest enterprises established with an aim to promote economic growth and achieve self-sufficiency in production of goods and services. Indian PSUs are broadly categorized into three categories i.e., Central Public Sector Enterprises (CPSEs), Public Sector Banks (PSBs) and State Level Public Enterprises (SLPEs) (Gupta, 2013). Investors aiming to gain exposure to PSUs have multiple options to choose from in terms of stocks, mutual funds and Exchange Traded Funds (ETFs). While stocks help gain exposure to a specific sector, mutual funds help diversify portfolio to varied sectors through investment in multiple stocks. ETFs further combine the relative advantages of stocks and mutual funds by enabling real-time trading of investment units while simultaneously providing diversification benefits.

ETF are passively managed funds that attempt to track the risk-return properties of specific asset classes which may include a broad based index, commodity prices, fixed income indices or international indices (Rompotis, 2011a). The Authorized Participants (APs) (also called market makers) play a vital role

in the process of creation and redemption of ETF units. These market makers buy the underlying basket of securities that the ETF aims to track and exchange them for the ETF creation units with the custodian bank of the fund house. These creation units are later floated in the secondary market where they are made available for trading by the investors. In case of redemption, APs buy the ETF units back from the open (secondary) market and get them exchanged for the constituents of the underlying index that the ETF attempts to replicate.

In March 2014, the Government of India (GoI), in consultation with Goldman Sachs Asset Management Company, floated the first CPSE ETF in order to divest a part of its holdings in CPSEs. The fund aimed at tracking the performance characteristics of CPSE index. It enabled investors to gain exposure to a broad basket of 10 public sector companies. This novel disinvestment strategy fetched the government ₹3,000 crore and provided investors an opportunity to become the shareholders of top 10 PSUs (Palande, 2014) through investment in a single security. Recently, in January 2010, the GoI launched the second tranche of CPSE ETF with the aim to raise about ₹6,000 crore as part of its disinvestment strategy (The Times of India, 2017, Jan 12). The move was a huge success since the issue was

oversubscribed by 2.170 times (Allirajan, 2017). Further, in its recent Union Budget 2017-18, the GoI indicated its willingness to launch a variety of such ETFs as part of its disinvestment initiative (The Economic Times, 2017, Feb 1). Given the growing inclination of government towards ETFs as a source of disinvestment, the present study attempts to evaluate the relative efficiency of PSU ETFs over the other two categories of ETFs i.e. Nifty ETFs and gold ETFs, a brief description of which has been provided below. Other ETFs that attempt to track the performance of PSUs include Goldman Sachs PSU Bank Exchange Traded Scheme, Kotak PSU Bank ETF launched in October 2007 and November 2007 respectively.

Nifty ETFs classifies another segment of ETFs that attempt to track the risk-return characteristics of the widely quoted Nifty 50 index. Nifty BeES was the first ETF to be launched in India by the Benchmark Asset Management Company (AMC) (taken over by Goldman Sachs Asset Management Company in 2011) in December 2001. The fund constitutes all the securities comprising the Nifty 50 index and is priced at 1/10th of the value of the index. It provides investors exposure to a well-diversified basket of top fifty securities. It took a couple of years for the fund to succeed and today it is one of the largest funds among the available ETFs. As on

31 December 2016, 13 Nifty 50 ETFs are being traded at the capital market segment of NSE.

In India, gold ETFs have a much larger asset base compared to that of equity ETFs. In fact, the idea of commodity ETFs was first premised in India in May 2001 when Benchmark Asset Management Company filed its offer document with SEBI containing proposal with regard to the introduction of gold ETFs. However, the idea could materialize only in 2007 with the launch of Goldbees after the imposition of certain regulatory frameworks. As on 31 December 2016, there are 13 gold ETFs that are being traded at NSE.

Select Related Literature

Here are a few studies that examined the performance efficiency of ETFs against their reference indices. Elton, *et al.* (2002) analysed the performance characteristics of SPDR (i.e. spiders) listed at AMEX using daily data from 1993 to 1998 and found that spiders under performed their benchmark index by 28 basis points. This under performance was attributed to the expenses charged by the fund and income lost on account of holding dividends (received from constituent stocks) in non-interest bearing account. Poterba and Shoven (2002) provided an overview of the functioning of exchange traded funds (ETFs) in U.S and

compared the before and after tax performance of SPDR ETF with that of the retail Vanguard Index 500 fund and the index (S&P 500) itself using annual data from 1993 to 2000. The results revealed that Vanguard Index fund not only provided superior before and after tax returns than those of SPDR but also outperformed its underlying index on account of different strategies adopted. Rompotis (2005) conducted a study in U.S to compare the performance characteristics of 16 ETFs and Index funds tracking the same indexes from 3 April 2001 to 20 November 2002. The study utilised both last traded prices as well as last bid ask prices in order to calculate daily ETF returns. The results found no significant difference between ETFs and Index funds with respect to tracking error but ETFs were found to exhibit higher tracking error when bid-ask returns were used. Gallagher and Segara (2006) examined the performance of four ETFs listed at Australian Stock Exchange using daily data from 2 January 2002 to 31 December 2003. The results indicated that ETFs manage to track their benchmark returns closely and any deviation in pricing of ETF from NAV is adjusted within a day. Harper, *et al.* (2006) evaluated the performance characteristics of 13 exchange traded funds (ETFs) and 22 closed-end funds (CEFs) tracking foreign indices using monthly returns from April 1996 to

December 2001. The study also included US ETF SPDR and seven US CEFs for the evaluation of domestic funds. The results revealed that ETFs tracked their underlying indexes efficiently and exhibited higher risk-return characteristics compared to their corresponding CEFs. ETFs were found to exhibit higher Sharpe ratio whereas CEFs were found to have negative alphas depicting the superiority of passive investment strategy over active investment strategy. Svetina and Wahal (2008) examined the performance characteristics of 584 U.S ETFs tracking different indices using daily data from the inception of each fund to December 2007. The results revealed that both domestic and international ETFs underperformed their underlying indexes and exhibited significant tracking error in performance. The study compared the returns of ETFs with those of their index fund (both retail and institutional) counterparts and found that the domestic equity ETFs provided investors with returns superior to those of retail index funds on a net return basis. Agapova (2010) compared the performance and operational characteristics of conventional index funds and exchange traded funds in terms of substitution and clientele effects. The data comprised of monthly returns of 171 index funds and 11 ETFs, both tracking 9 indices from the year 2000 to 2004. ETFs were found

to efficiently track their benchmark indexes since they exhibited much lower tracking error compared to their index fund counterparts. Shin and Soydemir (2010) used daily data to estimate the tracking error of 26 ETFs from July 2004 to June 2007. The tracking error metrics showed that the ETFs were subject to tracking errors while replicating their benchmark returns which were found to be higher in the case of American, Asian and European ETFs than those of the U.S. ETFs. Wong and Shum (2010) evaluated the performance characteristics of 15 ETFs from seven countries across bullish and bearish markets from 11 November 1999 to 31 July 2007 using daily returns. The results reported superior performance by ETFs against their underlying benchmark indexes. The higher mean and standard deviation in bullish markets compared to bearish market indicated volatile nature of ETFs in bullish markets. Jensen's alpha was found to be positive (though insignificant) for most of the ETFs indicating higher risk adjusted performance by ETFs especially during bullish markets. Rompotis (2011) conducted a study to examine the performance of 14 actively managed exchange traded funds traded at the U.S. Stock Exchange beginning from the inception date of each fund till 30 June 2010. The examination of raw returns revealed that the active

ETFs do not differ from their underlying indexes with respect to mean daily returns and risk. The results of CAPM, Fama and French three and four factor model revealed the failure of active ETFs to deliver above market returns. The estimated coefficients of beta were found to be less than unity which suggested that the selected ETFs were conservative in approach. The results of Sharpe ratio, Treynor ratio and Sortino ratio further confirmed the inability of ETFs to produce any statistically significant excess returns. Rompotis (2011b) examined the performance characteristics of 50 iShares tracking various broad, sector and international capital market indexes from 2002 to 2007 using both price returns and NAV returns. The study evaluated the ability of ETFs to outperform S&P 500 index using raw returns, Sharpe ratio and Sortino ratio. The results found that the majority of the selected ETFs were able to beat the market index. This return superiority was found to be persistent in the short run. ETFs were also evaluated in terms of their tracking efficiency with respect to their own benchmarks. The results revealed that the ETFs exhibited tracking inefficiency which was found to be persistent in the short-run. Chu (2011) made an attempt to study the magnitude of tracking errors of 18 ETFs traded at Hong Kong stock exchange from 2004 to 2008 using daily returns. The

tracking errors of Hong Kong exchange traded funds were found to be higher than those reported for U.S. and Australian ETFs. Buetow and Henderson (2012) empirically examined the performance of 845 U.S. ETFs classified as per the asset class of the benchmark index (i.e. equity, preferred, diversified, fixed income, real estate, other) using daily prices from 1994 to 2010. The results revealed that most of the ETFs closely tracked their underlying indexes but a few exhibited significant deviations in performance from their respective benchmarks. ETFs tracking indexes composed of U.S. securities were found to exhibit lower tracking error and higher correlation with the benchmark index. On the other hand, ETFs tracking indices composed of illiquid (such as high-yield bonds, commodities, derivatives) and non-U.S. securities exhibited higher tracking error and lower correlation with their respective benchmark indexes. Rompotis (2012) examined the performance characteristics of 36 ETFs traded at the Swiss Stock Exchange from August 2001 to April 2006 using daily data. The results revealed that Swiss ETFs under performed their respective benchmark indexes and exhibited much higher standard deviation compared to their underlying indexes. Significant performance deviations were found to exist between ETFs and their underlying indexes. Drenovak, *et al.* (2012) used daily,

monthly and annual data to analyse the tracking efficiency of 31 eurozone sovereign debt exchange traded funds (ETFs) from January 2007 to December 2010. The study employed four different tracking error metrics on the basis of correlation and cointegration analysis and found that sovereign debt ETFs under performed their underlying indexes and demonstrated significant tracking errors which were reported to be higher than those of U.S. treasury bond ETFs and passively managed equity funds. However, the adoption of appropriate measurement technique was found to have significant impact on the tracking performance of ETFs employing different replication strategies. ETFs employing synthetic replication were found to exhibit lower tracking errors with cointegration based metrics compared to those employing physical replication which were found to perform better with correlation based metrics. The results revealed that the performance of ETFs deteriorated during 2008 financial crisis leading to increased considerations with respect to the credit risk associated with sovereign bond ETFs. Meinhardt *et al.* (2015) examined the tracking efficiency of 95 physical and 326 synthetic ETFs classified into 286 equity, 117 fixed income and 18 other (commodity/total return) ETFs traded at Frankfurt Stock Exchange from 01 January 2010 to 31 August 2011 using daily returns. The results revealed that

both physical and synthetic ETFs exhibited significant tracking errors and tracking error of equity ETFs was found to be higher than that of fixed income ETFs. The results of Anova found no significant differences between the tracking error of physical and synthetic equity ETFs. However, significant differences were found to exist between tracking errors of physical and synthetic fixed income ETFs as physical fixed income ETFs exhibited tracking error higher than that of synthetic fixed income ETFs.

Motivation of the Study

Government of India (GoI) opted for a new disinvestment route in March 2014 when it decided to divest its holding in CPSEs through Exchange Traded Funds (ETFs). Goldman Sachs Asset Management Company was given the responsibility for designing such divestment product and as a result it came out with the CPSE ETF that provided investors an opportunity to simultaneously invest in the ten major CPSEs by investing in a single security. The route enabled government to garnish around ₹3,000 crore. Again, in 2017, the GoI floated its second tranche of CPSE ETF with the aim to monetize some of its holding in CPSEs. The issue was successful as it helped government raise ₹6,000 crore as part of its disinvestment policy. PSUs have an edge

over private units since they operate in areas of strategic importance, have access to resources that may not be available to private businesses, enjoy government's patronage as a result of which some PSUs (such as Coal India) even enjoy the monopoly. Comparing the performance of ETFs that track PSUs against those tracking Nifty 50 (which represents the economic strength of the country) and those tracking gold (widely used as a safe haven at times of financial crises) could be an issue of interest for investors exercising prudence in investment. Hence, the present study attempts to evaluate whether investment in PSUs through new investment avenue i.e. ETFs can help investors generate wealth in the form of enhanced returns when compared to the other categories of ETFs i.e. Nifty and gold ETFs.

Methodology and Data Description

Methodology

ETFs are designed to replicate the risk-return characteristics of their reference indices. Unlike actively managed funds, they do not attempt to beat their respective indices through indulging in aggressive trading strategies thus, keeping the expense ratio of ETFs much low compared to that of the mutual funds. Hence, the present study examines the performance characteristics of ETFs in

terms of their tracking efficiency (Tracking error), ability to generate returns over the risk free return per unit of risk undertaken (Sharpe ratio, Treynor ratio) and the extent to which they are sensitive to the movements in the underlying index (Beta coefficient of CAPM model).

Descriptive Statistics : Descriptive statistics have been estimated to gain an insight into the properties of the series with respect to mean, standard deviation, skewness, kurtosis and so on. The logarithmic returns of the ETFs and their corresponding indices have been calculated using the following formula :

$$\logret = \ln \frac{p_1}{p_0} 100$$

where p_1 is the closing price on t^{th} day and p_0 is the closing price on $t-1^{\text{th}}$ day. The rest of the statistics have been calculated using e-views 8 software.

Performance Evaluation

Tracking Efficiency : Tracking efficiency of ETFs has been calculated using the following three measures :

Tracking error 1 (TE1) : This measure calculates the average of the absolute difference between the return of an ETF and that of its underlying index.

$$TE1 = \frac{\sum_{t=1}^n |d_{pt}|}{n}$$

where $d_{pt} = r_{\text{etf},t} - r_{\text{index},t}$

$r_{\text{etf},t}$ refers to the log return of an ETF on day t , $r_{\text{index},t}$ refers to the log return of the index on day t and n is the number of days.

The daily returns of the ETFs and their target indices have been calculated as per the following formula :

$$\logret = \ln \left(\frac{p_1}{p_0} \right) 100$$

where p_1 is the closing price on n^{th} day and p_0 is the closing price on $n-1^{\text{th}}$ day.

Tracking error 2 (TE2) : This measure calculates the standard deviation of the difference between the return of an ETF and that of its target index.

$$TE2 = \sqrt{\frac{1}{n-1} \sum_{t=1}^n (d_{pt} - \bar{d}_{pt})^2}$$

where $d_{pt} = r_{\text{etf},t} - r_{\text{index},t}$

$r_{\text{etf},t}$ refers to the log return of an ETF on day t , $r_{\text{index},t}$ refers to the log return of the index on day t and n is the number of days.

Tracking error 3 (TE3) : This measure regresses the return of an ETF against that of its underlying index and denotes

the tracking error of the ETF through standard error of regression (i.e. standard deviation of residuals).

$$R_{ef,t} = \alpha_i + \beta_i R_{index,t} + \varepsilon_{pt}$$

Pope and Yadav (1994) states that the estimates obtained from TE2 would be the same as those obtained from TE3 in case beta is equal to one.

Sharpe Ratio : Sharpe ratio measures the risk premium earned per unit of total risk taken where risk premium is the excess return over risk free return and total risk is the standard deviation of excess returns. The interest rate on 91 day treasury bill has been used as a surrogate for risk free rate. The Sharpe ratio is defined as follows :

$$S = \frac{R_{i,t} - R_{fr,t}}{\sigma_{i,t}}$$

where S represents Sharpe ratio, $R_{i,t}$ refers to the return on the ETF i or the Index during the specified time period, $R_{fr,t}$ refers to the return on risk free asset during the same time period and $\sigma_{i,t}$ refers to the standard deviation of the excess returns during the specified time period (Reilly & Brown, 2013).

Treynor Ratio : Treynor ratio measures the risk premium earned per unit of systematic risk measured by beta. The ratio assumes a completely diversified

portfolio bearing no unsystematic risk and is calculated as follows :

$$T = \frac{R_{i,t} - R_{fr,t}}{\beta_{i,t}}$$

where T represents Treynor ratio, $R_{i,t}$ refers to the return on the ETF i or the Index during specified time period, $R_{fr,t}$ refers to the return on risk free asset during the same time period and $\beta_{i,t}$ refers to the ETF's relative volatility to the underlying index as measured by beta (Reilly & Brown, 2013).

Jensen's Alpha : Jensen's alpha, calculated using CAPM model is employed to determine whether ETFs provide investors with returns in excess of the returns generated by the target index. The model is expressed as follows :

$$R_{i,t} - R_{fr,t} = \alpha_i + \beta_i (R_{m,t} - R_{fr,t}) + e$$

where $R_{i,t}$ is the daily return on ETF i during the sample period, $R_{fr,t}$ is the risk free rate during the same period, β_i represents the systematic risk, $R_{m,t}$ refers to the daily return on the underlying index during the specified period and e is the error term. The α_i indicates the superior or inferior returns generated by ETFs against the reference index. A superior fund will have a positive alpha and an inferior fund will have a negative alpha (Jensen, 1968, Reilly & Brown, 2013).

Since ETFs are designed in a manner to exactly replicate the performance of their underlying indices or the commodity (as the case may be), Wald test has been employed to test whether the betas of ETFs differ significantly from one. A beta coefficient close to one would imply perfect replication whereas that different from one would imply imperfect replication. Further, since they are not expected to outperform the market in terms of returns, alpha is expected to not significantly differ from zero. Hence, the following null hypotheses are tested :

$$H_0 : \alpha = 0$$

$$H_0 : \beta = 1$$

Data Description

Since the present study attempts to compare the performance of PSU ETFs with that of Nifty ETFs and Gold ETFs, the time period of the study corresponds to that of the trading period of the PSU ETF with the shortest trading time span since inception i.e. CPSE ETF. Hence, all those ETFs (equity and gold ETFs) that have been actively trading from 4 April 2014 to 31 December 2016 form part of the sample. As such, the sample comprises of three PSU ETFs, eight Nifty 50 ETFs and 13 gold ETFs. The daily data of ETFs and their corresponding benchmark indices are obtained from

the official website of NSE. The spot price of gold of the Ahmedabad market has been obtained from the official website of Multi Commodity Exchange (MCX). A brief description of the various gold ETFs included in the sample is provided in Table-1.

Results and Analysis

Descriptive Statistics

Table-2 reports the descriptive statistics of daily returns of PSU ETFs, Nifty ETFs, gold ETFs as well as their corresponding indices. The daily mean returns of PSU ETFs range between 0.9 basis points (KOTAKPSUBK) to 4.0 basis points (CPSE ETF) whereas those of Nifty ETFs are observed to range from 2.4 basis points (BSLNIFTY) to 3.3 basis points (NIFTYBEES). The average daily returns of gold ETFs are found to be negative with losses varying from 0.5 basis points (GOLDBEES) to 1.4 basis points (AXISGOLD). The standard deviation of returns is reported to be highest for PSUBNKBEEES (2.153) and minimum for CPSE ETF (1.329) among PSU ETFs. In the case of Nifty ETFs, the fluctuations in returns are found to be low for KOTAKNIFTY (0.863), NIFTYBEES (0.897) and QNIFTY (0.913) compared to M50 (1.194), RELNIFTY (1.835), NIFTYIWIN (2.151), IVZINNIFTY (2.249) and BSLNIFTY (12.449) which turn out to be much more volatile

Table-1 : Profile ETFs Included in the Study

Panel-A : PSU ETFs			
ETF	Symbol	Launch Date	Fund House
Goldman Sachs PSU Bank Exchange Traded Scheme	PSUBNKBEES	Oct 25, 2007	Goldman Sachs Mutual Fund
Kotak PSU Bank ETF	KOTAKPSUBK	Nov 8, 2007	Kotak Mahindra Mutual Fund
Goldman Sachs Mutual Fund-CPSE Exchange Traded Scheme	CPSEETF	March 28, 2014	Goldman Sachs Mutual Fund
Panel-B : Nifty ETFs			
ETF	Symbol	Launch Date	Fund House
Goldman Sachs Nifty Exchange Traded Scheme	NIFTYBEES	Dec 28, 2001	Goldman Sachs Mutual Fund
Quantum Index Fund	QNIFTY	July 10, 2008	Quantum Mutual Fund
Kotak Nifty Exchange Traded Scheme	KOTAKNIFTY	Feb 8, 2010	Kotak Mahindra Mutual Fund
MoSt Shares M50	M50	July 28, 2010	Motilal Oswal Mutual Fund
Religare Invesco Nifty Exchange Traded Fund	IVZINNIFTY	June 6, 2011	Religare Invesco Mutual Fund
Birla Sun Life Nifty Exchange Traded Fund	BSLNIFTY	July 22, 2011	Birla Sun Life Mutual Fund
ICICI Prudential Nifty ETF-Growth	NIFTYWIN	March 20, 2013	ICICI Prudential Mutual Fund
R*Shares Nifty Exchange Traded Scheme	RELNIFTY	Nov 22, 2013	Reliance Mutual Fund
Panel-C : Gold ETFs			
ETF	Symbol	Launch Date	Fund House
Goldman Sachs Gold Exchange Traded Scheme	GOLDBEES	Mar 8, 2007	Goldman Sachs Mutual Fund

(Contd...)

UTI Gold Exchange Traded Fund	GOLDSHARE	Mar 12, 2007	UTI Mutual Fund
Kotak Gold ETF	KOTAKGOLD	July 27, 2007	Kotak Mutual Fund
R*Shares Gold ETF	RELGOLD	Nov 21, 2007	Reliance Mutual Fund
Quantum Gold Fund	QGOLDHALF	Feb 22, 2008	Quantum Mutual Fund
SBI Gold Exchange Traded Scheme	SBIGETS	April 28, 2009	SBI Mutual Fund
Religare Invesco Gold Exchange Traded Fund	IVZINGOLD	Mar 12, 2010	Religare Invesco Mutual Fund
HDFC Gold Exchange Traded Fund	HDFCFMGETF	Aug 13, 2010	HDFC Mutual Fund
ICICI Prudential Gold Exchange Traded Fund	GOLDIWIN	Aug 24, 2010	ICICI Prudential Mutual Fund
Axis Gold ETF Fund	AXISGOLD	Nov 10, 2010	Axis Mutual Fund
Birla Sun Life Gold Exchange Traded Fund	BSLGOLDETF	May 13, 2011	Birla Sun Life Mutual Fund
IDBI Gold Exchange Traded Fund	IDBIGOLD	Nov 9, 2011	IDBI Mutual Fund
Canara Robeco Gold Exchange Traded Fund	CRMFGETF	Mar 19, 2012	Canara Robeco Mutual Fund

Source : NSE, Valueresearchonline.

Note : The Table provides a glimpse of the ETFs included in the study.

funds with standard deviation reported to be above unity. The volatility in returns of gold ETFs is found to be lower for QGOLDHALF (0.697), GOLDBEES (0.741), SBIGETS (0.758), GOLDSHARE (0.768), HDFCFMGETF (0.779), RELGOLD (0.780), CRMFGETF (0.791),

KOTAKGOLD (0.812) and AXISGOLD (0.971) and higher for IDBIGOLD (1.060), GOLDIWIN (1.080), RELIGAREGOLD (1.381) and BSLGOLD (1.414). Amongst the reference indices, mean return of CPSE index (3.0 basis points), Nifty 50 (3.0 basis points) and PSU Bank index

(1.2 basis points) are found to be positive while that of gold is found to be negative (0.3 basis points).

The description of returns and standard deviation will be incomplete without analyzing them with respect to skewness and kurtosis. Skewness helps to better analyse returns whereas kurtosis helps to better analyse standard deviation (Odo, 2011). Since the distribution of PSU ETFs as well as gold ETFs is skewed to right (i.e. positively skewed), it indicates that the tail on the right side of the probability density function is much flatter than the left side and most of the values are confined to the left of the mean. On the contrary, the distribution of Nifty ETFs is found to be negatively skewed where tail on the left side of the probability density distribution is much flatter and most of the values are concentrated to the right of the mean (Sharma, *et al.*). On analyzing returns with skewness, the statistics suggests that, during the sample period under consideration, PSU ETFs appear to be the best of both the worlds by providing positive returns at reduced volatility. Gold ETFs, on the other hand, are found to experience a few extraordinary favourable days (as indicated by positively skewed returns) but those outstanding days are overshadowed by lower returns generated on the other days (as expressed by negative mean returns). Nifty ETFs are observed to suffer few extreme negative

returns during the period under examination but are able to offset those negative returns by providing modest returns during majority of the other days. Kurtosis helps to understand the nature of standard deviation i.e. whether the risk is clumped around the average or contained in the tails of the probability distribution. Since the value of Kurtosis is positive in all the cases, it indicates that the series are leptokurtic in nature meaning that the standard deviation is driven by tail events. However, the kurtosis of IVZINNIFTY (10.444), NIFTYIWIN (11.284) and RELNIFTY (17.818) (among Nifty ETFs) and HDFCMFGET (9.148) and CRMFGETF (24.972) (among gold ETFs) is high compared to that of the other ETFs which suggests that an investor might be confronted with extreme volatility during those rare tail events when risk increases (Odo, 2011). The results of Jarque-bera test imply deviation from normal distribution through rejection of the null hypothesis. However, since the daily data has been transformed into logarithms, it is capable of rescaling data and pulling in extreme observations ensuring normality. Moreover, a large number of observations also encourage evidence towards normal distribution (Naylor, *et al.*). In order to evaluate the performance of gold ETFs, further analysis has been done using tracking error and risk-adjusted performance metrics.

Table-2 : Descriptive Statistics of Return Series

Panel-A : PSU ETFs									
Statistics	PSU Bank Index	PSUBNKBEES	KOTAKPSUBK	CPSE Index	CPSE ETF				
Mean	0.019	0.009	0.030	0.040					
Median	-0.048	0.096	-0.104	0.062	0.000				
Std. Deviation	2.128	2.153	2.061	1.365	1.329				
Minimum	-9.818	-8.248	-7.403	-8.924	-8.267				
Maximum	9.442	12.454	9.975	8.963	8.808				
Skewness	0.207	0.563	0.353	-0.013	0.168				
Kurtosis	5.200	6.229	5.514	5.558	5.296				
J.B. 140.299	327.512	190.857	865.008	788.617					
p-value	0.000	0.000	0.000	0.000	0.000				
N	672	672	672	672	672				
Panel-B : Nifty ETFs									
Statistics	NIFTY 50	NIFTY-BEES	QNIFTY	KOTAK NIFTY	M50	IVZIN NIFTY	BSL NIFTY	NIFTY WIN	REL NIFTY
Mean	0.030	0.033	0.032	0.030	0.027	0.029	0.024	0.029	0.031
Median	0.023	0.048	0.000	0.045	0.063	0.000	0.000	0.036	0.000
Std. Deviation	0.949	0.897	0.913	0.863	1.194	2.249	12.449	2.151	1.835
Minimum	-6.097	-5.927	-4.563	-4.708	-6.600	-12.170	-14.966	-16.069	-13.521
Maximum	3.311	3.592	3.166	2.809	3.622	11.200	12.449	15.290	12.855

Skewness	-0.525	-0.543	-0.142	-0.289	-0.344	-0.235	-0.116	-0.259	-0.132					
Kurtosis	5.864	6.260	4.905	4.716	4.490	10.444	5.972	11.284	17.818					
J.B.	260.584	330.673	103.849	91.808	75.405	1557.676	248.820	1548.513	1649.942					
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
N	672	672	672	672	672	672	672	672	672					
Panel-C : Gold ETFs														
Statistics	Gold	GOLD BEES	GOLD SHARE	KOTAK GOLD	REL GOLD	QGOLD HALF	SBIG ETS	RELIGAR EGOLD	HDFCM FGETF	GOLDI WIN	AXIS GOLD	BSL GOLD	IDBI GOLD	CRMF GETF
Mean	-0.003	-0.005	-0.006	-0.009	-0.007	-0.006	-0.008	-0.008	-0.010	-0.008	-0.014	-0.006	-0.010	-0.008
Median	0.000	-0.045	-0.003	-0.027	0.000	-0.009	-0.003	0.000	-0.036	-0.004	-0.037	0.000	-0.022	0.000
Std. Deviation	0.757	0.741	0.768	0.812	0.780	0.697	0.758	1.381	0.779	1.080	0.971	1.414	1.060	0.791
Minimum	-2.929	-3.616	-4.156	-3.457	-3.014	-3.875	-2.969	-4.172	-4.884	-4.012	-3.428	-4.932	-3.044	-8.094
Maximum	4.396	3.503	5.026	4.680	3.794	2.916	3.246	7.242	5.581	5.141	5.095	6.552	4.197	5.284
Skewness	0.350	0.211	0.415	0.646	0.425	0.011	0.147	0.444	0.374	0.303	0.895	0.252	0.511	-0.993
Kurtosis	5.797	4.868	4.054	0.674	5.583	5.409	4.326	5.372	9.148	5.170	7.561	4.660	4.628	24.972
J.B. ^a	239.727	105.740	756.396	452.304	213.258	167.356	53.200	184.983	1105.982	146.303	692.262	86.775	106.528	1403.89
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	692	692	692	692	692	692	692	692	692	692	692	692	692	692

Source : Author's calculations.

Note : ^aJarque-Bera. The Table presents a summary of descriptive statistics of the ETFs and their corresponding indices included in the study.

Performance Evaluation

Table-3 reports the tracking efficiency of ETFs. Amongst all the ETFs, NIFTYBEES (0.179 per cent), CPSE ETF (0.198 per cent) exhibit the lowest tracking error (TE1) followed by KOTAKNIFTY (0.255 per cent), GOLDBEES (0.374 per cent), QGOLDHALF (0.413 per cent), SBIGETS (0.425 per cent), RELGOLD (0.428 per cent), KOTAKGOLD (0.442 per cent), HDFCFMGETF (0.450 per cent), GOLDSHARE (0.504 per cent), CRMFGETF (0.588 per cent), QNIFTY (0.610 per cent), AXISGOLD (0.634 per cent), GOLDIWIN (0.678 per cent), M50 (0.721 per cent), PSUBNKBEES (0.734 per cent), IDBIGOLD (0.740 per cent), KOTAKPSUBK (0.791 per cent) and RELIGAREGO (0.971 per cent) BSLGOLD (1.034 per cent), RELNIFTY (1.049 per cent), NIFTYIWIN (1.192 per cent), IVZINNIFTY (1.412 per cent) and BSLNIFTY (2.132 per cent) are reported to experience highest tracking error. The ranking in the case of the other two measures of tracking efficiency i.e. TE2 and TE3 remains more or less the same. Since ETFs are compared against paper indices which represent mathematical calculation that fails to account for the various frictions encountered while transacting at the

exchange such as transaction cost, volatility, changes in the underlying index and so on, they do have a tendency to exhibit tracking inefficiency.

An investment is considered valuable only if the excess return generated by it (compared to its counterparts) does not come with too much additional risk. Sharpe ratio helps define the excess return earned per unit of risk taken. Since the Sharpe ratio of PSUBNKBEES (-0.005), KOTAKPSUBK (-0.010), KOTAKNIFTY (-0.001), M50 (-0.003), NIFTYWIN (-0.001) and all gold ETFs turns out to be negative, it indicates that the given ETFs are unable to generate returns above the risk free return. The Sharpe ratio of CPSE ETF (0.007) is reported to be the highest followed by NIFTYBEES (0.003), RELNIFTY (0.003), IVZINNIFTY (0.002), QNIFTY (0.001) and BSLNIFTY (0.001). Treynor ratio defines the risk premium earned per unit of systematic risk. Treynor ratio of CPSE ETF (0.009) is found to be the highest followed by NIFTYBEES (0.002), RELNIFTY (0.002), QNIFTY (0.001), IVZINNIFTY (0.001) and BSLNIFTY (0.001).

The results obtained through CAPM are also displayed in Table-3. Theoretically, alpha (α) is not expected to significantly vary from zero and beta (β) is not expected to significantly deviate from one (Fassas, 2014). Jensen's alpha,

Table-3 : Estimation Results of Tracking Error, Sharpe Ratio, Treynor Ratio and Jensen's Alpha

Panel-A: PSU ETFs								
Index/ETFs	Tracking Error			Sharpe Ratio	Treynor Ratio	Alpha ($\alpha=0$)	Beta ($\beta=1$)	R ²
	TE1	TE2	TE3					
PSU Bank Index				-0.008	-0.018		1	
PSUBNKBEEES	0.734	1.035	0.999	-0.005	-0.013	0.004 (0.213)	0.893*** (-4.732)	0.780
KOTAKPSUBK	0.791	1.061	1.216	-0.010	-0.025	-0.006 (-0.296)	0.845*** (-7.231)	0.761
CPSE Index				0.001	-0.003		1	
CPSE ETF	0.198	0.342	0.333	0.007	0.009	0.012* (1.699)	0.943*** (-3.917)	0.937
Panel-B : Nifty ETFs								
Index/ETFs	Tracking Error			Sharpe Ratio	Treynor Ratio	Alpha ($\alpha=0$)	Beta ($\beta=1$)	R ²
	TE1	TE2	TE3					
Nifty 50 Index				-0.001	-0.001		1	
NIFTYBEEES	0.179	0.246	0.232	0.003	0.002	0.002 (0.516)	0.913*** (-7.951)	0.933
QNIFTY	0.610	0.783	0.697	0.001	0.002	0.001 (0.059)	0.621*** (-13.362)	0.418
KOTAKNIFTY	0.255	0.349	0.317	-0.001	-0.001	0.000 (0.025)	0.845*** (-12.004)	0.865
M50	0.721	0.954	0.933	-0.003	-0.005	-0.003 (-0.095)	0.785*** (-5.660)	0.390
IVZINNIFTY	1.412	2.296	2.22	0.002	0.001	0.004 (0.046)	0.383*** (-6.825)	0.262
BSLNIFTY	2.132	3.054	2.893	0.001	0.001	0.033 (0.296)	0.370*** (-8.819)	0.198
NIFTYWIN	1.192	2.168	2.108	-0.001	-0.003	-0.001 (-0.029)	0.460*** (-5.031)	0.192
RELNIFTY	1.049	1.829	1.770	0.003	0.002	0.011 (0.160)	0.512*** (-6.773)	0.240

(Contd...)

Panel-C : Gold ETFs								
Index/ETFs	Tracking Error			Sharpe Ratio	Treyner Ratio	Alpha ($\alpha=0$)	Beta ($\beta=1$)	R ²
	TE1	TE2	TE3					
Gold (Spot)				-0.045	-0.034		1	
GOLDBEES	0.374	0.526	0.488	-0.048	-0.048	-0.011 (-0.847)	0.738*** (-8.689)	0.568
GOLDSHARE	0.504	0.749	0.658	-0.047	-0.069	-0.018 (-0.731)	0.526*** (-14.360)	0.268
KOTAKGOLD	0.442	0.663	0.621	-0.048	-0.056	-0.015 (-0.653)	0.691*** (-9.887)	0.416
RELGOLD	0.428	0.606	0.565	-0.029	-0.032	-0.001 (0.098)	0.710*** (-7.115)	0.476
QGOLDHALF	0.413	0.559	0.493	-0.052	-0.056	-0.014 (-1.095)	0.651*** (-12.135)	0.501
SBIGETS	0.425	0.605	0.556	-0.050	-0.056	-0.015 (-0.699)	0.682*** (-11.402)	0.464
RELIGAREGO	0.971	1.334	1.302	-0.028	-0.063	-0.018 (-0.571)	0.611*** (-5.302)	0.112
HDFCMFGETF	0.450	0.679	0.618	-0.052	-0.064	-0.019 (-0.811)	0.626*** (-12.030)	0.371
GOLDIWIN	0.678	0.971	0.944	-0.036	-0.056	-0.036 (-1.011)	0.694*** (7.106)	0.487
AXISGOLD	0.634	0.924	0.867	-0.046	-0.077	-0.025 (-1.187)	0.577*** (-7.075)	0.203
BSLGOLD	1.034	1.378	1.343	-0.025	-0.059	-0.015 (-0.593)	0.588*** (-5.104)	0.299
IDBIGOLD	0.740	0.997	0.953	-0.038	-0.066	-0.020 (-0.543)	0.613*** (-8.075)	0.192
CRMFGETF	0.588	0.855	0.729	-0.047	-0.092	-0.024 (-1.177)	0.407*** (-9.795)	0.152

Source : Author's calculations.

Note : TE1 refers to tracking error 1, TE2 refers to tracking error 2, TE3 refers to tracking error 3,
 *** significant at 1 percent level, ** significant at 5 percent level and * significant at 10 percent level.

calculated using CAPM model, is found to be statistically insignificant as shown by t-statistics in all the cases except for CPSE ETF. It concludes that ETFs (except for CPSE ETF) fail to generate any excess return over their reference indices. However, in case of CPSE ETF, the excess return of 0.012 translates in percentage terms to 3.024 per cent p.a. meaning thereby, that an investor investing say, one million, is likely to earn excess return of ₹30,240 after one year. The beta coefficients of all the ETFs are observed to significantly vary from one suggesting that the ETFs fail to exactly replicate their underlying indices. It implies that both ETFs and their corresponding indices vary with regard to the systematic risk. The existence of significant tracking error further confirms the inability of ETFs to generate returns similar to those of their target indices.

On the basis of the above mentioned criteria, CPSE ETF is found to outperform other ETFs in terms of creating wealth for its shareholders compared to the other PSU, Nifty and gold ETFs. With the lowest tracking error (TE1 0.179 per cent, TE2 0.246 per cent, TE3 0.232 per cent) and highest Sharpe ratio (0.007), Treynor ratio (0.009) and Jensen's alpha (0.012), CPSE ETF is observed to be the most profitable

investment avenue over the period analysed. NIFTYBEES and QNIFTY are also found to exhibit lowest tracking error with positive Sharpe and Treynor ratios. Though Sharpe and Treynor ratios of IVZINNIFTY, BSLNIFTY and RELNIFTY are found to be positive, the funds exhibited highest tracking error against the other ETFs.

Conclusion and Implications

The present study attempts to compare the performance of PSU ETFs against Nifty and gold ETFs. The sample comprises of three PSU ETFs, eight Nifty ETFs and 13 gold ETFs. Using various performance metrics such as tracking error, Sharpe ratio, Treynor ratio and Jensen's alpha, the study suggests that during the period under analysis, CPSE ETF emerged as the best investment option available for investors in terms of wealth generation. The fund is reported to outperform all other ETFs as well its underlying index across all the performance measures adopted. The study shall have important implications for investors, fund managers and financial advisors. For investors aiming investment in government-owned enterprises, CPSE ETF seems to be the best available option. CPSE ETF offers investors a cost effective measure to gain exposure to all the ten blue-chip public sector companies. Also, comparison among

the ETFs (PSU ETFs, Nifty ETFs and gold ETFs) reveal that other than CPSE ETF, NIFTYBEES and QNIFTY are found to have competitive advantage over others in terms of reduced tracking error and higher Sharpe and Treynor ratios. Fund managers can gain an insight into the relative performance of funds and undertake measures to enhance the tracking efficiency of the funds that they manage. ETFs, however, are bound to exhibit deviation in performance on account of the various impediments faced in the market in the form of changes in the constituents of the underlying index, transaction cost, volatility and so on. All such costs are, however, brushed aside while computing indices which represent a mere mathematical calculation. The market for ETFs in India remains neglected largely on account of limited awareness among investors about the new investment product, lower trading frequencies and limited participation on part of both retail as well as institutional investors. One of the prime reasons for low popularity of passively managed funds in India is the unwillingness on part of financial advisors to promote the new financial product. ETFs do not offer any monetary rewards in the form of commission or so which makes them an unprofitable product for the financial managers.

The present study is confined to comparing the performance of PSU ETFs against Nifty ETFs and gold ETFs. With around 57 ETFs available at NSE as on 31 December 2016, comparison can be extended to other ETFs that are being traded at NSE. The returns have been calculated using the end-of-the-day values of ETFs and their reference indices. The analysis can be done by using net asset values (NAV) of the two asset classes. The spot price of gold of the Ahmedabad market has been obtained from the official website of MCX, the results may vary in case the spot prices are obtained from some other market.

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Occupational Stress and Burnout among Police Constabulary : An Analysis

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The jobs entrusted to police constabulary are wide and broad and it is police that is brought in to the scene for not only violation of law and order but also every discomfort caused to the citizens. Police constabulary is 24x7 job and police personnel have been subject to occupational stress (OS) and Burnout. High levels of stress and burnout not only affect the job performance but their personal lives and relationships. Maslach Burnout Inventory scale (developed by Christina Maslach & Susan E Jackson) and the ORS scale (as developed by Udai Pareek) are taken as a base for the study. The study considers a sample of 50 police constabulary at the level of policelhead constables selected based on stratified random sampling method from the law and order, detective department (crime) and traffic branch of Hyderabad city police. Select statistical tools such as correlation, factor analysis, t-Test, Anova and Regression Analysis were used to assess and analyse the relationship between OS and Burnout. Several recommendations were presented as to what police constabulary has to do as an individual and as an organization to make police job more decent and dignified to inspire the youth to join the police constabulary.

Keywords : Occupational Stress, Burnout, Police Constabulary, Maslach Burnout Inventory (MBI) Scale.

Introduction

Police work tends to impose a high degree of stress and a multiplicity of stressful situations which can affect the physical, mental and interpersonal relationships of police personnel. Police personnel, as an occupational group, endure particularly high levels of stress and burnout. Stress has been found to not only affect the police personnel's job performance but their personnel lives and relationships as well. Because police personnel are first responders to potentially stressful situations, their ability to successfully manage stress is

critical not only to their mental health but to the safety of society as a whole. It is observed that the police personnel who have difficulties coping with stress exhibit maladaptive behavior and personality traits such as aloofness, authoritarianism, cynicism, depersonalization, emotional detachment, suspiciousness, and excessive use of alcohol. Stress among police personnel has been connected to

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police misconduct and can have a negative effect on the law enforcement organization due to law suits resulting from police officers' performance.

Occupational Stress

It is an outcome of the mismatch between individual capabilities and organizational demands. Also, it arises when the expectations of both individual and organization significantly differ. Stress not only affects the physical, psychological and financial balance of the employee, but also the employers as well.

Burnout and its Consequences

Burnout is the end result of stress experienced, but not properly coped with resulting in symptoms of exhaustion, irritation, ineffectiveness, discounting self and others, and problems of health (hypertension, ulcers, and heart problems). It is a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with people in some capacity. Burnout syndrome is said to exist when there is increased feelings of emotional exhaustion; emotional resources are depleted, workers feel they are no longer able to give of themselves at a psychological level. It may also result in development of depersonalization, that is, negative, cynical attitudes and feelings about one's clients. When burnout is high,

one develops the tendency to evaluate oneself negatively, particularly with regard to one's work with clients. One feels unhappy about oneself and dissatisfied with one's accomplishments on the job front. The interactions with the such dissatisfied staff lead to negative results for the whole organisation. Desired results cannot be expected from employees who are burnt out, exhausted or stressed, as they lose more working days there by a decrease in productivity and increase in cost to organization. Some jobs which are inherently occupational hazard like the army, police and fire services are prone to high stress and strain.

Occupational Stress : The Personal and Organizational Effects

i) Personal Effects

1. Alcohol abuse
2. Drug abuse
3. Emotional instability,
4. Lack of self-control
5. Marital problems
6. Depression
7. Insomnia
8. Insecurity
9. Frustration
10. Anxiety
11. Psychosomatic diseases

12. Eating disorders
13. Boredom
14. Mental illness
15. Suicide
16. Health breakdown (cardio vascular etc.)
17. Violence

ii) Organizational Effects

1. Accidents
2. Thefts
3. Reduced productivity
4. High Turnover
5. Increased Errors
6. Absenteeism
7. Liability Payments
8. Sabotage
9. Damage and Waste
10. Replacement Costs
11. Inflated Healthcare Costs
12. Unpreparedness
11. Lack of Creativity
12. Increased Sick Leave
13. Premature Retirement
14. Organizational Breakdown
15. Disloyalty
16. Job Dissatisfaction
17. Poor Decisions
18. Antagonistic Group Activities.

Review of Related Literature

Different studies have classified occupational stress in terms of physical environment, role stressors, organizational structure, job characteristics, professional relationships, career development, and work versus family conflict (Burke, 1993). Several Research studies have been conducted in India and abroad to study the causes, levels of stress and burnout among police officers and other social service personnel.

Christina Maslach and Susan E. Jackson (1986) stated that Burnout is a syndrome of emotional exhaustion and cynicism that occurs frequently among individuals who do 'people-work' of some kind. They developed a scale designed to assess various aspects of burnout syndrome which was administered for human service professionals. Three subscales emerged from the data analysis : emotional exhaustion, depersonalization, and personal accomplishment. Various psychometric analysis showed that the scale has both high reliability and validity as a measure of burnout. They constructed Maslach Burnout Inventory (MBI) to measure the burnout syndrome under the three sub-scale i.e. Emotional exertion, Depersonalization, Personal accomplishment which contains 22 statements with 7-point scale from 0 to 6. This MBI has been used to assess the burnout among police constabulary.

George T. Paterson, Irene W. Chung, and Philip G. Swan (2012) recommended that police organizations should conduct evaluation research of their current stress management interventions. Collins and Gibbs (2003) confirms the previous findings of organizational culture and work load as the key issues in an officer stress.

Shanmuga Sundaram and Jeya Kumaran in their study of occupational stress and coping strategies among police head constables (Grade III) in Tamil Nadu concluded that police department must carry out some future research on the sources of stress and coping strategies. Balakrishnamurthy and Swetha Shankar (2009) concluded that the demographic variables such as age and level of experience significantly impact the level of stress experienced by CRPF personnel. Manoj Chhabra and Bindu Chhabra (2009) recommended that a periodic written feedback system is required to be institutionalized in BSF so that it will curb lot of arbitrariness and ensure fairness. The top leadership will be in a position to know the ground realities better.

Sibnath Deb, Tanushree Chakrabortiy and Pooja Chatterjee in their study of job related stress of traffic constables of Kolkata city reported that the traffic

constables offered solutions to the problems of stress as follows : reduction of duty hours (59.7%), recruitment of more staff (48.4%), salary hike (40.3%), proper interaction among all staff (35.5%), and removal of internal policies (33.3%). Udai Pareek (1983) pioneered work on the role stress by identifying as many as ten different types of Organizational Role Stresses (ORS). They are as follows: Inter-Role Distance (IRD), Role Stagnation (RS), Role Exceptional Conflict (REC), Role Erosion (RE), Role Overload (RO), Role Isolation (RI), Personal Inadequacy (PI), Self-Role Distance (SRD), Role Ambiguity (RA), and Role Ambiguity (RA). He developed and standardized the Organizational Role Stresses (ORS) scale to measure the above-mentioned role stresses. The ORS scale is certainly one of the best instruments available today for measuring a wide variety of role stresses. Pestonjee (1992) recommended stress audit for organizations for studying organizational stress and formulating coping strategies.

Research Gaps

From the above review of literature, it is evident that there are relatively less number of specific studies relating to occupational stress and burnout in Andhra Pradesh and this study fills up this gap.

Critical Role of Police Constabulary

Hyderabad city is a metropolitan city and the 4th largest in India with a population of 68,09,970. The city police is headed by Commissioner of Police who is of the rank of Additional DGP. There are 65 law and order police stations – 25 crime teams of detective department and 25 traffic police stations in the city with a force of 9,123 and a strength of 7,523 police constabulary (6,092 police constables and 1,431 head constables). The police constables and head constables together are known as police constabulary or in more popular term as policemen.

In the police department, constabulary are the basic field workers who come in regular contact with the public to perform various duties i.e. receptionists in the police station, receiving and registration of public complaints at the police station, performing beat and patrolling duties in the localities and highways for prevention of crime and disturbances to the public order and public nuisance, traffic regulation, crowd control, facing the irate mobs in controlling riots on the public streets, serving of summons and execution of warrants, escorting accused persons to judicial courts and jails, presenting witnesses in the judicial courts for the

trial of criminal cases. At the time of communal violence and terrorist attacks, the occupational stress and burnout levels are significantly high for all ranks in the police constabulary.

Research Methodology

Statement of the Problem

The job-related stress for policemen arises from long hours of duty, exposure to life risks, no time for family and children, no timely food and sleep, difficulty in getting leave, low status, powerlessness, authoritarian superiors, harassment by superiors, improper relations with colleagues, low pay, miserable living conditions. These problems lead to decreased work performance and further cause negative psychological states like emotional burnout, frustration, depression, anger, and psychosomatic conditions. There is a lot of absenteeism on the part of police constables and head constables because of higher levels of occupational stress and burnout.

Objectives of the Study

- a) To study the occupational stress and burnout among police constabulary in Hyderabad City Police
- b) To assess the levels of various Occupational Role Stress (ORS) and Burnout among police constabulary

- c) To assess the impact of socio-demographic factors on the Occupational Role Stress of constabulary
- d) To identify the coping strategies followed at individual level and organization level to fight stress and burnout
- e) To suggest/recommend individual and organizational coping strategies needed to fight stress and burnout.

Hypotheses

H₀₁ : The ORS and burnout in police constabulary is not severe.

H₀₂ : There is no significant difference in ORS among different age groups of police constabulary.

H₀₃ : There is no significant difference in ORS among police constabulary of different marital status.

H₀₄ : There is no significant difference in ORS among police constabulary with different lengths of work experience.

H₀₅ : There is no significant difference in ORS among police constabulary with different educational qualifications.

H₀₆ : The present coping strategies at individual and organizational level in Hyderabad city police are inadequate and ineffective.

Scope of the Study

The present study is confined to the constables and the head constables of Hyderabad city police.

Research Methodology

Primary Data

The primary data is drawn from a sample of 50 constabulary (10 head constables and 40 police constables) selected using stratified random sampling method from the law and order, detective department (crime) and the traffic branch of Hyderabad city police. Two sets of questionnaires were administered to study (a) Occupational Role Stress (ORS) and (b) the Burnout related issues. The questions were explained to the constables and head constables. The issues relating to ORS were covered in 50 questions, Maslach Burnout Inventory (MBI) was captured through 22 statements.

Secondary Data

The effects of stress and burnout among police personnel abroad were considered as a base to the present study forward. The law enforcement practices in USA and other countries were also studied apart from using MBI scale (developed by Christina Maslach, Susan E. Jackson, University of California, Berkeley USA) and the ORS scale (developed by Udai Pareek in 1983).

Size of Sample and Sampling Methods

Though there are multiple wings attached to the city police, only such wings (namely law and order, traffic and detective department) are selected for the study because they are more crucial in terms of crime prevention and detection, traffic management, maintenance of law and order. Further, these wings constitute bulk of the strength of the police strength in Hyderabad city. Out of 115 police stations/teams, a sample of 50 has been considered considering 40 PCs and 10 HCs.

Occupational Role Stress

The questionnaire is designed to measure occupational role stress. There are 50 questions in the ORS and they have been grouped under 10 role stressors as mentioned below. Under each stressor, there are five questions.

- Inter-Role distance (IRD)
- Role Stagnation (RS)
- Role Expectation Conflict (REC)
- Role Erosion (RE)
- Role Overload (RO)
- Role Isolation (RI)
- Personal Inadequacy (PI)
- Self- Role Distance (SRD)

- Role Ambiguity (RA)
- Resource Inadequacy (RIn)

Questionnaire on Burnout

The second questionnaire is based on Maslach Burnout Inventory (MBI), developed by Christina Maslach, Susan E Jackson, University of California, and Berkley. This MBI is designed to access the burnout level. It consists of 22 statements that are divided into 3 sub-scales comprising Emotional Exhaustion (EE), Depersonalization (DP) and Personal Accomplishment (PA). The written permission was obtained from the Commissioner of Police, Hyderabad city, to administer the questionnaire.

Statistical Tools

Mean, standard deviation were calculated for the 22 statements in MBI and 3 sub-scales i.e. emotional exhaustion (EE), depersonalization (DP), Personal accomplishment (PA). Reliability Test was conducted to check the internal consistency in the data by using Cronbach's alpha. All ORS dimensions except RE showed up higher value of internal consistency in the data.

Regression Analysis was used to analyze how the overall ORS (Dependent Variable) is influenced by and dependent on 10 ORS (Independent Variables). Correlation Coefficient (r) was used to

assess the relationship between ORS and Burnout. T-test was used to find out whether there is any significant difference in ORS among constabulary of different marital status. Analysis of variance (ANOVA) test was used in the case of socio-demographic dimensions of respondents in terms of age, educational qualifications and length of service.

Software Used for Data Analysis

The data was analyzed in SPSS version 20.0 using different statistical tools.

Data Analysis and Interpretation

As part of the analysis of various ORS and burnout among police constabulary and headconstable, the impact of socio demographic factors on occupational role stress of constabulary was assessed. Similarly, the coping strategy followed at the individual level and organizational to fight stress and burnout also have been identified and the coping strategies to be adopted by the Hyderabad city police also have been identified.

Table-1 : Status of Stressors

Descriptive Statistics	N	Mean	Std. Deviation	Rank	Status
IRD	50	2.60	.728	4	high
RS	50	2.68	1.186	3	high
REC	50	2.08	.724	6	high
RE	50	2.00	.728	7	high
RO	50	2.72	.834	2	high
RI	50	1.02	1.097	10	moderate
PI	50	1.08	.986	9	moderate
SRD	50	1.94	.818	7	moderate
RA	50	1.86	1.161	8	moderate
RIN	50	2.86	.904	1	high
ORS	50	2.10	.580	5	high
Valid N (List-wise)	50				

Source : Primary data.

Note : The mean score is calculated on a scale of 0 to 4, and divided stress levels into “low” (0-1), “moderate” (1-2), and “high” (2-4).

The constables and head constables of Hyderabad city police are undergoing stress and burnout. The overall occupational role stress level are high as indicated below :

Of the ten ORS, the following are at high level.

Table-2 : Six ORS Variables Having High Mean Scores

S.No.	ORS Variable	Mean Score
1	IRD- Inter Role Distance	2,60
2	RS- Role Stagnation	2.68
3	REC – Role Exceptional Conflict	2.08
4	RE- Role Erosion	2.00
5	RO – Role Over Load	2.72
6	RIn- Resource Inadequacy	2.86

Source : Primary data.

The following ORS variables have moderate mean score.

Table-3 : Four ORS Variables Having Moderate Mean Scores

S.No.	ORS Variable	Mean Score
1	RI – Role Isolation	1.02
2	PI – Personal Inadequacy	1.08
3	SRD- Self Role Distance	1.94
4	RA- Role Ambiguity	1.84

Source : Primary data

The total ORS is also high at 2.10. The total score given allotted to each question in the 50 questions in ORS is 4 that is 0 to 4. The mean score has been calculated on the scale of 0 to 4 and divided stress levels into 3 categories as follows :

Low (0-1) – Nil

Moderate (1-2) – Four

High (2-4) – Six

The mean score for the total ORS is 2.10. The following are the mean scores arranged in the decreasing order.

Table-4 : Ranking of Ten ORS in Descending Order

S.No.	ORS	Mean	Rank
1	RIn	2.86	1
2	RO	2.72	2
3	RS	2.68	3
4	IRD	2.60	4
5	REC	2.08	5
6	RE	2.00	6
7	SRD	1.94	7
8	RA	1.86	8
9	PI	1.08	9
10	RI	1.02	10

Source : Primary data.

The highest stress is caused by Resource Inadequacy (RIn) followed by the Role Overload (RO) i.e. over work. Similarly, Role Stagnation (RS) – is due to delayed promotions. Inter Role Distance (IRD) and Role Expectation Conflict (REC) are also high. It may be observed that the mean scores for SRD is 1.94 and for role ambiguity it is 1.84 which is close to mean score 2.

Further Anova results indicate that (a) there is no significant difference in Occupational Role Stress (ORS) among police constabulary of different the age groups. (b) there is no significant difference in ORS among police constabulary with different educational qualifications, there is no significant difference ORS among the length of services.

t-Test results indicate that there is no significant difference in ORS among police constabulary with different marital status.

Regression Analysis : It is observed that total Role Stress i.e. ORS is dependent variable while its other dimensions-IRD, RS, REC, RO, RE, RI, PI, RA, and RIn - are independent variables which generate total ORS. R value of 0.893 indicates that ORS has a positive relationship with RIn, IRD, RE, RO, RA, RI, REC, RS, PI, SRD. ORS as a dependent variable, is more reliable.

R square : Seventy nine (79) per cent of the variation in ORS is explained by independent variables RIn, IRD, RE, RO, RA, RI, REC, RS, PI and SRD. Here are the regression lines :

Anova and t-Test

Table-5 : One-way Analysis of Different Age Groups

Descriptive								
Occupational Role Stress (ORS)								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
21-30 yrs.	12	2.08	.515	.149	1.76	2.41	1	3
31-40 yrs.	10	2.00	.667	.211	1.52	2.48	1	3
41-50 yrs.	18	2.00	.594	.140	1.70	2.30	1	3
51 & above	10	2.40	.516	.163	2.03	2.77	2	3
Total	50	2.10	.580	.082	1.94	2.26	1	3

Source : Primary data.

Overall ORS = 0.229 + 0.076(IRD) + 0.057(RS) + 0.192(REC) + 0.117 (RE) -0.031 (RO) +0.097(RI) +0.092 (PI) + 0.070(SRD) + 0.140(RA) + 0.132 (RIn)

Findings on Maslach Burnout Inventory (MBI)

The second questionnaire on Maslach Burnout Inventory (MBI) has been used to assess the Burnout subscale levels among police constabulary i.e. Emotional Exhaustion (EE), Depersonalization (DP), Personal Accomplishment (PA). Burnout is a syndrome of Emotional Exhaustion (EE), Depersonalization (DP),

and reduced Personal Accomplishment (PA) that can occur among individuals who work with people with some capacity.

Factor Analysis

Factor Loading Values of 0.835, is the highest for the first factor representing the feeling of used up at the end of the day. The second factor is heavily loaded with working with people all day is strain (0.767) thus the subsequent factors can be interpreted based on their factor loading values. The final list of 07 factors which collectively account for 75 of the variance in the data is shown in the next page.

Burnout Inventory

The issues relating to burnout inventory are categorised into three subscales as given below :

**Table-6 : Burnout Inventory
Subscales Scores**

S.No	Subscales	Mean Score	Levels
1	EE	4.10	High
2	DP	1.92	Moderate
3	PA	4.18	High

So as far as Emotional Exhaustion is concerned it is high at more than the average while the mean score for Depersonalization is moderate at 1.92, and the score for Personal Accomplishment is high at 4.18. Burnout is a syndrome of Emotional Exhaustion (EE), Depersonalization (DP), and reduced Personal Accomplishment (PA) that can occur among individuals who work with people with some capacity. There are nine statements under emotional exhaustion. The statements describe some of the feelings. The scale indicates how often one have such feelings in work situation. The scores are 0 to 6. The mean score for EE is 4.10 which is considered high as it is more than the mean of the score i.e. 3.

Another aspect of the Burnout syndrome is the development of the Depersonalization, that is, negative, cynical attitudes and feelings about one's clients.

This callous or even dehumanized perception of others can lead to members view their clients as somehow deserving of their troubles. There are five statements under Depersonalization and each statement has a score of 0 to 6, i.e. average is 3. But the mean score for the Depersonalization is moderate at 1.92. The interpretation is that there is not much Depersonalization (DP) even though there is high Emotional Exhaustion (EE).

The third aspect of the Burnout syndrome, Reduced Personal Accomplishment, refers to the tendency to evaluate oneself negatively, particularly with regard to one's work with clients. Workers may feel unhappy about themselves and dissatisfied about their accomplishments on the job. Let us examine the mean score for the Personal Accomplishment. There are 8 statements under Personal Accomplishment and have a 7-point scale of 0 to 6. The mean score for Personal Accomplishment in our study of police constabulary in Hyderabad city police is very interesting. The mean score is 4.18 which is high i.e. higher than the mean of 3.

According to Christina Maslach, the pioneer of Burnout Inventory called MBI, there is always an inverse relationship between the first two subscales i.e. EE and DP and Personal Accomplishment. When EE and DP scores are high

the Personal Accomplishment are low. But in my study the three scores are as follows :

Correlation between ORS and MBI

If stress is experienced and not properly coped with, then burnout occurs were calculated for 10 Role Stressors (ORS) and also 3 subscales of Maslach burnout inventory. Here are the details of correlation between ORS and MBI. Occupational Role Stress is positively correlated with Emotional Exhaustion, Depersonalization and Personal Accomplishment. Further it is highly positively correlated with Depersonalization. Emotional Exhaustion is positively correlated with Depersonalization and Personal Accomplishment and Occupational Role Stress. Further it is highly positively correlated with Depersonalization.

Findings and Conclusions

Severity of ORS and Burnout

Considering the high scores on ORS and Burnout, it is concluded that the ORS and burnout are severe among police constabulary in Hyderabad city police. Under Burnout inventory, the mean score for Emotional Exhaustion is also high. Burnout occurs when stress is experienced but not properly coped with. The study revealed that ORS –

especially the following six occupational stressors are high.

- Resource in adequately (Rin)
- Role overload (RO)
- Role stagnation (RO)
- Inter-role distance (IRD)
- Role expectation conflict (REC)
- Role erosion (RE)

Occupational stress and burnout in police constabulary are not severe. There is no significant difference in ORS among the police constabulary of different age groups, marital status, educational qualification and lengths of service. Further, the present coping strategies at individual and organizational level in Hyderabad city police are grossly inadequate and ineffective.

Suggestions

Reduce the Workload

Since the work load for the police constabulary is enormous, 52.5 per cent said that the work load of policemen should be reduced in order to reduce job stress and burnout. This is corroborated by high mean scores of Role-overload (RO). With a view to enhance the effectiveness of the police force, it is suggested to follow 8-hours duty, spread over three-shift system across all

the police stations. Presently, only two shifts are being followed at the city police stations. Further it is suggested to provide a weekly off from duties and correspondingly to increase police strength in all the police stations alongside to fill up existing vacancies in all the wings. The constables and head constables revealed that the ORS in 6 variables are high. They are : Resource Inadequacy (RIn), Role over Load (RO), Role Stagnation (RS), Inter Role Distance (IRD), Role Expectation Conflict (REC) and Role Erosion (RE). Hence it is recommended that the police management pay attention to these aspects.

Leadership/Motivation

Superiors should know how to lead their teams so that the motivational levels are significantly kept high with a concomitant reduction of stress and burnout. Senior officers should interact with policemen on a regular basis to ascertain their job stress problems and other related causes due to their extra organizational roles and accordingly to initiate problem-solving measures. As human relations are so fragile, the superiors should treat policemen on humanitarian grounds and avoid harassment. They should regularly organise in-house refresher courses for policemen to impart adequate skills to cope with the job stress.

Duties need to be allotted based on the knowledge, skills, and aptitude of policemen so that the right men can be deployed for the right jobs. The need to provide extra TA to such policemen deputed exclusively for law and order bandobust before hand assumes much significance. There should be a provision to grant one day extra as a motivation for policemen to see places of interest whenever they are sent outside for law and order bandobust duties. A comprehensive strategy is a must to fight ORS and burnout and to regularly monitor its implementation. It is advisable that all superior officers should interact with policemen in polite language treating them with dignity and decorum. There should be a feedback mechanism from police after the bandobust is over.

Welfare Measures

Superiors should concentrate on police constabulary welfare and extend the Aroyga Bhadrata Scheme (ABS), health insurance scheme within Andhra Pradesh, for all policemen and officers to unmarried sons and daughters. At present, sons and daughters of police personnel who are 21 years or above are ineligible for ABS. There is a need to increase the number of policemen's cooperative stores (called Suidha stores) rather than restricting them to one per zone in the city. The police department should consider introducing excursions for the policemen's families.

Health Management

There should be regular health check-up for policemen to address issues arising due to job stress with a provision to provide opportunity for exercises and yoga. Medical checkup camps has to be facilitated once in three months for all policemen alongside yoga program should be conducted in the morning at the police stations at least once in a week. There should be regular health checkups and follow up action for all police personnel, supplemented by sufficient facilities for medical check-ups and tests. Medical camps should be conducted in police lines on a regular basis. Hospital facilities should be provided to the dependent parents of the policemen. Gyms and yoga centers should be provided to policemen and officers. Opportunities to be created for participation in sports and games and also provision for recreation room for policemen in police stations with required facilities.

Sanction of Needed Leaves

Police administration should be relatively liberal in sanctioning casual leave and other leaves when needed by the policemen to effectively perform their duties and responsibilities of extra-organizational roles. This is the only solution to address the high mean score for Role-Expectation conflict (REC) and Inter Role-distance (IRD). Alongside there

should be a provision to provide (a) special leaves for higher education (b) provide holidays as per religious event (c) sanction of LTC to travel anywhere in India.

Increase in Pay and Allowances

There should be general hike in the pay and allowances paid to policemen. As per the Criminal Procedure Code 1973, every policeman is deemed to be on duty 24 hours a day. Even if he is on leave, he can be called back to attend to urgent duties. The specific measures suggested by policemen in the study are as follows : (a) Increase pay and allowance. (b) Extra pay for extra duty hours. (c) Increase salaries to prevent corruption, and (d) provide sufficient TA and DA when deputed for outside bandobust duties.

Timely Promotions

Timely promotions has a positive impact on the the constabulary irrespective of the cadre and rank. At present, they are badly delayed. On an average, a police constable gets his next promotion as head constable after 15 years. Some get even late. A head constable gets his next promotion as ASI/SI after 10/15 years. This anomaly needs to be rectified.

Stress Audit

Stress Audit may be taken up in intervals to assess the occupational stress and

burnout and devise remedial strategy. Stress audit explores and controls the various types of stress which the individual officers/policemen experience by virtue of their organizational membership (Pestonjee 1992). As part of stress audit, data is collected related to organizational climate, role stress, and job anxieties etc.

Redesign the Training Systems

To design proper training program to include policemen of law and order and crime wing in order to cope with stress and burnout. Ensure that police officers/policemen acquire the necessary skills including training in techniques such as meditation, bio-feedback, muscle relaxations and stress inoculation (Newton 1992).

Police Doctors

Police doctors at the police hospitals will have valuable information documenting the interpersonal and organizational conflicts. Police doctors are a valuable resource to their organization members for coping with identified stress. It is recommended that the police management to avail regular feedback from the police doctors about the policemen's stress, burnout and health problems and take follow-up remedial measures.

Informed Actions

Policemen needs to be deployed based on knowledge, skills and aptitude so

that the stress caused by Role-Expectation Conflict (REC), Personal Inadequacy (PI), and Role Ambiguity (RA) can be reduced.

Strategies for Individual Policeman to Reduce Stress

The following activities need to be pursued individually to beat job stress.

- Walking and Yoga
- TV, music and entertainment
- Spending spare time with family and friends
- Twenty per cent expressed that they do not have time to do any individual activity to beat job stress.

Organizational Efforts to Reduce Stress and Burnout

Police organisation, *per se*, is viewed to be very poor at handling stress and burnout among police constabulary. Nearly 76 per cent opined that nothing is being done by the organization to reduce stress and burnout. Twenty four per cent said that during the one-week programme on traffic training imparted to traffic constables and head constables, yoga is taught and practiced. The policemen attached to the traffic wing are taught yoga during the quarterly held one-week traffic training for personnel of traffic police stations.

Since traffic men need to be updated regularly in traffic regulations and

signals used, a one-week traffic course is designed and imparted to policemen of traffic police stations. Though the policemen of law and order police stations and crime teams are continuously preoccupied with crime related cases, they must be nominated for training at least quarterly once, as is done in the case of traffic policemen.

Limitations of the Study

As the study is embodied with some limitations in terms of small sample size confined to Hyderabad city, the conclusions inferred in the analysis cannot be generalised.

Direction for Further Research

1. Considering the huge sample size of police personnel of all ranks (including the superior officers namely officers of the rank of Deputy Superintendent of Police, Superintendent of Police, DIG of Police and IGP of Police and the Commissioner of Police) future studies ought to focus more on the organizational interventions initiated to fight stress and burnout among the police personnel in the city police.
2. The quality of service delivery and performance of police also can be studied with a large sample of citizens drawn across the different regions selected for the study.
3. The family members of the police personnel can also be studied to assess

the behavioural problems and problems in the relationships caused by stress and burnout among the city police constabulary.

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Do Non-Performing Assets Differ with Ownership Category? A Study of Indian Banks

K.Aparna*

Non-Performing Assets (NPAs) is the buzz word at present in the Indian banking scenario. The public sector banks in India are facing the problem of credit risk in the form of unrecovered loans and advances. The defaulters are also from the corporate sector and from big business houses. Year-over-year the problem has been galloping and it is clear from the recent data from Bank of Maharashtra. In the year 2015-16 the gross percentage of NPAs of this bank were 9.3 per cent and by the end of March 2017 it rose to as high as 16 per cent. With this outcome RBI as a regulatory authority has resorted to corrective action that is Prompt Corrective Action to improve the internal controls of the bank and enhance its assets quality. An attempt is made in the present study to ascertain whether this problem of mounting NPAs is only with public sector banks operating in India or with private banks and foreign banks as well. Four different categories of banks based on their ownership operating in India are selected for the present study. Data for 69 banks is collected for a period of 12 years from 2004-2005 to 2015-2016 from RBI data base. To test the hypothesis that the ratio of gross NPAs to gross advances of banks does not vary based on their ownership category, test of Analysis of Variance is used. It is observed that there is a significant difference between private banks and foreign banks with respect to NPAs. And these two banks do not differ with SBI and its associate banks and nationalised banks.

Keywords : Non-Performing Assets, Public Sector Banks, Private Sector Banks, Foreign Banks, ANOVA, Post hoc Tests.

Introduction

Financial performance of a bank depends on the advances, deposits, interest income and also on Non-Performing Assets (NPAs). Banks in India are facing the problem of NPAs from different sectors and the NPAs vary among the banks based on their ownership category. High variations in the percentage of gross NPAs to gross advances of these

banks is observed which ranged all the way from a trivial value of 1.77 (All Private Sector Banks, March 2013) to a very elevated value of 10.69 per cent (All Nationalised Banks, March 2017). The public sector banks in India are facing the problem of credit risk in the

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form of unrecovered loans and advances. The defaulters are also from the corporate sector and from big business houses. The problem is aggravated due to wilful defaulters. Year-over-year the problem has been galloping, amply reflected in the recent data from Bank of Maharashtra. In the year 2015-16 the gross percentage of NPAs of this bank was 9.3 per cent and by the end of March 2017 it rose to as high as 16 per cent. Based on this outcome RBI as a regulatory authority has resorted to Prompt Corrective Action to improve the internal controls of the bank and enhance its assets quality. With this backdrop an attempt is made in the present study to ascertain whether this problem of mounting NPAs is only with public sector banks operating in

India or with private banks and foreign banks as well.

The number of branches as a percentage to total branches of scheduled commercial banks as on March 2016 are, the SBI and its Associate banks (SBI & Asso) 18.4 per cent, Nationalised Banks (NB) 50.4 per cent, Private Sector Banks (PB) 15.7 per cent, Foreign Banks (FB) 0.3 per cent and the Regional Rural Banks (RRB) with a share of 15.3 per cent as observed from Table-1A.

The share of these banks in total credit outstanding of scheduled commercial banks as on March 2016 are the SBI and Associates 21.5 per cent, NB 50.1 per cent, PB 20.8 per cent, FB 4.9 per cent and the RRBs with a share of 2.6 per cent.

Table-1A : Number of Offices, Deposits and Credit of Scheduled Banks according to Bank Group as on March 2016

(percentage to total)

Bank Group	No. of Offices	No. of Deposit Accounts	Deposit Amount	No. of Credit Accounts	Outstanding Credit Amount
SBI and Associate Banks	18.4	26.9	21.9	18.7	21.5
Nationalised Banks	50.4	49.2	51	36.7	50.1
Foreign Banks	0.3	0.2	4.4	3.7	4.9
Regional Rural Banks	15.3	12.6	3.0	15.4	2.6
Private Sector Banks	15.7	11	19.7	25.6	20.8
All SCBs	100	100	100	100	100

Source : Calculated from the Statistical tables relating to banks in India, RBI, 2016.

Table-1B : Gross NPA Ratio of Scheduled Commercial Banks

(in percentage)

Year	SBI & Asso	NB	PB	FB	All SCB
2006-07	2.59	2.69	2.19	1.92	2.52
2007-08	2.58	2.06	2.47	1.92	2.26
2008-09	2.56	1.75	2.92	4.37	2.31
2009-10	2.82	2.03	2.99	4.36	2.51
2010-11	3.12	1.97	2.48	2.61	2.35
2011-12	4.36	2.67	2.09	2.76	2.95
2012-13	4.42	3.24	1.77	3.04	3.23
2013-14	4.96	4.09	1.78	3.86	3.83
2014-15	4.28	5.26	2.10	3.20	4.27
2015-16	6.40	10.69	2.83	4.20	7.49

Source : Statistical tables relating to banks in India, RBI, 2016.

The ratio of gross NPAs to gross advances of banks during the study period are presented in Table-1B. The ratio is observed to be increasing for all categories of banks during the study period. Gross NPA ratio of scheduled commercial banks as on March 2016 is 7.49 per cent (89 banks), the SBI & Asso is 6.4 per cent (6 banks), NB is 10.69 per cent (21 banks), PB is 2.83 per cent (22 banks) and FB is 4.2 per cent (40 banks).

Related Literature Review

Indira, Sumon and Namita (1999) identified that NPAs as a percentage of bank advances of Indian commercial banks vary cross-sectionally by ownership

category. In the year 1996-97, the average NPAs of 27 public sector banks were 9 per cent, 6 per cent in the case of 25 old private sector banks, 2 per cent in new private sector banks and 29 foreign banks had 2.5 per cent.

Goutham and Bhabatosh Banerjee (2008) using test of significance of equality between two sample proportions observed that there is no significant difference in the NPAs from priority sector advances and that of the NPAs from other loans. With respect to generation of overall NPAs of public sector banks, there is no significant difference in the contribution of NPAs from priority sector advances and that

of the NPAs from other loans. Awasthi and Rahul Singh (2008) found a considerable increase in the percentage share of NPAs of priority sector in the total NPAs of public sector banks during 2000-01 to 2006-07. The true nature of India's bad loans problem may be more serious than alluded to in recent past (Niranjan, C. & Meenakshi, R. 2007). The authors, through econometric results strongly sustain the case for an understatement of gross NPAs by weak Indian banks during post-1999.

Bardhan and Mukherjee (2016) observed that capital adequacy ratio is a prudential indicator for NPAs of banks and larger size banks are more prone to default than smaller banks. Further, reduction in NPAs is possible with increase in profits of banks.

Objective of the Study

The objective of the study is that the average ratio of gross NPAs to gross advances of banks does not vary based on their ownership category.

Hypothesis

The null hypothesis designed is :

Ho : There is no significant difference among banks with respect to their NPAs.

Methodology

Four different categories of banks based on their ownership operating in India are selected. They are SBI & its Associates (SBI & Asso-06), other Nationalised Banks (NB-20), Private Sector Banks (PB-19), and Foreign Banks (FB-24). Data for all the 69 banks has been compiled from RBI data base for a period of 12 years from 2004-2005 to 2015-2016. Average of the ratio of NPAs to gross advances of four category of banks for twelve years has been calculated.

To test the hypothesis test of Analysis of Variances and the post-hoc test have been resorted for. The basic assumptions to be satisfied to conduct Analysis of Variance are that the data is normally distributed and the variance of sample group is same. The data is analysed using SPSS package.

Testing the Normality of the Data Distribution

Normality of data for each category of bank is tested by applying the Shapiro-Wilk test. This test is selected because of the fact that the data for each bank is for less than 50 years. The null hypothesis set is that, the distribution of the data is normal. The formula for the Shapiro-Wilk test is :

$$W = \frac{\left(\sum_{i=0}^n a_i x_{(i)}\right)^2}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad \dots(1)$$

Where,

$x_{(i)}$ is the i^{th} order statistic i.e., the i^{th} – smallest number in the sample

$\bar{x} = (x_1 + \dots + X_n) / n$ is the sample mean;

a_i is constant and is give by :

$$(a_1 \dots a_n) = \frac{m^T V^{-1}}{(m^T V^{-1} V^{-1} m)^{1/2}} \quad \dots(2)$$

Where :

$$m = (m_1 \dots m_n)^T \quad \dots(3)$$

and $m_1 \dots m_n$ are the expected values of the order statistics of independent and identically distributed random variable sampled from the standard normal distribution and V is the covariance matrix of those order statistics.

After applying the Shapiro-Wilk test of normality, the data is observed to be non-normalized. The non-normalized data has been converted into normalized with the Box-Cox Power transformation formula.

Box – Cox Power transformation formula is :

$$x_\lambda = \frac{x^\lambda - 1}{\lambda} = \text{where } \lambda = 0$$

$$x_\lambda^1 = \log(x) \quad \text{Where } \lambda = 0$$

For further analysis, the natural logarithmic values of average ratio of gross NPAs to gross advances were used.

Testing Homogeneity of Variance
Homogeneity of variance in the groups is another important condition for a parametric test. Levene’s test is employed to test the equality of variance. The null hypothesis set for this test is that, the variance is equal in all the groups. The test statistic W is defined as follows :

$$W = \frac{(N - k)}{(k - 1)} \frac{\sum_{i=1}^k N_i (Z_i - Z_{\dots})^2}{\sum_{i=1}^k \sum_{j=1}^{N_i} (Z_{ij} - Z_i \dots)} \quad \dots(4)$$

Where W is the result of the test, k is the number of different groups to which the samples belong, N is the total number of sample, N_i is the number of samples in the group :

$$Z_{ij} = \left| Y_{ij} - \bar{Y}_i \right| \quad \text{Where } \bar{Y}_i \text{ is the mean of } i^{\text{th}} \text{ group} \quad \dots(5)$$

$$Z = \frac{1}{N} \sum_{n=1}^{\infty} \sum_{j=1}^{N_i} Z_{ij} \quad Z_{ij} \text{ is the mean of all } Z_{-ij} \quad \dots(6)$$

$$Z_i = Z_{ij} \text{ is the mean of for group } i \dots(7)$$

Analysis of Variance (ANOVA) :
Analysis of variance is applied to test for the significant difference among

more than two sample means. It helps in making inferences about whether our samples are drawn from populations having the same mean. The null hypothesis is that,

$$H_0 : \mu_1 = \mu_2 = \mu_3 \dots \dots \dots = \mu_k$$

$H_1 : \mu_1 \neq \mu_2 \neq \mu_3 \dots \dots \dots \neq \mu_k$ is the alternative hypothesis.

Where μ_1, μ_2, μ_3 and μ_n refers to the mean of selected groups.

$$F = \frac{\text{Between - column variance}}{\text{within - column variance}} = \frac{\sigma^2 b}{\sigma^2 w} \dots (8)$$

Post-Hoc Tests : The “Honestly Significant Difference” (HSD) test was proposed by statistician John Tukey. It is employed to conduct the post-hoc tests. It is based on studentized range distribution. To test pair-wise comparisons among different categories of banks the Tukey HSD t-test is used.

$$t_s = \frac{M_i - M_j}{\sqrt{\frac{MSE}{n_h}}} \dots (9)$$

Where

$M_i - M_j$ is the difference between the i th and j th means, MSE is the Mean Square Error and n_h is the harmonic mean of the sample sizes of group i and j .

Analysis and Inferences

To test the hypothesis that the ratio of gross NPAs to gross advances of banks does not vary based on their ownership category, test of Analysis of Variance is used. From the data on average ratio of gross NPAs to gross advances (Table-2), it is observed that the minimum values range in between 1.67 to 1.96 whereas the maximum values range in between 5.35 to 12.51. The NPAs of foreign banks have recorded the maximum value. The deviation and variance is also high in the case of foreign banks.

Sample Characteristics

The skewness of SBI & Asso banks is 0.595 (SE-0.637) and a Kurtosis of -0.190 (SE-1.232). The skewness of NB, PB and FB are 0.087, 0.777 and 1.051 respectively with a standard error of 0.637. The Kurtosis of NB, PB and FB are 1.331, 0.168 and 0.957 respectively with a standard error of 1.232 (Table-2).

Table-3 depicts the results of Shapiro-Wilk test. From the Significance Values ($P > 0.10$) of different categories of banks based on their ownership, the assumption of normality of the data is satisfied. Further, from the visual inspection of their histograms, Normal Q-Q plots and Box Plots of the average ratio of gross NPAs as a percentage of gross advances of four banks are found to be

Table-2 : Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness (For LOG data)		Kurtosis (For LOG data)	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SBI&Asso	12	1.67	6.05	3.2783	1.39941	1.958	.595	.637	-.190	1.232
NB	12	1.75	10.36	3.8192	2.42953	5.903	.087	.637	-1.331	1.232
PB	12	1.77	5.35	2.7258	1.03717	1.076	.777	.637	.168	1.232
FB	12	1.96	12.51	5.52	3.4578	11.956	1.051	.637	.957	1.232

Source : Authors calculations based on statistical tables relating to banks in India, RBI, 2016.

Table-3 : Tests of Normality

Ownership Category of Banks	Shapiro-Wilk Test(Natural Logarithmic Values)		
	Statistic	DF	Sig
SBI_LOG	0.948	12	0.606
NB_LOG	0.924	12	0.318
PB_LOG	0.906	12	0.188
FB_LOG	0.926	12	0.337

Source : Authors Calculations.

approximately normally distributed. Hence the first assumption to analyse the data with the parametric test ANOVA is satisfied.

To analyse the data with Analysis of Variance (ANOVA) second assumption is to be satisfied. That is, homogeneity

of variance. The Levene's Homogeneity of Variances test is applied and presented in Table-4. The analysis of test indicates that the variance of all four banks is equal ($p > 0.10$). The second assumption is also satisfied so that the hypothesis can be tested with the statistical test analysis of variance.

Table-4 : Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.35	3	44	0.271

Source : Authors Calculations.

Table-5 : Analysis of Variance

ANOVA					
	Sum of Squares	DF	Mean Square	F-ratio	Sig.
Between Groups	0.451	3	0.15	3.588	0.021
Within Groups	1.842	44	0.042		
Total	2.293	47			

Source : Authors Calculations.

Results of analysis of variance are presented in Table-5. F-statistic is 3.588 with a significance of 0.021. The value of F-statistic is significant at 0.05 level ($P < 0.05$) indicating that there is difference among different groups of banks with respect to their average ratio of gross NPAs to gross advances. With a view to ascertain as to which of these four categories of banks differ from one another, the post-hoc tests are conducted.

Post-Hoc Tests

Pair-wise comparison of group means are analysed with the help of post-hoc test. Tukey's Honestly Significant Difference (HSD) criterion is one of the most

well known methods for conducting post-hoc test. In the present study, Tukey's HSD is applied to find out the relationship between the different categories of banks that would otherwise remain undetected.

The results of post-hoc test to compare the average ratio of gross NPAs to gross advances of SBI & Asso banks with other three banks i.e., nationalised banks, private sector banks and foreign banks are presented in Table-6. Mean difference indicates that there is no difference in the mean ratio for the last twelve years of SBI & Asso bank and other three banks. The significance

Table-6 : Comparison of NAPs of SBI & Asso Banks with Other Three Banks

SBI & Associate Banks	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
NB	-0.0401	0.08353	0.963	-0.2631	0.1829
PB	0.06734	0.08353	0.851	-0.1557	0.2904
FB	-0.19638	0.08353	0.102	-0.4194	0.0266

Source : Authors Calculations.

value ($p > 0.05$) of the mean differences indicates that the average ratio of gross NPAs to gross advances of NB, PB and FB do not differ with SBI&Asso bank.

The results of post-hoc test to compare the average ratio of gross NPAs to gross advances of NB with other three banks i.e SBI & Asso banks, PB and FB are presented in Table-7. Mean difference indicates that there is no difference in the mean ratio of nationalised banks and other three banks. The significance value ($p > 0.05$) of the mean differences indicates that the average ratio of gross NPAs to gross advances of SBI &Asso, PB and FB do not differ with NB.

Table-8 reveals the results of post-hoc test to compare the average ratio of gross NPAs to gross advances of PBs with other three banks i.e SBI & Asso Banks, Nationalised Banks and Foreign Banks. Mean difference indicates that there is no difference in the mean ratio of private banks and two public sector banks. The significance value ($p > 0.05$) of the mean differences indicates that the average ratio of gross NPAs to gross advances of SBI & Asso and NB do not differ with PB. But there is a significant difference in the average ratio of gross NPAs to gross advances of PB and FB. This is clear from the significance level 0.015 ($p < 0.05$) of the mean difference between these two banks (Table-8).

Table-7 : Comparison of NPAs of NB Banks with Other Three Banks

NB	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
SBI & Asso	0.0401	0.08353	0.963	-0.1829	0.2631
PB	0.10744	0.08353	0.576	-0.1156	0.3305
FB	-0.15628	0.08353	0.255	-0.3793	0.0667

Source : Authors Calculations.

Table-8 : Comparison of NPAs of PB Banks with Other Three Banks

PB	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
SBI & Asso	-0.06734	0.08353	0.851	-0.2904	0.1557
NB	-0.10744	0.08353	0.576	-0.3305	0.1156
FB	-.26372	0.08353	0.015*	-0.4867	-0.0407

Source : Authors Calculations.

**Significant at 5 per cent level.*

Table-9 : Comparison of NPAs of FBs banks with Other Three Banks

FBs	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
SBI & Asso	0.19638	0.08353	0.102	-0.0266	0.4194
NBs	0.15628	0.08353	0.255	-0.0667	0.3793
PBs	.26372*	0.08353	0.015*	0.0407	0.4867

Source : Authors Calculations
 *Significant at 5 per cent level.

Table-9 reveals the results of post-hoc test to compare the average ratio of gross NPAs to gross advances of FBs with other three banks i.e Nationalised banks, Private sector banks and SBI&Asso banks. Mean difference indicates that there is no difference in the mean ratio of foreign banks and two public sector banks. The significance value ($p > 0.05$) of the mean differences indicates that the average ratio of gross NPAs to gross advances of SBI&Asso, and NBs do not differ with FB. Obviously, there is a significant difference in the average ratio of gross NPAs to gross advances of FB and PB. This

is clear from the significance level 0.015 of the mean difference between these two banks.

Homogeneous Subsets

The results of homogeneous subsets which classify the banks into homogeneous groups are presented in Table-10. Alpha 0.05 indicates the null hypothesis that the banks in the same column do not differ significantly. Two subsets are identified in the present study based on similarities in NPAs. SBI &Asso, PB and NB are classified into one group and SBI & Asso, FB and NB are classified into another group.

Table-10 : Comparison of NPAs of Four Banks

Category of Banks	N	Subset for Alpha = 0.05	
PB	12	0.412	
SBI & Asso	12	0.4793	0.4793
NB	12	0.5194	0.5194
FB	12		0.6757
Sig.		0.576	0.102

Source : Authors Calculations.

This reveals that the SBI&Asso banks and nationalised banks average ratio of gross NPAs to gross advances do not differ with that of the private sector banks and foreign banks. But there is a significant difference in the average ratio of gross NPAs to gross advances of FB and PB with a significant value of more than 0.05.

Conclusion

From the analysis of data on average ratio of gross NPAs to gross advances of four categories of banks operating in India for a period of twelve years, it is observed that there is a significant difference between private banks and foreign banks with respect to NPAs. NPAs of these two banks do not differ with NPAs of SBI and its associate banks and also the nationalised banks. It can be affirmed that the public sectors banks alone are not facing the problem of NPAs. But this problem is common with all the categories of banks operating in India.

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Annexure-1

List of Banks Selected for the Study

SBI & Associate Banks (6)	Private Sector Banks (19)	Foreign Banks (24)
State Bank of Bikaner & Jaipur	Axis Bank	AB Bank Ltd
State Bank of Hyderabad	Catholic Syrian Bank Ltd	Abu Dhabi Commercial Bank
State Bank of India	City Union Bank Ltd	American Express Banking Corp.
State Bank of Mysore	DCB Bank Ltd	Bank of America N.A.
State Bank of Patiala	Federal Bank	Bank of Bahrain & Kuwait B.S.C.
State Bank of Travancore	HDFC Bank	Bank of Ceylon
Nationalised Banks (20)	ICICI Bank	Bank of Nova Scotia
Allahabad Bank	IndusInd Bank	Barclays Bank Plc
Andhra Bank	ING Vysya Bank	BNP Paribas
Bank of Baroda	Jammu & Kashmir Bank Ltd	Citibank N.A.
Bank of India	Karnataka Bank Ltd	Credit Agricole
Bank of Maharashtra	Karur Vysya Bank	CTBC Bank
Canara Bank	Kotak Mahindra Bank Ltd	DBS Bank Ltd
Central Bank of India	Lakshmi Vilas Bank	Deutsche Bank AG
Corporation Bank	Nainital Bank	Hongkong and Shanghai Banking Corpn. Ltd
Dena Bank	South Indian Bank	HSBC Bank Oman S.A.O.G.
IDBI Bank Ltd	Tamilnad Mercantile Bank Ltd	JP Morgan Chase Bank N.A.
Indian Bank	The Ratnakar Bank Ltd	Mashreq Bank PSC
Indian Overseas Bank	Yes Bank Ltd	Mizuho Bank Ltd
Oriental Bank of Commerce		Royal Bank of Scotland N.V.
Punjab and Sind Bank		Societe Generale
Punjab National Bank		Sonali Bank
Syndicate Bank		Standard Chartered Bank
UCO Bank		State Bank of Mauritius Ltd
Union Bank of India		
United Bank of India		
Vijaya Bank		

Endeavoring Turnaround through Retrenchment : Case Study of a State-Owned Enterprise in Kerala

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This research based case of a government-owned chlor-alkali enterprise in the State of Kerala, narrates it's organizational performance decline and the efforts to annul this decline. A combination of internal factors and a non-favorable external environment led the company to a financial and operational crisis. The absence of organizational slack and a diminutive environmental munificence led the company to devise retrenchment activities to reverse the decline and put the company back on the growth trajectory. The case elucidates briefly the major reasons for this decline and the retrenchment initiatives taken by the company in detail. Retrenchment is defined as the strategic response to organizational failure which consists of reductions in the scope or size of an organization. The organization focused on cost reduction strategies which included head count reduction, changes in the plant, E-Tendering, and increment freeze which led to acceptable cost savings. Asset retrenchment was marginally adopted and the retrenchment based governmental interventions also aided in reduction of costs and generation of funds. Cumulatively, these measures reflected positively in the performance of the organization. However, the adequacy of the retrenchment efforts is dubious, and the case closes by providing an engaging avenue for discussions on the additional measures that could be taken by the company to trounce the decline.

Keywords : Turnaround Strategies, Performance Decline, Cost Retrenchment, Cost Savings and Asset Retrenchment.

Introduction

The road resembled a well maintained national highway in a hill station. With greenery on one side and fog that seemed like clouds on the road, the new Head of Strategy was happy to open his eyes to this beautiful sight. A few minutes later however, he realized that this was a mirage. The fog was in fact, smoke from several industries that adorned the opposite side of the greenery

and the picture was indeed, not perfect. Rakesh Menon was summoned by the Head of Industries department of the State, to look into the way ahead for

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some of the State-Owned Enterprises that had scope for growth. His first assignment was in this organization which was one of the middling performers, but, one with scope for long-term sustainable growth. He rummaged the report that was sent to him by the organization. The company had a rickety pattern of return on investment for the past 10 years, with ebbs and highs. The reasons for the declining performance was endogenous and exogenous in nature said the report, as assessed by a standalone agency. Some measures to turnaround the performance were adopted, mostly in the form of retrenchment. The results, however, were cosmetic, not long standing. He wanted a first-hand experience to ascertain the veracity of the report and decided to get ready for his first day of work at a place, which looked like it needed help.

The Company's Story

The managing agents of a nationally recognized fertilizer manufacturer germinated the idea of commissioning a caustic soda plant, to be the first producers of rayon grade caustic soda in the country. A year later the partnership firm got converted into a public limited company, with Government of Kerala holding the major shares. With an initial capacity of 20TPD¹, the company started full-scale production in 1954. Adoption of caustic fusion technology and liquefaction of chlorine

were important milestones in the growth of the company, which incrementally added capacity, and now stands at 175TPD. The company is headed by the Chairman who also serves as the Managing Director and the Board has 9 other directors representative of a typical state-owned enterprise. It belongs to the heavy chemical industry specifically the chlor-alkali sector² and is engaged in manufacturing and marketing of caustic soda (Lye & Flakes), liquid chlorine, hydrochloric acid and sodium hypochlorite. The products of the company find uses in industries like rayon, textiles, paper, plastics, aluminum, pharmaceuticals, mineral processing, petrochemicals etc. The raw materials used for the production of the major products are salt and water. It is a co-product process, where the electrolysis of brine decomposes it into caustic soda, chlorine and elemental hydrogen. For each unit of caustic soda produced, 1.1 unit of chlorine is co-produced, collectively known as an electrochemical unit. By 1997, the then used technology of mercury cell process, which was measured to cause grave environmental problems and contaminated the end products with traces of mercury, was replaced by the membrane cell technology. This transformed the company to a zero effluent – environmentally friendly institution meeting all governmental stipulations. With an impending plan to add 50TPD capacity

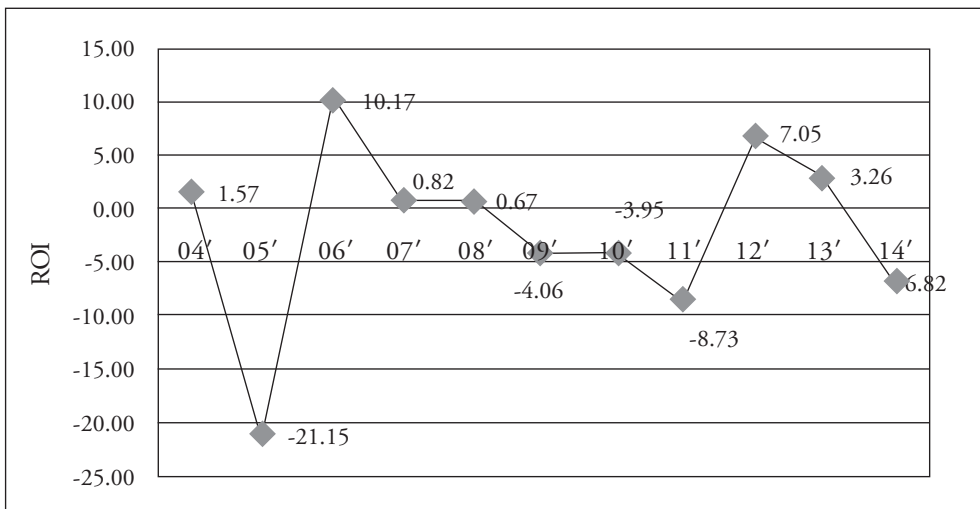
to the caustic soda plant and the proposed installation of a 125TPD bipolar electrolyser system, the company has the technical springboard to garner more business. However, the financial situation to aid this growth is grim. There has been no capital infusion since the time of inception, and debt financing fueled all the above growth milestones. The interest burden along with burgeoning operational costs pulled down the profits over the years. The intensifying competition and several other endogenous and exogenous factors led to a derelict return on investment pattern (Exhibit-1).

Declining Performance

In order to assess the effectiveness of the strategies selected to overcome the organizational performance decline,

Rakesh had to first understand the seminal reasons that led to it. Scanning through the annual reports and the performance analysis reports submitted by the standalone agency, he understood that the decline was a result of an admixture of endogenous and exogenous factors. Some of the endogenous factors included lack of organizational slack, increasing electricity cost, capital scarcity and management weakness. Exogenous factors that contributed to the decline included munificence, demand turbulence and loss of competitive advantage. Organization slack is the uncommitted resources in the organization that can be used to fund the organizational activities (Mone, Mckinley & Barker, 1998) and be classified into available, recoverable and potential slack (Wiseman & Bromiley, 1996).

Exhibit-1 : Return on Investment



The organization however, was struggling with the negligible levels of all the three slacks. Lack of organizational slack was one of the formative reasons for the organization to decline as; lack of internal funds forced them to rely on borrowed funds, the obligation of which could not be sustainably met.

The time series representation of the available slack (current ratio), recoverable slack (selling, general and administrative expenses divided by sales) and the potential slack (debt to equity ratio and interest coverage ratio) shown in the Exhibit-2.1 and 2.2 would give a factual affirmation. Electricity is one of

Exhibit-2.1 : Potential Slack

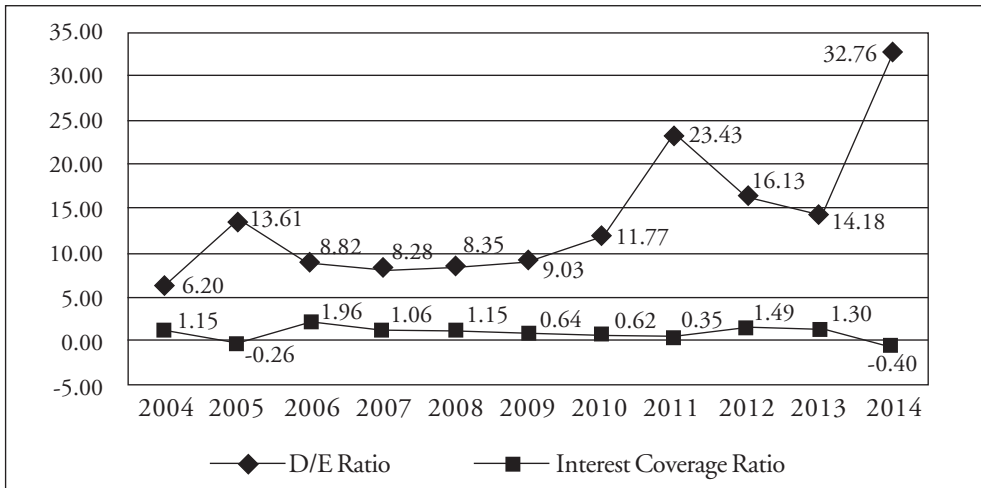
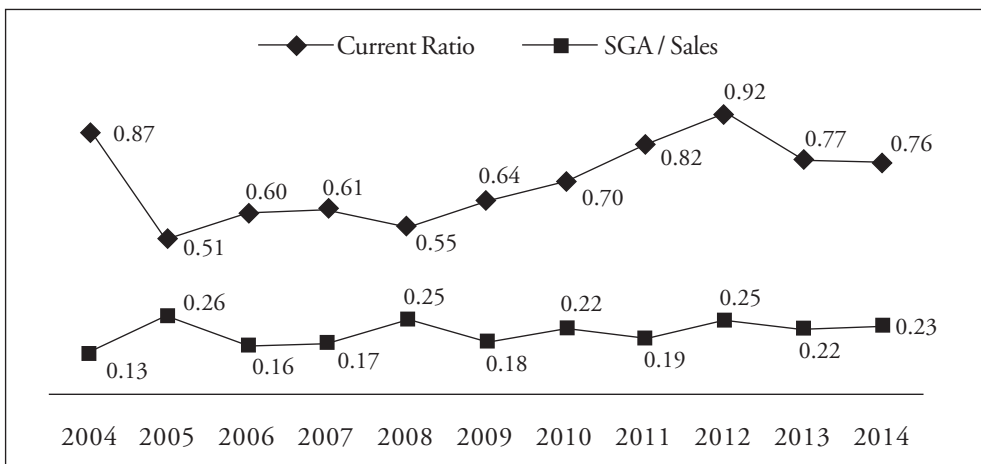


Exhibit-2.2 : Available and Recoverable Slack



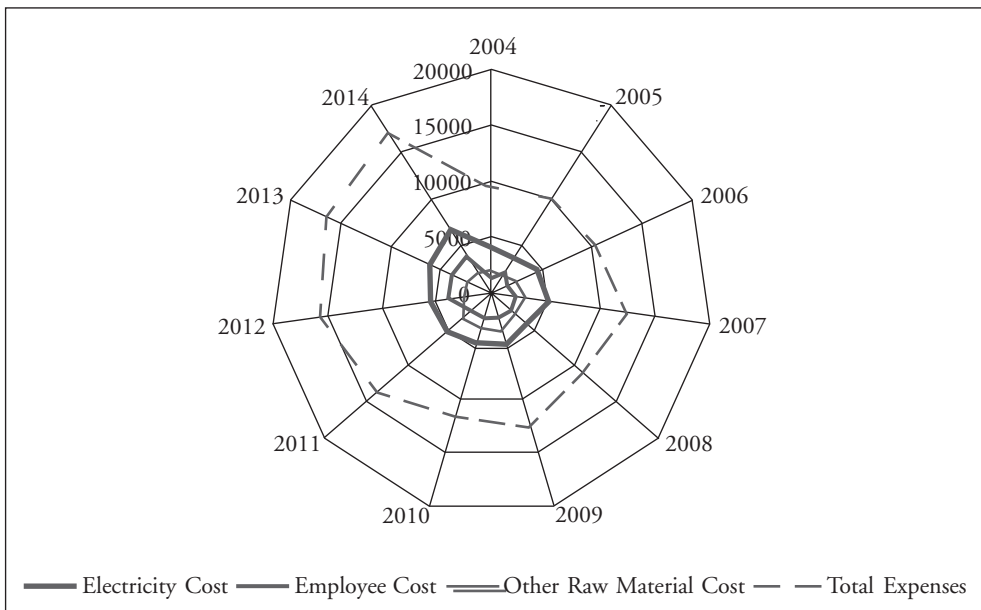
the major constituents in the production process of any chlor alkali company. The company made continuous loss from the year 1997 to 2003. The reason for which was the power cost escalation year after year. After the State Electricity Regulatory Commission³ came into force in Kerala in the year 2003, there was no power hike, but after 2012 there has been a time based differential pricing system. This has led to an electricity cost increase of ₹4.72/unit on an average. For example, the electricity purchased during the financial year 2013-14 was 1423.32 Lakh Kilo Watt Hour (KWH) at a total amount of ₹6,717.08 Lakhs which forms about 38.8 per cent of the total

expenses of the enterprise (Exhibit-3). Another key crisis the company faces is capital scarcity. The amount of capital that the company had and still has is only ₹21 crores, which was invested by the government during its inception. Flat line of shareholder's fund is an indication to this. With debt dominating the source of funds, servicing it becomes a colossal task.

Management weakness can be manifested as crisis in leadership (Weitzel & Jonsson, 1989), complacency of leadership (Chowdhury & Lang, 1996), or escalating commitment (Mone et al., 1998; Witteloostuijn, 1998). The management of the company was

Exhibit-3 : Decisive Costs as Components of the Total Expenses

(in ₹ Lakhs)

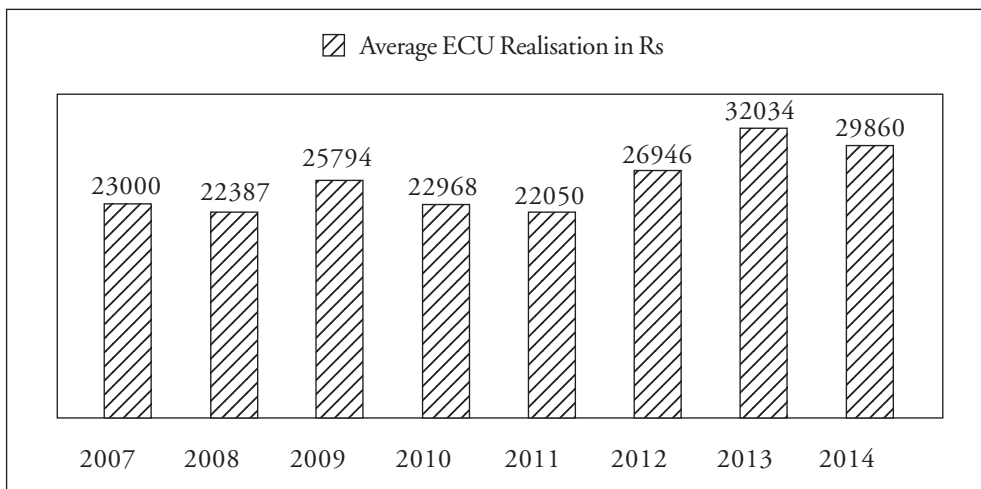


marred by the political impedance and consequential strategy paralysis and lacunae in circadian affairs. The inefficiency starts from the top management where poli-tical interferences are far too many. Political interference was an inescapable impediment in the path of growth of this company and for that matter any public sector enterprise. Being owned by the state, the enterprise has strong political trammeling and decisions were not always rid of nepotism.

One of the major exogenous factors that led to the performance decline was munificence, which reflects the carrying capacity of the environment (Maheshwari & Ahlstrom, 2004) and is affected by the intensity of the competition as well as the political and social conditions (Piening, 2013). In the case of the company, the carrying capacity has been

playing spoilt sport and forging a plethora of issues like attenuation of traditional markets, increased use of substitutes like hydrogen peroxide to chlorine, price fluctuations in the international market and dumping tendencies, performance achievement trade policy by the central government etc. The ECU realization trend is a testimony to this factor (Exhibit-4). Demand Turbulence is characterized by cyclical, random or declining demand (Witteloostuijn, 1998). The production process invariably produces 0.886 tons of chlorine for a ton of caustic soda. It is challenging to find homologous demand for both the products and hence based on the demand of one, the production of the other is controlled. Competitive Advantage is lost when the company fails to cater to the present

Exhibit-4 : Average ECU Realisation



needs of the market and when the products are obsolete which result in customer base attrition (Maheshwari, 2007). Since it is a commodity, quality and pricing are the two areas where competitiveness can be created. Though the quality of the product is praiseworthy, the price of the product plays a dampener. Owing to the high freight charges of the raw materials and its addition to the price of the product, and the ensuing price competitiveness outside the state, better realization can be made only if the product is sold in Kerala. But unfortunately, the state does not have a sizeable market.

Rakesh now had a perceptible about the dominant reasons that led to the performance decline of the organization. His task now, was to assimilate the retrenchment efforts taken by the company and assess its adequacy.

Retrenchment Efforts

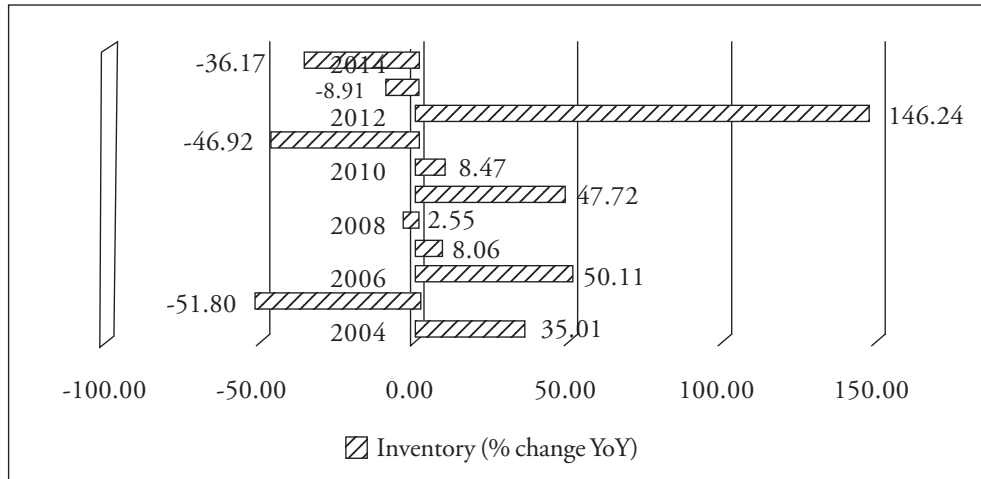
To overcome the company's cascading performance, adoption of remedial measures was the need of the hour. To ensure immediate results, belt tightening was the way forward decided by the top management team. Retrenchment strategies were hence adopted, intending to reverse the decline. Also known as restructuring, downsizing and downscoping, retrenchment stands for all those activities undertaken to mitigate the conditions responsible for the

financial downturn and primarily includes cost and asset reductions (Robbins & Pearce, 1992). Retrenchment strategies are defined as a reduction of a firm's assets and cost base (Mone et al., 1998) and this is often the first strategy employed by a financially distressed firm (Hofer, 1980). Retrenchment is often considered as an immediate action to combat momentous problems (Murphy, 2008). Retrenchment is considered as an immediate step succeeding the trigger for change and consists of stabilization activities which would be the springboard for return to growth according to (Haron, Rahman, & Smith, 2013). The company envisaged total cost reductions and also short-term asset reductions. Exhibit-5 shows the total cost and short-term assets over period 2004-2014. As can be seen from the exhibit, total cost reductions i.e., the total of administrative, factory and selling expenses were realized only during two periods 2008 and 2010. However, short-term assets which consisted of cash and cash equivalents, inventory and trade receivables were reduced during the periods, 2005, 2008, 2011, 2013 and 2014. The retrenchment of short-term assets was effected through a reduction in the level of inventory by 51 per cent, 2 per cent, 46 per cent, 8 per cent and 36 per cent during the years 2005, 2008, 2011, 2013 and 2014 respectively (Exhibit-6).

Exhibit-5 : Table Showing the Total Cost and Short-term Assets – Cost Retrenched Years

Time Cost Elements	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Administrative Expenses	1,196.74	2,325.78	1,719.4	2,420.59	2,676.51	2,375.6	2,565.77	2,611.91	4,111.986	3,965.8
Factory Expenses	6,303.88	5,695.24	7,269.07	8,350.03	6,921.32	8,409.65	7,787.78	8,897.08	9,913.86	10,850.74	11,304.6
Selling Expenses	16.79	17.29	36.7	25.28	27.45	26.95	33.66	33.39	83.98	34.99	31.4
Total Cost	7,517.41	8,038.31	9,025.17	1,0795.9	9,625.28	1,0812.2	10,387.21	1,1542.4	14,109.826	14,851.53	15,478.1
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cash and Cash Equivalents	682.53	166.17	124.12	139.28	115.26	102.49	58.58	65.57	328.56	74.22	109.2
Inventory	13,36.39	644.19	967	1,044.91	1,018.27	1,504.21	1,631.59	866.03	2,132.54	1,942.49	1,239.94
Trade Receivables	1,175.4	954.67	1,098.56	1,424.95	1,229.14	974.11	1,129.79	1,871.33	1,804.99	1,934.36	1,665.75
Short Term Assets	3,194.32	1,765.03	2,189.68	2,609.14	2,362.67	2,580.81	2,819.96	2,802.93	4,266.09	3,951.07	3,014.89

Exhibit-6 : Cost Reduction through Inventory



Cost savings was yet another mechanism through which cost efficiency was consummated. Technological modifications and alternate use of heating methods were adopted to achieve this. The elemental hydrogen that is produced as a byproduct during the co-product process was used in addition to the main fuel-furnace oil in the continuous caustic soda concentration and flaking unit. This was initiated during the year 2006 and till 2014, has cumulatively saved an amount of ₹13.336 crores. Another inventiveness taken by the company was to purchase steam from the Fertilizers and Chemicals Travancore Limited (FACT), a Government of India owned manufacturer and marketer of fertilizers and caprolactam. This enterprising move was instituted in the year 2009, and though initially was not a very rewarding; later on,

proved to be profitable. The aggregate savings from using steam as an alternate fuel source was ₹78.989 crores. Electricity being the major cost element, a thorough energy monitoring system has been undertaken in a phased manner. Timely technical interventions as suggested by the audit like replacement of motor pumps in the cooling tower, interactive solar power grid for energy requirements of the administrative building, retrofitting to zero gap technology⁴ etc have been adopted. The collective savings as reflected from the annual reports during the period 2009-14 was ₹126.37 lakhs. Exhibit-7 shows the above stated savings.

Another important move by the company to maintain its buoyancy was to reduce the workforce. In 2004, a Voluntary Retirement Scheme was introduced and 53 employees retired from the

Exhibit-7 : Cost Saving Measures (Technical Interventions)

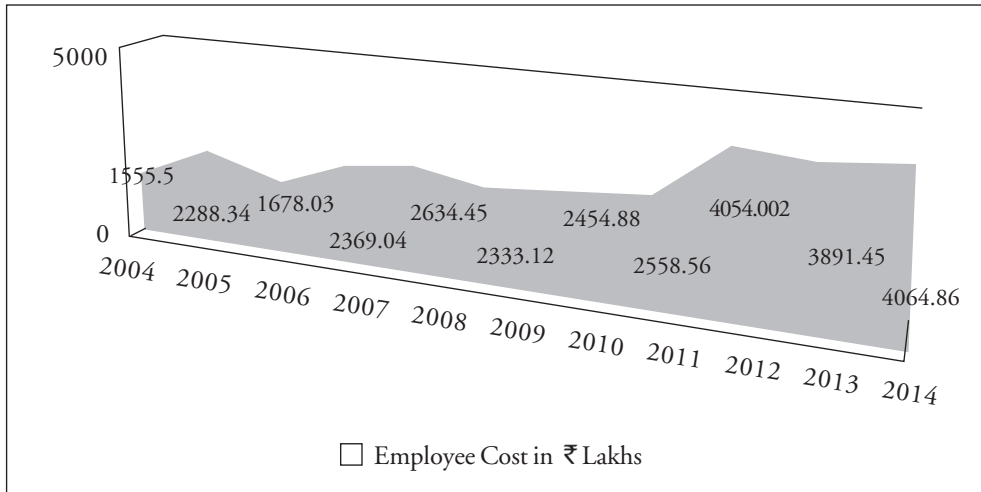
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Use of Hydrogen									
Furnace Oil saved	319.9	437.66	208.7	193.71	352.174	592.16	774.5	707.6	716.235
Average Rate	14874	16289	19830	24225	23824	26847	38406	41042	41290
Cost Savings in Lakhs	47.58	71.29	41.39	46.93	83.90	158.98	297.45	290.41	295.73
Use of Steam									
Furnace Oil saved				386	1030	0.846	1060	780	15821.1
Average Rate				24225	23824	26847	38406	41042	41290
Cost Savings in Lakhs				93.51	245.39	0.23	407.10	320.13	6532.53
Electrical Energy Saved									
KWH saved				638000	511000	945000	965000	150000	230000
Rate				3.74	3.47	3.5	3.54	4.46	4.72
Cost Savings in Lakhs				23.86	17.73	33.08	34.16	6.69	10.86

services of the company using this. The company had received ₹194 lakhs from Government of Kerala towards subsidy for implementation of this scheme. This ensured that there was no cash outlay from the company's pocket. Furthering this move, the employee strength was brought down from 1,200 in 2001 to 696 in 2010. The vacant positions remain unfilled and new recruitments were frozen. Nonetheless, the effect of this move on the balance sheet is minimal, taking into account

the increase in the basic salary structure over the period of years. Exhibit-8 shows that the employee cost element has only increased year-on-year.

Asset retrenchment was undertaken sparingly. Forty-nine cents of land was sold to the Grama Panchyath where the company is located, which gave them additional revenue and a profit of ₹12.15 Lakhs in the year 2010. Also, as directed by the Government of Kerala the company has leased out 8.53

Exhibit-8 : Employee Cost



acres of land and also given the power to mortgage to M/S Kerala State Industrial Enterprises Limited (KSIEL) for 30 years in 2010. Till 2014, the company has received a lease rental of ₹73.78 Lakh per year i.e a total of ₹368.9 Lakhs.

The Big Question

After reading the report, Rakesh had a few questions that needed answers. The big question being, whether these measures were adequate to turnaround or reverse the declining performance of the organization. Though these initiatives made cosmetic changes to the bottom-line of the organization, profits were made on account of a healthier top line, thanks to the well performing markets during the profit making period. The dismal situation of the organizational

slack i.e. the absence of uncommitted resources forced the company to take a conservative path to reverse the decline. With very limited funds for innovation, the organization did what it could at the operational level. The company did turn green for a couple of years, but it could not be sustained. The state government is the major shareholder and plays a dual role of policy maker at the macro and the micro level. This duality should aid the enterprise positively in an ideal scenario. But lamentably, the contrary is happening. Delay in project approvals, nil capital infusion and lack of timely intervention to resolve financial and operational issues have led the organization to grapple in this maze of un-sustained profitability. Rakesh realized that the retrenchment measures presently adopted must be reinforced

by ancillary measures at the meso and macro level to bring about long lasting changes. A plan that focused on the reasons for the decline, and analogous curative measures needed to the developed. However, the most studied and precisely defined strategy is practically insignificant if it is not implemented successfully. The three requisite rudiments for successful strategy implementation are the attitude and behavior of people involved, the unstinting dedication towards the strategy and finally the continual learning that assist strategy implementation. Rakesh was dubious about the receptiveness of the strategies that he planned to develop, but nevertheless, he had to do what he came for – transform this irresolute middling performer to a sustainable top performer.

Endnotes

1. Tons Per Day (Unit of measurement for the Plant Capacity).
2. The industry sector which represents manufacturers of Caustic Soda, soda ash and chlorine. Alkali Manufacturers of India (AMAI) is the apex body of the industry in the country.
3. The Kerala State Electricity Regulatory Commission, comes under the purview of the Electricity Act 2003. Some of their important functions include tariff fixation, regulating electricity purchase, facilitate intra state transmission etc.
4. Maintaining uniform gap between anode and cathode so that they are in contact with the membrane there by saving electrical energy to a large extent.

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Component of Working Capital in Select Public Sector Oil and Gas Companies in India : A Study

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Working capital is considered to be the fund available for meeting the day-to-day requirements of a business enterprise. The term working capital is also used as synonym of current assets. Current assets include those assets which can be converted into cash within an accounting year or within the next year as a result of the ordinary course of business, such as stock, trade receivables, advances, cash and bank etc. Several studies on the issue of working capital have been featured in India and abroad but no such study on Indian select public sector oil and gas companies considering the matter addressed here has been made. In the present study an attempt was made to investigate the component which is responsible for changes in working capital and also to make a comparison in this respect between the pre-liberalisation and post-liberalisation periods. For this purpose, five public enterprises have been selected for a period of 38 years from 1978-79 to 2015-16. The present study has been made by simple mathematical and statistical analysis of collected secondary data.

Keywords : Working Capital, Public Sector Oil and Gas Companies.

Introduction

A business firm may survive without earning profit but it cannot exist and survive without working capital. The working capital of a business represents the amount of funds which the business firm uses to finance its day-to-day working on operations. It can also be regarded as that portion of firm's total capital which is employed in current assets. Current assets include inventory, account receivables, current investments, marketable securities, cash, bank balance etc. Every operating activity of a business firm affects the components

of its working capital. The various functions like purchase, production, wage contracts, marketing, distribution, financing decisions etc. have changed the amount of components of working capital. Management of current assets done by a concern is known as working capital management. Working capital management involves the procurement, administration, control and financing of current assets. Hence, the efficiency of working capital management is

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determined by the efficient administration of its various components.

Related Literature Review

While extensive research has been done on the various components of working capital, but there is a paucity of research on Indian select public sector oil and gas companies. An attempt was made to survey the various studies carried out in the areas of working capital management. The following are the some of the studies in this field :

Mishra (1975) examined the different problems of working capital management faced by the selected six central public sector enterprises. The study covered an 8 year period from 1960-61 to 1967-68. The study revealed that the inefficient management of working capital of the selected companies was largely responsible for suffering losses or earning low level profits. The study concluded that the excessive investments in inventory, receivables and cash of the selected public enterprises were noticed during the study period. Ramamorthy (1976) carried out a study on working capital management of 1,650 public limited and 116 government companies. The study observed that inventory constituted the highest percentage of current assets in sugar, cotton and jute industries, while

loans and advances and book debts constituted as a major component of current assets in the case of tea plantation. The coffee and rubber plantation industry groups showed high ratio of cash and bank balances in current assets. Agrawal (1983) examined the working capital management of ten selected manufacturing and trading public limited companies belonging to the Indian private sector during the period 1966-67 to 1976-77. The study revealed a downward trend in the amount of working capital per rupee of sales in almost all the selected companies. The study observed that the majority of the companies failed to plan their working capital requirement properly. It also depicted that most of the companies under study failed to maintain optimal balance to meet their current obligations. Sur (1997) conducted a study on working capital management of Colgate Palmolive (India) Ltd. for the period of twelve years 1980-1991 with an objective to analyse the liquidity position of the company. The study concluded that the short-term liquidity position of the company was not at all satisfactory during the period under study. The researcher also found the company's efficiency in managing its inventory throughout the period under study.

Mukhopadhaya (2004) conducted a study on working capital management of a firm belonging to the heavy engineering industry group for the period 1993-94 to 2002-03 in order to examine the effectiveness of working capital management of the firm and its effect on the commercial operations of the company. The study observed severe crisis of working capital which resulted in alarming liquidity of the firm throughout the study period. Talekar (2005) made a study to examine the efficiency of working capital management of fourteen cooperative sugar factories in Maharashtra for the period of ten years from 1991-92 to 2000-01. The study observed that inventories occupied major share in gross working capital in all the sugar factories throughout the study period. The study concluded that share of components of working capital in all factories were more or less same. Khatik and Jain (2009) carried out a study on the cash management of state electricity board of Madhya Pradesh (MPSEB) for a period of the ten years from 1995-96 to 2004-05. The study attempted to analyse the short term solvency, utilisation of cash resources, capacity of financial management, ability to generate daily cash met financial obligations and long term solvency of cash to debt service ratio of MPSEB. The study revealed that cash management position of the board was not satisfactory.

Gill, *et al.* (2010) in their study examined the relationship between working capital management and profitability of 88 selected American firms listed on New York stock exchange for the period of three years from 2005 to 2007. They found statistically significant relationship between cash conversion cycle and gross operating profit but did not find any significant relationship between size of the firm and operating gross profit.

Sharma, *et al.* (2015) examined the profitability and working capital management of SAIL for the period 2006-07 to 2013-14. The study observed that all the profitability ratios like gross profit ratio, return on investment, return on capital employed, return on equity and earnings per share depicted declining trend in the entire study period except in the ultimate year. The efficiency of working capital management measured through current ratio, liquid ratio, debtors turnover ratio, inventory turnover ratio and working capital turnover ratio. The efficiency of working capital management improved significantly during the study period. The study also revealed that there was a significant relationship between corporate profitability and working capital management.

The review of the studies so far made on the components of working capital reveals that though several studies on the issue of working capital management

was conducted in both India and abroad, this matter was not properly addressed in the case of Indian gas and oil sector during the post-liberalisation period. At this backdrop, the present study seeks to examine the components of working capital of the selected public sector gas and oil companies covering a large span of time i.e., 38 years from 1978-79 to 2015-16.

Research Design

Objectives of the Study

The present study has the following objectives –

1. To make an item-wise analysis of components of working capital to identify the items responsible for changes in working capital.
2. To make a comparison in respect of components of working capital of the selected companies during the pre-liberalisation period and post-liberalisation periods.

Methodology

Selection of Sample Companies

The present study was based on the five selected oil companies in the Central Public Sector Enterprises (CPSEs). The companies are Oil and Natural Gas Corporation Ltd (ONGCL), Hindustan Petroleum Corporation Ltd, (HPCL), Bharat Petroleum Corporation Ltd, (BPCL),

Indian Corporation Ltd, (IOCL) and Gas Authority of India Ltd (GAIL (India)). It is based on secondary data exclusively. The data relating to these selected enterprises were collected from published annual reports of the enterprises and Official Directory, Public Enterprises Survey etc. Editing, classification and tabulation of the data collected from the above mentioned sources were done as per the requirement of the study. For analyzing the data, simple mathematical tools like percentages, averages, ratios were used.

Analysis and Findings

An attempt was made to analyse the components of working capital in order to trace out the factors responsible for the significant changes in working capital of the selected companies during the pre-liberalisation and post-liberalisation periods. The share of each component in gross working capital was calculated in percentages separately for each of the years under study and average share in percentages for all the years was also calculated. Table-1 shows that of the six components of working capital of BPCL, the four components namely trade receivables, short-term loans & advances, cash & bank balances and other current assets contributed (average) 15.11, 19.49, 9.82 and 0.98 per cent respectively towards gross working capital whereas the inventories

Table-1 : Components of Working Capital of BPCL in the Pre-liberalisation and Post-liberalisation Periods
(Percentage)

Pre-Lib. Period Particulars	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85	1985- 86	1986- 87	1987- 88	1988- 89	1989- 90	1990- 91	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventories	51.13	68.74	72.99	79.70	56.44	56.98	46.16	42.63	47.59	55.01	57.06	42.46	59.10	55.82	70.61	60.10	55.52	32.49	26.73	54.59
Trade Receivables	4.37	9.9	14.88	8.44	20.05	9.89	17.76	21.91	17.48	8.84	12.58	31.72	9.00	11.73	11.06	17.03	19.52	22.69	17.79	15.11
Short Term Loans & Advances	34.51	11.36	2.12	4.28	12.50	23.27	23.45	22.50	23.34	19.68	18.89	15.44	18.76	21.04	9.69	15.91	14.22	32.14	46.78	19.49
Cash & Bank Balance	9.49	9.5	10	7.55	10.99	9.84	12.61	12.91	11.57	12.86	8.70	6.56	10.11	8.72	7.96	6.49	10.32	12.01	8.37	9.82
Other Current Assets	0	0	0	0.04	0.03	0.02	0.02	0.05	0.02	3.61	2.77	3.81	3.03	2.69	0.67	0.48	0.41	0.66	0.33	0.98
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Post-Lib. Period Particulars	1997- 98	1998- 99	1999- 20	2000- 01	2001- 02	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	23.03	15.08	13.44	11.62	16.80	18.16	16.36
Inventories	37.29	42.18	56.31	51.39	52.42	55.04	51.38	64.07	67.94	63.53	53.89	44.92	51.73	49.93	40.43	43.48	48.10	47.74	48.79	51.08
Trade Receivables	25.56	22.96	16.91	15.62	17.69	10.54	9.84	8.75	9.88	11.14	8.17	9.39	11.45	8.23	16.17	10.48	10.29	8.61	7.71	12.60
Short Term Loans & Advances	27.87	24.38	19.89	26.87	23.66	25.98	31.26	23.47	12.67	11.62	7.99	22.41	19.07	1.69	2.00	3.24	2.37	2.47	3.67	15.43
Cash & Bank Balance	8.88	9.85	6.85	6.10	6.20	8.43	7.51	3.61	3.70	6.34	4.89	2.91	1.47	1.23	2.48	6.07	0.51	4.49	7.36	5.20
Other Current Assets	0.40	0.12	0.04	0.03	0.03	0.01	0.00	0.10	5.81	7.38	25.07	20.37	16.28	15.89	23.84	23.29	27.10	19.88	14.31	10.52
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source : Compiled and computed from Public Enterprise Survey from 1978-79 to 2015-16.

contributed (average) the highest i.e. 54.59 per cent towards the gross working capital during the pre-liberalisation period. During this period a noticeable change in the share of different components of working capital took place. While the share of short-term loans and advances, trade receivables and other current assets in gross working capital stepped up from 34.51, 4.37 and 0 per cent in 1978-79 to 46.78, 17.79 and 0.33 per cent respectively in 1996-97, the share of cash & bank balance and inventories came down from 9.49 and 51.13 per cent in 1978-79 to 8.37 and 26.73 per cent respectively in 1996-97 during the pre-liberalisation period. Table-1 also reveals that the average contributions of current investment, inventories, trade receivables, short term loans & advances, cash & bank balance and other current assets were 16.36, 51.08, 12.60, 15.43, 5.20 and 10.52 per cent respectively towards gross working capital during the post-liberalisation period. During the post-liberalisation period a significant change in the share of different components of working capital was made. The share of inventories and other current assets increased from 37.29 and 0.04 per cent in 1997-98 to 48.79 and 14.31 per cent respectively in 2015-16, while the share of trade receivables, short-term loans & advances and cash & bank balances came down from 25.56, 27.87 and 8.88 per cent in 1997-98 to 7.71, 3.67

and 7.36 per cent respectively in 2015-16. The share of current investment reduced from 23.03 per cent in 2010-11 to 18.16 per cent in 2015-16 during the post-liberalisation period.

Table-2 shows that the average shares of inventories, trade receivables, short-term loans & advances, cash & bank balance and other current assets were 65.27, 5.43, 23.29, 5.05 and 0.95 per cent respectively towards gross working capital of HPCL during the pre-liberalisation period, whereas these were 47, 13.05, 19.23, 0.06 and 1.18 per cent respectively towards gross working capital during the post-liberalisation period. The average contribution of current investment was 19.49 per cent in gross working capital during the post-liberalisation period. It is noticed that the share of short-term loans & advances of HPCL increased from 26.63 per cent in 1978-79 to 53.99 per cent in 1996-97 during the pre-liberalisation period, while it decreased from 42.38 per cent in 1997-98 to 19.26 per cent in 2015-16 during the post-liberalisation period. The share of inventories and cash & bank balance in working capital came down from 63.24 and 5.13 per cent in 1978-79 to 36.07 and 2.21 per cent respectively in 1996-97, while the share of trade receivables stepped up from 5.13 per cent in 1978-79 to 7.74 per cent in 1996-97 during the

Table-2 : Components of Working Capital of HPCL in the Pre-liberalisation and Post-liberalisation Periods
(Percentage)

Pre-Lib. Period Particulars	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85	1985- 86	1986- 87	1987- 88	1988- 89	1989- 90	1990- 91	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventories	63.24	68.69	75.41	78.95	81.21	78.36	71.16	69.09	82.17	67.63	66.26	65.51	64.48	51.79	66.69	57.98	48.69	46.82	36.07	65.27
Trade Receivables	5.13	3.09	3.29	1.94	4.17	3.48	4.98	3.93	4.82	4.88	2.40	5.54	5.45	6.76	7.23	9.49	10.40	8.47	7.74	5.43
Short Term Loans & Advances	26.63	23.12	16.05	13.34	7.77	13.01	18.54	23.78	10.79	15.00	29.46	26.98	24.63	18.99	25.80	31.68	19.86	43.05	53.99	23.29
Cash & Bank Balance	5	5.1	5.25	5.77	6.83	5.10	5.24	3.10	2.07	12.32	1.68	1.70	5.12	6.54	0.21	0.48	20.60	1.65	2.21	5.05
Other Current Assets	0	0	0.00	0.00	0.01	0.05	0.09	0.10	0.15	0.16	0.19	0.26	0.32	15.91	0.06	0.37	0.45	0.00	0.00	0.95
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Post-Lib. Period Particulars	1997- 98	1998- 99	1999- 2000	2000- 01	2001- 02	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	13.55	7.85	6.18	12.89	19.49	18.17	13.02
Inventories	42.43	47.50	64.52	48.76	59.59	59.92	57.30	60.13	70.94	70.64	62.29	54.98	60.94	56.17	52.92	43.00	47.25	47.00	46.24	55.40
Trade Receivables	12.67	13.05	9.30	7.08	12.89	10.09	10.61	11.10	12.65	13.76	8.86	14.01	11.81	10.40	9.70	12.91	13.76	13.05	15.25	11.73
Short Term Loans & Advances	42.38	39.09	25.64	43.80	27.36	29.77	30.00	26.63	15.93	14.04	27.07	26.07	25.47	18.76	27.61	36.80	25.19	19.23	19.26	27.37
Cash & Bank Balance	2.00	0.08	0.48	0.36	0.14	0.22	2.09	2.13	0.39	0.76	1.52	3.80	1.18	0.27	0.62	0.38	0.09	0.06	0.07	0.88
Other Current Assets	0.52	0.28	0.07	0.00	0.01	0.00	0.00	0.00	0.10	0.81	0.26	1.13	0.60	0.85	1.31	0.73	0.83	1.18	1.01	0.51
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source : Compiled and computed from Public Enterprise Survey from 1978-79 to 2015-16.

pre-liberalisation period. During the post-liberalisation period the share of inventories, trade receivables and other current assets in gross working capital increased from 42.43, 12.67 and 0.52 per cent in 1997-98 to 46.24, 15.25 and 1.01 per cent respectively in 2015-16 whereas the share of cash & bank balance in gross working capital reduced from 2 per cent in 1997-98 to 0.07 per cent in 2015-16. The share of current investments in gross working capital stepped up from 13.55 per cent in 2010-11 to 18.17 per cent in 2015-16. It implies that HPCL made investment in marketable securities by its surplus cash balances. It indicates efficiency of managing cash of the company.

Table-3 depicts that in IOCL, the inventories, trade receivables, short-term loans & advances, cash & bank balance and other current assets contributed (average) 51.05, 14.07, 30.87, 2.39 and 1.63 per cent respectively towards gross working capital during the pre-liberalisation period, whereas these contributions were 52.57, 14.51, 25.94, 2.14 and 1.79 per cent respectively towards gross working capital during the post-liberalisation period. The average contribution of current investments was 9.69 per cent towards gross working capital during the post-liberalisation period. A noticeable change in the share of different components of working capital took place during both the pre-

liberalisation and post-liberalisation periods. The share of short term loans & advances increased from 23.56 per cent in 1978-79 to 57.03 per cent in 1996-97 and 34.50 per cent in 1997-98 to 34.87 per cent in 2015-16 during the pre-liberalisation and post-liberalisation periods respectively. Again, the share of inventories decreased from 50.01 per cent in 1978-79 to 26.51 per cent in 1996-97 during the pre-liberalisation period, whereas it increased from 39.68 per cent in 1997-98 to 42.85 per cent in 2015-16 during the post-liberalisation period. While the share of cash & bank balance in gross working capital stepped up from 2.50 per cent in 1978-79 to 2.99 per cent in 1996-97 during the pre-liberalisation period, the share of it was in the gross working capital came down from 3.94 per cent in 1997-98 to 0.57 per cent in 2015-16 during the post-liberalisation period. The share of other current assets in gross working capital increased from zero per cent in 1978-79 to 0.49 per cent in 1996-97 during the pre-liberalisation period and it stepped up again during the post-liberalisation period from 1.12 per cent in 1997-98 to 4.88 per cent in 2015-16. The share of trade receivables in gross working capital reduced in both the pre-liberalisation and post-liberalisation periods. It decreased from 23.93 per cent in 1978-79 to 12.98 per cent

Table-3 : Components of Working Capital of IOCL in the Pre-liberalisation and Post-liberalisation Periods
(Percentage)

Pre-Lib. Period Particulars	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85	1985- 86	1986- 87	1987- 88	1988- 89	1989- 90	1990- 91	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventories	50.01	47.66	57.78	63.38	61.02	68.78	71.02	75.99	71.72	64.04	57.92	38.82	37.62	25.31	23.89	41.43	48.34	38.69	26.51	51.05
Trade Receivables	23.93	18.21	11.93	21.94	17.90	13.68	15.18	8.42	11.28	12.04	11.72	10.97	8.72	12.38	11.56	12.53	14.57	17.34	12.98	14.07
Short Term Loans & Advances	23.56	32.03	27.59	13.41	19.90	16.73	9.35	12.85	14.24	20.04	20.38	46.63	48.66	49.59	60.62	41.86	32.26	39.77	57.03	30.87
Cash & Bank Balance	2.5	2.1	2.70	1.27	1.17	0.82	4.45	2.75	2.47	2.43	1.62	1.12	2.02	1.83	2.93	3.21	3.75	3.29	2.99	2.39
Other Current Assets	0	0	0	0	0	0	0	0.00	0.30	1.45	8.36	2.45	2.98	10.89	0.99	0.98	1.08	0.91	0.49	1.63
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Post-Lib. Period	1997- 98	1998- 99	1999- 20	2000- 01	2001- 02	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	Ave- rage
Particulars	98	99	20	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	15.37	11.30	10.63	5.41	7.58	7.85	9.69
Inventories	39.68	49.98	51.40	39.60	52.73	56.10	59.68	61.46	66.42	63.17	58.42	56.45	61.30	51.04	46.69	46.23	48.07	47.48	42.85	52.57
Trade Receivables	20.77	20.10	21.44	17.29	19.88	16.05	15.86	17.93	18.33	17.23	12.88	13.33	9.77	9.18	12.74	8.77	8.19	7.04	8.98	14.51
Short Term Loans & Advances	34.50	24.87	23.88	40.10	24.00	24.07	21.68	18.91	12.94	15.12	25.59	26.03	24.80	21.81	27.33	28.70	30.89	32.79	34.87	25.94
Cash & Bank Balance	3.94	4.46	3.23	3.00	3.38	3.79	2.79	1.41	2.04	2.37	1.56	1.79	2.21	1.34	0.25	0.39	1.94	0.12	0.57	2.14
Other Current Assets	1.12	0.59	0.06	0.00	0.01	0.00	0.00	0.30	0.28	2.11	1.55	2.40	1.92	1.27	1.69	5.27	5.49	5.00	4.88	1.79
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source : Compiled and computed from Public Enterprise Survey from 1978-79 to 2015-16.

in 1996-97 during the pre-liberalisation period and during the post-liberalisation period it came down from 20.77 per cent to 8.98 per cent in 2015-16. The share of current investments decreased from 15.37 per cent in 2010-11 to 7.85 per cent in 2015-16 during the post-liberalisation period.

In the case of ONGC the average contributions of inventories, trade receivables, short term loans & advances and other current assets were 24.52, 23.24, 41 and 7.35 per cent respectively towards gross working capital during the pre-liberalisation period, whereas these were 14.64, 17.58, 23.47 and 3.03 per cent respectively towards gross working capital during the post-liberalisation period. It is also observed from Table-4 that the average contribution of cash & bank balance was 3.89 per cent towards gross working capital during pre-liberalisation period, while it was 40.65 per cent towards gross working capital during the post-liberalisation period. The current investment contributed 2.02 per cent towards gross working capital during the post-liberalisation period. During both the pre-liberalisation and post-liberalisation periods a significant change in the share of different components of working capital took place. While the share of inventories in gross working capital came down from 51.79 per cent in 1978-79 to

22.12 per cent in 1996-97, the share of trade receivables, short-term loans and advances, cash & bank balance and other current assets in gross working capital increased from 25.26, 22.70, 0.26 and 0 per cent in 1978-79 to 44.87, 25, 1.82 and 6.19 per cent respectively in 1996-97 during the pre-liberalisation period. During the post-liberalisation period the share of inventories, trade receivables, short-term loans & advances and other current assets in gross working capital came down from 24.93, 17.38, 25.14 and 3.64 per cent in 1997-98 to 18.36, 17.26, 20 and 2.20 per cent respectively in 2015-16, whereas the cash & bank balances in gross working capital stepped up from 28.91 per cent in 1997-98 to 32.40 per cent in 2015-16. The proportion of current investments in gross working capital increased from 0.0002 per cent in 2010-11 to 9.78 per cent in 2015-16 during the post-liberalisation period. Another remarkable feature is that more than 40 per cent (average) of total investment in working capital was made for short-term loans & advances in the pre-liberalisation period and during the post-liberalisation period more than 40 per cent (average) of total investment in gross working capital was blocked up in cash & bank balance. It implies inefficiency regarding cash management of ONGC during the post-liberalisation period.

Table-4 : Components of Working Capital of ONGC in the Pre-liberalisation and Post-liberalisation Periods
(Percentage)

Pre-Lib. Period Particulars	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85	1985- 86	1986- 87	1987- 88	1988- 89	1989- 90	1990- 91	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventories	51.79	45.96	53.82	34.12	23.20	18.28	15.40	20.95	24.27	19.49	19.16	16.54	14.00	14.21	13.81	16.96	20.08	20.68	22.12	24.52
Trade Receivables	25.25	17.5	16.82	25.13	21.63	11.44	10.55	9.40	11.32	14.29	17.09	27.83	45.82	38.45	34.23	34.11	19.51	16.36	44.87	23.24
Short Term Loans & Advances	22.7	35.11	28.60	38.82	52.59	68.82	68.75	64.04	57.60	52.39	48.01	43.94	32.73	31.59	33.54	14.09	37.79	22.88	25.00	41.00
Cash & Bank Balance	0.26	0.25	0.30	1.70	0.97	0.36	0.25	0.80	1.98	0.01	2.10	3.39	0.32	3.63	2.89	5.07	15.75	32.00	1.82	3.89
Other Current Assets	0	0.19	0.46	0.23	1.61	1.10	5.05	4.82	4.82	13.82	13.64	8.29	7.13	12.12	15.54	29.78	6.86	8.09	6.19	7.35
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Post-Lib. Period Particulars	1997- 98	1998- 99	1999- 20	2000- 01	2001- 02	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	Ave- rage
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0002	2.33	0	0	0	9.78	2.02
Inventories	24.93	16.34	13.16	11.01	9.34	10.99	14.14	13.44	15.08	10.18	9.39	10.76	12.86	15.89	14.12	18.64	19.71	19.77	18.35	14.64
Trade Receivables	17.38	11.53	14.51	12.42	14.48	27.54	13.62	19.51	18.39	9.26	11.77	10.82	8.41	15.41	16.93	22.43	27.36	45.02	17.26	17.58
Short Term Loans & Advances	25.14	48.34	40.23	57.55	36.20	15.98	17.68	15.25	21.04	13.41	14.76	24.25	26.89	10.31	8.54	12.67	14.63	23.03	20.00	23.47
Cash & Bank Balance	28.91	19.71	28.23	14.71	35.67	42.75	51.38	49.52	43.75	64.71	60.49	50.59	50.11	55.86	55.01	43.20	36.19	9.15	32.40	40.65
Other Current Assets	3.64	4.08	3.87	4.32	4.30	2.73	3.19	2.28	1.74	2.44	3.58	3.59	1.74	2.53	3.07	3.07	2.11	3.03	2.20	3.03
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source : Compiled and computed from Public Enterprise Survey from 1978-79 to 2015-16.

Table-5 shows that the five components of working capital of GAIL i.e. inventories, trade receivables, short-term loans & advances, cash & bank balance and other current assets contributed (average) 15.18, 17.65, 42.33, 23.65 and 1.18 per cent respectively towards gross working capital during the pre-liberalisation period, whereas these contributions were 10.98, 17.96, 38.89, 30.89 and 1.25 per cent respectively towards gross working capital during the post-liberalisation period. The average contribution of current investment towards gross working capital was 0.09 per cent during the post-liberalisation period. The share of gross working capital of GAIL increased from 0 per cent in 1985-86 to 8.85 and 22.63 per cent respectively in 1996-97, while the share of short-term loans & advances, cash & bank balances and other current assets in gross working capital reduced from 77.72, 20.15 and 2.12 per cent in 1985-86 to 63.27, 4.57 and 0.68 per cent respectively in 1996-97 during the pre-liberalisation period. Few remarkable changes in the share of different components of working capital took place during the post-liberalisation period. While the share of inventories, trade receivables, cash & bank balances and other current assets in gross working capital increased from 9.64, 20.86, 16.36 and 1.30 per cent in 1997-98 to 16.22, 25.36, 16.68 and 11.14 per cent in 2015-16, whereas the

share of short-term loans & advances in gross working capital reduced from 51.83 per cent in 1997-98 to 30.48 per cent in 2015-16. Another significant feature is that during both the pre-liberalisation and post-liberalisation periods more than 38 per cent of total investment in working capital was made for short-term loans and advances, whereas only 17.65 and 17.96 per cent of total investment in gross working capital was blocked up in trade receivables during the pre-liberalisation and post-liberalisation period respectively.

Conclusion

The paper deals with the components of working capital in the selected gas and oil companies in India. The study stresses importance on component-wise analysis of working capital. It reveals that inventories contributed the highest percentage towards gross working capital in BPCL, HPCL and IOCL in both the pre-liberalisation and post-liberalisation periods. In the case of GAIL, of the six components of working capital, the short-term loans and advances contributed the highest percentage towards gross working capital in both the pre-liberalisation and post-liberalisation periods. The average contribution of short-term loans and advances in gross working was the highest in ONGC in the pre-liberalisation period, while in the post-liberalisation period cash & bank balances contributed the highest percentage towards gross working capital.

Table-5 : Components of Working Capital of GAIL in the Pre-liberalisation and Post-liberalisation Periods

		(Percentage)												Average						
Pre-Lib. Period Particulars	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85	1985- 86	1986- 87	1987- 88	1988- 89	1989- 90	1990- 91	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	
Current Investments	#	#	#	#	#	#	#	-	-	-	-	-	-	-	-	-	-	-	-	-
Inventories	#	#	#	#	#	#	#	0	0	24.37	32.88	41.49	32.96	16.94	5.83	5.36	5.56	6.92	8.85	15.18
Trade Receivables	#	#	#	#	#	#	#	0	0	11.25	15.31	17.48	26.57	37.05	28.79	17.34	12.52	22.87	22.63	17.65
Short Term Loans & Advances	#	#	#	#	#	#	#	77.72	15.12	10.46	29.12	35.46	32.21	33.48	47.61	68.36	48.09	47.09	63.27	42.33
Cash & Bank Balance	#	#	#	#	#	#	#	20.15	83.38	53.75	21.91	4.94	7.29	11.88	15.59	7.56	32.34	20.39	4.57	23.65
Other Current Assets	#	#	#	#	#	#	#	2.12	1.50	0.17	0.79	0.63	0.97	0.65	1.18	1.28	1.49	2.74	0.68	1.18
Total Current Assets	#	#	#	#	#	#	#	100	100	100	100	100	100	100	100	100	100	100	100	100
Post-Lib. Period Particulars	1997- 98	1998- 99	1999- 2000	2000- 01	2001- 02	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13	2013- 14	2014- 15	2015- 16	Average
Current Investments	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.00	0.43	0.00	0.00	0.12	0.09
Inventories	9.64	9.98	11.12	13.17	10.77	9.01	11.56	7.60	6.65	7.13	5.47	4.91	4.63	9.08	15.00	16.96	20.04	19.64	15.22	10.98
Trade Receivables	20.86	15.06	17.18	22.96	19.39	15.28	17.55	12.98	10.39	10.21	10.31	12.29	9.49	19.46	20.11	28.18	24.99	29.21	25.36	17.96
Short Term Loans & Advances	51.83	59.37	46.30	29.16	24.85	24.86	32.63	24.60	20.38	47.90	40.70	54.11	55.25	48.79	55.04	28.23	31.24	33.14	30.48	38.89
Cash & Bank Balance	16.36	15.54	25.28	34.32	44.71	50.53	38.18	54.39	62.02	34.35	42.97	28.24	30.57	22.63	9.84	26.04	23.56	10.77	15.68	30.89
Other Current Assets	1.30	0.05	0.12	0.39	0.30	0.32	0.08	0.43	0.55	0.41	0.55	0.45	0.06	0.04	0.01	0.16	0.16	7.23	11.14	1.25
Total Current Assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source : Computed and computed from Public Enterprise Survey from 1978-79 to 2015-16.
The Pre-liberalisation period in case of GAIL covers only twelve years as the company was formed in the year 1984-85.

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There is a growing realization that long-term business success can only be achieved by companies that recognize corporate social responsibility (CSR) as part of the process of wealth creation and as providing a competitive advantage. The conference aims at discussing CSR in the existing perspective and future outlook with focus on lighting up the challenges and the best practices in CSR.

Conference Objectives

- To discuss the existing practices and future prospects of Corporate Social Responsibility in a globalized economy.
- To highlight the 'Best Practices in CSR in the context of business sustainability.
- To discuss implementation models and structures that can be used in all sectors of industry.
- To explore ways of aligning CSR to the business agenda for sustainability.
- To create awareness of the latest thinking on CSR and governance issues as a driver of change, innovation and sustainable profit.

Discussion Themes at the conference (Yet not limited to...)

- Perspectives of CSR in the Global Economy
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- Evaluation, Monitoring and Documenting CSR practices
- Accounting for value: Measuring and managing social investment
- Social Auditing Integrating CSR with Business Policy
- Cascading the CSR strategy
- Creating impact and ensuring sustainability of community based programmes
- Partnership – Engaging Stakeholders
- Ethical issues in CSR
- Leading Sustainability Change
- Benchmarking CSR practices
- Turning CSR into Corporate Social Innovation (CSI)
- Case Studies on Best practices in CSR (Private and Public sector)
- Making CSR mandatory
- CSR: Sectoral perspective
- Empowering the next generation: Engaging youth in CSR
- Entrepreneurship opportunities within CSR Participation
- Best practices in CSR



Participation

The conference is a platform for intellectual deliberations related to the area of Corporate Social Responsibility is open to Business - Corporate and Small & Medium Enterprise (SMEs), Company Chairmen, Directors & Practicing Managers, NGOs, Consultants and Academicians, Research scholars & Management students and Government Policymakers.

Call for Papers: Submission guidelines

All submissions must be in MS Word form in around 3500 - 7000 words, text typed in Times New Roman in 12 font size with heading in 14 font size. It should be printed on A4 size white paper. Each paper should include Title page that should contain title of the paper, name(s), affiliation(s), complete mailing address, telephone and fax number, and e-mail ID. All papers should use Harvard style of referencing only.

Please visit website for detailed guidelines for authors. Only those papers that adhere to the author's guidelines will be considered for review. All papers are to be submitted by electronic mail to gcsrcongress@ipeindia.org

Conference Schedule:

The conference will be held in the City of Hyderabad, India at Institute of Public Enterprise. The program will be divided into technical sessions. Each session shall be chaired by an expert from academia/industry. Each author will be given 10 minutes to present which will be followed by discussion for about five minutes.

Conference Fee:

S. No.	Registration category	(Indian delegates) (INR)	(Foreign/NRI delegates) (USD)
1	Corporates	8000	400
2	Corporate consultants	4000	300
3	Academicians	3500	200
4	Research Scholars	2000	150
5	Students	1000	100

- 10% discount will be given in case of two or more delegates from the same organization.
- 20% discount will be given in case of five or more delegates from the same organization.

Registration fee will include admission to all technical sessions, conference kit, and conference proceedings in a CD, working lunch, tea and coffee.

Registration:

Filled nomination forms along with a demand draft drawn in favor of "Institute of Public Enterprise", payable at Hyderabad should be sent to Training Officer, Training Department, Institute of Public Enterprise, Osmania University campus, Hyderabad-500-007.

Spot registration is discouraged, and will be allowed only at an additional charge of Rs. 500 over and above the fee mentioned.

Important Dates:

- 1st December, 2017 : Last date for submission of full papers
10th December, 2017 : Confirmation of paper acceptance
20th December, 2017 : Last date for registration & submission of power point presentation
15th January, 2018 : Communication of final schedule
1st – 2nd February, 2018 : Conference



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Prof R K Mishra, who is a widely recognized expert in Public Enterprise Management is currently the Director of IPE. The Institute is governed by a body of eminent professionals, academics and administration with Mr. K. Madhava Rao, IAS (Retd), as the President.

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The Center for Corporate Social Responsibility (CCSR) was setup during 2011 to promote training, research, consultancy assignments and document case studies in thrust areas of Corporate Social Responsibility. The Center works on the existing body of knowledge, systems, structures, models and mechanisms associated with different CSR initiatives. The Center provides opportunities to discuss about the guidelines issued in the area of CSR and also deliberates upon the latest developments in the CSR field. The Institute is empanelled by TISS as center for training, research and consultancy.

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The NLCIL Chair on CSR was established at IPE through MoU between the two organizations, signed on 22nd Feb, 2014 at the new campus of IPE located in Shameerpet, Hyderabad. It is a progressive step by the two organizations towards its commitment to promote knowledge, experience and excellence in the area of CSR through research, training, workshop and work-association.

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