

# An Examine on Effect of Mergers and Acquisitions on the Viable overall Accomplishment of Indian Pharmaceutical Sector

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## Abstract

The study seeks to assess the effect of M&A over operational accomplishment over the Indian pharmaceutical zone during before and after amalgamation period. According to the review provided by Equity Master the Indian prescribed drugs market is the third highest by volume and thirteenth by value. The foreign trade of this sector to the United States will expand, as branded tablets well worth US\$55 billion will become off-change all through 2017-2019 and self-generated finance and venture capital investments in this industry have increased at a rate of 38 percent year after year during first six months of the year 2017 due to prominent business of the zone.

Present study covers duration 1994-2016 to analyze the facts, every form of quantitative tools that have been taken up for analyze. The analysis is completely set up on processes data compiled through Ministry of Statistics and Programme Implementation (MOSPI) and Center for Monetary Indian Economy (CMIE) data base. The detailed literature provided proposes that the after-merger duration depicts a basic positive upliftment to utter no or negative effect. But this research found that improved in many firms specifically, in pure efficiency change during after merger period in the form of viable accomplishment of acquiring firms. Further, research has proved efficiency, M&A activities to reduce cost by achieving scale economies.

**Keywords :** Merger, Acquisition, Productivity Growth, Efficiency

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## I. Introduction

Indian pharmaceutical industry includes each domestic and multinational agency; it can be properly categorized with the aid of turnover, foreign trade, structure and R&D skills. The New industrial policy 1991 became applicable for the pharmaceutical region, in 1994 through

amendment in the Drug coverage 1986, provided thru investment by multinationals. During January 2005, India modified the patent law confining to prescribed drug sector, in accordance with the WTO TRIPS settlement. As per the brand-new patent regulation, Indian pharmacists can no further produce and market

opposite-engineered pills patented by way of international pharmaceutical firms. This regulation compelled Indian corporations to modify their enterprise strategies and they pay attention at the generics market in Europe and the United States, finance more in revolutionary R&D and fix on contract manufacturing marketplace.

Viable strategies broaden by combining the activities of different firms lead to benefits of size and capacity. Advantages of size can be attained from generating combined production team and minimize the manufacturing expenses else provide companies with the opportunities to provide specific items within the business through creativity and information exchanges. Indian pharmaceutical industry has a greater competitive spirit has cross checked the item pricing consequently, performance benefits derived from massive range assist company can boom income scale in which flip may set off takeover funding.

## II. Previous Research Works

Studies by *Pradeep Agrawal et al, 2001; Rashmi Banga, 2004; S. Pattangak et al, 2006; Promod Mantravadi, 2008; Mainak Mazumder, 2009; Danzon, 2010; Vyas, 2012; Priya Bhalla, 2014; Neha Duggal, 2015 and Ketan et al, 2016* were found related to the impact of liberalization policy restructuring, effect of M&A on financial accomplishment in the Indian prescribed drug industry.

Another studies by *Ravi Sanker & Rao K.V, 1998; Jayakumar.S, 1999; Canagavally.R, 2000; Pawaskar, 2001; Ms.Surjit Kaur, 2002; Gopinath, 2007; Nayyar, 2007; Vanitha & Selvam, 2007 and Mantravedi & Reddy, 2007* have confirmed the conclusion of *Puri, 1981; Healy et al, 1992; Cantwell & Santangelo, 2002 and Fred et al, 2005* that market power, cost

cutting, access to market or technology, to attain a mixture of synergies and economies of scale are the reasons why firms agree for and adopt M&A as a growth strategy, and there exists prominent variation in accomplishments of acquirer companies on takeover. *Bradley et al, 1987; Berkovitch & Narayanan, 1993; Beena, 2004 & 2010; Gondhalekar & Bhagwat, 2005* have reported positive financial synergy effects in acquirer firms.

However, Studies by, *Megenheim & Muller, 1998; Jensen & Ruback, 1983, Muller, 1985; Dickerson et al, 1997 and Loughran & Vijn, 1977* have reported that, takeovers had adverse effect on the output generated by the acquirer industries also the motives of M&A fail in almost half of the total deals. *Houston et al, 2001 and Beitel et al, 2002* found that only target firms shareholders gain and the acquirers lose their value. Similar studies by *David C. Cheng 1989 and Huszifa Husain, 2000* have reported the negative impact of takeovers on the acquirer's performance. Further, if acquisitions are used as a medium to avoid competition, it proves to be detrimental to the nation. On the contrary, studies by *Gugler et al, 2003 and Babali & Parray, 2011* identified that demonstrate insignificant changes in the after takeover period operational accomplishment of acquirer firms.

Hence it is clear that the different researches taken up provide contradictory output regarding M&A also inferences drawn were also inconclusive. Hence, there is a need to re-examine takeover strategies its economic effect over growth and operational accomplishment.

## III. Statement of Problem

In the present globalized era, the concept of amalgamation and takeover has been taking up the countries as a technique for growing faster

also increases the profitability of the firm and reduces risk and uncertainties. In general, theoretical perception for the important motives of M&A are; to attain economies of scale, Reduction in transportation and distribution costs, Saving of costs, Duplicate R&D tasks, reasonable inputs due to the raised range of purchase, and Pecuniary gains.

Thus, the existing studies reported mixed effect of M&A on economic accomplishment of the companies such as profitability, liquidity, asset value and no physical parameters like productivity, growth, Technical efficiencies, etc. were taken into consideration. These raise an important question; has the wave of M&A in the later reform era helped Indian firms in improving their performance. This leads to certain problems in the area of M&A's that needs to be addressed.

In this perspective, the proposed study makes an attempt to evaluate the effect of M&A on physical parameters of pharmaceutical sector in India.

#### IV. Objectives of the Study

1. Examine impact of M&A in terms of operational synergy.
2. Analyze, suggest measures for policy formulations.

#### V. Hypothesis Related to Operational Performance

H01: M&A would have a significant improvement in Technical Efficiency.

H02: M&A would have a significant improvement in Allocative Efficiency.

H03: M&A would have a significant improvement in Pure Efficiency.

H04: M&A would have a significant improvement in Scale Efficiency.

H05: M&A would have a significant improvement in complete input processing rate.

## VI. Methodology

### 6.1 Scope

Pharmaceutical industry in India has been chosen for the proposed study period, the study a total time span of 23 years covers during pre (1994-95 to 2003-04) and post (2004-05 to 2015-16) merger periods.

### 6.2. Sample selection

The study takes a look at takes under consideration the M&A in Indian Pharma sector all through 1994 to 2016. For the reason of the look at, the year 2005 has been taken as a bench mark, because it has the highest of ninety five firms underwent M&A interest in that 12 months. It is clear that, Competition Policy Act 2002 has been enacted in January 2003, to launch a CCI. Arrangement of cartels, collusive bids and collection through M&A that find out the market abuses; these are the activities properly carried out by the Commission and the whole period is divided into phases as pre-merger length (1994-95 to 2003-04) and post-merger duration (2004-05 to 2015-sixteen) .

However, based on the availability of data for 23 years as sample size of the study, thus finally 21 firms were selected.

### 6.3. Data Source

Secondary sources were used for the data collection purpose and it is compiled from MOSPI and PROWESS database. PROWESS is interlinked with the CMIE database and it contains information of 654 pharmaceutical firms, which includes in the organized sector. However, only firms for which have information about sales, capital stock, foreign ownership and compensation to employees are included for the analysis.

### 6.4. Estimation of TEC, SEC, AEC and TFPG:

To analyze the decomposition of productivity growth into four components of TEC, SEC,

AEC, TFPG and the whole analysis we will consider Model 1.5 of the stochastic frontier production function.

A stochastic frontier production function is defined by

$$y_{it} = f(x_{it}, t) \exp(-u_{it}),$$

Where  $y_{it}$  is the output of the  $i$ th firm ( $i = 1, N$ ) inside the  $t$ th term ( $t = 1, \dots, T$ ),  $f(\cdot)$  is the manufacturing frontier,  $x$  is an enter vector,  $t$  is a time fashi

on index that serves as a proxy for technical exchange and  $u \geq 0$  is the output-oriented technical in efficiency. Note that technical inefficiency in (1) varies over the years.

Totally differentiating the logarithm of  $y$  in (1) with appreciate to time, the trade in manufacturing may be represented as

$$\dot{y} = TP + \sum_j \varepsilon_j \dot{x}_j - (du/dt), \quad (2)$$

where  $\varepsilon_j = \partial \ln f / \partial \ln x_j$  is The output elasticity of issue input  $j$ , and a dot over a variable indicates its price of alternate. The common productiveness alternate is affected no longer most potent through TFPG and changes in enter use, but also by means of the change in technical inefficiency. By substituting (2) into

TFP growth,  $\dot{TFP} = \dot{y} - \sum_j S_j \dot{x}_j$ , where  $S_j$  is input  $j$ 's share in production costs,  $\dot{TFP}$  is rewritten as

$$\dot{TFP} = TP - (du/dt) + (RTS - 1) \sum_j \lambda_j \dot{x}_j + \sum_j (\lambda_j - S_j) \dot{x}_j, \quad (3)$$

Where  $RTS$  ( $= \sum_j \varepsilon_j$ ) denotes the measurement of returns to scale, and  $\lambda_j = f_j x_j / \sum_l f_l x_l = \varepsilon_j / \sum_l \varepsilon_l = \varepsilon_j / RTS$ . The last component in (3) measures inefficiency in resource allocation resulting from the deviations of input prices from the value of their marginal product. Thus, in equation (3), TFP growth can be decomposed into TP, the technical efficiency change ( $-du/dt$ ), scale components ( $(RTS - 1) \sum_j \lambda_j \dot{x}_j$ ) and the allocative efficiency change ( $\sum_j (\lambda_j - S_j) \dot{x}_j$ ).

If technical inefficiency does no longer exist or is time-invariant, the above decomposition implies that technical inefficiency does not affect TFP broaden, which it does within the Solow residual approach. If generation reveals steady returns to scale, the TFP increase process in (three) is the same as the one derived in Nishimizu and web page (1982). Bauer (1990) and Kumbhakaret al., (2000) in a similar fashion decomposed TFP into the 4 add-ons of equation (3), and the derivation on this phase attracts on Kumbhakaret al., (2000) and Kim and Han (2001).

## 6.5.Functional Form

The additives of productivity exchange may be predicted inside a stochastic manufacturing

frontier framework, and the time-various manufacturing frontier, in the beginning proposed by **Aigner et al., (1977)** in translog form as

$$\ln y_{it} = \alpha_0 + \sum_j \alpha_j \ln x_{jit} + \alpha_T t + 0.5 \sum_j \sum_l \beta_{jl} \ln x_{lit} \ln x_{jit} + 0.5 \beta_{TT} t^2 + \sum_j \beta_{Tj} t \ln x_{jit} + v_{it} - u_{it}, \quad j, l = L, K, \quad (4)$$

Where  $y_{it}$  is the found output,  $t$  is the time variable and the  $x$  variables are inputs. Subscripts  $j$  and  $l$  indicate inputs ( $j, l = L, K$ ). The performance errors,  $u$ , represents manufacturing loss due to corporation-precise technical inefficiency; as a consequence, it's miles continually extra than or identical to zero ( $u \geq 0$ ), And it's miles assumed to be independent of the statistical mistakes,  $v$ , which is thought to be independently and identically distributed as  $N(0, \sigma_v^2)$ .

Following **Battese and Coelli (1992)** and **Greene (1997)**, technical inefficiency is assumed to be defined by

$$u_{it} = u_i \eta_{it} = u_i \exp(-\eta[t - T]),$$

Where the distribution of  $u$  is taken to be the non-terrible truncation of the ordinary distribution,  $N(\mu, \sigma_u^2)$ , And  $\eta$  is a parameter that represents the price of exchange in technical inefficiency. A high quality price ( $\eta > 0$ ) is associated with the improvement of the technical efficiency established by way of a organization over the years.

The maximum-likelihood estimates for the parameters of the stochastic frontier version, defined by (four) and (5), may be obtained through the usage of the programme FRONTIER four.1, in which the variance parameters are expressed in phrases of  $\gamma = \sigma_u^2 / \sigma_s^2$  and  $\sigma_s^2 = \sigma_u^2 + \sigma_v^2$  (see **Coelli, 1996**).

The technical efficiency stage of agency  $i$  at time  $t$  ( ) is defined as the ratio between the actual output and the potential output:  $TE_{it} = \exp(-u_{it})$ . (6)

The elasticity of output with respect to the  $j^{th}$  factor (input) is defined by

$$\varepsilon_j = \partial \ln f(x, t) / \partial \ln x_j = \alpha_j + \sum_{l \neq j} \beta_{jl} \ln x_l + \beta_{jj} \ln x_j + \beta_{Tj} t, \quad j, l = L, K. \quad (7)$$

The elasticity of scale (= RTS) is defined as  $RTS = \sum_j \varepsilon_j$  ; RTS decreases,

remains constant and increases if  $RTS < 1$ ,  $RTS = 1$  and  $RTS > 1$ , respectively.

The rate of technical factor productivity growth (TFPG) is defined by

$$TFPG = \partial \ln f(x,t) / \partial t = \alpha_T + \beta_{TT}t + \sum_j \beta_{Tj} \ln x_j, \quad j = L, K. \quad (8)$$

In the estimation of equations (7) and (eight), output elasticity and TFPG are features of input stages and are expected at the pattern means of input stages.

## VII. Results and Discussions

The performance of technical effectively exchange for the period of pre and put up-merger period, 9 out of 21 companies used to be expanded in post-merger period compared to pre-merger interval. But 12 out of 21 firms recorded less than unity and the overall firms recorded constant in both period implies that the severity of technical inefficiency due to the input/output configuration as well as the size of operations. Allocative efficiency is achieved at the point where the factor prices are equal to their marginal products. It is evident that most of the firms (10 out of 21) were improved in post-merger period.

The pure efficiency change reflects the managerial performance to organize the inputs in the production process. However, majority of the firms was improved and it is to be noted that the magnitude was positive in all firms reinforcing the positive impact of mergers and acquisition as the technology of the Indian

pharmaceutical industry. Scale efficiency change during post-merger period scored constant in both periods indicates that scale efficiency of the firms to choose the optimum size of resources and it is evident that M&A strategy has not altered the scale economies significantly.

Total factor productivity change measures the efficiency of all inputs to a production process; in this case majority of firms (14 out of 21) was improved during post-merger performance and the end of the pre-merger period negative TFPG further continued in the post-merger period upto 2010-11, also in 2012-13. These swings in total factor productivity growth suggest that the impact of Competition Commission Act 2002 in Indian pharmaceutical industry. But the positive productivity during 2013-16 is an indication of positive effects of mergers and acquisitions.

The results however, contrast with the findings of **BeenaSaraswathy2015**, who suggested that Decline in technical effectively after getting into M&A due to creation probability frontier that's no expansion in construction after merger and in addition profitability ratio decline for majority of the years because of the acquisition of loss making or much less effective firms.



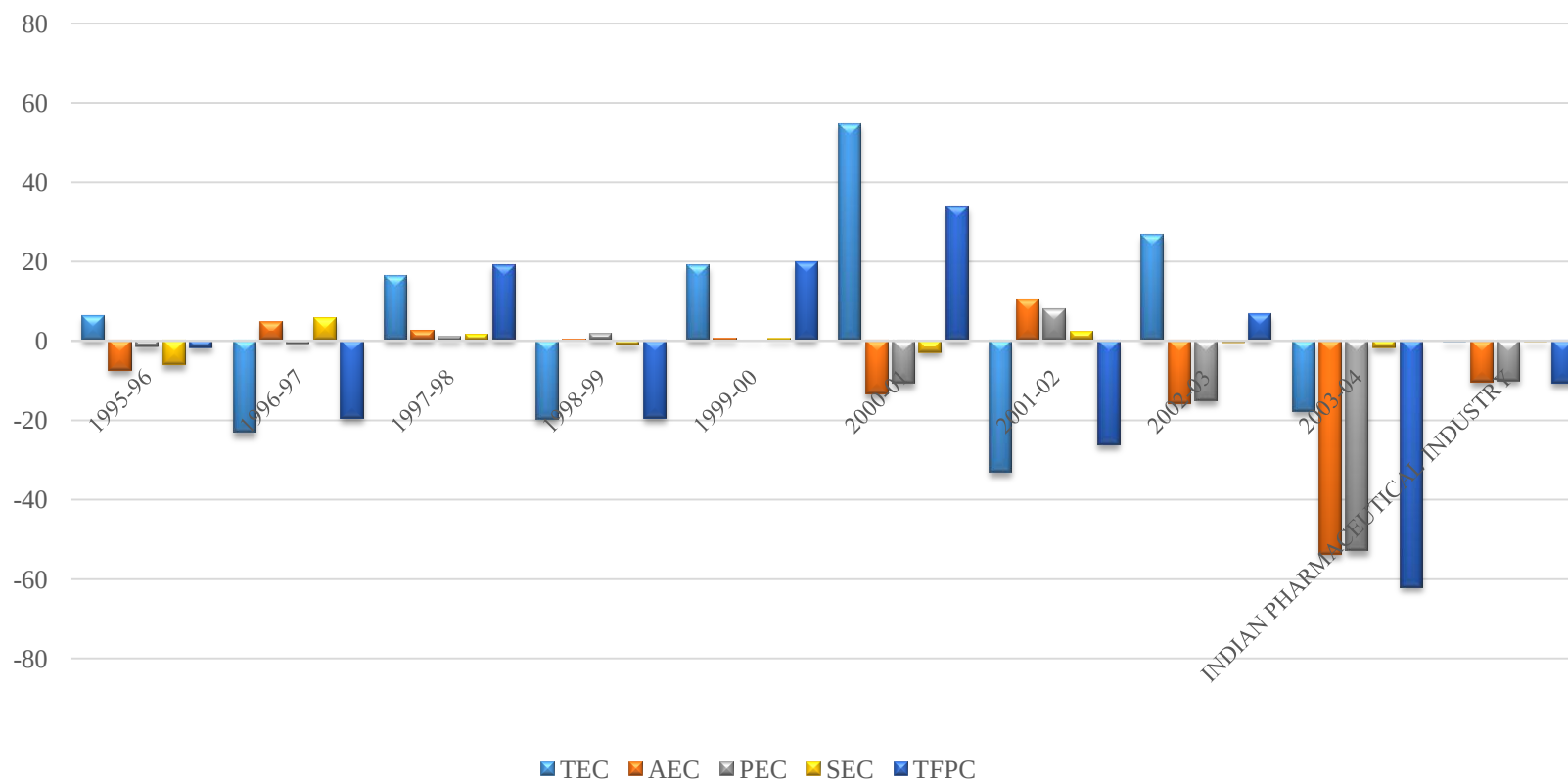
**Table 1.Operational Performance during Pre and Post-Merger Period**

(In percent)

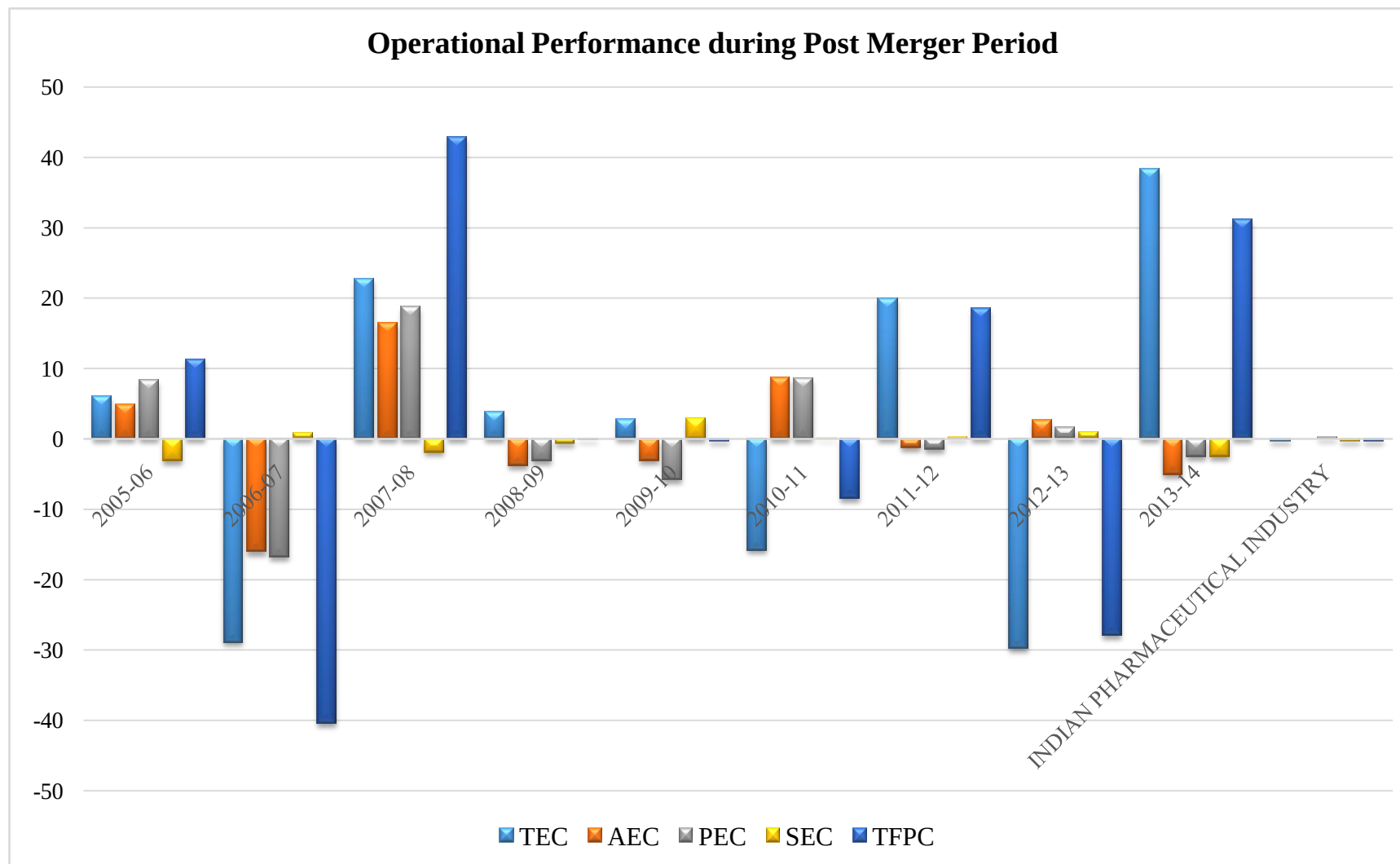
| Acquirer firms                        | TEC          |              |             | AEC           |              |              | PEC           |             |              | SEC          |              |             | TFPC          |              |              |
|---------------------------------------|--------------|--------------|-------------|---------------|--------------|--------------|---------------|-------------|--------------|--------------|--------------|-------------|---------------|--------------|--------------|
|                                       | I            | II           | Δ           | I             | II           | Δ            | I             | II          | Δ            | I            | II           | Δ           | I             | II           | Δ            |
| Alembic Ltd.                          | -1.21        | -4.06        | -2.85       | 1.49          | -4.58        | -6.08        | 0.74          | -2.58       | -3.32        | 0.73         | -2.10        | -2.83       | 0.28          | -8.46        | -8.75        |
| Aurobindo Pharma Ltd.                 | -3.46        | -5.63        | -2.17       | 1.23          | 0.49         | -0.73        | 0.75          | 0.64        | -0.11        | 0.47         | -0.15        | -0.62       | -2.28         | -5.16        | -2.88        |
| Cipla Ltd.                            | 0.73         | -4.36        | -5.09       | -12.27        | 0.35         | 12.63        | -11.09        | 0.35        | 11.44        | -1.31        | 0.01         | 1.32        | -11.61        | -4.02        | 7.59         |
| Glaxosmithkline Pharmaceuticals Ltd.  | -1.08        | -1.70        | -0.62       | -7.39         | 0.41         | 7.80         | -8.41         | 0.48        | 8.89         | 1.11         | -0.05        | -1.16       | -8.38         | -1.30        | 7.09         |
| Granules India Ltd.                   | 1.83         | -0.54        | -2.36       | -25.67        | 1.08         | 26.75        | -25.88        | 0.96        | 26.84        | 0.32         | 0.11         | -0.21       | -24.28        | 0.52         | 24.80        |
| Hindustan Antibiotics Ltd.            | 0.27         | -0.60        | -0.88       | -18.77        | 1.82         | 20.59        | -18.62        | 1.78        | 20.40        | -0.16        | 0.03         | 0.20        | -18.58        | 1.21         | 19.79        |
| Indoco Remedies Ltd.                  | 0.16         | -2.08        | -2.23       | -23.11        | 2.96         | 26.07        | -23.19        | 2.88        | 26.07        | 0.10         | 0.08         | -0.02       | -22.96        | 0.83         | 23.79        |
| Intas Pharmaceuticals Ltd.            | -1.34        | -3.32        | -1.97       | -15.56        | -0.01        | 15.55        | -15.70        | 0.00        | 15.70        | 0.20         | 0.01         | -0.18       | -16.65        | -3.32        | 13.32        |
| Jubilant Life Sciences Ltd.           | -0.47        | -2.72        | -2.25       | -11.25        | 6.51         | 17.76        | -11.04        | 6.15        | 17.19        | -0.23        | 0.34         | 0.57        | -11.67        | 3.59         | 15.26        |
| Kopran Ltd.                           | -1.24        | -0.16        | 1.09        | -7.06         | 6.73         | 13.79        | -7.03         | 6.40        | 13.43        | -0.05        | 0.32         | 0.36        | -8.20         | 6.56         | 14.76        |
| Merck Ltd.                            | -3.38        | 0.02         | 3.40        | -7.68         | 1.13         | 8.81         | -7.18         | 1.13        | 8.31         | -0.56        | 0.01         | 0.57        | -10.77        | 1.12         | 11.89        |
| Mylan Laboratories Ltd.               | -2.77        | -3.53        | -0.76       | -5.60         | -1.89        | 3.71         | 0.00          | -1.15       | -1.15        | -5.59        | -0.75        | 4.84        | -8.25         | -5.36        | 2.88         |
| Natural Capsules Ltd.                 | -0.01        | -3.38        | -3.37       | -5.67         | -1.75        | 3.92         | -5.51         | -1.22       | 4.30         | -0.18        | -0.55        | -0.38       | -5.69         | -5.07        | 0.63         |
| Pfizer Ltd.                           | 1.43         | 1.65         | 0.22        | -14.94        | -1.53        | 13.41        | -14.65        | -0.92       | 13.73        | -0.32        | -0.58        | -0.26       | -13.71        | 0.12         | 13.83        |
| Piramal Enterprises Ltd.              | 2.64         | 1.27         | -1.37       | -6.48         | -1.27        | 5.21         | -6.00         | -0.68       | 5.32         | -0.50        | -0.59        | -0.09       | -3.96         | 0.00         | 3.96         |
| Sun Pharmaceutical Inds. Ltd.         | -0.07        | 3.42         | 3.49        | -31.45        | -2.19        | 29.25        | -30.90        | -1.69       | 29.21        | -0.71        | -0.50        | 0.21        | -31.32        | 1.13         | 32.45        |
| Suven Life Sciences Ltd.              | 0.42         | 3.63         | 3.20        | -9.05         | -0.03        | 9.02         | -8.68         | -0.16       | 8.52         | -0.42        | 0.13         | 0.54        | -8.68         | 3.58         | 12.26        |
| Themis Medicare Ltd.                  | 0.53         | 1.75         | 1.21        | -7.84         | -0.64        | 7.21         | -7.41         | -0.47       | 6.93         | -0.52        | -0.18        | 0.33        | -7.36         | 1.12         | 8.49         |
| Wanbury Ltd.                          | -0.59        | 2.64         | 3.23        | 0.00          | 0.49         | 0.48         | 0.00          | 0.16        | 0.16         | 0.00         | 0.34         | 0.34        | -0.58         | 3.12         | 3.70         |
| Wockhardt Ltd.                        | 0.39         | 6.17         | 5.78        | -1.37         | -3.96        | -2.59        | -1.31         | -2.20       | -0.89        | -0.06        | -1.82        | -1.75       | -0.96         | 1.97         | 2.93         |
| Wyeth Ltd.                            | -0.23        | 4.87         | 5.09        | -1.08         | -4.01        | -2.93        | -1.09         | -2.24       | -1.15        | 0.01         | -1.81        | -1.83       | -1.29         | 0.67         | 1.96         |
| <b>Indian Pharmaceutical Industry</b> | <b>-0.37</b> | <b>-0.37</b> | <b>0.00</b> | <b>-10.43</b> | <b>-0.04</b> | <b>10.39</b> | <b>-10.09</b> | <b>0.34</b> | <b>10.43</b> | <b>-0.37</b> | <b>-0.37</b> | <b>0.00</b> | <b>-10.74</b> | <b>-0.41</b> | <b>10.33</b> |

Source: Author's Calculation based on CMIE Database.

## Operational Performance during Pre Merger Period







## VIII. Conclusion

This paper has been analyzed the effect of M&A on selected Indian pharma firms and its operational performance during pre and post-merger period. If the numerical value of the efficiency change parameter is positive to positive and negative to positive the returns to scale improves and negative to negative and positive to negative, the returns to scale suffers implying inefficiency in scale economies.

The analysis indicates the strategy of M&A on pre and post-merger period in technical efficiency change scored similar negative value of 0.37 percent depicts the constant returns-to-scale (CRS). This technical inefficiency continue to persist even after M&A cannot be considered as a causative factor.

Allocative efficiency change during the post-merger period was scored negative of 0.04 percent compared from pre-merger period negative value of 10.43 percent. This allocative efficiency change confirms that M&A strategy has substantially augmented in this industry.

The results showed the pure efficiency change of selected acquired firms during the post-merger period scored positive of 0.34 percent compared from pre-merger period negative value of 10.39 percent coupled with increasing returns-to-scale (IRS). It is evident that M&A has had positive impact on the pure efficiency change to capture managerial performance.

The measure of scale efficiency change during pre and post-merger period also similar result from TEC of negative value of 0.37 percent implies that the selected

acquired firms was too large to take full advantage of scale and has optimum sale size.

The mean value of total factor productivity growth was improved considerably during the post-merger period negative value of 0.41 percent compared from the pre-merger negative value 10.74 percent. It is witnessed the effect of M&A among the selected Indian pharmaceutical industry.

A wide literature overview suggests that in submit-merger interval starting from quite constructive improvement to tremendously terrible or no improvement. But this research found that improved in many firms specifically, in pure efficiency change during post-merger period operating performance of acquiring firms. Further, the study proved efficiency, M&A activities to reduce cost by achieving scale economies.

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