

# IS MERGERS AND ACQUISITIONS OF INDIAN INDUSTRY GROWING POSITIVELY IMPACT DURING 1995 TO 2018?

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## ***Abstract***

*The study seeks to investigate the impact of mergers and acquisitions (M&A's) on operational performance on Indian industry during pre and post-merger period. In general, the aim of M&A's is to attain economies of scale on the one hand, and increase market share on the other. In India, most of the studies were found on banking and finance and their focus were on the changes in profitability after M&A's and very few studies were found examining any one or two of the performance indicators. In this perspective, the study makes an attempt to examine the mergers and acquisitions on physical parameters of Indian industries specifically pharmaceutical industry.*

***Keywords:*** *mergers and acquisitions, Indian industry, M&A's*

## **I. Introduction**

“Corporate restructuring” has become a common strategy of almost all the business units all over the globe. These kind of restructuring strategies are classified into three different groups viz; merging, acquiring and conglomeration. Among these strategies, merging and acquiring (M&A'S) is one of the most adopted restructuring strategies by business units. A merger takes place when two entities decide to combine into a single entity, and an acquisition involves one company essentially taking over another company's share partially or completely. Each category has their unique difference in their operations and motives. In general, these merging activities are now termed as a kind of acquisition in the current business world. However, in the introduction of deregulatory policy in India has showed tremendous growth in the M&A'S deal which has been improving in all sectors' of the economy.

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### **Identified Research Gaps**

From the existing literature, the following research gaps were identified.

1. Most of the studies on M&A'S were on banking and finance companies and their focus was on the changes in profitability after M&A's.
2. Except some studies there was no studies on the impact of M&A's on growth and structural break in Indian context.
3. Similarly, there was no studies on the impact of M&A's on the production efficiency of acquirer firms in Indian context, and this study pertains to Indian manufacturing industries; and
4. As far as the impact of M&A's on the operational performance is concerned, very few studies were found examining any one or two of the performance indicators.

### **Statement of the Problem**

The research study by BeenaSaraswathy 2015 found that, domestic firms have experienced both technological progress and efficiency growth in post-merger period. Studies by Pradeep Agrawal and P. Saibaba, 2001; S. Pattangak and S.M .Thagarelm, 2006 have conformed the conclusions of Grima et al, 1999; Rashmi Banga, 2004; Beena, 2001and Beena.S, 2006, the domestic firms were more efficient than the foreign owned firms after merger. Similar study by Higgins and Rodriguez, 2006 concluded positively that, the abnormal returns after M&A's is highly correlated with their degree of information regarding the target prior to the acquisitions.

Another study by MainakMazumder and Meenakshi Rajeev, 2009; Vyas et al, 2012; PriyaBhalla, 2014 and Neha Duggal, 2015 have identified that most large firms were efficient and experienced technological innovation after M&A's. Similar studies by Nilesh Zacharias &Snadeep Farias, 2007 and Patricia M. Danzon, et al, 2010 have found that merged small firms experienced slower R&D and growth than firms that did not merge.

On the contrary, studies by PromodMantravadi&Vidyadhar Reddy, 2008; Raymond. R. Drawinata et al, 2012 and Ketan et al, 2016 have identified a marginal negative impact on operating performance of acquired firms after M&A'S. Relevant studies by Manikandan, 2004; BabliDhiman and Bilal A. Parray, 2011; Marc Kirchhoff and Dirk Schiereck, 2011 found that, there is no significant difference between foreign and domestic companies in Profitability, Cost efficiency, financial performance after M&A'S. Dr. Pratap Singh, 2010 concluded that, M&A'S had a decreasing trend from the year 2000 to 2008 due to the global crisis.

Thus the literature have reported mixed results of M&A's such as asset value, profitability and liquidity of financial parameters and not using the parameters of physical like technical efficiency, productivity growth and so on had been taken into the analysis. In this viewpoint, the proposed study makes an attempt to survey the mergers and acquisitions on physical parameters of Indian industries specifically pharma industry.

### **Hypothesis framed:**

Based on the pre-defined objectives, the following hypotheses are framed;

- ❖  $H_{01}$ : M&A's will have been improving in Technical Efficiency.
- ❖  $H_{02}$ : M&A's will have been increasing in Allocative Efficiency.
- ❖  $H_{03}$ : M&A's will have been growing in Scale Efficiency

## II. Methodology

### Scope

The study chosen the life span of 24 years covers during pre (1994-95 to 2003-04) and post (2004-05 to 2017-18) merger periods.

### Sample Selection and Data Source

For the determination of the study, the year 2005 has taken as a bench mark, since it has 95 firms underwent M&A's activity in that year which was adopted the methodology of Beena Saraswathy 2015. However, only firms for which there is information about productivity, sales, capital stock to employees are included for 24 years has considered as sample size of the study, thus finally 21 firms were selected for the study. The study has completely based on secondary data collected from Ministry of Statistics and Programme Implementation (MOSPI) and CIME-PROWESS database.

### Test of stationary: Unit root/Co-integration test

**Table 1 Pre-Merger Period 1995-2004**

Acquirer firms	UT(-1) ( $\tau$ )	D(UT(-1)) ( $\tau$ )	Critical Value (1%)	Results
Alembic Ltd.	-5.21	-	-3.83	Stationary
Aurobindo Pharma Ltd.	-5.23	-	-4.01	Stationary
Cipla Ltd.	-5.41	-	-3.83	Stationary
Glaxosmithkline Pharmaceuticals Ltd.	-5.25	-	-3.87	Stationary
Granules India Ltd.	-5.57	-	-3.87	Stationary
Hindustan Antibiotics Ltd.	-5.26	-	-3.83	Stationary
Indoco Remedies Ltd.	-5.61	-	-3.83	Stationary

<b>Acquirer firms</b>	<b>UT(-1) (<math>\tau</math>)</b>	<b>D(UT(-1)) (<math>\tau</math>)</b>	<b>Critical Value (1%)</b>	<b>Results</b>
Intas Pharmaceuticals Ltd.	-5.42	-	-3.87	Stationary
Jubilant Life Sciences Ltd.	-5.11	-	-3.83	Stationary
Kopran Ltd.	-	-4.35	-4.02	Stationary
Merck Ltd.	-5.01	-	--3.83	Stationary
Mylan Laboratories Ltd.	-5.14	-	-3.83	Stationary
Natural Capsules Ltd.	-5.53	-	-4.01	Stationary
Pfizer Ltd.	-5.92	-	-3.83	Stationary
Piramal Enterprises Ltd.	-6.02	-	-3.83	Stationary
Sun Pharmaceutical Inds. Ltd.	-5.23	-	-3.87	Stationary
Suven Life Sciences Ltd.	-	-4.56	-3.85	Stationary
Themis Medicare Ltd.	-5.66	-	-3.83	Stationary
Wanbury Ltd.	-	-4.85	-3.83	Stationary
Wockhardt Ltd.	-5.43	-	-3.83	Stationary
Wyeth Ltd.	-	-4.38	-4.07	Stationary
<b>Indian Pharmaceutical Industry</b>	<b>-5.14</b>	<b>-</b>	<b>-3.89</b>	<b>Stationary</b>

**Table 2 post merger period 2005-2018**

<b>Acquirer firms</b>	<b>UT(-1) (<math>\tau</math>)</b>	<b>D(UT(-1)) (<math>\tau</math>)</b>	<b>Critical Value (1%)</b>	<b>Results</b>
Aurobindo Pharma Ltd.	-5.45	-	-4.62	Stationary

<b>Acquirer firms</b>	<b>UT(-1) (<math>\tau</math>)</b>	<b>D(UT(-1)) (<math>\tau</math>)</b>	<b>Critical Value (1%)</b>	<b>Results</b>
Cipla Ltd.	-5.68	-	-4.60	Stationary
Glaxosmithkline Pharmaceuticals Ltd.	-5.63	-	-4.62	Stationary
Granules India Ltd.	-5.61	-	-4.62	Stationary
Hindustan Antibiotics Ltd.	-	-5.21	-4.53	Stationary
Indoco Remedies Ltd.	-5.43	-	-4.62	Stationary
Intas Pharmaceuticals Ltd.	-5.72	-	-4.62	Stationary
Jubilant Life Sciences Ltd.	-5.64	-	-4.62	Stationary
Kopran Ltd.	-5.48	-	-4.62	Stationary
Merck Ltd.	-5.91	-	-4.62	Stationary
Mylan Laboratories Ltd.	-5.23	-	-4.71	Stationary
Natural Capsules Ltd.	-	-5.08	-4.59	Stationary
Pfizer Ltd.	-4.87	-	-4.62	Stationary
Piramal Enterprises Ltd.	-	-5.21	-4.59	Stationary
Sun Pharmaceutical Inds. Ltd.	-5.69	-	-4.60	Stationary
Suven Life Sciences Ltd.	-	-5.21	-4.63	Stationary
Themis Medicare Ltd.	-5.68	-	-4.62	Stationary
Wanbury Ltd.	-5.61	-	-4.62	Stationary
Wockhardt Ltd.	-5.43	-	-4.59	Stationary
Wyeth Ltd.	-5.82	-	-4.62	Stationary

<b>Acquirer firms</b>	<b>UT(-1) (<math>\tau</math>)</b>	<b>D(UT(-1)) (<math>\tau</math>)</b>	<b>Critical Value (1%)</b>	<b>Results</b>
<b>Indian Pharmaceutical Industry</b>	<b>-5.48</b>	<b>-</b>	<b>-4.61</b>	<b>Stationary</b>

From the results it is clear that, majority of the firms residual is stationary at level. Hence the data set has been used as it is, and the regression results are not spurious even though the individual variable is not stationary at level.

### **III. RESULTS AND DISCUSSION**

#### **Technical Efficiency Change during Pre-Merger Period (1995 -2004)**

Table 3 presents the estimates of technical efficiency change (TEC) during Pre-M&A'S from 1995-2004. Across the acquirer firms, only 9 out of 21 firms' records positively, specifically Priamal Enterprises Ltd recorded 2.64 percent, followed by Granules India Ltd recorded 1.83 Percent and 12 out of 21 firms deteriorates during the reference period. Though the magnitude of down turn in technical efficiency change varied across the firms, the range between maximum and minimum was small, suggesting a uniform down turn in the TEC of all the respondent firms.

The overall technical efficiency change during the reference period was also recorded negative of 0.37 percent and this trend coupled with decreasing returns-to-scale (DRS). Since these firms have opted for M&A route, the subsequent analysis alone will throw light on the motive for M&A'S, and whether M&A strategy has helped these firms to reverse the down turn in Technical Efficiency.

#### **Technical Efficiency Change during Post-Merger Period (2005-2018)**

The post-merger scenario of technical efficiency was scored negative value of 0.37 percent. However, technical efficiency change which was scored negative of 28.94 percent in 2006-07 and increased the post-merger period and reached negative of 29.83 percent in 2012-13. On the contrary, this trend reverted in the acquirer firms, Wockhard Ltd scored positive of 6.17 percent followed by Wyeth Ltd scored 4.87 percent and this scenario implies that there is no stability in the intra-firm allocative efficiencies also. Though some of the firms achieved positive scores in some years they could not sustain it for a considerable period.

**Table 3- Technical Change during Pre-Merger Period (1994-95 to 2003-04)**

(In percent)

<b>Acquirer firms</b>	<b>1994-95</b>	<b>1995-96</b>	<b>1997-98</b>	<b>1999-00</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>	<b>MEAN</b>
Alembic Ltd.	-	5.20	15.10	2.90	9.40	18.90	0.80	-1.21
Aurobindo Pharma Ltd.	-	5.60	18.70	1.50	9.50	11.50	-16.90	-3.46
Cipla Ltd.	-	6.20	17.20	10.50	7.80	63.90	-22.20	0.73
Glaxosmithkline Pharmaceuticals Ltd.	-	6.30	18.00	8.70	7.90	24.20	-23.10	-1.08
Granules India Ltd.	-	6.10	19.70	9.30	156.90	39.40	-15.90	1.83
Hindustan Antibiotics Ltd.	-	6.60	20.40	9.00	156.90	26.20	-17.90	0.27
Indoco Remedies Ltd.	-	8.40	22.70	34.50	140.80	18.00	-18.60	0.16
Intas Pharmaceuticals Ltd.	-	14.20	27.50	38.60	83.90	7.50	-18.40	-1.34
Jubilant Life Sciences Ltd.	-	19.70	-6.80	25.80	112.60	15.90	-16.70	-0.47
Kopran Ltd.	-	11.10	-4.40	28.40	97.90	12.30	-20.00	-1.24
Merck Ltd.	-	-4.40	20.10	25.00	117.60	4.00	-18.80	-3.38
Mylan Laboratories Ltd.	-	-1.10	25.50	28.60	63.00	1.90	-18.70	-2.77

Natural Capsules Ltd.	-	-1.10	25.00	30.10	41.00	28.20	-17.40	-0.01
Pfizer Ltd.	-	1.90	24.00	39.60	25.30	50.60	-21.30	1.43
Piramal Enterprises Ltd.	-	3.40	29.00	45.00	22.10	66.00	-20.40	2.64
Sun Pharmaceutical Inds. Ltd.	-	10.20	36.80	-3.40	41.50	49.40	-19.00	-0.07
Suven Life Sciences Ltd.	-	6.90	40.80	7.30	36.30	68.90	-24.60	0.42
Themis Medicare Ltd.	-	8.40	16.30	12.70	32.90	49.50	-21.10	0.53
Wanbury Ltd.	-	8.80	-6.80	20.50	38.00	18.70	-15.60	-0.59
Wockhardt Ltd.	-	6.70	-12.10	20.30	43.20	12.20	-15.40	0.39
Wyeth Ltd.	-	3.30	9.10	17.30	41.00	4.50	-12.90	-0.23
<b>Indian Pharmaceutical Industry</b>	-	<b>6.18</b>	<b>16.08</b>	<b>18.89</b>	<b>54.57</b>	<b>26.52</b>	<b>-17.95</b>	<b>-0.37</b>

**Table 4 - Technical Efficiency Change during Post-Merger Period (2004-05 to 2017-18)**

(In percent)

<b>Acquirer firms</b>	<b>2004-05</b>	<b>2005-06</b>	<b>2008-09</b>	<b>2010-11</b>	<b>2013-14</b>	<b>2016-17</b>	<b>2017-18</b>	<b>MEAN</b>
Alembic Ltd.	-	2.80	-30.70	4.40	2.30	-0.90	56.20	-4.06



Aurobindo Pharma Ltd.	-	3.70	-32.70	4.90	2.70	-0.60	58.70	-5.63
Cipla Ltd.	-	6.30	-35.50	3.40	3.40	-0.40	39.50	-4.36
Glaxosmithkline Pharmaceuticals Ltd.	-	4.90	-33.90	9.30	4.50	0.50	42.00	-1.70
Granules India Ltd.	-	9.20	-38.90	14.90	5.60	10.70	48.10	-0.54
Hindustan Antibiotics Ltd.	-	11.50	-42.20	27.10	8.10	5.70	45.40	-0.60
Indoco Remedies Ltd.	-	13.10	-52.90	51.60	5.00	-1.70	43.40	-2.08
Intas Pharmaceuticals Ltd.	-	16.20	-56.30	37.00	2.50	-1.80	46.20	-3.32
Jubilant Life Sciences Ltd.	-	17.90	-46.30	13.70	2.80	-1.80	53.90	-2.72
Kopran Ltd.	-	1.10	-17.90	15.60	2.40	-1.60	53.70	-0.16
Merck Ltd.	-	1.30	-16.70	16.60	3.10	-1.90	66.00	0.02
Mylan Laboratories Ltd.	-	1.30	-18.30	20.90	4.90	-3.40	29.10	-3.53
Natural Capsules Ltd.	-	1.30	-14.80	12.50	3.10	-2.20	21.10	-3.38
Pfizer Ltd.	-	1.30	-14.80	15.80	4.70	21.90	22.60	1.65
Piramal Enterprises Ltd.	-	1.30	-14.30	16.80	-1.60	25.30	23.30	1.27
Sun Pharmaceutical Inds. Ltd.	-	1.40	-15.00	32.40	5.80	3.60	23.00	3.42

Suven Life Sciences Ltd.	-	3.20	-25.20	54.10	6.90	2.70	23.20	3.63
Themis Medicare Ltd.	-	4.20	-31.40	42.70	3.10	2.50	22.90	1.75
Wanbury Ltd.	-	13.40	-24.50	26.80	3.80	0.30	24.00	2.64
Wockhardt Ltd.	-	15.20	-7.60	33.90	3.30	1.80	28.10	6.17
Wyeth Ltd.	-	1.60	-6.80	41.90	3.00	3.00	49.10	4.87
<b>Indian Pharmaceutical Industry</b>	-	<b>6.15</b>	<b>-28.94</b>	<b>22.77</b>	<b>3.76</b>	<b>2.69</b>	<b>38.31</b>	<b>-0.37</b>

### **Allocative Efficiency Change during Pre-Merger Period (1995-2004)**

Table 5 shows the detail of the year wise estimates of allocative efficiency change in selected Indian pharmaceutical industry during pre-merger period 1994-05 to 2003-04 using malmquist productivity index. The estimated productivity indices for selected acquirer firms in this industry depicts that out of 10 years and during this reference period of AEC records negative of 10.43 percent and also majority of the acquirer firms, 19 out of 21 firms records negative reflects uniformity in input mix strategy among the respondent firms throughout the pre-merger period.

Furthermore, Sun Pharmaceutical Indus Ltd recorded a least retrogression value of 31.45 and this implies that the Indian pharmaceutical industry entrepreneurs do not pay serious attention to input allocation.

### **Allocative Efficiency Change during Post-Merger Period (2005-2018)**

Post Mergers & Acquisitions of allocative efficiency change in Period II shows the detail of the year wise estimates for selected Indian pharmaceutical industry depicts that out of 10 years, all the 21 firms' exhibits improved compared with pre-merger period and also across the 10 out of 21 firms records positive, specifically Kopran Ltd recorded high of 6.73 percent followed by Jubliant Life Sciences Ltd recorded 6.51 percent.

The details presented here in reinforces the general criticisms that the Indian pharmaceutical industry entrepreneurs do not pay serious attention to input allocation in pre-merger period and the post-merger period, but the entrepreneurs high allocation of factor input in the impact of M&A'S and the economic reforms measures depicts the substantial improvement during the reference period compared to the pre-merger period and this results are matching with the findings of another study by *Allirani, 2013* concluded that the allocative score are slightly improved in the impact of mergers and acquisitions on post-merger period.

**Table 5 Allocative Efficiency Change during Pre-Merger Period (1995 - 2004)**

(In percent)

<b>Acquirer firms</b>	<b>1994-95</b>	<b>1995-96</b>	<b>1997-98</b>	<b>1999-00</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>	<b>MEAN</b>
Alembic Ltd.	-	14.40	-16.10	-9.30	6.50	-21.60	27.50	1.49
Aurobindo Pharma Ltd.	-	10.10	-2.80	-4.10	1.60	-26.10	37.50	1.23
Cipla Ltd.	-	1.40	2.60	-12.60	5.80	-33.30	-59.00	-12.27
Glaxosmithkline Pharmaceuticals Ltd.	-	10.00	-1.80	9.60	-8.40	-31.70	-32.50	-7.39
Granules India Ltd.	-	9.30	9.40	-6.80	-1.10	-7.50	-93.60	-25.67
Hindustan Antibiotics Ltd.	-	9.30	0.50	31.90	3.50	-34.80	-78.90	-18.77
Indoco Remedies Ltd.	-	10.90	0.10	9.40	0.00	-26.90	-88.60	-23.11
Intas Pharmaceuticals Ltd.	-	5.70	18.20	4.00	13.40	-27.00	-71.60	-15.56
Jubilant Life Sciences Ltd.	-	11.10	35.80	-9.90	14.40	-25.00	-57.10	-11.25
Kopran Ltd.	-	-11.10	16.00	-8.30	-5.40	-20.50	-38.70	-7.06
Merck Ltd.	-	-14.20	-4.10	2.00	-0.80	-13.60	-40.30	-7.68

Mylan Laboratories Ltd.	-	-16.00	21.10	-0.40	10.80	-6.60	-31.50	-5.60
Natural Capsules Ltd.	-	-18.40	-1.40	0.80	12.90	-68.10	91.00	-5.67
Pfizer Ltd.	-	-16.90	-1.10	-2.20	-7.10	-40.30	-52.80	-14.94
Piramal Enterprises Ltd.	-	-17.50	-1.00	2.70	27.30	-7.40	-34.30	-6.48
Sun Pharmaceutical Inds. Ltd.	-	-25.30	5.90	-4.30	11.30	25.70	-96.50	-31.45
Suven Life Sciences Ltd.	-	-17.50	6.90	0.00	16.80	33.60	-59.10	-9.05
Themis Medicare Ltd.	-	-20.20	0.00	3.10	43.80	32.20	-52.20	-7.84
Wanbury Ltd.	-	-16.90	4.70	-2.00	17.70	9.50	22.00	0.00
Wockhardt Ltd.	-	-25.50	-12.20	7.70	37.50	24.10	-11.60	-1.37
Wyeth Ltd.	-	-19.90	-14.60	9.60	31.90	27.10	-12.00	-1.08
<b>Indian Pharmaceutical Industry</b>	-	<b>-7.58</b>	<b>2.49</b>	<b>0.59</b>	<b>10.22</b>	<b>-15.71</b>	<b>-53.87</b>	<b>-10.43</b>

**Table 6 Allocative Efficiency Change during Post Merger Period (2004-05 to 2017-18)**

(In percent)

<b>Acquirer firms</b>	<b>2004-05</b>	<b>2005-06</b>	<b>2008-09</b>	<b>2010-11</b>	<b>2012-13</b>	<b>2014-15</b>	<b>2016-17</b>	<b>2017-18</b>	<b>MEAN</b>
Alembic Ltd.	-	12.10	-8.70	10.50	2.50	1.70	-15.50	19.60	-4.58
Aurobindo Pharma Ltd.	-	14.10	-13.00	16.00	-11.70	13.30	-31.50	44.70	0.49
Cipla Ltd.	-	12.70	-6.40	7.20	-3.30	-33.50	9.50	30.80	0.35
Glaxosmithkline Pharmaceuticals Ltd.	-	15.70	-17.70	21.40	-38.80	4.00	43.80	1.90	0.41
Granules India Ltd.	-	17.20	-13.90	20.60	-39.50	49.20	3.00	2.80	1.08
Hindustan Antibiotics Ltd.	-	15.20	-39.60	41.40	3.10	5.50	2.70	-1.80	1.82
Indoco Remedies Ltd.	-	29.90	-32.40	33.50	1.50	10.60	2.90	-1.50	2.96
Intas Pharmaceuticals Ltd.	-	-3.80	-6.50	-24.10	23.60	11.60	-11.90	15.90	-0.01
Jubilant Life Sciences Ltd.	-	76.30	37.40	-24.80	29.50	3.60	-6.40	-16.70	6.51
Kopran Ltd.	-	63.00	49.90	-16.10	17.20	7.60	-8.10	-4.20	6.73
Merck Ltd.	-	-0.60	86.40	-8.00	16.10	-6.90	7.40	-32.70	1.13
Mylan Laboratories Ltd.	-	-1.40	52.50	6.90	-4.50	0.50	-10.20	-21.90	-1.89
Natural Capsules Ltd.	-	-4.30	33.00	-9.30	10.20	-31.10	45.20	-9.10	-1.75

Pfizer Ltd.	-	-2.10	6.20	2.90	0.20	-13.60	15.80	-4.10	-1.53
Piramal Enterprises Ltd.	-	2.80	39.80	-41.30	69.50	-2.70	-7.70	10.70	-1.27
Sun Pharmaceutical Inds. Ltd.	-	-8.50	45.70	-40.90	15.90	55.70	-13.40	19.00	-2.19
Suven Life Sciences Ltd.	-	-5.50	135.50	5.50	-33.50	49.10	-10.20	17.90	-0.03
Themis Medicare Ltd.	-	-34.60	190.70	-6.40	-25.60	47.30	-9.30	8.50	-0.64
Wanbury Ltd.	-	-32.90	3.50	-5.50	-24.80	43.70	-1.10	-4.10	0.49
Wockhardt Ltd.	-	0.00	-1.60	-8.30	-18.80	32.30	-7.50	11.30	-3.96
Wyeth Ltd.	-	-7.20	3.00	-11.30	12.80	-5.60	5.90	-2.70	-4.01
<b>Indian Pharmaceutical Industry</b>	-	<b>4.82</b>	<b>16.41</b>	<b>-3.84</b>	<b>-3.05</b>	<b>8.68</b>	<b>-1.24</b>	<b>2.56</b>	<b>-0.04</b>

### **Scale Efficiency Changeduring Pre-Merger Period (1995 -2004)**

The mean scale efficiency change during the pre-merger period was scored negative of 0.37 percent. This negative scale efficiency change depicts decreasing return-to-scale (DRS) and this changes were marked wide fluctuations. But the positive sale efficiency change observed 1.11 percent in Glaxosmithline Pharmaceuticals Ltd and least negative SEC was observed of 5.59 percent in Mylan Laboratories Ltd. whereas, majority of selected Indian pharmaceutical industry were found to have negative scale efficiency change implies that a firm is too large to take full advantage of scale and has a maximum scale size.

### **Scale Efficiency ChangeduringPost-Merger Period (2005-2018)**

The scale efficiency change during the post-merger period was recorded negative of 0.37 percent. It is evident that scale inefficiency continue to persist even after mergers and acquisitions, despite substantial growth in scale efficiency change has not resulted compared with pre-merger period implies that the constant returns-to-scale (CRS) and this could be an area for further research. Across the firms, 11 out of 21 firms indicate decreasing returns to scale, 10 firms increasing returns-to-scale. Thus it is evident that M&A'S strategy has not altered the scale economies significantly.



**Table 7** Scale Efficiency Change during Pre-Merger Period (1994-95 to 2003-04)

(In percent)

<b>Acquirer firms</b>	<b>1994-95</b>	<b>1995-96</b>	<b>1997-98</b>	<b>1999-00</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>	<b>MEAN</b>
Alembic Ltd.	-	6.80	-7.50	-3.00	2.30	-18.60	22.80	0.73
Aurobindo Pharma Ltd.	-	3.10	-5.00	-2.60	2.00	-22.40	27.90	0.47
Cipla Ltd.	-	2.00	2.50	-6.80	3.20	-0.40	-15.30	-1.31
Glaxosmithkline Pharmaceuticals Ltd.	-	7.30	1.20	1.60	-0.30	-1.90	2.00	1.11
Granules India Ltd.	-	3.30	0.30	0.90	0.10	-2.70	-1.20	0.32
Hindustan Antibiotics Ltd.	-	1.50	9.20	31.90	0.00	-1.30	-3.80	-0.16
Indoco Remedies Ltd.	-	2.20	6.70	0.40	0.00	-0.80	-1.90	0.10
Intas Pharmaceuticals Ltd.	-	0.90	-0.40	-1.50	-1.40	0.60	1.50	0.20
Jubilant Life Sciences Ltd.	-	4.00	1.30	-3.50	-2.00	1.80	-4.90	-0.23
Kopran Ltd.	-	-8.00	16.00	-1.30	-3.70	2.20	-3.00	-0.05
Merck Ltd.	-	-6.10	0.60	-1.20	0.10	-3.10	3.00	-0.56
Mylan Laboratories Ltd.	-	-8.50	2.20	-2.30	4.20	-1.30	-36.60	-5.59

Natural Capsules Ltd.	-	-9.70	1.90	-2.70	12.90	-2.50	4.00	-0.18
Pfizer Ltd.	-	-7.60	2.30	-2.20	8.30	0.30	0.40	-0.32
Piramal Enterprises Ltd.	-	-9.00	-1.80	0.30	5.90	2.90	-3.70	-0.50
Sun Pharmaceutical Inds. Ltd.	-	-17.60	1.40	-4.30	-0.50	7.30	-4.70	-0.71
Suven Life Sciences Ltd.	-	-13.00	2.90	0.00	-0.80	10.40	-4.10	-0.42
Themis Medicare Ltd.	-	-13.10	0.00	3.10	4.50	6.60	-4.60	-0.52
Wanbury Ltd.	-	-12.50	1.30	0.50	3.80	5.20	2.60	0.00
Wockhardt Ltd.	-	-25.50	-1.00	3.70	5.40	5.00	-0.40	-0.06
Wyeth Ltd.	-	-20.90	1.90	4.30	4.40	6.30	-1.60	0.01
<b>Indian Pharmaceutical Industry</b>	-	<b>-6.19</b>	<b>1.61</b>	<b>0.49</b>	<b>2.24</b>	<b>-0.62</b>	<b>-1.81</b>	<b>-0.37</b>

**Table 8 Scale Efficiency Change during Post-Merger Period (2004-05 to 2017-18)**

(In percent)

<b>Acquirer firms</b>	<b>2004-05</b>	<b>2005-06</b>	<b>2007-08</b>	<b>2009-10</b>	<b>2011-12</b>	<b>2013-14</b>	<b>2015-16</b>	<b>2017-18</b>	<b>MEAN</b>
Alembic Ltd.	-	1.10	-5.50	-0.60	3.20	1.60	0.80	0.40	-2.10
Aurobindo Pharma Ltd.	-	1.50	-0.80	-6.30	7.70	-1.90	2.00	-12.00	-0.15
Cipla Ltd.	-	1.60	-0.60	-8.90	8.80	-0.20	0.00	-11.00	0.01
Glaxosmithkline Pharmaceuticals Ltd.	-	1.50	0.00	-6.00	6.40	-19.70	22.30	-0.60	-0.05
Granules India Ltd.	-	1.60	-0.20	-5.90	6.50	-21.10	24.40	-1.20	0.11
Hindustan Antibiotics Ltd.	-	-0.90	1.50	-18.80	9.10	12.20	-1.10	-2.10	0.03
Indoco Remedies Ltd.	-	0.70	-4.20	-15.40	3.10	19.10	-1.10	-1.90	0.08
Intas Pharmaceuticals Ltd.	-	-3.00	3.10	-3.20	-10.90	15.40	-1.00	-2.30	0.01
Jubilant Life Sciences Ltd.	-	3.10	-3.40	1.50	-27.70	40.10	-0.80	-1.20	0.34
Kopran Ltd.	-	-0.70	1.30	2.20	-0.10	-0.90	-0.50	-1.00	0.32
Merck Ltd.	-	-3.70	1.30	2.50	-0.50	0.60	-2.10	2.20	0.01
Mylan Laboratories Ltd.	-	-3.30	0.80	1.90	1.20	-1.20	-0.90	-4.40	-0.75
Natural Capsules Ltd.	-	-3.50	0.50	3.20	-0.40	0.40	-20.50	25.80	-0.55
Pfizer Ltd.	-	-3.50	-5.00	6.40	2.80	0.20	-9.30	10.30	-0.58

Piramal Enterprises Ltd.	-	-3.20	0.40	3.20	-4.90	4.80	0.20	0.00	-0.59
Sun Pharmaceutical Inds. Ltd.	-	-2.10	1.10	-6.10	-0.40	9.20	1.10	-0.20	-0.50
Suven Life Sciences Ltd.	-	-3.10	-6.40	0.90	5.30	3.30	-0.60	1.20	0.13
Themis Medicare Ltd.	-	-22.90	15.90	9.10	-2.50	3.40	1.70	-0.10	-0.18
Wanbury Ltd.	-	-21.70	25.00	4.00	-3.70	2.90	2.20	0.00	0.34
Wockhardt Ltd.	-	0.00	-0.90	0.30	-4.30	3.00	-1.90	3.10	-1.82
Wyeth Ltd.	-	-0.80	-0.90	1.80	-5.00	5.30	-5.60	5.90	-1.81
<b>Indian Pharmaceutical Industry</b>	-	<b>-3.17</b>	<b>0.88</b>	<b>-1.87</b>	<b>-0.66</b>	<b>2.95</b>	<b>0.06</b>	<b>0.27</b>	<b>-0.37</b>

#### **IV. Conclusion**

This paper has analysed the impact of M&A's on selected Indian pharmaceutical firms 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.

This study indicates that technical change showed constant-returns-to-scale explained inefficiency continue to persist even after M&A cannot be considered as a causative factor.

Allocative efficiency change during the post-merger period confirms that M&A strategy has substantially augmented in this industry.

The measure of scale efficiency change implies that the selected acquired firms was too large to take full advantage of scale and has optimum sale size.

The study has found that in many firms improved during post-merger period operating performance against the existing literature was identified slightly improve to slightly diminish.

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