Industrial R&D in India – a few insights
(1995-96 to 2010-2011)

Dr. Nirmalya Bagchi
Professor
Administrative Staff College of India
nirmalya@asci.org.in
R&D, Sales trends

- The analysis of data for the last 16 years and also for the year 2011-12 shows that there has been a rapid increase in R&D spending by Indian Industry.
- Two distinct phases are evident from 1995-96 to 1999-2000 wherein the R&D expenditure by Indian Industry was choppy with a random up and down pattern, going up one year and then coming down the next (i.e. no distinct pattern was discernible).
- However, from 1999-2000 till date the R&D expenditure of Indian industry has grown every year and the value stood at 177216.2 in 2010-11. This value is an increase of 11.1 times over the 1995-96 value, even though the number of firms investing in R&D has reduced from 1995-96.
- The sales in the corresponding period has grown by 7.68 times only, which indicates that relatively firms are now spending more on R&D than earlier with respect to their sales.
- The data also shows that the trend of rapid spending on R&D by domestic industry has not been affected by the recent global financial crisis.
- Increasing trend of R&D spending by industry. RDI has increased from 0.24 in 1995-96 to 0.37 in 2010-11.
• R&D investment has registered a sizeable increase of nearly two and a half fold during 2004-05- to 2009-10 period. Interestingly, the growth in turnover of the companies put together make up only two-fold increase.
• Slightly over 1000 companies out of over 22,000 in operation invest in R&D.
• Relatively more R&D expenditure could be noticed in sectors such as pharma/Drugs, Automotives and electronics sectors.
• Only four companies invested over Rs. 500 crores on R&D in 2011, two of them were from Govt companies.
• Substantial R&D investments are due from Indian industry sector. Despite the growth registered in the 2005 – 2010 period the figures reflect poorly on international comparison.
• Interestingly the increase has been more than three-fold for sectors such as: Ag. Prod., Non-elec. Machinery, Electrical Machinery, Mineral Products, Energy, Basic Metals, Paper.
• Sectors such as Drugs, Misc Manu, Construction, Transport, Food products, electronics, Non-Metallic Minerals, Chemicals and services have registered more than two-fold increase in the total R&D investment.
• Increase for Leather products and Textiles is nearly two-fold.
• R&D investments in companies dealing with Wood Products and plastics group has remained the same.
Indian and Foreign Private Sector

- The R&D expenditure by Indian Private Sector companies in 2010-11 stand at Rs 103837.2 Millions which is 11.15 times the similar value for the year 1995-96 and it represents 58.59% of the total industrial R&D expenditure in 2010-11.
- The corresponding share of Indian Private Sector R&D expenditure in 1995-96 was 58.33%
- Foreign Private Sector Companies- The 2010-11 value of R&D expenditure in such companies was 8.23 times the value of R&D expenditure of the same category of companies in 1995-96. It must be noted that there has been an impact of the global financial crises on investments in R&D in such companies.
- The 2010-11 R&D expenditure of this category of companies’ represents 15.43 % of the total industrial R&D expenditure which is down from the 20.81% share which such companies had in 1995-96.
PSUs and Top 50 Business Houses

- Central government industrial R&D - It will be interesting to note that there seems to be very little or no impact of the global financial crisis and consequent economic slow down on Central Govt R&D expenditure.
- The value of R&D expenditure in 2010-11 was 11.79 times the value in 1995-96 indicating an extremely robust and healthy state of affairs.
- Top 50 Business Houses - The R&D expenditure for such companies in the year 2010-11 was Rs 42464.9 millions which is 8.56 times the value of 1995-96.
- The 2010-11 value of R&D expenditure of such companies represents 23.96% of total Industrial R&D which is down from 31.06% for the year 95-96.
<table>
<thead>
<tr>
<th>Turnover (Rs. million)</th>
<th>1996</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Number of Firms</td>
<td>Firms that spend on R&amp;D</td>
<td>Total Number of Firms</td>
<td>Firms that spend on R&amp;D</td>
</tr>
<tr>
<td>&lt;10</td>
<td>484</td>
<td>6</td>
<td>797</td>
<td>1</td>
</tr>
<tr>
<td>10--20</td>
<td>258</td>
<td>7</td>
<td>335</td>
<td>6</td>
</tr>
<tr>
<td>20-30</td>
<td>207</td>
<td>7</td>
<td>260</td>
<td>5</td>
</tr>
<tr>
<td>30-40</td>
<td>197</td>
<td>8</td>
<td>187</td>
<td>5</td>
</tr>
<tr>
<td>40-50</td>
<td>173</td>
<td>12</td>
<td>175</td>
<td>6</td>
</tr>
<tr>
<td>50-100</td>
<td>583</td>
<td>44</td>
<td>683</td>
<td>39</td>
</tr>
<tr>
<td>100-200</td>
<td>729</td>
<td>64</td>
<td>811</td>
<td>62</td>
</tr>
<tr>
<td>200-300</td>
<td>505</td>
<td>89</td>
<td>623</td>
<td>66</td>
</tr>
<tr>
<td>300-400</td>
<td>287</td>
<td>43</td>
<td>433</td>
<td>61</td>
</tr>
<tr>
<td>400-500</td>
<td>250</td>
<td>57</td>
<td>305</td>
<td>52</td>
</tr>
<tr>
<td>500-1000</td>
<td>625</td>
<td>176</td>
<td>845</td>
<td>151</td>
</tr>
<tr>
<td>1000-2000</td>
<td>471</td>
<td>197</td>
<td>621</td>
<td>157</td>
</tr>
<tr>
<td>2000-3000</td>
<td>180</td>
<td>94</td>
<td>276</td>
<td>92</td>
</tr>
<tr>
<td>3000-4000</td>
<td>72</td>
<td>42</td>
<td>131</td>
<td>59</td>
</tr>
<tr>
<td>4000-5000</td>
<td>54</td>
<td>26</td>
<td>74</td>
<td>20</td>
</tr>
<tr>
<td>5000-10000</td>
<td>112</td>
<td>71</td>
<td>162</td>
<td>80</td>
</tr>
<tr>
<td>10000-50000</td>
<td>89</td>
<td>52</td>
<td>143</td>
<td>67</td>
</tr>
<tr>
<td>50000&gt;</td>
<td>17</td>
<td>14</td>
<td>29</td>
<td>22</td>
</tr>
</tbody>
</table>
The data has been captured for calendar years and not for financial years. The pattern that emerges is interesting to note. The Table clearly shows that firms in low turnover ranges from below Rs. Million 10 to Rs. Million 50-100 are showing a drastic dip in number of firms spending on any R&D even though by and large the total number of firms in such turnover range is increasing rapidly.

Over the years the trend of number of firms spending on R&D is sharply downward in this turnover range.

Similarly the pattern of number of firms in the turnover range Rs. Million 100 to Rs. Million 2000 with any R&D spending shows a sharp dip from 2005 to 2010.

In the Rs. Million 2000 to 4000 range the number of firms with R&D spending has remained stable and in the range Rs. Million 4000 and above, there has been a sharp increase in the number of firms spending on R&D.

This shows that the firms that have the means to spend on R&D are now beginning to spend on R&D, even though in percentage terms, this is still below the 50% mark. **Hence, more needs to be done on the advocacy front to impress upon the companies in various turnover ranges the need to spend on R&D. This can only be handled with a policy measure.**
No. of companies with R&D expenditure

- 1995-96: 935
- 1996-97: 1030
- 1997-98: 989
- 1998-99: 1000
- 1999-00: 964
- 2000-01: 945
- 2001-02: 1105
- 2002-03: 1160
- 2003-04: 1149
- 2004-05: 1101
- 2005-06: 1100
- 2006-07: 1128
- 2007-08: 1142
- 2008-09: 1149
- 2009-10: 1111
- 2010-11: 874

Graph showing the number of companies with R&D expenditure from 1995-96 to 2010-11.
Transport Sector

- The R&D intensity of the sector in 1995-96 was at 0.58 which has steadily increased and in 2010-11 was at 1.45.
- The R&D expenditure also has grown in last 16 years from Rs 2201.5 millions to Rs 45881.1 millions which is an increase of 20.84 times and which indicates that the industry is spending heavily on R&D.
- 1995-96 to 2000-01 during which R&D expenditure had a very modest growth and the second phase 2001-10 which shows a pattern of exponential growth in R&D expenditure
- R&D expenditure in the transport sector represented about 25.89% of the total Industrial R&D expenditure of the country in 2010-11 which is up from the 13.79% share of R&D expenditure that the sector had in 1995-96
Services Sector

• Firms in this sector have shown rather low R&D intensity since 1995-96.
• The R&D intensity was at 0.07 which has increased to 0.05 in 2010-11.
• The R&D expenditure from the firms in this sector in 2010-11 was Rs 13571.2 millions which is 19.19 times the corresponding in 1995-96 and which represents 0.08% of the total industrial R&D in the country.
• In terms of number of firms spending on R&D also the sector shows a decreasing trend and the royalty paid by the company which showed a pattern of rapid growth from 1999-2000 till 2008 has also drastically reduced. This clearly indicates that the global financial crisis may have had some impact on R&D investment in this sector.
Electronics Sector

• The firms in the electronic sector have also traditionally shown high R&D expenditure.
• In 1995-96 the R&D intensity of firms in this sector was 0.66, which has increased to 1.04 in 2010-11.
• The R&D expenditure is steady barring a couple of years. However the number of firms investing in R&D has gone down.
• In 2010-11 firms in this sector reported R&D investment of Rs 5288.70 millions which is 6.86 times the corresponding value of 1995-96 and which represents 3% of the total R&D investment in the country in 2010-11.
• Share of Electronic firms in total industrial R&D in 1995-96 was 4.8%. The royalty paid by Electronic firms show a phase of almost very low growth from 1996-2004 after which there is a rapid increase till date.
Drugs Sector

- Drugs and pharmaceuticals is the sector which has reported the highest R&D intensity in 1995-96 and subsequently in each passing year. R&D intensity of firms in this sector was 1.45 in 1995-96 which has increased to 4.97 in 2010-11.
- In 2010-11 firms in this sector have spent Rs 43958.20 millions on R&D which is 21.54 times the corresponding value in 1995-96.
- In 2010-11 the share of R&D spending in this sector in total Indian industrial R&D was 24.80% which is up from 12.78% the sector had in 1995-96.
- However, the worrying trend for the sector is that there has been a sharp fall in the number of companies investing in R&D in the last couple of years. From the high of 127 firms it is now down to 94 firms.
- The R&D Expenditure by the firms in this sector can be categorized in to 3 phases of low growth, moderate growth, and high growth. 1956-96 to 1999-2000 represents a phase of low growth, 2000-03 is period of high growth and 2003-to ill date is a period of rapid growth. Royalty also broadly mimics the same pattern.
Diversified Sector

- Manufacturing firms also represent a sector which has shown almost steady R&D intensity in last 16 years. In 1995-96 R&D expenditure in this sector was Rs 456.9 millions which is grown in 2010-11 to Rs 2470.2 millions which is 5.40 times the 1995-96 value.
- The pattern of expenditure in this sector shows a period of low growth from 1996-2002, high growth in 2002-05 and high variability thereafter indication some negative impact of the global financial crisis.
- The number of firms in this sector spending on R&D has remained constant over the last 16 yrs.
- The sector spent more on royalties than on R&D.
Plastics Sector

• Broadly the companies that fall under the chemical sector have traditionally shown high R&D intensity. The R&D intensity of such firms in 1995-96 was 0.13 which is has increased to 0.19 in 2010-11.
• In 1995-96, Rs 97.10 milion was the R&D expenditure which is now Rs 771.90 million.
• The number of companies decreased from 28 to 26 from 1995-96 to 2010-2011.
• In terms of pattern it is evident that the sector shows a spurt in R&D expenditure in 2005 and thereafter the sector has undergone a period of rapid growth.
• Royalty also broadly mimics the same pattern.
Non-electrical Sector

- The sector also has traditionally invested heavily in R&D, which reflects in the high R&D intensity that the sector reports. In 1995-96 R&D intensity for the sector was 0.46, which has increased to 1.25 in 2010-11.
- The number of companies have also grown and expenditure in R&D was Rs 15240 million in 2010-11 whereas it was only Rs 1068.6 million in 1995-96 representing an increasing of 14.26 times.
- The firms in this sector have a share of 8.6% of the total industrial R&D in 2010-11, while in 1995-96 it was 6.7% only.
- The pattern of R&D expenditure shows that 1995-96 to 2005-06 the sector has had period of low growth in R&D spending which has now changed to high growth from 2006 onwards.
Low RDI sectors

- Electrical machinery
- Energy
- Food and Beverages Sector
- Leather Sector
- Miscellaneous Manufacturing
- Non-metallic Products
- Paper
- Textiles
- Wood Products
- Mineral Products
- Chemicals
- Agricultural Products
- Base Metals
- Construction
## Top 5 companies by R&D expenditure

<table>
<thead>
<tr>
<th>Company Name</th>
<th>1995-96</th>
<th>1999-2000</th>
<th>2009-10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales</strong></td>
<td><strong>R&amp;D expenses</strong></td>
<td><strong>Total Royalty</strong></td>
<td><strong>Company Name</strong></td>
</tr>
<tr>
<td><strong>Tata Motors Ltd.</strong></td>
<td>76364.6</td>
<td>1106.8</td>
<td></td>
</tr>
<tr>
<td><strong>Reliance Industries Ltd.</strong></td>
<td>57266.6</td>
<td>750.9</td>
<td></td>
</tr>
<tr>
<td><strong>Oil &amp; Natural Gas Corpn. Ltd.</strong></td>
<td>132277.2</td>
<td>581.2</td>
<td></td>
</tr>
<tr>
<td><strong>Indo Rama Synthetics (India) Ltd.</strong></td>
<td>7471</td>
<td>504.3</td>
<td></td>
</tr>
<tr>
<td><strong>Steel Authority Of India Ltd.</strong></td>
<td>148312.4</td>
<td>501.2</td>
<td>256.8</td>
</tr>
</tbody>
</table>

*All figures are in Rs. Million*
### Top 5 companies by Total Royalty (Royalty + Technical know-how Fees)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company Name</strong></td>
<td><strong>Sales</strong></td>
<td><strong>R&amp;D expenses</strong></td>
</tr>
<tr>
<td>South Eastern Coalfields Ltd.</td>
<td>28599.9</td>
<td>3902.1</td>
</tr>
<tr>
<td>Bharat Coking Coal Ltd.</td>
<td>22255.7</td>
<td>2988</td>
</tr>
<tr>
<td>Central Coalfields Ltd.</td>
<td>20997.8</td>
<td>2929.4</td>
</tr>
<tr>
<td>Northern Coalfields Ltd.</td>
<td>19862.8</td>
<td>2895.9</td>
</tr>
<tr>
<td>Western Coalfields Ltd.</td>
<td>19222.5</td>
<td>2497.2</td>
</tr>
</tbody>
</table>

All figures are in Rs. Million