Chapter - III
CHAPTER - III

THE ENGINEERING SECTOR IN INDIA:

AN OVERVIEW

3.1. Introduction:

India’s Engineering sector is the prime mover of industrial growth in Indian economy. It has played a pivotal role in industrial resurgence of India since the advent of independence especially after the adoption of the Mahalanobis Capital goods oriented development strategy from the second five year plan onwards. It has transformed the shape, enlarged the size and refined the character of Indian industries. In this context, our objective in this chapter is to provide an overview of the engineering sector in India in terms of its growth over the years and to examine its present status in the Indian economy. We also discuss factors that have contributed to the growth of this sector over the years and the main challenges before it.

The chapter is divided into five sections including the present one. In section 3.2 we discuss the growth of engineering sector in India in the post independence period. This is followed by an analysis of the factors
contributing to the growth of this sector in the section 3.3. In section 3.4 we discuss the problems and prospects of this sector. The final section summarises the main conclusions of this chapter.

3.2 Growth of Engineering Sector in India:

Engineering sector in India as elsewhere in the world is a vast field of industrial activity. Its products are many as also varied. But they are generally grouped into five categories following the 2-digit National Industrial Classification (NIC) Codes as shown in the Table 3.1 below.

Table 3.1

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>List of some items</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>Basic Metals and Alloys</td>
<td>Iron and Steel, Aluminium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forging/casting etc.</td>
</tr>
<tr>
<td>34</td>
<td>Metal products and parts except machinery and</td>
<td>Metal cans, containers, Metal</td>
</tr>
<tr>
<td></td>
<td>transport equipment.</td>
<td>furniture/fixtures etc.</td>
</tr>
<tr>
<td>35</td>
<td>Machinery, Machine Tools and parts, except</td>
<td>Agriculture and Machine Tools.</td>
</tr>
<tr>
<td></td>
<td>electrical.</td>
<td>Refrigerator, Air conditioners etc.</td>
</tr>
<tr>
<td>36</td>
<td>Electrical Machinery, Apparatus, Appliances,</td>
<td>Motors, generators, wires cables, electric</td>
</tr>
<tr>
<td></td>
<td>suppliers and parts.</td>
<td>instruments, components etc.</td>
</tr>
<tr>
<td>37</td>
<td>Transport Equipment and parts.</td>
<td>Locomotive, Wagons, Motor Vehicles etc.</td>
</tr>
</tbody>
</table>

According to the Association of Indian Engineering Industries (AIEI), the engineering sector includes all manufacturing activities ranging from simple metal products to sophisticated machinery and equipment producing sectors, which differ widely in their technological capacity.

The engineering industry in India had a modest beginning in the early 1950s. Since then it has picked up momentum in many directions enabling India to become self-sufficient in manufacturing the entire range of industrial machinery. At present, it is the largest segment of the overall industrial sector. Its significance in the Indian economy is revealed by the fact that it accounts for: 30.5 per cent of weight in the index of industrial production. 29.9 per cent share of the total investment in all industries. 33.5 per cent of share in the value of output of all industries. 37.1 per cent share in value added by all industries. 30.6 per cent share in employment of all industries. 62.8 per cent share in number of foreign collaborations (EEPC- Engineering Export Promotion Council).

Furthermore, it is a major exporting sector and also provides technical know-how and consultancy services to a number of African and Arabian States. As per the recent data, engineering industry has emerged as the single largest item of total Indian exports pushing aside gems and jewellery export which had been dominating Indian export basket as the
single largest item for some time now. It employs over 4 million skilled and semi-skilled workers (direct and indirect).

The engineering industry in India comprises two main segments the heavy engineering and the light engineering segments. The former produces machine tools, heavy machinery and equipment, mining and quarrying equipment, material handling equipment, automobiles and automotives components etc. that cater to heavy electrical industries, power generation and distribution, steel, transport sectors etc. The light engineering segment produces goods that are used as inputs by the heavy engineering segment. The types of products manufactured include electric wires and cables, transmission towers, lifts and escalators, cranes, lighting equipments etc. According to the Indian Brand Equity Foundation, in the year 2003-04, out of the total engineering production of US $ 22 billion, the heavy engineering segment contributed over 80 per cent with the light engineering segment accounting for the remaining.\(^2\) Table 3.2 shows the classification of the engineering sector in India and their sub-segments.
### Table-3.2
**Classification of the Engineering Sector in India**

<table>
<thead>
<tr>
<th>Heavy Engineering Sector</th>
<th>Number of organized players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Machinery</td>
<td>18</td>
</tr>
<tr>
<td>Sugar Machinery</td>
<td>27</td>
</tr>
<tr>
<td>Rubber Machinery</td>
<td>19</td>
</tr>
<tr>
<td>Metallurgical Machinery</td>
<td>39</td>
</tr>
<tr>
<td>Machine Tools</td>
<td>125</td>
</tr>
<tr>
<td>Material Handling Equipment</td>
<td>50</td>
</tr>
<tr>
<td>Mining Machinery</td>
<td>32</td>
</tr>
<tr>
<td>Dairy Machinery</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Light Engineering Sector</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Welded Steel Pipes &amp; Tubes</td>
<td>123</td>
</tr>
<tr>
<td>Process Control Instrument</td>
<td>26</td>
</tr>
<tr>
<td>Antifriction Roller Bearing</td>
<td>19</td>
</tr>
<tr>
<td>Plain Paper Copier</td>
<td>12</td>
</tr>
</tbody>
</table>

*Source: Ministry of Heavy Industries as Public Enterprises. Annual Report 2007 and www.indiainbusiness.inc.in*
The heavy engineering segment involves sophisticated technology and greater competence, calling for a more organized format. Public sector enterprises play an important role in this segment.

The Indian engineering industry forms the crucial backbone of the economy and is intricately linked with umpteen other core sectors for its demand. Which is primarily derived from capacity creations in core sectors like power, infrastructure, mining, oil and other several sectors including general manufacturing sector, consumer goods industry, automotive and process industries. The enterprise mix of the Indian engineering industry comprises multinational company controlled units or joint ventures with good foreign stakes, large Indian Companies without foreign collaboration, medium sized companies maintaining regional dominance and small/grey markets players largely constituting the unorganized sector with niche markets. The engineering industry can also be divided into electrical and non-electrical segments. The electrical segment depends upon the investments in power industry, while the prospects of the non-electrical segment are driven by industrial investment.

The engineering sector is relatively less fragmented at the top, as the competencies required are high, while it is highly fragmented at the lower end (e.g. unbranded transformers for retail segment) and is
dominated by smaller players. The engineering industry in India manufactures a wide range of products, with heavy engineering goods accounting for bulk of the production. Most of the leading players engaged in the production of heavy engineering goods and mainly produces high-value products using high-end technology. Requirement of high level of capital investment poses as a major entry barrier. Consequently, the small and unorganized firms have a small market presence. The light engineering goods segment, on the other hand, uses medium to low-end technology. Entry barrier is low on account of the comparatively lower requirement of capital and technology. This segment is characterized by the dominance of small and unorganized players which manufacture low-value added products. However, there are few medium and large scale firms which manufacture high-value added products. This segment is also characterized by small capacities and high level of competition among the players.

Main characteristics of the Indian engineering industry include:

- Production of the majority of the output across segment by a few large companies which include large PSEs and private sector companies and multinational companies.
• Presence of a large number of small and unorganized players which contribute to output by producing smaller parts and components.

• Use of inputs and raw materials which are mostly of domestic origin.

• Production of items which compare functionally with those manufacturing in Western Countries.\textsuperscript{5}

Engineering industries’ production trend by selected products groups during the period 1991-92 to 2008-09 is shown in Table 3.3.

It can be seen from the Table 3.3 that during the period 1991-92 to 2008-09, heavy structural industries showed the highest growth (33341%), followed by electrical generators (1695%), boilers (997%) and auto-ancillary & parts (599%). On the other hand the steel casting (5%), pipes & tubes (30%), aluminium ingots (53%), complete tractors (83%) during the same period. Since 1991-92, the industry picked up momentum as steel industries gradually was moving up. The production of finished steel increased from 10179 thousand tonnes in the year 1991-92 to 53717 thousand tonnes in the year 2008-09. Boilers, auto-ancillary & parts, electric generators and textiles machinery also appeared to be most attractive segments from the growth perspective.
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<tbody>
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<td>Finished steel</td>
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<td>15199</td>
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<td>Steel casting</td>
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<td>376</td>
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<td>467</td>
<td>438</td>
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<td>435</td>
<td>402</td>
<td>454</td>
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<td>459</td>
<td>476</td>
<td>506</td>
<td>581</td>
<td>512</td>
<td>411</td>
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<tr>
<td>Pipes &amp; tubes</td>
<td>1208</td>
<td>1163</td>
<td>1103</td>
<td>1198</td>
<td>1304</td>
<td>574</td>
<td>507</td>
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<td>755</td>
<td>763</td>
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<td>820</td>
<td>885</td>
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<td>Stamping &amp; forgings</td>
<td>188</td>
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<td>216</td>
<td>229</td>
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<td>280</td>
<td>330</td>
<td>407</td>
<td>364</td>
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<td>318</td>
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<td>Heavy structural</td>
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<td>Aluminium Ingots</td>
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<td>471</td>
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<td>509</td>
<td>549</td>
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<td>516</td>
<td>561</td>
<td>719</td>
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<tr>
<td>Commercial vehicles</td>
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<td>149</td>
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<td>216</td>
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<td>350</td>
<td>391</td>
<td>520</td>
<td>545</td>
<td>416</td>
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<tr>
<td>Auto-ancillary &amp; parts</td>
<td>2394</td>
<td>2713</td>
<td>3232</td>
<td>3837</td>
<td>5249</td>
<td>6756</td>
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<td>7886</td>
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<td>12745</td>
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<td>300</td>
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<td>Textile machinery</td>
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<td>1122</td>
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<td>2143</td>
<td>2910</td>
<td>2910</td>
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<tr>
<td>Electric generators</td>
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<td>307</td>
<td>395</td>
<td>474</td>
<td>442</td>
<td>579</td>
<td>506</td>
<td>481</td>
<td>409</td>
<td>465</td>
<td>822</td>
<td>1179</td>
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<tr>
<td>Machine tools</td>
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<td>933</td>
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<td>1408</td>
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<td>1324</td>
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<td>1835</td>
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<td>2644</td>
<td>2901</td>
<td>2914</td>
<td>2972</td>
<td>2719</td>
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<tr>
<td>Complete tractors</td>
<td>166</td>
<td>147</td>
<td>139</td>
<td>158</td>
<td>202</td>
<td>245</td>
<td>278</td>
<td>273</td>
<td>280</td>
<td>285</td>
<td>226</td>
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<td>311</td>
<td>304</td>
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<tr>
<td>Diesel engines</td>
<td>1677</td>
<td>1682</td>
<td>1674</td>
<td>1766</td>
<td>1988</td>
<td>1988</td>
<td>1946</td>
<td>2221</td>
<td>2928</td>
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<td>2943</td>
<td>2972</td>
<td>2975</td>
<td>3021</td>
<td>3172</td>
<td>3232</td>
<td>3335</td>
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<tr>
<td>Ball rollers &amp; needle bearings</td>
<td>873</td>
<td>943</td>
<td>969</td>
<td>1493</td>
<td>2313</td>
<td>2142</td>
<td>1965</td>
<td>1677</td>
<td>2910</td>
<td>3749</td>
<td>3113</td>
<td>2984</td>
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<td>3108</td>
<td>3276</td>
<td>3280</td>
<td>2891</td>
<td>2962</td>
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<tr>
<td>Boilers</td>
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<td>975</td>
<td>908</td>
<td>1025</td>
<td>1202</td>
<td>1412</td>
<td>1311</td>
<td>1180</td>
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<td>2187</td>
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<td>2474</td>
<td>3941</td>
<td>5870</td>
<td>8231</td>
<td>10154</td>
</tr>
<tr>
<td>Tin metal containers</td>
<td>-</td>
<td>-</td>
<td>54</td>
<td>58</td>
<td>77</td>
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<td>80</td>
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<td>91</td>
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<tr>
<td>Bolts and nuts</td>
<td>-</td>
<td>-</td>
<td>358</td>
<td>463</td>
<td>517</td>
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<td>551</td>
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<td>626</td>
<td>632</td>
<td>660</td>
<td>678</td>
<td>685</td>
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</table>

Source: Reserve Bank of India (www.rbi.org)
Thus the above analysis shows that the continued growth and development of engineering industry in India have been a source of strength to the India economy. Considerable saving of foreign exchange has been effected by import substitution in automobile, industrial machinery and heavy electricals. Infact the impact of import substitution on the development process of economy has not been as pronounced in the other sectors of the economy as it is in the engineering sector. The recognition and impact of the Indian engineering industry abroad is not confined to exports alone, but has several dimensions. It has won many contracts in areas of structural projects, power plants, cement plants integrated steel plants etc. in countries like Kuwait, Iraq, Philippines, Indonesia and African nations. The faith that can be reposed in Indian engineering organizations is also reflected in the willingness of reputed engineering concerns abroad to work together with their Indian counterparts in joint ventures abroad. Foreign investment and technical know-how has acted as catalyst in the development of Indian engineering industry. The Indian Engineering Industry has witnessed tremendous technological progress in the last decade or so and expertise has been gained in several areas. Indian technology, whether imported or indigenously developed has put India on the industrial map of the world. India ranks as one of the top ten industrial nations of the world with the
largest pool of technical personnel and scientists in the world. It has not only been able to cater to growing domestic demand but has achieved commendable success in meeting orders from the quality conscious and sophisticated overseas markets. The range of Indian Engineering products extend from simple consumer durables to highly sophisticated power generation, transmission and distribution systems, cement plants, petrochemical complexes and so on. Considerable progress has been made in manufacture of metals and alloys, chemicals, fertilizers, machine tools, transportation equipment, machine building and in various other industrial products.

3.3 Factors Contributing to the Growth of Engineering Sector in India:

The emergence of the engineering sector in India as leading sector has been the outcome of several factors. Some of them can be discussed as under:

(i) Government Policy and Initiatives:

India was a typical backward economy at the time of Independence in 1947. This was more a consequence of her political dependency to Britain rather than of her own cultural heritage. The British rule resulted into colonization and systematic exploitation of Indian economy. In their
efforts to convert India into market for their manufactures, the British systematically destroyed India’s own manufacturing industry. Liberal imports of machine-made goods led to the decline of domestic handicrafts, causing unemployment and misery for the native Indians. India was gradually transformed into an agrarian society with emphasis on cash crops and plantations. Economy remained stagnant, masses suffered appalling poverty, and famines occurred frequently.  

At the time of independence, India had a very low industrial base. The industrial sector was too weak to bring about any turnaround in the level of economic development in the country. Therefore, after independence India entered into an era of ambitious industrialization during the mid-1950s with the Mahalanobis Strategy of development as its basis. The emphasis was on import substitution, heavy industries and central role for the public sector. The development of engineering segments like the plant and machinery was considered essential to free the country from her dependence on such imports from abroad. Since then a series of measures ranging from changes in policy measures to various initiatives have been taken by the government to promote the engineering sector in India. The policy framework evolved in the wake of economic liberalization and structural reforms introduced since 1991 has sought to achieve accelerated pace of industrial growth by ensuring
greater freedom in investment decisions. The various initiatives taken by
the government to create an environment in which the engineering sector
can thrive have included:

- Removal of tariff protection on capital goods.
- Delicensing of heavy electrical industry and allowance of 100 per
cent FDI.
- Focus on infrastructure development and construction.
- Improvement in quantity quality of power supply.
- Reduction of custom duties on various equipments.

All these have helped the engineering sector become competitive
and grow.\footnote{9}

(ii) **Growth of the key end user sectors in India:**

The engineering industry in India is integrated with core segments
in the economy for its demand. The government of India’s focus on
infrastructure sectors over the years has generated massive demand for
engineering products. The performance of the engineering sector is linked
to the performance of the end user industries for this sector. The user
industries for engineering include power utilities, industrial majors
(refining, automotive and textiles), government (public investment) and
retail consumers (pumps and motors). The engineering sector has been growing, driven by growth in end user industries and new projects being taken up in power, railways, infrastructure development, and private sector investment fields.

(iii) Large size of domestic markets:

The main advantage of the engineering industry in India is the large size of the domestic market. According to the World Economic Forum’s Competitiveness Report 2007-08, India ranks third in market size after United States and China.

India also has raw material resources to meet the demands of the engineering industry. Key raw materials required by the engineering sector-ferrous and non-ferrous metals such as mild steel and aluminium—are available in India. Ready availability of these materials have given India a major cost advantage, as materials accounts for nearly 50 percent of the industry’s operation costs.

The presence of the supporting industries provides a conducive environment for the engineering sector to grow and prosper. India’s engineering industry has significant support from India’s well established IT sector, as well as institutions of higher education.
India has a well developed vendor base for supporting engineering industries. Industries such as machine tools, textile machinery, auto components, etc., provide ample support to the engineering sector. Some of these factors have developed global capabilities and help the engineering sector achieve global competitiveness.

(iv) **Lower labour cost and better designing capabilities:**

This has made the global manufacturing companies to prefer India as an important outsourcing destination. Among developing countries, India offers the best combination of low costs, availability and skills and capabilities of manpower for the engineering sector. India produces over 500 Ph. Ds, 200,000 engineers, 300,000 non-engineers postgraduates and 2,100,000 other graduates each year, thereby ensuring a steady supply of qualified manpower for the sector.

- India’s comparatively cheaper and skilled work force have enabled the engineering sector to setup large low cost production bases for domestic and export markets.
- Huge investments from the companies for R&D etc. have also helped in the growth of this industry.\(^{10}\)
(v) **Changing demographic profile of Indian consumers:**

Key demographic changes have included increasing income levels and greater propensity to spend and change in the style driven by trends like increase in nuclear families, working women, and exposure to global trends.

These changes have been driving consumption in end-user sectors such as consumer durables. This in turn, has facilitated growth in the engineering sector.

**3.4. Problems and Prospects of Engineering Industry in India:**

The engineering industry has widened its base across a broad spectrum and induced the latest technology in many areas. However, a number of these units face some complex problems. For instance, some sectors face the problem of under-utilization of capacity. The main causes of this is under utilization of raw materials like steel, pig iron, aluminum and other non-ferrous metals, labour disputes, wrong government policies and so on. At times, demand constraint has acted as a brake on capacity utilization. For instance, the four producers of heavy commercial vehicles Tata Engineering and Premier Automobiles have encountered serious difficulties in recent years due to the demand constraint. Plants of Heavy Engineering Corporation, Bharat Heavy Electrical Limited, Hindustan
Machines Tools etc. have operated for a considerable period below 50 percent of their installed capacity. A number of factors have caused rising costs of production in the engineering industries. This is due to spiraling raw material and power costs, growth rate in productivity not commensurate with wage levels, crippling fiscal levies etc. The process of modernization in a number of engineering goods industries has been hampered by infrastructural lags in transport, communication and other key areas.

(i) **Licensing policy:**

Though there has been considerable relaxation in the government licensing policy since many years but this is not adequate and the procedures for getting clearance under the various acts, leads to delay in installing a vital new capacity. The engineering industries particularly the larger units will have to design and develop and take up the manufacture of the large range of engineering items. At the same time, large manufacturers gave up some of the simple machines to the medium and small manufacturers and assisted them with the technical know-how and facilities for manufacturers or marketing of those machines. Unless the procedure of licensing was abolished or considerably simplified and quickened, the desired goals of expansion and transposition were either delayed or were not feasible.
Industrial sector of the Indian economy developed fairly rapidly during the first fifteen years (1951-66) of planned economic development. After that the pace of industrialization slowed down, particularly in the capital goods sector. This so-called industrial retrogression was explained in terms of a host of factors, the chief among them being:

- Exogenous causes like Chinese aggression (1962), Indo-Pak conflict (1965), and Bangladesh Crisis (1971).
- Successive droughts of 1965-66 and 1966-67 and again in 1971-72 which disrupted the supply of raw materials and the demand for industrial goods emanating from the rural sector.
- Oil crisis of 1973 resulting in cost-push inflation.

Some of the economists believe that the rigid industrial licensing policies and other controls coupled with bureaucratic hurdles also hampered the growth of the industrial sector.  

(ii) **Inadequate Supply of Infrastructural Facilities:**

Availability of adequate, efficient and affordable infrastructural facilities constitutes the core of development strategy and efforts. Economic infrastructure, covering, *inter alia*, power transportation and communication, creates congenial for growth process through its
backward and forward linkages. The demand for infrastructural services has increased rapidly after industrial liberalization of the Indian economy. Unfortunately, infrastructural bottlenecks remain the biggest stumbling block of industrial progress in the country. By their very nature, infrastructure projects involve huge initial investment, long gestation periods and high risk.¹²

Perhaps the most important constraints upon the development of engineering industries in the recent years were those arising from the poor performance of the key infrastructure sectors such as power, coal, steel and transport. Not only was the performance in the individual sector, but there was also an inadequate response in terms of evolving an effective strategy for improving performance and co-ordinating between sectors to ensure that the priority needs were met. Scarcity of raw materials, fuels is another impediment limiting the growth of some of the industries. A number of industries, including the steel and cement (which are essential inputs for building infrastructure) and electricity generation, use coal as the basic fuel in their production process. Adequate availability of the required grades of coal needs to be ensured for them if their supply is not to prove an obstacle to growth.
(iii) **Labour Problems:**

The engineering industries have been hit hard by the labour problem also. There was a sharp increase in strikes and lock-outs in the fourth quarter of 1980-81 in non-electrical machinery, transport equipments and machine tools industries. There is a need to recognize three influences that could work on firm behaviour in organized manufacturing in future. First, in order to meet the pressures of increased competition resulting from global integration, firms have a need to build flexibility into their organizational structure, so that they can adjust to volatility in the international demand for their products. Enterprises are increasingly focusing on their core competence and outsourcing all other activities to specialist organizations, which can deliver better and at lower cost. Second, the lack of flexibility in some of the labour laws, such as Chapter V-B of the Industrial Disputes Act, 1947, and Contact Labour (Regulation & Abolition Act), which focus on job protection, inhibits employment. Later it was recognized that these laws make it difficult for employers to flexibility respond to changes in demand when necessary and have the net effect of discouraging the growth of strong labour absorbing sector. Furthermore, in the context of severe shortages of skilled personnel being experienced by existing engineering industry the need to reduce staff is not a current problem for many labour intensive
enterprises. Third, while several fiscal incentives for corporate investment encourage capital, only one relates to labour use, and that too is of little practical value. This induces enterprises to give preference to capital-intensive technology over labour-intensive technology.\textsuperscript{13}

(iv) **Depreciation:**

There are a large number of engineering industries in India which are in need of the replacing of existing machines with more productive machines. The replacement of machines will help rapid increase in production and productivity.

(v) **Research and Development (R&D):**

For updating its technology, it is necessary that the engineering industries should invest in Research and Development Programmes. But the research and development establishment of public sector undertakings enjoys duty free import of capital goods for R&D; on the other hand, such concessions are not extended to the R&D centres of non-public sector companies and latter have to shell out duty on capital goods for research. If differentiation on grounds of ownership of undertakings is to be done away with, then both the sectors should be put on par so far as the charging of import duty is concerned.
(vi) **Technological Problems:**

Technological competitiveness of Indian engineering goods sector is low. Some of the Indian exporters are still at a disadvantage in international market in terms of product design, finish, specific features, performance and raw material substitutes. Although Indian firms are capable of achieving high levels of precision, they are unable to provide high quality products due to lack of supporting process, technologies such as precision measuring, material engineering and process control.

(vii) **High Cost of Industrial Inputs:**

The engineering industry mainly uses raw materials of domestic origin. The prices of raw materials have risen faster than the machinery price. It is difficult for engineering manufacturers to pass on the rise in prices to the consumers thereby impacting their profitability. Similarly, the quality of raw material is also not upto the international standards and it in turn affects the quality of final products.

(viii) **High-transaction cost:**

The export transaction costs for Indian engineering goods industry are among the highest in the world. Heavy transaction costs not only increase the prices of the final export products, but also result in
inordinate delay in export fulfillment, thus affecting export competitiveness.\textsuperscript{14}

Well the inherent disadvantages faced by the industry are higher cost of raw material and their inputs, inadequate infrastructural facilities and power shortage that act as a drag on productivity and competitiveness. Moreover, Indian products have to compete with the newly industrialized countries whose cost is less, technology is sophisticated and marketing is superior. Further the Indian interest rates are high compared to the advanced and newly-industrialized countries' rate structure. Also Indian manufacturer exporters are obliged to pay higher port and freight charges. Engineering exports from the country can be trebled, provided there is an assured supply of inputs at the international price and quality. It also calls for an environment in which productivity and efficiency of all the players—the industry, the government and the financial institutions—are at their best. It is hoped that the ongoing liberalization measures are completely implemented, the contribution of the engineering industry to the foreign exchange of the country would, perhaps to be highest.

The problems of the industry can be seen by two factors as follows:

The internal factors, which arise within an organization, includes:
• Mismanagement in various functional areas of an industry like finance, production, marketing and personnel,

• Wrong location of a unit,

• Overestimation of demand and wrong dividend policy,

• Poor implementation of projects which may be due to improper planning or managerial inefficiency,

• Poor inventory management in respect of finished goods as well as inputs,

• Unwarranted expansion and diversion of resources such as personal extravagances, excessive overheads, acquisition of productive fixed assets, etc.,

• Failure to modernize the productive apparatus, change the product mix and other elements of marketing mix to suit the changing environment,

• Poor labour-management relationship and associated low workers’ morale and low productivity, strikes, lockouts, etc.

External factors are those which take place outside an organization. They include:

• Energy crisis arising out of power cuts or shortage of coal or oil,
• Failure to achieve optimum capacity due to shortage of raw materials as a result of production set-backs in the supply industries, poor agricultural output because of natural reasons, changes in the import conditions, etc.

• Infrastructural problems like transport bottlenecks,

• Credit squeeze,

• Situations like market recession, changes in technology, etc.,

• International pressures or circumstances, etc.\textsuperscript{15}

\textbf{Prospects of the Engineering Industry in India:}

The prospects of the engineering industry are strongly correlated to the economic activity in the country especially in core sectors like power, infrastructure, mining, oil. Engineering companies derive their demand from capacity creations in these core sectors. Apart from them several other sectors including the manufacturing sector, consumer goods industry, automotive and process industries further provide indirect demand for engineering firms. With investment cycle on an upturn, government’s focus on improvement of infrastructure and capacity addition plans fructifying in various industries like metals (steel, copper, zinc etc.), refineries, power and textile, the engineering sector is likely to reap the benefits of the heightened economic activity.
On the broader basis, the growth of engineering companies is highly dependent on the level of private and public sector investment in the economy. Specially the power sector is one of the largest consumers of the engineering equipment and contributes significantly to the order book of engineering majors like Bharat Heavy Electrical Limited (BHEL), Asea Brown Boveri Limited (ABB), Siemens, L&T, etc. In the recent years many power projects have achieved financial closure. The government has also made a provision of financial support to the state governments to carry out the reforms in the power sector. From the single sector alone, engineering companies are likely to witness a surge in orders. This explains that such high investments in power are indicative of the demand for power from other sectors and thus indicates an upturn in the investment cycle from various other industries, which directly or in directly contributes to further orders for the engineering sector. Hence other engineering components like boilers, automation components or drives etc. will witness growth in demand in the near future. In such a scenario we may witness healthy order books for even the smaller engineering companies.¹⁶

India is emerging as a global design hub with an increasing number of multinational companies outsourcing industrial and engineering design tasks to India. These tasks are spread across different areas such as
semiconductors, aerospace, automotive, farming equipment, power and electronic equipment industries among others. The expertise of Indian designers is well known across countries like USA, Germany, France and UK. Hence, large multinational manufactures like Airbus, General Electric, Bosch, Toyota etc. have set up research and design centres in India and are now outsourcing design tasks to Indian design houses.

With increase in outsourcing of engineering services it is also set to become an Engineering Services Outsourcing (ESO) hub. ESO includes product design, research and development and other technical services across sectors like automotive, aerospace, telecom, utilities and construction/industrial machinery. This industry has already been showing robust growth rates. The global ESO market is expected to grow from US$ 15 billion in 2006 to US $ 150 billion in 2020, India’s share in global ESO market is estimated to increase to 25-30 per cent by 2020 from 12 per cent in 2006. This would take India’s ESO market size to US $ 50 billion. The Ministry of Commerce and Industry aims to increase the size of the engineering design segment to 1 per cent of the GDP in future.\textsuperscript{17}

The prospects of the engineering sector however, will depend upon some of the strategy initiatives of the government which may be summarized as follows:
• Development of industry vision for capital Goods Sector. Such common strategic vision will not only provide broad signals to investors but also assist in coordinating the efforts of all concerned stakeholders in identifying targeted strategic goals for production and exports, and developing guidelines for public-private recourses mobilization. [Associations-capital Goods Council, CII [Government - DIPP].

• Development and restructuring of infrastructure to support firms striving to improve technological capabilities and competitiveness.

• Drive for Public R&D institutes and laboratories to become more demand-driven and service-oriented, and make the resource allocation (government budgetary support) more performance driven. R&D institutes should acquire international accreditation for granting product certification in India and for providing in competition with private consulting firms, effective technological extension services in order to help firms improve their manufacturing and design capabilities. [Government- Department of Science & technology, National Competitiveness Council] [Supporting Players-R&D Institutes].
• Promotion of capital Goods industry networks for a consortium approach to industry R&D activities and integrated development of new product designs and production processes, with the intensive involvement of and collaboration with suppliers. [Association-Capital Goods Council, CIT] [Capital Goods Firms].

• Focus on selected manufacturing technological and products: Encourage capital Goods firms, through the dissemination of relevant information, to acquire arms length technology through technology licensing, technology transfer agreement, reverse engineering and adoption to build their own capabilities. [Associations- Capital Goods Council] [Government-TIFAC] [Capital Goods Firms].

• Promotion of technology based FDI partnerships between foreign and local enterprises especially in medium scale SMEs with the view of developing India as global outsourcing and subcontracting base (Government SME Development Council).18

World class infrastructure has emerged as one of the most important necessities for unleashing high and sustained growth and alleviation of poverty in any economy. And this poor infrastructure to support other growth initiatives, the Indian economy continues to be a laggard when
compared to its developing peers. From the policy perspective, however, there has been a growing consensus that a private-public partnership is required to remove difficulties concerning the development of infrastructure in the country. The realization finally seems to be setting in. This makes the future of the Indian engineering sector extremely bright.

The government’s initiative to bring clarity to the power sector reforms is a welcome sign for the industry. More coordination between the centre and the states for infrastructure development is a step in the right direction.

The shift in focus towards reducing transmission and development (T&D) losses will further increase the order book size of the companies operating in the realm. With power generation and distribution looking up, power equipment companies can look forward to a promising future.

Deregulation in the Indian context, combined with high global prices for crude has led to a surge in exploration and production (E&P) activities both domestically and globally. Also, there has been a radical change in the government’s approach to E&P activities in the country. This trust in development of new wells and improvement of output from old wells promises bright prospects for engineering companies.

Automation business has perked as the user industries started realizing its benefits. With increasing competition among the power
companies the consumers will demand better quality and uninterrupted power supply. In such a scenario automation will play an important role. With the automation technologies gaining momentum, companies like ABB and Siemens will benefit a lot going forward.

Capacity addition and de-bottlenecking exercise being carried by various industries like steel, power, refineries, chemicals etc. is likely to provide a fillip to the industrial segment of the engineering companies.

3.5. Concluding Remarks:

To conclude engineering sector has emerged as dynamic and vibrant sector of the Indian economy over the years since independence. The sector policy initiatives and policy support measures taken by the government have made this sector significant in terms of its weight in the index of industrial production, share in total investment, value of output, value added and employment of all industries. It also accounts for the highest share in number of foreign collaborations in industries. The industry is however, faced with various problems like low capacity utilization, rising cost of production, stiff competition in the international market etc. The industry has significant potential for future growth. Factors like infrastructure development, industrial growth and favourable policy regulations will largely determine its future growth.
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