CHAPTER II

ELECTRONICS INDUSTRY

The telecommunication and computer sectors are belong to electronics industry. Therefore, a need arises to provide an idea of the electronics industry, the ways it has been developed internationally and nationally over the period. An attempt has been made to examine the factors which contribute to the development and growth of electronics industry.

INTERNATIONAL SCENARIO

Recent electronics revolution has affected lives of millions the world over and pervading virtually in all spheres of their social and economic activities.

The growth and technological development in electronics have opened new avenues, and is establishing an undoubted position of supremacy.

Within just four decades of the invention of the transistor in 1946, followed by the integrated circuit in 1960 and miracle chip in 1980, today another change is leading to convergence of three major technologies i.e. computer, communication and microelectronics. In the last decade equipment has become smaller in size and its cost has also been reduced.

In the year 1987 the electronics production in the world was 50 billion U.S. dollars. The share of the developing countries was very insignificant before the 1970's. The progress in electronics prior to 1980's was mainly noticed in the industrialized countries. Japan maintained a growth rate of 20 percent, and
produced more than EEC countries production put together. From mid 1970’s a group of South-East Asian countries namely, South Korea, Taiwan, Hong Kong and Singapore recorded 20 percent annual growth rate, has been possible partly due to policies pursued by their governments which encouraged foreign investment, and relocation of enterprises from countries like USA for using cheap manpower resources.

Since 1982, world production has grown in value terms at the average rate of 13 percent. The share of developing countries in world production is estimated to be about 12 percent in 1987. The two major producers among developing countries were China and India.

The share of electronic product has risen from 9 percent of world trade in the 1970’s to 7.3 percent in 1986, although the relative cost of these products has dropped. In 1987 and 1988 the personal computer market indicated a growth rate of 27 percent. In the year 1989 Asian factories made more than five million units worth US $12.5 billion, and occupying 25 percent of the world market for PCs.

In 1984, the Americans were dominating the world market with 68 percent of the 15 million PCs sold. The Japanese were far behind with just 13 percent of the world market share. By 1988, the Americans share had shrunk down to 62 percent of the 19.2 million PCs while the Japanese share rose to 16 percent. Other beneficiaries were South Korea and Taiwan whose share in world market increased from two percent in 1984 to 10 percent in 1988.

The emergence of Japan in the computer segment and the arrival of mini-supercomputers changed the shape of the supercomputer
In 1988 sales in the total artificial intelligence market totalled to $42 million and it included language tools, applications, training, and hardware, as per report issued by Cutter Information Corp.

According to one estimate, the mid-range sector will grow at about 7.5 percent, the mainframe by 8-6 percent, and desktop computer market by 14.7 percent.

In the US, computer-aided design engineering and manufacturing systems grew by 19 percent in 1988 and the worldwide revenue totalled $8 billion.

The growing popularity of networks with the focus on 'client server' computing has affected almost every segment in the computer industry.

Portables and laptops are getting powerful, they are also becoming smaller, light weight, long battery life, low price and easy to use. Dataquest, the US research firm, estimates that the worldwide sales of portables should increase from 817,000 units in 1988 to more than 3.5 million in 1993.

INDIAN SCENARIO

India is on the threshold of an electronic revolution. Our government, realising the vital role played by electronics in increasing productivity and accelerating process of economic growth, has been announcing a number of liberal and promotional policy measures and incentives towards building an integrated, self reliant and vibrant electronic industrial base.
Electronics industry in India has achieved a remarkable growth rate during the last decade. During the sixth five-year plan period (1980-85), the compound growth rate was 25 per cent, which stepped up to 35 per cent during seventh plan (1985-90). In monetary terms, the production of electronics was to increase from Rs. 20,810 million in 1984-85 to Rs. 92,100 million in 1989-90.

Alongwith the increase in production, electronics exports during 1985-90 have grown at a cumulative annual rate of 40 percent compared to 27 percent achieved during 1980-85. It was estimated that by the end of 1989-90, the exports are likely to cross a figure of Rs. 8,500 million. The exports of software are estimated to increase from Rs. 300 million in 1985-86 to Rs. 1,750 million in 1989-90.

SEVENTH PLAN REVIEW

From seventh plan targets it is quite clear that the electronics industry is in the government's priority list of industries. To keep pace with technological advancement, a total outlay of Rs. 1,310 crores has been recommended for electronics by government of India in the seventh plan.

From the total proposed outlay of Rs. 1,310 crores, Rs. 550 crores has been earmarked for computer hardware and software sector (i.e. 42 per cent of total outlay), Rs. 310 crores for microelectronics (i.e. 23.6 per cent of total outlay), and Rs. 100 crores for telematics development (Electronic Switching System) (i.e. 7.6 percent of total outlay).

GOVERNMENT POLICIES

Several initiatives have been offered by the government in the
last few years in terms of policy measures. Some of these are given below in short:

i) A general liberalization in the licensing policy for electronic industry.

ii) Announcement of specific growth oriented policies for important sectors such as computers, components, telecommunication and entertainment electronics such as colour TVs etc.

iii) Planning of electronic industry under Schedule IX of the Income tax act, thereby making investments in electronics more attractive, by giving tax holiday, step and pay etc.

iv) Reduction in custom and excise duties and liberalization in the import policy, to enhance its production and make it more price attractive.

v) Special TV coverage plan to cover 70 per cent of the total population, to create awareness among masses.

Objectives of Electronics Plan (1985-90)

The policies formulated by the government of India as per Electronics plan prepared for 1985-90 by the Planning Commission are based on the following objectives:

The development of an integrated and self reliant industry in the country as rapidly as possible. The need is now to bring about a rapid spread of potential use of electronics amongst the people all over the country. It is, therefore, necessary not only to achieve leadership in production, create an internationally competitive base in electronics, adopt viable production, technologies, but also to develop our technology base in critical areas by strengthening R & D activities.

It has been stressed that the role of Department of Electronics (DoE) should be promotional rather than regulatory.
Government Policies for Eighth Plan (1990-95)
(Source: Annual Report 1989-90, Department of Electronics, India, pp.2-4, 6-7)

Working Group on Electronics Industry:

The Planning Commission constituted a Working group on electronics industry in September, 1988 under the chairmanship of the Secretary, Department of Electronics (DoE) to formulate eighth five year plan.

The final report of the working group was submitted to the Planning Commission in August, 1989.

Highlights of the Working Group Report

The main task during the eighth plan period is to achieve high level of growth in electronics production at near international technology, quality, costs and prices. The main endeavour would be to assist industries in earning foreign exchange through exports and as a sector does not remain a net consumer of foreign exchange.

The working group has recommended the following quantitative targets for the electronics industry during the eighth plan:

1. Production is targetted to grow at a compound rate of 7 percent. It will increase from Rs. 92,100 million in 1989-90 to Rs. 3,00,000 million in 1994-95.

2. Exports are targetted to grow to Rs. 63,000 million in 1994-95.

3. Investment of Rs. 60,000 million would be required to be made during Eighth Plan out of which 50 percent will be in the Components sector. The share of public sector investment would be Rs. 18,000 million and balance from private sector.

4. The share of public and private sector in production will change from the present 30:70 to about 23:77.
5. The total import requirements for electronics industry sector would be about Rs. 63,500 million.

6. Through increased export, efforts will be made to balance the foreign exchange requirements with an objective that by the end of Eighth Plan, electronics industry sector as a whole becomes Foreign Exchange (FE) neutral.

Licensing Policy and Coordination:

The following steps related to policy and procedural aspects concerning the electronics sector were taken during the year 1988 and 1989.

1. In June 1988, the government delicensed a large number of industries including major sectors of electronics for non-MRTP or non-FERA companies with certain conditions on investment limit, location and import requirements. In February 1989, the investment limit was further reduced to Rs. 50 million subject to certain conditions. This facility of delicensing was extended to a few more electronics items in July 1989, like modems and telephone amplifiers.

2. In March 1989, the government decided that an industrial unit holding a licence or registration for any finished equipment may manufacture components and parts required for that equipment not only to meet its own captive consumption but also for merchant sale in the market, provided turnover from sale of such components and parts shall not exceed 25 percent of the turnover of the finished equipment to which the components and parts are specifically reserved for small-scale or public sector. This facility is available to all companies including those covered by MRTP or FERA. This scale is allowed over and above the exports of such components and parts.

3. In June 1989, the government decided that Indian companies can acquire software companies abroad from out of the 30 percent of excess software export earnings made over and above the export obligation, in addition to the other options already available as per the policy within the overall limit.

4. In July 1989, consequent on the formation of the Telecom Commission, telecom items related to public networks were transferred to Department of Telecommunication as it became the administrative ministry for them.

5. With a view to promote export production, the government had provided for one time permission to all industrial undertakings, including MRTP or FERA companies, to manufacture items not covered by their existing licences, against export contracts. Administrative ministries were empowered to grant permission. In order to enable the Department of Industrial Development to monitor the foreign exchange earned on account of this facility, it has been decided with effect from September 1989, that such permissions would be granted by SIA, Ministry of Industry.
6. In February 1998, within the framework of the policy on computer software export, criteria for registration of software development organisation engaged in software development purpose was announced. In November 1989 criteria for registration was revised as follows:

a) The organisations which have installed computer systems including indigenous computer systems for development of software for export purposes and/or

b) Companies which have exported computer software as defined in the policy on Software Export, Software Development and Training announced by the government in December, 1986 to the tune of Rs. 2,00,000 or more per annum in the preceding year.

Fiscal and Import Policies:

In the budget 1989-90, overall increase in the level of custom and excise duty rates were announced. A revised list, in two parts viz. capital equipment for modernisation and balancing was announced with 40 percent and 60 percent duty rates. Excise duty on components applicable at 10 per cent was removed and tariff rates were made applicable. At the same time, countervailing duty (CVD), at tariff rates, was made applicable on imported materials.

Import-Export policy for electronics industry continued to remain liberal. Import of materials required for manufacture of components having no production base, continue to remain under OGL policy provisions pertaining to electronics components. Where production in quantity and quality have stabilised, it was reviewed from time to time and suitable protection was provided, so that continuous growth rate can be achieved.

PERFORMANCE OF ELECTRONICS INDUSTRY

A review of the performance of India's electronics industry during the seventh plan has revealed the following positive aspects:
1. The production of almost all types of electronics items has increased with marked improvement in quality of products. The prices of certain items like computers have reduced significantly.

2. An investment of Rs. 25,000 million has been made in the industry during the seventh plan (both public and private). From that substantial investment has been made in component and computer sectors.

3. Electronics is considered as the key sector of the economy, particularly application of process control and industrial electronics, has increased. In traditional industries like sugar, textiles etc. use of electronics has enabled improvement in techno-economics of operations, thereby productivity and total production in such industries have increased significantly.

4. A wide manufacturing base has been established both in small-scale sector and large scale units.

5. A large pool of technical manpower at various levels such as technicians, engineers and managers have been developed.

6. Substantial R & D and electronics application base has contemporary technologies or products.

7. Infrastructure has been built for standardisation, testing and quality control for which institutions such as CEOT, ER&D, etc. have been established.

8. Computers are being used in all sectors of economy including research, defence, railways, business, education and offices.
INDUSTRY PROFILE

Production base:
Our country has over 2,500 units engaged in electronics production. They include 11 central public sector units with 12 manufacturing establishments, over 60 state public sector units. Over 400 units are in organised private sector and more than 2,000 units are in small scale sector, apart from a number of unregistered smaller units.

The small scale sector contributes nearly 38 per cent of total output, as against 24 per cent by central public sector units. It also reveals that organised sector is contributing less in total output in compare to small scale sector.

Employment:
Total direct employment in electronics manufacturing industry has risen from 1,753,000 in 1981-82 to 2,60,000 in 1988-89 and to about 3 lakhs in 1989-90. In addition, an indirect employment of 2.5 lakhs persons is provided in the area of computer software, repair and services, auxiliary units, dealers and sales network.

The direct employment in private sector units has grown at a faster rate i.e. 23.5 per cent in compare to public sector units i.e. 4.5 per cent over the period i.e. 1981-82 to 1988-89.

Labour Productivity:
The labour productivity of public sector units has increased at a faster rate i.e. 221 per cent annually in compare to private sector units i.e. 41 per cent annually over the period. Among public sector units, central public sector units productivity is increased at a faster rate i.e. 581 per cent annually as against 29 per cent annually of state public sector units.

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Projections and Performance:

The production is projected to escalate to Rs. 1,00,000 million by the end of century. The break-up of projection is given below in the Table 2.1.

Table 2.1  Projection for the Electronics Industry

<table>
<thead>
<tr>
<th>Sector</th>
<th>Projection in Rs. million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer electronics</td>
<td>210,000</td>
</tr>
<tr>
<td>Industrial electronics</td>
<td>90,000</td>
</tr>
<tr>
<td>Computers and office automation</td>
<td>120,000</td>
</tr>
<tr>
<td>Software</td>
<td>200,000</td>
</tr>
<tr>
<td>Communications</td>
<td>120,000</td>
</tr>
<tr>
<td>Defence</td>
<td>60,000</td>
</tr>
<tr>
<td>Components</td>
<td>200,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

Source: Rai, V., "Indian Electronics Industry", Financial Express, Bombay, June 1, 1990, p. 4

Table 2.1 shows that consumer electronics sector will contribute nearly 21 per cent, software and components sector individually to 20 per cent and computer and communication sector individually to 12 per cent of total projections by 2000 A.D.

The total production of electronics during the year 1989 was worth Rs. 83,000 million compared to Rs. 63,000 million in 1988 and Rs. 47,200 million in 1987. The rate of growth achieved during 1989 was 31.7 per cent. This is despite the fact that consumer electronics, which accounts for about 55 per cent of total production, has shown only a marginal growth. The major growth has been in the communication, computers and electronic...
component sectors. The production and the growth trends for the last 5 years is given below in Table 2.2.

Table 2.2  Production and Growth Trends

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (Rs. in million)</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>18,900</td>
<td>39.0</td>
</tr>
<tr>
<td>1985</td>
<td>28,600</td>
<td>40.7</td>
</tr>
<tr>
<td>1986</td>
<td>34,600</td>
<td>30.1</td>
</tr>
<tr>
<td>1987</td>
<td>47,200</td>
<td>36.4</td>
</tr>
<tr>
<td>1988</td>
<td>63,000</td>
<td>33.5</td>
</tr>
<tr>
<td>1989</td>
<td>83,000</td>
<td>31.7</td>
</tr>
</tbody>
</table>

Source: "Electronics industry in India", Instruments and Electronics Developments, Sept., 1990, p. 30

The sectorwise production for the industry is given in Table 2.3 for the year 1981-1984 and in Table 2.4 for the year 1985-1989.

Table 2.3  Production of various Sectors of Electronics Industry (Rs. in millions)

<table>
<thead>
<tr>
<th>Sector/ Year</th>
<th>1981</th>
<th>1982</th>
<th>1983</th>
<th>1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Consumer electronics</td>
<td>2460</td>
<td>3370</td>
<td>3300</td>
<td>5870</td>
</tr>
<tr>
<td>2) Communication broadcasting equipment</td>
<td>1540</td>
<td>2550</td>
<td>2700</td>
<td>3205</td>
</tr>
<tr>
<td>3) Aerospace &amp; defence equipment</td>
<td>690</td>
<td>1085</td>
<td>1280</td>
<td>1490</td>
</tr>
<tr>
<td>4) Computer, control &amp; instrumentation</td>
<td>1885</td>
<td>2420</td>
<td>3290</td>
<td>4270</td>
</tr>
<tr>
<td>5) Electronics components</td>
<td>1730</td>
<td>2140</td>
<td>2300</td>
<td>3030</td>
</tr>
<tr>
<td>6) SEEPZ *</td>
<td>255</td>
<td>485</td>
<td>750</td>
<td>1035</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8560</td>
<td>12050</td>
<td>13600</td>
<td>13900</td>
</tr>
</tbody>
</table>

* SEEPZ means Santacruz Electronic Exports Processing Zone.

Table 2.4  Production of various Sectors of Electronics Industry

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Consumer electronics</td>
<td>10300</td>
<td>12750</td>
<td>18200</td>
<td>21000</td>
<td>28000</td>
</tr>
<tr>
<td>2) Industrial electronics</td>
<td>4040</td>
<td>5250</td>
<td>6850</td>
<td>9350</td>
<td>13100</td>
</tr>
<tr>
<td>3) Computers</td>
<td>1550</td>
<td>2800</td>
<td>3750</td>
<td>4860</td>
<td>7000</td>
</tr>
<tr>
<td>4) Communications and broadcasting</td>
<td>3800</td>
<td>5040</td>
<td>7100</td>
<td>9000</td>
<td>14250</td>
</tr>
<tr>
<td>5) Strategic electronics</td>
<td>1960</td>
<td>2220</td>
<td>3000</td>
<td>3900</td>
<td>5000</td>
</tr>
<tr>
<td>6) Electronics components</td>
<td>4100</td>
<td>5100</td>
<td>7000</td>
<td>10250</td>
<td>14400</td>
</tr>
<tr>
<td>7) Export processing zones</td>
<td>850</td>
<td>1440</td>
<td>1300</td>
<td>1640</td>
<td>2250</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26600</td>
<td>34600</td>
<td>47200</td>
<td>63000</td>
<td>83000</td>
</tr>
</tbody>
</table>

Source: "Electronics industry in India", Instruments and Electronics Development, Sept., 1990, p. 31

Table 2.3 and 2.4 depicts that production of electronics industry has grown at a rate of 107 per cent over the years i.e. 1981 to 1989. Among them consumer electronics sector has grown at a rate of 130 per cent, communication and broadcasting sector has grown at a rate of 34 per cent over the years.

Exports:

During the year 1989, electronics exports increased from Rs. 4,750 million in 1988 to Rs. 7,750 million, registering a growth of 63 per cent.
TECHNOLOGY DEVELOPMENT IN ELECTRONICS

The Electronics Commission was constituted on 1.2.1971 to review the field of electronics with full authority to formulate policy in the electronics field and to direct implementation of measures, both promotional and regulatory. The commission was reconstituted in August 1980 for formulating policies to promote the integrated and coordinated development of electronics industry in India and advise on connected matters. A further review was made of the development and it was felt that the commission played the role well, assigned to it. Now it was possible for the government, industry and P & D institutions to carry on the task. The commission was wound up in May 1989.

The Department of Electronics has been giving high priority for all round development of technology since its inception. Work in this area has been streamlined and strengthened to ensure that research, design and development is result-oriented and helps in indigenisation and has stressed on the increased share of domestic production of electronics items. Using the established mechanisms of supporting technology development, the Technology Development Council (TDC), the National Radar Council (NRC), the National Microelectronics Council (NMC) and the Electronic Materials Development Council (EMDC), a number of new projects are initiated for R & D. Time-bound projects are being implemented through separate scientific societies like Centre for Development of Advanced Computing (C-DAC), Society for Applied Microwave Electronics Engineering and Research (SAMEER) etc.

To encourage application-oriented research, design and development, Electronics Research and Development Centre, and Rural Electronics Technology Centre all are being strengthened.
CONCLUSION

In recent times, the world has witnessed one of the most spectacular revolutions. Today the electronics industry is leading to convergence of major technologies i.e. computer, communication and microelectronics.

The Indian government has announced number of liberal and promotional policies and incentive schemes to build an integrated, self reliant and vibrant electronic industry. As a result of this, electronic industry has achieved a remarkable growth during the last decade. During the sixth five year plan period (1980-85), the industry grew at a compound rate of 25 per cent. During the seventh five year plan period (1985-90), the growth rate of 35 per cent is likely to be achieved. Exports during 1985-90 have grown at a cumulative annual rate of 40 per cent compared to 27 per cent achieved during 1980-85. A large pool of technical manpower at various levels has been developed and nearly 5,50,000 employment opportunities have been generated by 1989-90. The production of electronics has shown the growth of 68 per cent over the years i.e. 1984 to 1989.

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18. Annual Report 1989-90, Department of Electronics, India, p. 1
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24. Ibid., p. 4
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