CHAPTER - III

COMPUTER INDUSTRY - A PROFILE
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- Methods to earn more

Indian Computer Industry
- Evolution of computers in India
- Characteristics of domestic companies
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3.1 INTRODUCTION

No technology in the World has shown more rapid progress than computers, where the astonishing improvement in price-performance has continued relentlessly for over a decade, and few technologies have had the impact on our lives and the way we work as information technology has done.

Both these trends appear to continue and accelerate during the next decade. Fortunately, India is already in line with the World in terms of availability of latest computing technology, though it continues to lag behind severely in terms of availability of infrastructure to enhance the benefits of computers. It is due to the absence of appropriate data communication networks, overstressed telecommunication networks, inadequate data links with the rest of the World and a range of services which become feasible through such networks.

During the next six years (i.e., 1995-2000), this gap between India and the developed nations will also be largely bridged enabling India to become a part of the global village.
The underlying technologies which have driven the performance of computers viz., digital and microprocessor technology and more powerful innovative software will make their impact in many other areas. Accordingly, as the cost of computing is driven down further, computers will be embedded for many different products.

As digital technology is adopted in telecommunications, entertainment electronics etc., the Country will see a rapid convergence of computers and communications and multifunctional appliances in offices and homes.

Finally, as software becomes more innovative, computers will become more user friendly. All these will further alter the way we work. For instance, voice recognition systems will be so simple that an executive need not suffer from computer phobia any more; they will also alter the traditional role of secretaries. Video conferencing will reduce the need for at least some business travel, and work groups will be able to function effectively without necessarily being in the same physical location.
The above trends will favour India to the extent that they play to India's strengths in software. However, implementation of new technologies and improvements in communication infrastructure will require enormous capital employment which will continue to be a constraint factor.

Many new services will become widely and competitively available in the Indian environment, such as E-Mail, EDI, Store and Forward fax and Database access. The availability of such services riding on data communication networks will have the capability of addressing voice requirements and will create pressures on dismantling the current telecom monopoly, but there will be only limited free competition in this area by the year 2000.

An important issue which should be addressed at this stage is to know as to what impact all these changes in technology will have on the way the organisations work. Organisations will increasingly see the value of information technology as a competitive weapon. This will, in turn, influence organisational structure, training methodologies and the skill sets needed to succeed both at individual and the organisational levels.
 CURRENTLY, quite a lot of restructuring is going on in the computer industry. While on the one hand, the world is coming out of a massive recession due to which the hardware industry has been adversely affected, on the other, certain new developments in technology have given hope for a repositioning of the computer industry.

In this scenario, many of the world's personal computer (PC) manufacturing companies are in trouble. Battered by falling prices, deepening recession in their key European markets, beset with soaring developmental costs and shrinking product life cycles, even the strongest PC makers are stumbling. With the industry's average net profit margin being reduced from 8% in 1990 to around 2% in 1993, many firms are wondering if there is any future in what was once the immensely profitable business of assembling PCs. In 1992 itself, though the unit sales of PCs increased by about 15%, the prices fell by about 30%. Even during 1993, sales continued to grow much more slowly (about 8%) though the prices of PCs were still stumbling.
Simultaneously, computer manufacturers have to introduce new products faster than ever. Two years ago, PCs spent a year in the catalogue before being replaced; now they last only six months. Further, these shortlived machines cost more to develop. A year ago, most of the PCs were based on Intel's 386 microprocessor chip (or its clones); now the majority of the PCs use its successor viz, the 486. This transition added up to 20% to computer makers' costs but the price of 486 based laptop PC is only 15% more than its 386 based equivalent. Now PC companies have to redesign their machines to take Intel's new pentium chip which is an even costlier process.

Added to their woes, the prices of memories used in computers have shot up by 100%. It is due to the explosion in Sumitomi Chemicals, Japan which is supplying 60% of World's epoxy resin used in the manufacture of memories. All these are hitting the industry hard. Major PC makers in US, France, etc are laying off their labour force and resorting to other cost cutting measures.
Methods To Earn More

With the objective of regaining their lost profits, PC manufacturers are resorting to new ideas like adding Compact Disc Read Only Memory (CDROM) drives or introduction of Personal Digital Assistants (PDAs) - hand held combinations of computer, electronic note pad and cellular communicator. According to Link Resources, a New York consultancy firm, the potential for this product world over will be 3.5 billion pieces by 1998. Big companies in US such as Apple Computers and Compaq are introducing this product to the market shortly.

Another method of regaining profits is through segmentation. Like every other mature industry in the past, PC makers are trying to carve out some niches. US's Leading Edge Products, a subsidiary of South Korea's Daewoo Telecom, is now aiming its PC systems at the office automation market, selling them as a package with faxes and other peripherals. Italy's Olivetti is doubling its number of PC models targeting each on a small niche. The theory is that, new found niches are less price sensitive and thus more profitable.
Reclaiming profits from chip makers is another idea being thought of by PC makers. While PC manufacturers are struggling to stay alive, the chip makers that supply them with microprocessors are clearing net profit margins of up to 27%. To get some of that back, PC companies are teaming up with semiconductor firms. Reclaiming profits from software firms is another method. Many computer manufacturers are planning to have tie ups with software manufacturers.

3.3 INDIAN COMPUTER INDUSTRY

As of mid 1992, the electronics industry including computers is the fourth largest industry in the world, after 'chemicals', 'oil and gas' and 'automobiles'. The industry's turnover ranges between US $630 billion and US $650 billion. In all probability, this industry is going to be the largest industry in the world by the end of this century. Indian domestic industry is a pigmy by comparison. The value of computers produced in India in 1983 was only Rs.0.78 billion which was increased by Rs.8.5 billion during 1993 as against world's production of Rs.20,250 billion. Computer production in India may reach Rs. 40 billion by 2000 A.D.

EVOLUTION OF COMPUTERS IN INDIA

India's exposure to computers began only in sixties with the installation of 2nd generation, IBM Mainframes using transistors. Subsequently, the third generation machines using ICs - IBM 360, 370 were introduced in seventies.

By 1978, India had 800 Mainframes maintained by Computer Maintenance Corporation after withdrawal of IBM.

During early eighties, even the fourth generation mainframes, using VLSI mounted in multilayered boards, had been introduced. While most of these mainframes were imported, a few domestic producers also emerged like ICIM, PSI-Bull, etc.

Advances in micro computing have revolutionised the industry. The advent of 8 bit and 16 bit microprocessors heralded a market segmentation. Initially, only large organisations could afford mainframe computers. The development of micros, minis and superminis brought computers within the reach of smaller organisations, firms and even individuals. Thus, emerged a sizable market for computers.
This was further facilitated by the technological developments like convergence of computers, controls and communications. High speed transmission of information through telecommunication - satellite, fibre optics, digital switches has contributed to the reduced cost of transmitting information.

As the computing power of microprocessors increased from 8 bit to 16 to 32 bit with provision for additions on memory and multibus architecture, the distinction between mainframe, superminis, minis and micros became somewhat blurred. A natural corollary to these advances was a consistent decline in the price per unit of processing power.

Decline in computer price has benefitted industries like aircraft, automobile, steel, petrochemical as also service industries like railways, airlines and telecommunications. Besides, it has resulted in the widening of the scope for widespread use of computers in all sectors of the economy.
The domestic computer industry is fragmented with over 150 units competing for a turnover of just Rs.14 billion. But what is interesting is the fact that the top ten units (7%) accounted for 79% of the turnover in 1992-93 and the remaining 21% turnover is enjoyed by 93% of the units.

The computer peripheral industry is comparatively a less fragmented one. Here also, 5 companies enjoyed over 73% of the turnover in 1992-93 and all other firms taking the remaining 27%.

Characteristics of Domestic Companies

The domestic computer industry is characterised by the predominance of PCs owing to a variety of reasons. PCs and minis account for 94% of the total number produced in 1992-93. As is known, the computer industry is highly import and capital intensive. Indian hardware prices are much higher than their counterparts' prices in the international market. High import intensity and a high tariff structure are two main reasons for the high price of Indian hardware. Due to these, the export content of computer hardware segment is negligible. The price comparison of computers in domestic and international markets is furnished in Table - 3.1.
## TABLE - 3.1

PRICE COMPARISON OF COMPUTERS IN DOMESTIC & INTERNATIONAL MARKETS

<table>
<thead>
<tr>
<th>Product</th>
<th>Domestic Price (Rs.)</th>
<th>International Market (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC AT286 system</td>
<td>40,000</td>
<td>15,500</td>
</tr>
<tr>
<td>PC AT386 system</td>
<td>78,000</td>
<td>30,000</td>
</tr>
<tr>
<td>PC AT486 system</td>
<td>98,000</td>
<td>40,000</td>
</tr>
<tr>
<td>5½&quot; FDD</td>
<td>2,500</td>
<td>1,100</td>
</tr>
<tr>
<td>Monochrome monitor</td>
<td>3,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Key Board</td>
<td>1,400</td>
<td>550</td>
</tr>
<tr>
<td>Dot Matrix printer</td>
<td>18,000</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Source: Business India, 15th Anniversary issue, 1993, P290
From the above, it can be seen that the domestic price of computer systems like PC AT 286, 386 & 486 cost over 2 to 2.6 times in the home market compared to the prices in the international market. But peripherals like 5½" Floppy disk drives, monitors, Key boards and Dot matrix printers cost 1.4 to 2.5 times only.

Since microcomputer has major share in the computer industry, its import intensity is highlighted here. A typical microcomputer system comprises of Microprocessor chip, Hard disk drive, Floppy disk drive, Power supply, Electronics and other sub-assemblies, Monitor, Keyboard, Printer (Optional), Plotter (Optional), Modem (Optional), Mouse (Optional), Digitizer (Optional), Interfaces (Optional), etc.

A brief analysis of the import content of each of the above items is made in the following paragraphs. Since India is not manufacturing, at present, microprocessor chips, they are currently being imported. Hard disk drives are also imported to a large extent as only low capacity hard disk drives are manufactured indigenously on a small scale. While the power supply is more or less wholly indigenous, the floppy disk drives may or may not be indigenous depending on the manufacturer's preferences. However, floppy disk drives are manufactured in India. As far as the assemblies are concerned a majority of them are imported. These include
ICs, LSI, VLSI, and Multi layered Printed Circuit Boards, certain types of capacitors, connectors, crystals, cables, transistors, inductance coils and switches, etc. However, certain other assemblies are manufactured indigenously. These include connectors, capacitors, transistors, wire, mechanical parts, some plastic parts, single layered PCBs, switches and sockets.

India also makes monochrome Monitors, Keyboards, Line & Dot Matrix Printers and certain types of Interfaces. The other items like Laser Printers, Mouse, Digitizers, etc are wholly imported. Even in the category of items which are manufactured in India, there is a substantial import content by way of components and raw materials. For instance, in the case of Dot matrix printers, components apart from ICs, capacitors and diodes have to be wholly imported. In the case of monitors, quite a few high value components like CRT tubes, Key switches, plastic cabinet, Deflection components and certain ICs, connectors, etc are being imported. Even in the case of Keyboards, cable assembly, LED, Switches and certain other components have to be imported. The indigenous parts in Hard disk and Floppy disk drives are imported steel parts, motors, Read/Write heads apart from ICs, etc.
Apart from importing the above items for which indigenous production is virtually non-existent, the manufacturers also import certain other components which are domestically available, as these components are not available in requisite quality or due to the reason that the indigenous components are costly.

Components that are domestically manufactured have a raw material content of about 50% of their value. These materials are Germanium, Silicon, Ferric Oxide, electronic grade chemicals, high purity metals and alloys, glass epoxy laminates, ceramics, etc.

An estimate by the Department of Electronics states that about 70% of these materials used in the making of components are wholly imported. This implies that the indigenous components manufacture has an imported content of at least 35% of their value. To this, the import content in capital goods used for manufacturing components, imported tools and moulds, imported designs and imported testing equipment are to be added. Consequently, the import intensity of any system is bound to be very high given the current state of manufacturing capacity.
All imported components invite customs and countervailing duty. To this, we should add import duty on raw materials used in the manufacture of domestically made components plus the import duty on capital goods and tools and moulds not to mention the excise duty on finished components and peripherals locally made, the excise duty and sales tax on the final assembled unit and the carrying costs, and octroi wherever applicable.

The details about the customs tariff on imported computer items are furnished in the following table (Table 3.2)

<table>
<thead>
<tr>
<th>SI. No.</th>
<th>Item</th>
<th>Basic duty (%)</th>
<th>Countervailing duty (%)</th>
<th>Total duty (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer Systems</td>
<td>80</td>
<td>15</td>
<td>107.0</td>
</tr>
<tr>
<td>2.</td>
<td>Peripherals</td>
<td>80</td>
<td>15</td>
<td>107.0</td>
</tr>
<tr>
<td>3.</td>
<td>Microprocessors &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>other components</td>
<td>80</td>
<td>15</td>
<td>107.0</td>
</tr>
<tr>
<td>4.</td>
<td>Memory</td>
<td>50</td>
<td>15</td>
<td>72.5</td>
</tr>
<tr>
<td>5.</td>
<td>Memory modules</td>
<td>80</td>
<td>20</td>
<td>116.0</td>
</tr>
<tr>
<td>6.</td>
<td>Populated PCBs</td>
<td>80</td>
<td>20</td>
<td>116.0</td>
</tr>
<tr>
<td>7.</td>
<td>Sub-assembly</td>
<td>80</td>
<td>15</td>
<td>107.0</td>
</tr>
<tr>
<td>8.</td>
<td>Software</td>
<td>85</td>
<td>--</td>
<td>85.0</td>
</tr>
</tbody>
</table>

The procedure used for computing tariff is explained below with a hypothetical illustration.

For instance for item No.1 (i.e., computer systems), let the CIF value be Rs.100. On this, 80% works out to Rs.80. Adding this to the CIF value, the total works out Rs.180. The countervailing duty of 15% is taken on this value and it comes to Rs27. Adding this to Rs.180, the total works out to Rs.207. Deducting CIF value of Rs.100, the total duty works out to Rs.107 (i.e., 107%). The duty is calculated likewise for other items.

The cascading effect of these duties on the final price of a finished system would be substantial. Therefore, it might be more economical for a user to import a finished system and pay the import duty on the final product. However, from the point of view of developing a strong and self-sustaining domestic computer industry, a certain degree of protection is essential and inevitable provided the indigenous hardware manufacturers make a deliberate and conscious effort to indigenise.

Problems

The computer manufacturing companies have been facing a number of problems. A few important problems are presented hereinunder:
1. Huge loss on hardware development
2. Low capacity utilization.
3. Working capital is being tied up in receivables and inventories.

It is the revenue from software and maintenance that is keeping them afloat.

Usage of computers in the Indian context is heavily hampered by the high cost of production. Import duty is very high at 107% for imported components. Resurgence of grey market has made the final products much cheaper. The securities scam caused knee jerk reactions among bankers and it resulted in the crippling credit squeeze applied to computer industry as this segment is reckoned as a non-priority sector.

With the objectives of globalising the computer manufacturing environment and making computer manufacturing internationally competitive, the Manufacturers' Association of Information Technology (MAIT) has submitted a memorandum to the Union Government of India listing out certain suggestions. The main recommendations are: rationalization of duty structure and simplification of procedure. These steps are expected to make the Indian hardware industry globally competitive. If these recommendations are implemented, the hardware industry is expected to witness a
growth rate of around 30% as against the current rate of 16%. Further, it is also expected that the implementation of the recommendations will result in an increase in the sales revenue from Rs.14 billion in 1993 to Rs.66 billion by 2000 registering an increase of 371%. As of 1993, India's performance from the point of view of sales turnover is very poor when compared to other Asian countries. The figures presented below substantiate this point:

TABLE - 3.3
SALES TURNOVER OF ASIAN COUNTRIES (HARDWARE)

<table>
<thead>
<tr>
<th>Country</th>
<th>Sales turnover (Rs. Billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1456.00</td>
</tr>
<tr>
<td>Taiwan</td>
<td>255.72</td>
</tr>
<tr>
<td>South Korea</td>
<td>87.10</td>
</tr>
<tr>
<td>China</td>
<td>61.28</td>
</tr>
<tr>
<td>India</td>
<td>14.00</td>
</tr>
</tbody>
</table>

Source: Data Quest, December 1993, p.26

From the figures in the table, it is obvious that the sales turnover of India in 1993 is the least among some of the Asian countries. It is less than 1% of Japan's turnover and about 5.5% of Taiwan's. Then again, it is about 16% of South Korea's and 23% of China's turnover.
In the light of the above, the computer hardware companies should identify niche areas for exports on the same lines as contract manufacturing being done by Pertech Computers Ltd (PCL) to DELL Computers USA and computer mother boards manufactured by Silicon Valley Technology being distributed in US. Image and Credibility are as important as quality of goods. Hence testing labs being made to certify the quality of goods will go a long way in promoting exports. Government and the industry should initiate measures on priority basis to encourage the exports. Inspite of many problems, the computer hardware industry has witnessed a phenomenal growth in recent years. Some details are shown in the following table.

### Table - 3.4
**Growth of Computer Hardware Industry**

<table>
<thead>
<tr>
<th>Years</th>
<th>Value (Rs. Million)</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>5,010.00</td>
<td>--</td>
</tr>
<tr>
<td>1989-90</td>
<td>7,040.00</td>
<td>40.50</td>
</tr>
<tr>
<td>1990-91</td>
<td>8,600.00</td>
<td>22.15</td>
</tr>
<tr>
<td>1991-92</td>
<td>9,680.00</td>
<td>12.55</td>
</tr>
<tr>
<td>1992-93</td>
<td>11,740.00</td>
<td>21.30</td>
</tr>
</tbody>
</table>

Source: Data Quest, July 1993, P.48
From the figures in the table, it is obvious that the value of output of the industry has registered an increase on a continuous basis. It increased from Rs.5,010 million in 1988-89 to Rs.7,040 million during 1989-90 to Rs.8,600 million during 1990-91, to Rs.9,680 million during 1991-92 and to Rs.11,740 million by 1992-93. This is a welcome trend. But what is unfortunate is the decline in the growth rate over the years. During 1989-90, the industry achieved a growth rate of 40.50% over the immediately preceding year. But this rate has decreased to 22.15% during 1990-91 and to 12.55% during 1991-92. The growth rate increased slightly during 1992-93. But still the rate of growth accomplished during 1992-93 was not at least equal to the growth rate achieved during 1989-90. These aspects are clearly depicted in the graph 3.1.
GROWTH OF COMPUTER HARDWARE INDUSTRY IN INDIA

Graph 3.1
Though the industry has succeeded in increasing the output continuously, it has failed to maintain the same trend in its exports. The figures presented below substantiate this point.

TABLE - 3.5

EXPORT PERFORMANCE OF COMPUTER HARDWARE INDUSTRY

<table>
<thead>
<tr>
<th>Years</th>
<th>Value (Rs. Million)</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989-90</td>
<td>515</td>
<td>--</td>
</tr>
<tr>
<td>1990-91</td>
<td>330</td>
<td>-36.00</td>
</tr>
<tr>
<td>1991-92</td>
<td>562</td>
<td>70.30</td>
</tr>
<tr>
<td>1992-93</td>
<td>300</td>
<td>-46.60</td>
</tr>
</tbody>
</table>

Source: Data Quest, July 1993, P.48

It could be seen that the industry has experienced both the increases and the decreases in its exports. During 1990-91, it earned a revenue of only Rs.330 million which is Rs.185 million lower than the revenue of Rs.515 million earned during 1989-90 accounting for 3% reduction. However, the industry has succeeded in improving the exports to earn a revenue of Rs.562 million which is 70.3% higher than that of 1990-91, performance. But, the industry has failed to maintain this trend and allowed it to decline during 1992-93 to Rs.300 million which is 46.6% lower than that of 1991-92 exports. Perhaps the most important reason for the decline in the export performance during 1992-93 was the splintered Soviet Union and the resulting Rupee-Rouble impasse in addition to others. Besides, one can also witness both the upward and the downward movements in the sales quantities of different systems. Table-3.6 furnishes the details about the sales volume.
TABLE - 3.6
NO. OF UNITS OF 'MICROS', 'MINIS & SUPERMINIS', & LARGE SYSTEMS SOLD.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Micros</th>
<th>Minis &amp; Superminis</th>
<th>Large Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>51715</td>
<td>2185</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1989-90</td>
<td>75786</td>
<td>2443</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>46.50</td>
<td>11.80</td>
<td>-69.50</td>
</tr>
<tr>
<td>1990-91</td>
<td>91308</td>
<td>3891</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>20.50</td>
<td>59.30</td>
<td>292.85</td>
</tr>
<tr>
<td>1991-92</td>
<td>103334</td>
<td>4688</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>13.20</td>
<td>20.50</td>
<td>21.80</td>
</tr>
<tr>
<td>1992-93</td>
<td>123379</td>
<td>4816</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>19.40</td>
<td>2.70</td>
<td>-6.00</td>
</tr>
</tbody>
</table>

Source: Data Quest July 1993, P.48

From the above table, the following facts become very clear.

i) The industry has experienced the increase in the sale of all types of computers during the last five years with an exception of sale of large systems during 1989-90 and 1992-93. The sale of large systems in the country declined from 46 in 1988-89 to just 14 during 1989-90 registering a decline to the extent of 69.5%.
ii) The growth rate in the sale of computers differs from one period to another. For instance, the industry was able to sell 46.5% more of micros during 1989-90 than the micros sold during 1988-89. But during the same period, the industry witnessed a decline in sale of large systems by 69.5% and the increase in the sale of minis and superminis was only by 11.8%.

iii) During the last five years, the growth rate in the sale of computers is as high as 139% in case of micros, 120% in case of minis and superminis and only 37% in case of large systems. Therefore, it can be said that the market trend is more towards the sale of micros than minis, superminis and large systems. These aspects are clearly depicted in the graphs 3.2, 3.3 and 3.4.
NUMBER OF UNITS OF 'MICROS' SOLD IN INDIA

Graph 3.2
NUMBER OF UNITS OF 'MINIS AND SUPER MINIS' SOLD IN INDIA

Graph 3.3
In addition to hardware, the industry also exports software. Figures state that, in recent years, the industry has achieved better performance in the export of software. The details are presented in the following table.

**TABLE - 3.7**

EXPORT PERFORMANCE OF COMPUTER SOFTWARE INDUSTRY

<table>
<thead>
<tr>
<th>Years</th>
<th>Value (Rs. Million)</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>1,000</td>
<td>--</td>
</tr>
<tr>
<td>1989-90</td>
<td>1,555</td>
<td>55.50</td>
</tr>
<tr>
<td>1990-91</td>
<td>2,354</td>
<td>51.40</td>
</tr>
<tr>
<td>1991-92</td>
<td>4,255</td>
<td>80.75</td>
</tr>
<tr>
<td>1992-93</td>
<td>6,704</td>
<td>57.50</td>
</tr>
</tbody>
</table>

Source: Data Quest, July 1993, P.66

From the above, it is evident that the industry has succeeded in improving its performance over the years. The value of software exports had increased from Rs.1,000 million in 1988-89 to Rs.6704 million by 1992-93 registering an overall growth of 570%. Though the industry has succeeded in improving its export
performance during the five year period, it has failed to maintain the growth rate consistently. For instance, during 1991-92, its growth rate was as high as 80.75% but it declined to 57.5% during 1992-93.

**COMPUTER UTILISATION IN INDIA**

Computer production and use in India:

Consequent to the policy decisions taken by the Government to strengthen the computer industry in the recent past, the indigenous production of computers and related items has gone up to Rs. 8,500 million by 1993 from Rs. 920 million in 1984. The rate of increase comes to 8.24 times (824%) over a period of just 10 years. The mini/micro systems have reached a level of 1,28,000 units in 1993 compared to only 3,000 systems in 1984 registering an increase by 42 times over the same period.

At present, more than 300 companies of different sizes are engaged in the production of computers and related items including software.
As the export of computers is insignificant (less than 4% in 1993), we can say that the computer systems and related items produced so far are mostly used within the Country. Apart from the indigenous production, a large quantity of computer and computer based systems are imported primarily from U.S.A and far Eastern Countries. Combining these two facts, we can infer that computer use in India has gone up substantially in the recent past. The following are the important reasons for the substantial increase in the use of computers in India.

(i) A strong emphasis by the Government on modernization programmes;

(ii) Computer awareness within some private sector firms especially for multinational co-operations;

(iii) Personal computers becoming the status symbol of individuals and groups; and

(iv) Substantial reduction in the costs due to the Government policy. In the process, it can be seen that the use of computers in industry, banking, insurance, Government and other sectors is picking up.
EXTENT OF EFFECTIVE UTILIZATION

The increased production and use of computers however do not imply their effective utilization. One can buy a computer and use it merely for word processing or for some trivial task. But, in order to feel the impact of computers, one has to learn to utilize it effectively. One has to get or write appropriate packages suitable for one's environment and build up an infrastructure. It is a tool to increase the effectiveness of work in different sectors of society which would lead to an overall growth of the national economy or bring about substantial societal benefits. Though the computer use in India has gone up substantially in the recent past, it has not yet made the expected impact on the overall economic growth. The reason may be the lack of effective utilization of the computers to increase the productivity and quality of the product.

While we need not be ecstatic about the current growth of computer production and use in the Country, we can certainly be optimistic, looking to the possible trends, as some sectors have shown reasonable growth and efficiency after computerization. For example, the leading newspaper houses have shown a substantial growth after they switched to computer based phototype setting. Some process industries have shown optimal fuel and raw material utilization after installation of some form of process control computers.
Railways and Airlines reservations have demonstrated promising efficiency after they switched over to computer based reservation systems. Still, there are massive computerization programs in the pipeline. e.g., modernisation of steel and fertilizer industry.

Office automation in general has demonstrated limited success. Social factors including business ethics are not conducive to large scale office automation. While there are a few cases of proper utilization, there are numerous cases where computers are under-utilized or not properly utilized. The current growth rate of computer production and usage in India has so far had a very little impact on the overall economy of the Country.

Factors Affecting Effective Utilization

There are a number of factors which affect the effective utilisation of computers. These factors can be classified into technological factors, socio-economic factors and socio-cultural factors.
Technological Factors:

The computer is essentially an imported technology in India. It has come before its need has been felt. Therefore, in order to make full use of this transplanted technology, we should have the technical capacity to absorb it and the innovative capacity to go beyond to suit it to our needs.

Computers in some form can be used in any sector starting from small shops to large organizations. A user has to work out his requirement to see how he can use a computer in the sector he is associated with. He has to specify the system requirement starting from system specification, interfaces and peripheral and software requirement. A computer manufacturer should have the capability to guide and help the user in this regard. Unfortunately, not many vendors have this technical competence. This competence has to be acquired in a number of areas like, application package software, system software, firmware, hardware and possibly chip design.
Socio-economic Factors:

There is a common apprehension that computerization will adversely affect our economy and socio fabric by creating widespread unemployment and hence it is not at all suited for our Country. Based on this notion, trade unions have objected and resisted computerisation in the corporate sector.

But, there is no historical evidence to support such a belief. On the contrary, the experiences of industrialized countries indicate that automation has created jobs through business expansion and by opening up new avenues for employment in the servicing and distribution centres.

It needs only a careful manpower adjustment programme and retraining of the employees to fit them in the new work process. It is a well established fact that it is not the technology perse but the lack of overall economic growth which is responsible for unemployment. Hence we have to look forward for an overall economic growth rather than blaming the technology.
It is true that computerization tends to be a cause of worry and anxiety to certain weak and handicapped sections of workers. But the problem faced by them cannot be resolved by perpetuating outdated and inefficient techniques. On the other hand, suitable manpower relocation programs and other related policies have to be taken to ensure employment protection.

To sum up, the general misapprehension amongst trade unions and workers about the adverse economic impact of computers has to be removed. This needs conscious effort from the Government and the management. People should learn to think that it is the lack of overall economic growth and short sighted management policies which are responsible for unemployment and not new technologies.

Socio-cultural Factors:

There is another factor (i.e., the socio-cultural factor) which coupled with the lack of technological competence and innovative spirit of the management on the one hand and resistance from the workers due to Socio-economic reasons on the other has inhibited computerization.
These factors which are operative for both management and workers have hindered the efficient adoption and effective use of the computer.

Since India is predominantly an agrarian economy and a conservative society, it took the Country a long time to absorb industrialization. Indians are basically orthodox in nature and reluctant to adapt to changes. Inducting computers produces a sudden change in the nature of the organization. It changes the job content of both managers and workers and the interactional pattern within the organizations, mode of control and communication, nature of job and so on. As a result, the organisations often find it difficult to cope up with this change.

Computing therefore has to be seen as a culture rather than simply as a tool. Unless we are culturally aware and make ourselves compatible with the social organisation of computing, it would be far more difficult for us to absorb it.

Governmental efforts:

In the recent past, the Government has put in a lot of effort to promote computer technology and culture throughout the Country. The Department of Electronics has initiated a number of programmes. Some of the important programmes are indentified hereinunder:
1. (i) Appropriate Automation Promotion Programme.

To promote the concept of computer based automation techniques suitable in the Indian context through short term courses, workshops and industrial interaction and help users in different sectors to computerize.

(ii) Microprocessors Applied Engineering Programme:

To promote the usage of processor based systems in different areas through courses, workshops, research and development and providing active help to users.

(iii) Class Project:

To promote computer usage in schools as a teaching media. In this project, school teachers are trained on various aspects of elementary computing and so on.

2. The Department of Electronics has created a number of centres and projects operating independently in leading technical Institutes to undertake research and development on advanced computing and its application.
It includes Very Large Scale Integration (VLSI) design centres, CAD/CAM centres, projects for Centre for Development of Advanced Computing (CDAC) for development mainly in the domain of Super Computers. It has created NCST as a National Centre for Software development.

Apart from this, the Department of Science and Technology (DST) has also sponsored a number of projects on computers and related areas in different academic institutions. There is a strong emphasis on manpower development and training in this area at various levels.

Apart from the Government efforts, there is a growing number of small private computer education centres which offer short term courses mainly on computer programming and personal computer usage. These short term courses offered by small private centres are becoming popular and they are playing a role in creating computer awareness mostly among young people in urban area.
COMPUTER EDUCATION:

There are a few magazines (like Computer Age, Computer Today, Computer Education, Data Quest, Computers and Communications and other science magazines) which are also playing a role in propagating the computer awareness among the general readers.

In spite of all these efforts, the computer has still not become a part of our work place culture. The non-experts and common people who will eventually be the computer users still have a strong psychological barrier which prevents them from imbibing the computer culture.

3.4 COMPUTER INDUSTRY - SCENARIO IN BANGALORE AND MYSORE

Bangalore is one of the fastest growing cities in the Country. A large number of industrial undertakings including the public sector undertakings like Bharat Electronics Ltd., Indian Telephone Industries, Bharat Heavy Electricals Ltd., Hindusthan Aeronautics Ltd., Hindusthan Machine Tools Ltd., Bharat Earth Movers Ltd., are located in this city. Hence, it is called the Electronics City of South India.

There are 14 established computer manufacturers in Bangalore, besides about 120 Software consultants. Leading computer manufacturers in the Country have established their offices and dealer network in Bangalore. In Mysore, there are 2 computer
manufacturing units. Details of computer manufacturers in Bangalore and Mysore are given below (Table 3.8)

**TABLE - 3.8**

COMPUTER MANUFACTURERS IN BANGALORE AND MYSORE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Wipro Infotech Limited</td>
</tr>
<tr>
<td>02.</td>
<td>Digital Equipment India Limited</td>
</tr>
<tr>
<td>03.</td>
<td>PSI Data Systems Limited</td>
</tr>
<tr>
<td>04.</td>
<td>Microland Limited</td>
</tr>
<tr>
<td>05.</td>
<td>Tata Elxsi (India) Limited</td>
</tr>
<tr>
<td>06.</td>
<td>Keonics Magnavision Limited</td>
</tr>
<tr>
<td>07.</td>
<td>Advance Micronic Devices Limited</td>
</tr>
<tr>
<td>08.</td>
<td>South Asian Computers Limited</td>
</tr>
<tr>
<td>09.</td>
<td>Sunray Computers Private Limited</td>
</tr>
<tr>
<td>10.</td>
<td>Ultra Business Machines</td>
</tr>
<tr>
<td>11.</td>
<td>Computek</td>
</tr>
<tr>
<td>12.</td>
<td>Kirloskar Electric Company Limited</td>
</tr>
<tr>
<td>13.</td>
<td>Microadvance</td>
</tr>
<tr>
<td>14.</td>
<td>Sparrow Electronics Private Limited</td>
</tr>
<tr>
<td>15.</td>
<td>Apollo Computers</td>
</tr>
<tr>
<td>16.</td>
<td>Bion Computers Private Limited</td>
</tr>
</tbody>
</table>

Source: Personal Survey Data
3.5 PROFILE OF COMPUTER UNITS

Computer Units located in Bangalore and Mysore and selected for this study are analysed very briefly in the following pages.

Wipro Infotech Ltd., is one of the leading manufacturers of computers in the Country. It was started in 1981. It has its registered office in Bombay and the factory is located at Mysore. It manufactures micros, minis, work stations and printers. Its collaborators are Sun Microsystems, USA and Seiko Epson, Japan. It is also representing Tandem Corporation, USA for micros.

The company employed a total capital of Rs. 9,754 Lakh by March 31, 1993. During the year 1992-93, the company earned a sales revenue of Rs.2,298 lakh and exported Rs.90 lakh worth of computers. 1,695 employees are working in this unit.

Digital Equipment India Ltd., is the second biggest computer manufacturer located here. It was started in 1988. Its registered office is located at Bombay and works at Bangalore.
It manufactures large systems (Mainframes) and minis. It has collaboration with Digital Equipment Corporation, USA. It is also representing Apple Computers, USA for Micros.

During the year 1992-93, the company has earned a revenue of Rs.7,900 lakh from the sales in the domestic market and another Rs.3,270 lakh from export sales. 983 employees are working in this unit. By March 31, 1992, it had employed a capital Rs.4,674 Lakh.

PSI Data Systems Ltd., is one of the oldest companies in Bangalore. It was started 1976. Its registered office is located at Kochi in Kerala and the Factory operates at Bangalore.

It manufactures mainframes and minis. It has collaborated with Bull SA France. The company has employed a capital of Rs.4,284 lakh by March 31, 1993. It has earned a sales revenue of Rs.30 lakh from the domestic market and Rs.1,510 lakh from export sales. 212 employees are working in this unit.

Microland Ltd., started its operations in the year 1989. Both the registered office and the manufacturing plant are located in Bangalore.
It produces micros and represents Compaq, USA as a distributor for their range of computers. The amount of capital employed as on March 31, 1993 was Rs. 200 Lakh. It has earned a net sales revenue of Rs. 1,810 lakh during 1992-93. 218 employees are working in this unit.

Tata Elxsi (India) Ltd., was started in 1989. Both the registered office and the manufacturing plant are located at Bangalore. It produces mainframes. Its collaborator is Silicon Graphics Inc. USA.

The amount of capital employed as on March 31, 1993 was Rs. 1,774 lakh. It had earned a net sales revenue of Rs. 1,710 lakh during 1992-93. 184 employees are working in this unit.

Keonics Magnavision Ltd., was started in 1986. Both the registered office and the manufacturing plant are located in Bangalore. It produces micros. The amount of capital employed as on March 31, 1993 was Rs. 100 lakh. It had earned a revenue of Rs. 600 lakh during 1992-93. In total, 145 employees are working in this unit.

Advanced Micronic Devices Private Limited., was started in 1980. Both the registered office and the manufacturing plant are located in Bangalore.
It produces micros. It also undertakes software consultancy. It represents AST, USA as a distributor for their range of computers.

The amount of capital employed as on March 31, 1993 was Rs.50 Lakh. It had earned a net sales revenue of Rs.550 lakh during 92-93. 65 employees work in this unit.

South Asian Computers Ltd., was started in 1985. Its registered office is located in Delhi and the manufacturing plant at Bangalore. It produces micros. The amount of capital employed as on March 31, 1993 was Rs.100 lakh. It had earned a net sale revenue of Rs.420 lakh during 92-93. In total, 94 persons are employed in this unit.

Sunray Computers Private Limited was started in 1983. Both the registered office and the manufacturing plant are located at Bangalore.

It produces minis and micros. Its collaborators are Charles River Data Systems and Mercury Systems Inc. USA. The capital employed as on March 31, 1993 was Rs.50 lakh. It had earned a net sales revenue of Rs.400 lakh during 1992-93. 50 employees are working in this unit.
Ultra Business Machines was started in the year 1981. Both the registered office and the manufacturing plant of the company are located at Bangalore. It produces minis and micros. Its collaborators are Themis Computers, France; VMIC, USA; and Bray Electronics, USA. The capital employed as on March 31, 1993 was Rs.30 lakh. It had earned a net sales revenue of Rs.310 lakh during 1992-93. 42 employees are working in this unit.

Computek was started in 1987. Both the registered office and the manufacturing plant are located at Bangalore. It produces micros and also undertakes third party maintenance of computers. The capital employed as on March 31, 1993 was Rs.30 lakh. It had earned a net sales revenue of Rs.210 lakh during 1992-93. In total, 84 employees are working in this unit.

Kirloskar Electric Company Limited was started in 1988. This company belongs to the Kirloskar group. The registered office is located at Bangalore and the manufacturing plant at Mysore.

It produces minis and micros. The amount of Capital employed as on March 31, 1993 was Rs.180 lakh. It had earned a net sales revenue of Rs.240 lakh during 1992-93. 46 employees are working in this unit.
Microadvance was started in 1982. Both the registered office and the manufacturing plant are located at Bangalore. It produces micros. The capital employed as on March 31, 1993 was Rs.30 lakh. It had earned a net sales revenue of Rs.150 lakh during 1992-93. 40 employees work in this unit.

Sparrow Electronics Private Limited was started in 1989. Both the registered office and the manufacturing plant are located at Bangalore. The capital employed as on March 31, 1993 was Rs.30 lakh. It had earned a net sales revenue of Rs.120 lakh during 1992-93. 25 employees are working in this unit.

Apollo Computers was started in 1986. Both the registered office and the manufacturing plant are located at Bangalore. It produces micros and also undertakes third party maintenance of computers. The capital employed as on March 31, 1993 was Rs.20 lakh. It had earned a net sales revenue of Rs.50 lakh during 1992-93. 28 employees are working in this unit.

Bion Computers Private Limited was started in 1990. Both the registered office and the manufacturing plant are located at Bangalore. It produces micros and also undertakes third party maintenance of computers. The amount of capital

- 95 -
employed as on March 31, 1993 was Rs.20 lakh. It had earned net sales revenue of Rs.50 lakh during 1992-93. 20 employees work in this unit.

A summary of the above analysis of the units covered by the study is presented hereunder:

**TABLE - 3.9**

**YEAR OF ESTABLISHMENT, CAPITAL EMPLOYED, REVENUE**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Company</th>
<th>Year of Establishment</th>
<th>Capital Employed as on 31-03-93 (Rs. lakh)</th>
<th>Revenue Earned during 1992-93 (Rs. lakh)</th>
<th>No. of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Wipro Infotech Ltd</td>
<td>1981</td>
<td>9754</td>
<td>22980</td>
<td>900</td>
</tr>
<tr>
<td>02</td>
<td>Digital Equipment India Limited</td>
<td>1988</td>
<td>4674</td>
<td>7900</td>
<td>23880</td>
</tr>
<tr>
<td>03</td>
<td>PSI Data Systems Limited</td>
<td>1976</td>
<td>4284</td>
<td>300</td>
<td>1695</td>
</tr>
<tr>
<td>04</td>
<td>Microland Limited</td>
<td>1989</td>
<td>200</td>
<td>1810</td>
<td>1510</td>
</tr>
<tr>
<td>05</td>
<td>Tata Elxsi (India) Limited</td>
<td>1989</td>
<td>1774</td>
<td>1710</td>
<td>1810</td>
</tr>
<tr>
<td>06</td>
<td>Keonics Magnavision Limited</td>
<td>1986</td>
<td>100</td>
<td>600</td>
<td>184</td>
</tr>
<tr>
<td>07</td>
<td>Advanced Micronic Devices Pvt Ltd</td>
<td>1980</td>
<td>50</td>
<td>550</td>
<td>65</td>
</tr>
<tr>
<td>No.</td>
<td>Company Name</td>
<td>Year</td>
<td>Sales</td>
<td>Profits</td>
<td>Sales</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>08.</td>
<td>South Asian Computers Ltd</td>
<td>1985</td>
<td>100</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td>09.</td>
<td>Sunray Computers Private Limited</td>
<td>1983</td>
<td>50</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>10.</td>
<td>Ultra Business Machines</td>
<td>1981</td>
<td>30</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>11.</td>
<td>Computek</td>
<td>1987</td>
<td>30</td>
<td>270</td>
<td>270</td>
</tr>
<tr>
<td>13.</td>
<td>Micro advance</td>
<td>1982</td>
<td>30</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>14.</td>
<td>Sparrow Electronics Private Limited</td>
<td>1989</td>
<td>30</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>15.</td>
<td>Apollo Computers</td>
<td>1986</td>
<td>20</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>16.</td>
<td>Bion Computers Private Limited</td>
<td>1990</td>
<td>20</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Personal Survey Data.

The following additional aspects are also useful to get an idea about the profile of computer units selected for this study.

1) Form of the organisations: The units covered by this study comprise of both the firms, private and public limited companies. This is as evident from the following:
**TABLE - 3.10**

**FORM OF THE ORGANISATIONS**

<table>
<thead>
<tr>
<th>Form of Organisation</th>
<th>Number of companies</th>
<th>% to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnership</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Private Limited Company</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Public Limited Company</td>
<td>8</td>
<td>50</td>
</tr>
</tbody>
</table>

**TOTAL** 16 100

Source: Personal Survey Data

From the above, it is obvious that out of 16 units, 4 accounting to 25% are partnership firms, another 4 companies which works out to 25% are Private Limited companies and the remaining 8 companies which come to 50% of the total units are Public limited companies.

2. Experience: The units taken for this study comprise of both the newly established companies and the companies established long ago. This is evident from the following table.
### TABLE - 3.11

**DISTRIBUTION OF MANUFACTURERS BY EXPERIENCE**

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of companies</th>
<th>% to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 5 years</td>
<td>4</td>
<td>25.00</td>
</tr>
<tr>
<td>5 to 10 years</td>
<td>6</td>
<td>37.50</td>
</tr>
<tr>
<td>10 to 15 years</td>
<td>5</td>
<td>31.25</td>
</tr>
<tr>
<td>15 to 20 years</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

*Source: Personal Survey Data*

Out of 16 units, 4 units were established during the last 5 years, 6 units 5 to 10 years ago and the remaining 6 units between 10 to 20 years back. That means, more than 50% of the units covered by this study have been established during the last 10 years.

3. **Capital Employed**: The amount of capital employed differs from one unit to another which is evident from Table-3.12.
TABLE - 3.12
CAPITAL EMPLOYED IN MANUFACTURING COMPANIES

<table>
<thead>
<tr>
<th>Capital employed (Rs. in Crores)</th>
<th>Number of Companies</th>
<th>% to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10</td>
<td>12</td>
<td>75.00</td>
</tr>
<tr>
<td>10 - 20</td>
<td>01</td>
<td>6.25</td>
</tr>
<tr>
<td>20 &amp; above</td>
<td>03</td>
<td>18.75</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Personal Survey data

From the above, it is obvious that the majority of the units (viz, 12 units forming 75% of the total number of units under study) have employed less than Rs.10 crore of capital each. 1 unit has employed a capital of Rs.10 crore to Rs.20 crore and the remaining 3 units have employed capital of more than Rs.20 crore each.
4. Production Capacity: Out of 16 companies under study, one is manufacturing mainframes, two are manufacturing mainframes and minis. 4 companies are manufacturing minis and micros and the remaining 9 are manufacturing only micros. These companies differ from one to another depending upon the product/s they are producing and the licensed capacity. The details are furnished in the following tables.

**TABLE - 3.13**

**ANNUAL PRODUCTION CAPACITY : MAIN FRAMES**

<table>
<thead>
<tr>
<th>Licensed Production Capacity (Nos)</th>
<th>No. of Companies</th>
<th>% age to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Above 100</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Personal Survey Data

Out of 16 companies under study, only 3 are manufacturing mainframes. Out of these 3, two have an annual capacity of 100 or less than 100 units each (i.e., mainframes) and the third company has the licence to produce more than 100 units a year.
### TABLE - 3.14

**ANNUAL PRODUCTION CAPACITY : MINIS**

<table>
<thead>
<tr>
<th>Licensed Production Capacity (Nos)</th>
<th>No. of Companies</th>
<th>% age to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>1</td>
<td>16.70</td>
</tr>
<tr>
<td>100 - 200</td>
<td>4</td>
<td>66.60</td>
</tr>
<tr>
<td>Above 200</td>
<td>1</td>
<td>16.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

*Source: Personal Survey Data*

Only 6 companies, out of 16 under study, are manufacturing minis. Out of these, 4 have an annual capacity of 100-200 units each. One has less-than 100 units of annual production capacity and another has more-than 200 units of annual production capacity.
TABLE - 3.15
ANNUAL PRODUCTION CAPACITY : MICROS

<table>
<thead>
<tr>
<th>Licensed Production Capacity (Nos)</th>
<th>No. of manufacturers</th>
<th>% age to Total manufacturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1000</td>
<td>3</td>
<td>23.07</td>
</tr>
<tr>
<td>1000 - 5000</td>
<td>9</td>
<td>69.23</td>
</tr>
<tr>
<td>Above 5000</td>
<td>1</td>
<td>7.70</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source : Personal Survey Data

From the above, it is obvious that out of 13 companies manufacturing micros, 9 have the production capacity ranging from 1000 to 5000 units each annually. Of the remaining 4, 3 have less than 1000 units of annual capacity each and the last one has an annual capacity of more than 5000 units.
3.6 MARKET SEGMENTATION

Market segmentation is a relatively recent and revolutionary concept in computer business circles. Market segmentation represents the subdividing of a market into homogeneous subsets of customers, where any subset may conceivably be selected as a market target to be reached with a distinct marketing mix.

The opportunity present in a market increases when the seller recognizes that it is made up of many parts not all of which are likely to be receiving complete satisfaction from current offerings of sellers.

The seller who is alert to the needs of different market segments may gain in three ways:

1. He is in a better position to spot and compare marketing opportunities. He can examine the needs of each segment against the current competitive offerings and determine the extent of current satisfaction. Segments with relatively low levels of satisfaction from current offerings may represent excellent marketing opportunities.
2. The seller can use his knowledge of the marketing response differences of the various market segments to guide the allocation of his total marketing budget. The ultimate basis for meaningful segmentation is the differences in customer response to different marketing tools. These response differences become the basis for deciding the allocation of company's marketing funds to different customers.

3. The seller can make proper adjustments of his product and marketing appeals. Instead of one marketing programme aimed to draw in all potential buyers, the seller can create separate marketing programmes aimed to meet the needs of different buyers.

Markets can be segmented on geographic, demographic, psychographic, and buyer-behaviour variables. The idea of market segmentation itself is evolved through several stages, those of geographic, demographic, psychographic, benefit, volume, marketing-factor segmentation, and most recently, product-space segmentation. To be ultimately useful, the segments should be measurable, accessible, and substantial.
Companies have used different strategies due to the existence of different market segments. Some ignoring them (undifferentiated marketing), some developing a variety of products and marketing programmes to meet different needs (differentiated marketing) and some going after a few segments (concentrated marketing). No particular strategy is superior to others in all circumstances. There can be undifferentiation over differentiation or over concentration. Much depends on such characteristics as company resources, product homogeneity, product stage in the life cycle, market homogeneity, and competitive marketing strategies. The company must analyze the attractiveness of the different market segments as a prelude to setting market target goals and allocations of company resources.

Market Segmentation for Computers:
At the outset, market for computers is divided into zones/regions. In each zone/region, market segmentation for computers is generally based on the type of endusers viz, small accounts like, individual buyers, small organizations, etc and large accounts like, corporate accounts, public sector undertakings, etc. Small accounts are handled by dealers and large accounts by manufacturers.
3.7 THE ORGANISATIONAL SETUP FOR MARKETING FUNCTION

Marketing has evolved over the years from a simple sales function to a complex group of functions. Kotler explains four stages in this long evolution.

Simple Sales Department: In the first stage, selling was one of the functional areas of management. The head of the sales department handled all functions related to selling.

Sales Department with Ancillary Marketing

Functions: As the company expands to serve new types of customers or new geographical areas, it needs to develop certain marketing functions like, market research, advertising, sales promotion, etc. The head of the sales department may appoint a marketing manager to manage these new marketing functions.

Separate Marketing Department: The continued growth of the corporate sector calls for the expansion of other marketing functions - marketing research, new product development, advertising and sales promotion, customer service - relative to sales force activity. The managing director of the company may find the need for establishing a separate marketing department, independent of the sales department. The head of marketing department, along with the head of the sales department, reports to the managing director.

Modern Marketing Department: When the sales and the marketing departments are independent of each other, conflict between sales and marketing may arise, and in order to achieve the desired integration between all marketing and sales activities, the head of marketing is placed in-charge of everything including sales management. After this eventual evolution, the marketing organisation may assume the broad structure as shown in Figure 3.1.
A MODERN MARKETING ORGANISATION

MANAGING DIRECTOR

Vice President or Director, Finance

Vice President or Director, Personnel

Vice President or Director, Manufacturing

Vice President or Director, Marketing

Planning and Development

Physical Distribution

Sales Management

Strategic Marketing

Marketing Research

Advertising and Sales Promotion

Sales Personnel

Selling

Sales Service

Figure - 3.1
WAYS OF ORGANIZING THE MODERN MARKETING DEPARTMENT

All marketing organizations must provide for the four basic dimensions of marketing activity: Functions, Geographical areas, Products and Customer markets.

Functional Organisation: The most common form of marketing organisation consists of functional marketing specialists reporting to a marketing vice president or Director (Marketing) who coordinates their activities. If the number of persons reporting to the marketing vice president becomes too large, they can be grouped into two or three sub groups:

1) Planning and Development: Strategic planning, product development, marketing research, advertising and sales promotion.

2) Physical Distribution: Transportation, warehousing and storage, packaging, inventory control and material handling; and

3) Sales Management: Sales force, selling and sales service.
The main advantage of functional marketing organization is its administrative simplicity. However, this form loses effectiveness as the company's products and markets grow. Because, there is inadequate planning for specific products and markets as no one has full responsibility for any product or service. Further, each functional group competes to gain more budget and status, making coordination difficult.

Geographical Organisation: A company selling in a nation-wide market often organizes its selling function on territorial basis.

Regional or Zonal Managers will report to the Vice president/General manager (sales) in the corporate office.

In each region or zone, a number of sales branches may be established, and the branch managers will report to their respective regional or zonal managers. A typical organisation chart is presented in figure 3.2.
Product Organisation: Companies producing a variety of products often establish product-based departments as an additional sub-group. This sub-group is headed by a product manager who supervises several product group managers, who in turn supervise product managers in charge of specific products. A typical organisation chart is presented in figure 3.3.

A product organization is justifiable if the products are quite different and/or if their number is beyond the capacity of a functional organization to handle.

The product manager's role is to develop product plans, monitor their implementation and take corrective action. The functions of a Product Manager will therefore include the following:

1) Developing a long range and competitive strategy for the products,
2) Sales forecasting and preparing an annual marketing plan,
3) Working with advertising agencies to develop copy and campaigns,
4) Gathering continuous intelligence on the product's performance, customer and dealer attitudes, etc, and
5) Initiating product improvements to meet the changing market needs

3. Ibid, p. 709
A PRODUCT ORGANISATION

Figure - 3.3.
The product organization has several advantages. The important are:

1) The product manager develops a cost-effective marketing mix for the product,

2) Proper attention is given to advertising and sales promotional efforts for each product, and

3) The product manager can react more quickly to problems and changes in the market place.

However, product organization creates some conflict and frustration. Product managers have to rely on persuasion to get the cooperation of advertising, sales, manufacturing and other departments. The product organization often turns out to be costlier than anticipated. Product managers become experts in their product, but rarely become experts in any other functions.
Pearson and Wilson have suggested five steps to make the product organization work better:

1) Clearly delineate the limits of the product manager's role and responsibility for the product;
2) Build a strategy development and review process to provide an agreed-to-frame work for the product manager's operation;
3) Take into account area of potential conflict between product managers and functional specialities. While defining their respective roles, it is necessary to clarify the decisions which are to be taken by the product manager, which are to be taken by the expert, and which will be shared;
4) Set up a formal procedure that forces to the top all conflicts-of-interest situations between product management and functional line management; and
5) Establish a system for measuring results that is consistent with the product manager's responsibilities.

Product Team Approach: Another alternative is to switch from a product manager to a product-team approach.

There are three types of product-team structures:

1) Vertical product team: This consists of a product manager, deputy product manager and product assistant. The product manager is the leader and primarily deals with other executives to gain their cooperation. The deputy manager assists in the task and also does a lot of paper work and runs around.

2) Triangular product team: This consists of a product manager and two specialized product assistants—one to take care of (say) marketing research and the other, market communications/distribution.

3) Horizontal product team: This consists of a product manager and several specialists from marketing and other functions. Instead of bearing the entire responsibility for product planning, a product manager shares it with representatives from key parts of the company. Their input is critical in the marketing-planning process and also each team member can bring influence to bear in his own department.
Divisional organisation: When a multi-product company grows in size, it often recognizes its larger product groups into separate divisions.

Each product division sets up its own functional departments and services. This raises the question as to what marketing activities should be retained at corporate headquarters.

A corporate marketing staff may play three important roles:

1) To serve as a corporate focus for review and leadership of overall company marketing activities and opportunities.

2) To offer certain marketing services that could be provided more economically on a centralized basis than by being duplicated in the different divisions.

3) To take responsibility for educating divisional managers, sales managers and others in the company on the meaning and implementation of the marketing concept.
THE ORGANISATIONAL SET UP FOR MARKETING FUNCTIONS OF COMPANIES UNDER STUDY

The companies under study have separate marketing departments at the corporate offices. In the case of companies having turnover of Rs. 100 million and above, the marketing department is headed by corporate Vice president (Marketing).

The General Manager (Marketing) and the General Manager (Sales) will be reporting to the corporate Vice president (Marketing). The marketing department is divided into a number of groups on the basis of the number of products and each product group is headed by a product manager. Geographical divisionalisation has also been made. A typical organisation chart is presented in figure 3.4.

Even in the case of companies having an annual turnover of less-than Rs. 100 million, the marketing department at the corporate office has a similar setup as stated above but the department is headed by a General Manager (Marketing). No separate managers for advertising/Public relations and dealer network. These activities are looked after by the General Manager (Marketing) himself. A typical organisation chart is presented in figure 3.5.

An analysis of the organisation chart shows the absence of planning and development wing to undertake: a) Strategic planning b) Market research c) Advertising and Sales promotion.
AN ORGANISATION STRUCTURE FOR MARKETING FUNCTION (I)

PRESIDENT

Corporate Vice President (Marketing)

General Manager (Marketing)

General Manager (Sales)


Figure - 3.4
AN ORGANISATION STRUCTURE FOR MARKETING FUNCTION (II)

Figure - 3.5.
CONCLUSION

In conclusion, it may be said that the production of computers in India should increase substantially in order to be competitive in the international market. The Government of India could support the manufacturers by reducing, further, the duties on imported parts and components used in computers.

MAJOR FINDINGS

The major findings of the chapter are:-

1. The growth rate in the sale of micros and minis is 3 to 4 times higher than that of large systems.

2. The computer manufacturing companies do not have separate wing for planning and development in their marketing departments.
The global and Indian scenario of the computer industry is dealt with in this chapter. The production of computers in India is negligible compared to World's production figure. The profile of all 16 computer manufacturing companies is given in this chapter. The profile covers such information as year of establishment, capital employed, sales revenue and total number of employees working in the companies. The profile also covers information such as form of organisation, experience of the company, production capacity, etc. Out of 16 computer manufacturing companies, Wipro Infotech Limited happens to be the biggest company manufacturing micros. The recent Government policy has helped in strengthening the computer industry. The chapter also deals with organisational setup for marketing function of Computer units under study. On analysing the organisational setup of marketing department of Computer manufacturing units it is found that there is no separate planning and development wing to undertake strategic planning, market research, advertising and sales promotion.