CHAPTER – III

PAPER INDUSTRY – AN OVERVIEW

3.1 INTRODUCTION AND HISTORICAL BACKGROUND

The origin of paper goes to the early Egyptian civilization. The Egyptians used the stalks of the papyrus plant to manufacture a material resembling paper. Over the centuries several changes have been made and many new materials have been used in the paper making process, but the base of most papers is still fiber from plant.

India's first machine-made paper was manufactured in 1812. During this time there were 15 mills with a total production of tones. In India the soft wood is the principal raw material used for making paper especially newsprint and high class printing papers. With the rise in population and broadening of education the demand for paper has been constantly escalated. Owing to very narrow forest resources, wood pulp was in shortage. As soft woods grow in temperate climate, India was in short supply of such woods. Thus, in such circumstances the bamboo became the major raw material for the manufacture of paper in the country as it grows very quickly even after cutting.

3.2 ORIGIN OF PAPER INDUSTRY IN THE WORLD

Paper making can be traced to about 105 AD, when T'Sai Lun, an official in the Imperial Court of China created a sheet of paper using mulberry and other best
fibres along with fishnets, old rags and hemp waste. In its slow travel westward, the art of papermaking reached Samarkand, in Central Asia, in 751 AD and in 793 AD the first paper was made in Baghdad during the time of Harunat-Rashid, with the golden age of Islamic culture that brought papermaking to the frontiers of Europe. In the 10th century Arabians substituted linen fibres and bamboo to create fine sheet of paper. By 12th century paper making reached Europe. Johannes Gutenberg invented printing machine in 1448 which led to a rapid increase in the demand of paper. The first successful paper machine was built by JLN Robert in 1798. Thereafter, papermaking underwent revolutionary changes, when several major pulping processes were gradually developed which relieved paper industry of its crucial dependence upon cotton and linen rags. The origin and development of paper industry is segregated in five stages and presented in the following table:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Different Stages</th>
<th>Development Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I (1800-1860)</td>
<td>□ Mechanization – rage preparation, use of filler, pulp beating and paper machine</td>
</tr>
<tr>
<td>2.</td>
<td>II (1840-1880)</td>
<td>□ Industrial scale rage substitute (ground wood/chemical pulp) □ Appropriate pulp mills were developed</td>
</tr>
<tr>
<td>3.</td>
<td>III (1860-1950)</td>
<td>□ Enlargement of web width - 85 to 770cm □ Increase in production speed - 5 mpm to 500mpm □ Introduction of electric drive □ Machines to produce particular type of paper</td>
</tr>
<tr>
<td>4.</td>
<td>IV (1950-1980)</td>
<td>□ Further increase in web width and working speed, use of new materials (TMP, dinked paper, new filler, chemicals and dyes), new sheet forming (twin wire formers) etc.</td>
</tr>
</tbody>
</table>

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3.3 TRANSFORMATION OF TECHNOLOGY IN PAPER INDUSTRY

Although modern inventions and engineering have transformed an ancient craft into a highly technical industry, the basic operations in papermaking remain the same to this day. The steps in the process are as follows (1) suspension of cellulose fibre is prepared by beating it in water, so that the fibres are thoroughly separated and saturated with water; (2) the paper stock is filtered on a woven screen to form a matted sheet of fibre; (3) the wet sheet is pressed and compacted to squeeze out a large proportion of water; (4) the remaining water is removed by evaporation; and (5) depending upon use and requirements, the dry paper sheet is further compressed, coated or impregnated. The differences among various grades and types of paper are determined by the type of fibre or pulp, the degree of beating, the addition of various materials to stock, formation conditions of the sheet, including basis weight, or substance per unit, and the physical or chemical treatment applied to the paper after its formation.

Government has completely de licensed the paper industry with effect from 17th July, 1997. The entrepreneurs are now required to file an Industrial Entrepreneur Memorandum with the Secretariat for Industrial Assistance for setting up a new paper mill for substantial expansion of the existing mill in permissible locations.

The new millennium is going to be the millennium of knowledge. So demand for paper would go on increasing in times to come. In view of paper industry's
strategic role for the society and also for the overall industrial growth it is necessary that the paper industry performs well.

The Paper industry is a priority sector for foreign collaboration and for foreign equity participation in India. Several fiscal incentives have also been provided to the paper industry, particularly to those mills which are based on non-conventional raw material.

Global production of paper and paper board was around 350 million tons which contributes to about 3.5 percent of World’s Industrial production and 2 percentage of world’s trade. India was ranked 15th in the World in terms of Paper and Boards production capacity.

The world paper industry was growing at a CAGR (Compound Annual Growth Rate) of 2.8 percent with a per capita consumption of 45kg. The per capita consumption is 152 KG in developed countries and 12kg in developing countries and in India it is around 6 kg.

The per capita consumption of paper in Asian countries is shown in Table No.3.2.
Per Capita Consumption of Paper - Asian Countries

The world paper industry is growing at a CAGR of 2.8 % with a percapita consumption of 45 kg. The percapita consumption is 152 kg in developed countries and 12 kg in developing countries and in India it is around 6 kg.

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (Million)</th>
<th>Consumption (million tons)</th>
<th>Consumption per capita (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>31.828</td>
<td>31.736</td>
<td>250</td>
</tr>
<tr>
<td>China</td>
<td>30.900</td>
<td>36.277</td>
<td>28</td>
</tr>
<tr>
<td>Korea</td>
<td>9.308</td>
<td>7.385</td>
<td>156</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6.935</td>
<td>3.911</td>
<td>19</td>
</tr>
<tr>
<td>Taiwan</td>
<td>4.500</td>
<td>5.110</td>
<td>229</td>
</tr>
<tr>
<td>India</td>
<td>5.260</td>
<td>5.220</td>
<td>5</td>
</tr>
<tr>
<td>Thailand</td>
<td>2.466</td>
<td>2.114</td>
<td>34</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.078</td>
<td>2.251</td>
<td>101</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.750</td>
<td>0.828</td>
<td>11</td>
</tr>
<tr>
<td>Vietnam</td>
<td>0.389</td>
<td>0.570</td>
<td>7</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>0.190</td>
<td>1.041</td>
<td>151</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.052</td>
<td>0.577</td>
<td>160</td>
</tr>
</tbody>
</table>

Source: Metso paper 2008

The paper industry is estimated to contribute about 2,000 to 2,500 crores to the national exchequer by way of Excise Duty and Sales Tax. Indian paper industry reported a volume growth of about 6 percentage in 2007-08 in line with GDP growth. Low domestic per capita consumption of paper is 6Kg. The paper market in India is in a ‘catch up’ phase with growth rate more than twice the world's average.

3.4 PAPER INDUSTRY IN INDIA

Paper industry is primarily dependent upon forest-based raw materials. The first paper mill in India was set up at Sreerampur, West Bengal, in the year 1812. It was based on grasses and jute as raw material. Large scale mechanized technology of papermaking was introduced in India in early 1905. Since then the raw material for
the paper industry underwent a number of changes and over a period of time, besides
wood and bamboo, other non-conventional raw materials have been developed for use
in the papermaking. The Indian pulp and paper industry at present is very well
developed and established. Now, the paper industry is categorized as forest-based,
agro-based and others (waste paper, secondary fibre, bast fibres and market pulp).

In 1951, there were 17 paper mills, and today there are about 515 units
engaged in the manufacture of paper and paperboards and newsprint in India. The
pulp and paper industries in India have been categorized into large-scale and small-
scale industries. Those paper industries, which have the capacity of above 24,000
tonnes per annum are designated as large-scale paper industries. India is self-
sufficient in the manufacture of most varieties of paper and paperboards. Import is
confined only to certain speciality papers. To meet part of its raw material needs the
industry has to rely on imported wood pulp and waste paper.

Indian paper industry has been de-licensed under the Industries (Development
& Regulation) Act, 1951 with effect from 17th July, 1997. The interested
entrepreneurs are now required to file an Industrial Entrepreneurs' Memorandum
(IEM) with the Secretariat for Industrial Assistance (SIA) for setting up a new paper
unit or for substantial expansion of the existing unit in permissible locations. Foreign
Direct Investment (FDI) up to 100 percentage is allowed on automatic route on all
activities except those requiring industrial licenses where prior governmental
approval is required.
Growth of paper industry in India has been constrained due to high cost of production caused by inadequate availability and high cost of raw materials, power cost and concentration of mills in one particular area. Government has taken several policy measures to remove the bottlenecks of availability of raw materials and infrastructure development.

India is facing a profound economical change. Economic liberalization and reduced import duties for paper as well as paper product have triggered a significant restructuring in the India pulp and paper industry. The domestic supplier’s ability to meet the rapidly growing demand of printing industry of paper product is limited by the high quality fiber shortage and also technology gap prevailing in India. Securing the fiber supply is an important precondition for the growth of the domestic pulp and paper industry. The shift from small to medium and large scale operation has become vital importance due to the erosion of important tariff barriers and consequent supply pressures from abroad. The changing market scenario has made paper manufacturers rethink and plan the strategies to sustain in the market.

In India, the first paper mill was developed in Kashmir, established by Sultan Zainul Abedin (Shahi Khan) of Kashmir in 1417-67 AD. Actually his father Sultan Sikander (c.1386-1410) was ruling over Kashmir at the time of Timur's invasion of India (AD 1398). Sultan Sikander sent an embassy, led by his son, Shahi Khan, to that formidable personage and sought his friendship. Timur summoned him for a meeting but in the meanwhile political developments at home compelled him to leave India. He hastened to Samarkand but took along Shahi Khan and kept him virtually as
a hostage until his death. Shahi Khan returned to Kashmir with many artisans and persons skilled in various trades with a view to introducing new industries there. These included paper-makers, bookbinders, harness-makers and midwives. The author of *Tarikh-I-Kashmir* stated the following about Shahi Khan, "During his stay at Samarkand he acquired knowledge. When he returned to Kashmir he brought with him a number of artisans skilled in different trades such as paper-makers, bookbinders, carpet-makers, harness-makers and well trained midwives."

**GROWTH OF PAPER INDUSTRY IN INDIA**

India's population is forecasted to grow from 923 million in 1994 to 1.23 billion by 2010, corresponding to an average long term growth rate of 1.8 per cent. The literacy rate in India has been steadily growing (52 per cent) in 1995 to at least 70 to 75 per cent during the next ten years. The average GDP growth is expected to remind between 8 to 9 per cent per annum in the next 5 to 10 years and for every increase of 1 per cent in GDP, paper demand increases by 1 lakh tonnes annually. The Indian paper industry is highly fragmented with the capacity of paper mills ranging from 3300 tpa to 2 lakhs tpa. The product segments in the paper industry can be broadly classified as newsprint, printing and writing paper, industrial paper and speciality papers. Based on the primary raw material used, the companies in the paper industry are categorizing into wood based, agro based and waste paper based companies.

There are estimated 400 paper mills in India with a total capacity of about 51 lakhs tpa (1999-2000). Of the total effective capacity of 51 lakhs tpa about 39 per
cent is accounted for wood based units and 32 per cent for agro residual based mills. The total supply in the country including all grades from organized sector was about 28.3 lakhs tones in 1994-95 and 38.8 lakhs during 1999-2000.

Generally speaking, per capita consumption of paper is a measure of the standard of living. Business activity, personal spending power and advertising are the main engine behind paper consumption in the earth requirements for packaging boards, business papers and advertising media. With the increasing literacy levels and per capita income, the demand for all grades of paper will have a growth rate of 7 per cent. If the demand continues, they should reach at 51 lakhs tones by 2010-2011 as shown below:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Demand by 2010-1011</th>
<th>Production 2008-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing and writing</td>
<td>1688</td>
<td>1530</td>
</tr>
<tr>
<td>Industrial packaging</td>
<td>2093</td>
<td>1577</td>
</tr>
<tr>
<td>News print</td>
<td>1094</td>
<td>613</td>
</tr>
<tr>
<td>Others</td>
<td>172</td>
<td>130</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5047</strong></td>
<td><strong>3850</strong></td>
</tr>
</tbody>
</table>

There are many conjectures as to when and how paper industry and its manufacture came to India. The general view often expressed is that Muslims came into eastern India from China via., Nepal. One has to examine critically whether the former view is not due to the preponderance of Muslim sources and lack of tradition for documentation in others in the east. The manuscript evidence begins from the 12th century onwards and these are non-Muslims libraries. In both eastern and western India, Hindu, Buddhist and Jain manuscript libraries made extensive use of papers.
But only after the Muslim conquest of India, unfortunately the records of invention, use and manufacture of paper are scant in non-Muslim sources.

Indian Paper Industry accounts for about 1.6 per cent of the world's production of paper and paperboard. The estimated turnover of the industry is Rs 25,000 crore (USD 5.95 billion) and its contribution to the exchequer is around Rs. 2918 crore.

Demand of paper has been around 8 per cent and during the years 2002-07 newsprint registered a growth of 13 per cent. Newsprint and publication paper consumption account for 2 million tonnes, of which 1.2 million tonnes of newsprint paper is manufactured in India and the remaining 0.8 million tonnes is imported.

The industry provides employment to more than 0.12 million people directly and 0.34 million people indirectly. Some of the paper products are sheet paper, paper boxes, tissues, paper bags, stationery, envelopes, and printed-paper products such as books, periodicals, and newspapers. Speciality papers like sandpaper, blueprint paper, carbon paper are not a part of paper products industry. Stationery includes greeting cards, printing and writing papers, school and office papers, etc. The toiletry products include paper towels, tissue paper, and bath tissue.

The earliest reference one could trace to writing material resembling paper is to that of nearchos (325 b.c) which is a historical work of Greek, strabo. Sindosi is described as well beaten cloth well beaten linen of paper making. Unfortunately since there is no actual material evidence available, its existence may be considered a matter of speculation. However, this reference is a strong indication that paper and its
manufacture did exist in the Indus region (South Asia, India). The process of manufacture used is similar to the Parsian one using water power.

TABLE NO. 3.3
DETAILS OF PAPER MILLS IN INDIA

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>NAME OF THE STATE</th>
<th>No. OF PAPER MILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andra Pradesh</td>
<td>25</td>
</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Chandigarh</td>
<td>7</td>
</tr>
<tr>
<td>5.</td>
<td>Delhi</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Gujrat</td>
<td>52</td>
</tr>
<tr>
<td>7.</td>
<td>Haryana</td>
<td>14</td>
</tr>
<tr>
<td>8.</td>
<td>Himachal Pradesh</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>Jammu</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>Karnataka</td>
<td>19</td>
</tr>
<tr>
<td>11.</td>
<td>Kerala</td>
<td>10</td>
</tr>
<tr>
<td>12.</td>
<td>Maharashtra</td>
<td>59</td>
</tr>
<tr>
<td>13.</td>
<td>Nagaland</td>
<td>3</td>
</tr>
<tr>
<td>14.</td>
<td>Orissa</td>
<td>5</td>
</tr>
<tr>
<td>15.</td>
<td>Pondichery</td>
<td>6</td>
</tr>
<tr>
<td>16.</td>
<td>Punjab</td>
<td>35</td>
</tr>
<tr>
<td>17.</td>
<td>Rajastan</td>
<td>6</td>
</tr>
<tr>
<td>18.</td>
<td>Tamil Nadu</td>
<td>27</td>
</tr>
<tr>
<td>19.</td>
<td>Ujjaini</td>
<td>1</td>
</tr>
<tr>
<td>20.</td>
<td>Utradinakpur</td>
<td>1</td>
</tr>
<tr>
<td>21.</td>
<td>Utranchal</td>
<td>3</td>
</tr>
<tr>
<td>22.</td>
<td>Uttar Pradesh</td>
<td>57</td>
</tr>
<tr>
<td>23.</td>
<td>Uttarkand</td>
<td>9</td>
</tr>
<tr>
<td>24.</td>
<td>West Bengal</td>
<td>14</td>
</tr>
</tbody>
</table>

PAPER INDUSTRY AFTER ECONOMIC REFORMS

With liberalization, the industry is thrown open to competition from mills abroad without providing a level field. Shortage of fiber supply, high cost of energy and old technology have plagued the industry. The three years ending with the financial year 2005-2006 have been extremely difficult for the paper industry. In the domestic market, the supply outstripped the demand. Improved newsprint was available at rock bottom prices. Domestic newsprint prices have been rolled back by 30 per cent. As the prices in the international market were ruling low, export of printing and writing from the country also dwindled down. Even now the industry is under the grip of several recessions.

Now with the global economic slowdown, the demand for newsprint has started declining from January 2001. Consequently, the prices in the international market have become soft since January 2001. This has begun to affect the price in the domestic market. Over supplying in Asia has also affected the printing and writing papers segment since January 2001. Unlike in the past when a market downturn would seriously impact its profitability, the mills can do reasonably well by cost reduction of imported pulp and flexibility in product mix.

The last decade of the twentieth century will almost certainly be characterized as one of accelerating globalization. Although individual countries and regions of the globe experience change and react to it in ways that are unique, it is clear that they are becoming increasingly interdependent. Corporations are becoming more and more multinational through expansion, mergers, and acquisitions. Trade barriers are falling
away. Public policy issues, notably those concerning environment, are having worldwide impact, democratization is changing social and political patterns in the direction of increased co-operation and accord. The pulp and paper industry worldwide is clearly a participant and is profoundly affected by these changes. An international perspective is essential today, both in developing longer term strategy and in making shorter term business decisions.

The Indian paper industry presents a unique picture, with a mix of large and small paper mills, having capacities that range from 5 to 600 tonnes per day, with an average size of 11,500 tonnes per year. There are more than 600 pulp and paper mills that produce nearly 6.2 million tonnes per year of paper and board as against its installed capacity of 8.6 million tonnes. The industry has a turnover of more than Rs.25000 Crore, employing nearly 3,00,000 people directly and another one million indirectly.

But in the wake of the economic liberalization, triggered by the new economic policy of the government in 1991, the Indian paper industry found itself confronted with international competition. Almost overnight, the industry was exposed to the difficult task of integrating into the global economy. This also had an evolutionary effect on the traditional Indian management style, triggering a serious redesign of strategies to ensure survival. Today, the concept of globalization, eco-cycle compatibility and other environmental issues are being integrated at the planning level by the major domestic players.
Among the above three segments of the Indian paper industry, the forest-based pulp and paper industry is slowly moving towards competitiveness through adequate modernization. However, a significant proportion of this segment is yet to undertake modernization programs. Areas identified for technological improvement in these mills include the installation of oxygen delignification for low kappa pulp and improved online control of stock preparation and paper machines.

In the agro-residue-based segment, there are very few mills complying with quality and environmental requirements. Furthermore, the majority of units do not have the proper technology to produce good quality products at a competitive price. This segment is also having serious environmental problems due to the lack of chemical recovery systems.

Major portions of this segment require modernization to become competitive. Upgrading pulp washing systems to reduce the organic carryover to the bleach plant, extracting the maximum amount of chemicals (addition of extra rotary drum washer) and building a common chemical recovery plant for a cluster of mills have been identified as the main technological initiatives needed.

The third segment, recycled fibre, also has a number of small pulp and paper mills that are based on obsolete technology. One of the major concerns of these mills is lack of adequate equipment for processing recycled fibre. As a consequence, the quality of paper products produced from these mills does not conform to international standards. The competitiveness of this segment without modernization would be poor. Among the areas identified for improvement in this sector are upgrades of secondary
fibre processing systems and the installation of a common effluent treatment plant for a cluster of mills.

In a vibrant, growth-oriented economy, the demand for paper is expected to increase, which in turn is expected to foster growth in the Indian paper industry. Pressure for technological improvements is also closely tied to demands for greater environmental responsibility in the country. The industry has to comply with the Charter on Corporate Responsibility for Environmental Protection (CREP) wherein the emission limits have already been fixed for the future.

PROBLEMS OF INDIAN PAPER INDUSTRY

The Indian paper industry faces the problems of

(1) Non availability of good quality raw materials
(2) Lack of modernization and basic infrastructure
(3) Increased emerging environmental issues
(4) Resource development.

India is the land area covered by 3.3 million Sq. Km in which area covered by agriculture is 47 percent, forest by less than 20 percent that are having the population of 1.04 billion. Its population growth per annum is 1.96 percent and population density is 324 persons/Sq. km.

India is the 10th largest industrialized sector in the world and it accounts for Asia’s 4th largest economy. The GDP growth rate is around 7 percent, one of the highest in the world and the GNP per capita is Rs.21,9576 or GNP 22,834 billion
rupees. The economy size constituted to US $ 600 billion and is growing at 6 percent for the last five years. The value of exports (2007-08) is Rs.28,3605 crore and Imports (2007-08) is constitutes Rs. 34,6475.

**ROLE OF PAPER INDUSTRY IN ECONOMIC DEVELOPMENT**

Paper industry is the second largest sector providing employment to 0.3 million directly and about 1 million people indirectly. Industry turnover is 120 billion rupees and contributes to about 2.3 percentage of overall Indian industry's output. Generally, the composition of Indian paper industry is wood-based (35-40 percent) and non-wood based (60-65 percent). The wood based industries are functioning under imported/indigenous hardwood/ softwood, bamboo and the non wood based industries are classified as agro-residue based (functions under baggase and sabai grass, Jute/rag, wheat straw) and waste paper based (imported/ indigenous waste paper, corrugated/kraft waste paper, waste cuttings). The end products of paper industry are classified under (i) Cultural paper: this accounts for 44 percentage of total domestic demand. It consists of writing and printing paper, office stationery, communication paper and speciality paper such as cheques and currency papers. The demand is a function of the GDP, the population, the literacy levels, and the standard of living. (ii) Industrial paper: This accounts for 43 percentage of the total demand in India. It consists of kraft paper, pulp board and duplex board, and is used in packaging applications. Demand depends on growth in industrial production, consumer durables, processed food, and other kind of packaging. This segment is relatively price inelastic. (iii) Newsprint: This accounts for 80 percentage of the output. It depends on the number of newspapers, the size of the paper and the
circulation. It has been placed under the OGL which means that newspaper companies are free to import any quantity of newsprint.

Large size mills (above 50,000 tpa) are reasonably modern and efficient but design capacities of world paper machines are about 20-30 times the capacity of the best Indian paper machines. Smaller size machines result in higher energy consumption besides quality constraints. Quality benchmarking with international standards, improved technology are being used for cleaner, brighter and stronger paper. High speed machines of more than 1000 mpm are not many in India.

Paper Industry represents an important segment of the Indian economy. The Industry has witnessed a steady increase in installed capacity and production over the decades. The paper industry in India is primarily tree-free as 62 percent of the market is catered by paper products from non-conventional raw material like agro-waste, agro-resides and recycled papers. The demand is estimated to be around 54.80 lakh tonnes in 2005-2006 on the basis of growth rate of 6.5 per cent for the period 2000-01 to 2005-2006.

At present, there are about 380 mills in the country with an annual installed capacity of about 45.5 lakh tonnes. They account for more than 5 per cent of the total installed capacity and production. At present, the capacity utilization in the paper industry is about 67 percent, as 125 paper mills particularly small mills are sick and are lying closed. Several fiscal incentives have also been provided to the paper industry, particularly to those mills which are based on non-conventional raw material. Import was 2.20 lakhs tonnes in 2005-06 and 3.05 lakhs tonnes in 2006-07.
It is estimated to be almost 4.20 lakh tonnes in 2007-08. About 70,000 tonnes of paper is exported per annum mainly to the neighbouring countries.

**Coping with Global Competitiveness**

With India becoming a member of WTO, it has become important for the industry to develop a strategy to become globally competitive. During the phase of industrialization after independence, the immediate focus of the industry was essentially on growth and expansion. In a regulated market under a mixed economy, it had developed a feeling of complacence. For a long time, it often compromised quality, perhaps due to monopolistic conditions in a closed market scenario. Indeed, for several decades, a major part of the Indian industry never really came to attach significance to terms such as market forces, economy of scale, quality and customer satisfaction.

Demand of Paper has been around 8 per cent and during the years 2002-07 while newsprint registered a growth of 13 per cent writing and printing, Containerboard, Cartonboard and others registered a growth of 5 per cent, 11 per cent, 9 per cent and 1 per cent respectively. So far, the growth in paper industry has mirrored the growth in GDP and has grown on an average 6-7 per cent over the last few years. India is the fastest growing market for paper globally and it presents an exciting scenario and paper consumption is poised for a big leap forward in sync with the economic growth and is estimated to touch 13.95 million tons by 2015-16. The futuristic view is that growth in paper consumption would be in multiples of GDP and
hence an increase in consumption by one kg per capita would lead to an increase in
demand of 1 million tons.

As per industry estimates, paper production is likely to grow at a CAGR of 8.4
per cent while paper consumption will grow at a CAGR of 9 per cent till 2012-13.
The import of pulp and paper products is likely to show a growing trend. During the
last few years, the Indian paper market witnessed a five-fold jump in the import of
coated paper. The total import of this paper rose to 10,000 tonnes in 2008 from 2,000
tones.

PAPER TECHNOLOGY IN INDIA

Paper manufacturing and book printing mark the beginning of the knowledge
revolution. In ancient India knowledge spread verbally through word of mouth from
the teacher to the disciple, hence it was called Shruti. But with the discovery of
scripts, written records gradually replaced the verbal transmission of thought.

It is interesting to note that mutual East-to East technological exchanges
among Asian nations were frequent. The Silk Road must also have played a
significant role in the spread of early technologies. For example, the Bower
Manuscript (mss), which is named after its discoverer, was found in 1890, in Kuchar,
in Eastern Turkistan, on the great caravan route of China. The large medical treatise
called Navanitaka forms the second part of the Bower mss. The date of that mss falls
in the second half of the fourth century A.D. Similarly, zinc smelting began in China
in the Jiajung period (1552-1566 AD) of the Ming dynasty, though it was being
produced in India in the 12th Century AD. It is believed that Buddhist monks also played a significant role in the transmission of medicinal and zinc technologies among the Asian countries.

It seems that the Chinese were the first to make paper, from where the technology went to Samarkand. From there it eventually reached India. Soon the Indian paper was being exported to West Asia, Europe and Turkey.

**INDIAN PAPER MANUFACTURE CENTRES**

With the rapid demand of writing materials, the paper making centres were established in different parts of the country like Sialkot (Punjab); Zafarabad district of Jaunpur (Oudh); Bihar Sharif district Azimabad (Patna) and Arwal in district Gaya (Bihar); Murshidabad and Hooghly (Bengal) ; Ahmedabad, Khambat and Patan (Gujarat) and Aurangabad and Mysore in the south.

- Out of these, Punjab was the leading centre. Sialkot paper was white in colour and very thick. It was used throughout Punjab.

- In Uttar Pradesh, Zafarabad was a famous town belonging to Jaunpur district.

  It was known as Kaghd Shahar (paper city) in olden times. It produced a very fine, glossy and strong variety of bamboo paper. Generally two varieties of paper were produced there. First was the polished paper, which was exceedingly glossy and second was the unpolished paper.

- Bihar had two major papermaking centres in medieval times. First was Arwal town in the district Gaya, and second was Bihar Sharif in the district Azimabad (Patna).
In Bengal, Murshidabad and Hooghly were the major papermaking centres in the medieval times. At a later period, Dinajpur also started manufacturing paper.

After some time, Gujarat employed as the largest producer of paper. It supplied paper to the rest of India and also exported it to the West, other Asian countries and Turkey. In Gujarat, Ahmedabad was the largest papermaking centre, it produced white and glossy paper.

During the Mughal period, Daulatabad, with Aurangabad as its capital, emerged as an important papermaking center. The most remarkable feature of Daulatabad paper was its durability and glossiness. Daulatabad was the chief supply centre of paper to south India.

Tipu Sultan developed papermaking centres in Mysore. The paper produced by Mysore was a high quality paper, which was employed only for royal use.

Other big paper making centres of medieval India were: Sanganer (in Jaipur, Rajasthan), Kotah (Rajasthan), Tijarah (in Alwar, Rajasthan), Kannauj (in Farrukhabad, Uttar Pradesh), Kalpi and Pukharayan in Kanpur (Uttar Pradesh), Maler-Kotlal (Punjab), Hariharganj(in district Shahabad, Bihar), Kalita (in district Pabna, now in Bangladesh), Panchamnagar (in district Damoh, Madhya Pradesh), Dharangaon and Erandel town (in district East Khandesh, Maharashtra) and Poona.

Generally Indian papermaking centres produced glazed paper. Rahman has categorized ancient paper into seven categories: Kashmiri, Ahmedabadi, Hyderabadi, Faizabadi, Khasah-i-Jahangiri, Kanpuri and Aurangabadi.
Ahmedabadi paper was a little thick and was of two qualities: fine and superfine. The paper had extra whiteness and glossiness.

Kashmiri paper was thick and glazed. Some Kashmiri centres produced superfine paper called silken paper.

Khasah-i-Jahangiri paper was made at Sialkot. The paper was glossy, thin, polished and bluish white.

Hyderabadi paper was well glazed; some were polished and were of brown colour with very fine shades.

Faizabadi paper had three varieties: i) unpolished paper (medium quality); ii) pale yellow; and iii) polished dark yellow.

Kanpuri paper was prepared from bamboo and was greyish in colour.

Aurangabadi paper was glossy and thick, had a few varieties like, Bahadur Khani (medium quality paper, thick, stout and durable), Sahib Khani paper (medium quality, thick), Murad Shahi paper (fine quality), Sharbatı paper (thick and fine), Qasim Begi paper (thick), Ruba-Kari paper (This variety was made in four or five different grades) and Balapuri paper (four or five varieties of different colours).

Economic Aspects of Paper Industry

There are, at present, about 515 units engaged in the manufacture of paper and paperboards and newsprint in India. The country is almost self-sufficient in the manufacture of most varieties of paper and paperboards. Import, however, is confined only to certain speciality papers. To meet part of its raw material needs the industry
has to rely on imported wood pulp and waste paper. Production of paper & paperboard during the year 2002-03(upto December, 2002) was 24.52 lakhs tonnes. At present about 60.8 per cent of the total production is based on non-wood raw material and 39.2 per cent is based on wood.

Performance of the industry has been constrained due to high cost of production caused by inadequate availability and high cost of raw materials, power cost and concentration of mills in one particular area. Several policy measures have been initiated in recent years to remove the bottlenecks of availability of raw materials and infrastructure development. To bridge the gap of short supply of raw materials, duty on pulp and waste paper and wood logs/chips have been reduced. The capacity utilization of the industry is low at 60per cent. About 194 paper mills, particularly small mills, are sick and / or lying closed. Several policy measures have been initiated in recent years.

The import of paper and paper products has been growing over the years. However, it increased during 2001-02 after a fall in 2000-01. About 1,40,000 tonnes of paper were exported in 2000-01 mainly to the neighbouring countries. India's per capita consumption of paper is around 4.00 kg, which is one of the lowest in the world. With the expected increase in literacy rate and growth of the economy, an increase in the per capita consumption of paper is expected.
**For Wood Based Industry**

Revision of forest policy says that plantation can be raised by industry/Co-operatives of farmers/State Government. Degraded forest land to be made available to the industry for raising plantations.

**For Waste Paper based Industry**

Import of waste paper is at minimum import of industry. Introduction of eco labelling system wherein products made from recycled fibre are rated higher than the products made from virgin fibre. Introduction of modern and effective collection belongs to grading system.

**For Agro Based Industry**

In small and medium scale industries, funds should be made available for technology up-gradation for handling and processing of agro residue fibre.

**Government Policies**

Accelerated depreciation has to partially mitigate high capital intensity. Allow duty free imports of new and second hand machinery/equipment for Technology up gradation.

**Energy Policy**

More uniform Energy Policy by States leads to better availability with the quality of coal. The paper market in India is resurgent growth indicators are on the rise. Investment is necessary and ongoing to improve both the quality of paper produced and environmental.
TYPES OF PAPERS PRODUCED IN PAPER INDUSTRY

There are different types and grades of paper for different uses, which are often reflected in their names. Coated text and cover are used for the majority of four-color printing. Uncoated text and cover are also used regularly. Bond, book, offset, label, index, and news-print are some of the other grades used commercially. Paper choice can make a major difference in the appearance of finished job. A dull or plain design can be perked up with an exciting color or texture.

3.11.1 Coated Papers

They are best suited for higher-quality jobs. Coated papers may be gloss-coated, dull-coated (usually a clay or chemical coating), machine-coated (a sheet is made smooth by a blade running over it during the manufacturing process), and cast-coated (a high-gloss coating used for the highest-quality premium papers) on one or both sides. Printing ink does not soak into a coated sheet as much as it does with an uncoated paper, so coated papers can make halftones and color images look richer. Coated papers are associated with corporate capability brochures and annual reports. Since coated papers come in several grades and prices, one should not have to shy away from using them. Today, more and more coated papers are recycled, which also lower their costs.

3.11.2 Uncoated Papers

They are also known as text. These papers can be excellent sheets for printing. Some uncoated papers are so smooth that it is hard to tell that they're not coated.
Uncoated papers are manufactured in many textures and colors. They are used for
halftones when the designer tries to achieve a certain effect or look.

3.11.3 Bond

They are often used for stationery. It takes ink well from a laser printer or a
pen. Part of this absorbency comes from the paper's rag content, which is the
percentage of cotton fiber in a sheet of bond. Twenty five percent or fifty percent is
the usual amount added.

3.11.4 Book

The books and text books are as the name implies that these papers come in
antique (rough) or smooth finishes. They also come in many weights so that a book
can be bulked up or down.

3.11.5 Offset papers

They are similar to the coated and uncoated sheets, except that they have
sizing added to resist the moisture that occurs in offset printing.

3.11.6 Index papers

Index papers are used for cards or tabs and are used in place of the more
expensive cover stocks and come in a smooth or vellum finish. They are stiff and take
writing ink well but are less expensive than cover grades.
Newsprint papers

As their name suggests, Newsprint papers are used for newspapers. The sheets are not as white as other papers, and ink tends to soak into them. Being relatively inexpensive, newsprint is ideal for the large volumes of paper that modern newspapers need.

Computer Paper

This is the general term used to describe paper used with a computer. It can also refer to paper used with a copier or for a laser printer. Although the -fan-fold‖ paper was probably the most thought of when the term ||computer paper|| was used, copier paper, or just plain bond paper, is usually the type referred to today. This is because of the move from the dot-matrix printer to the laser and inkjet printers.

Copier Paper

These are standard papers used for copiers. They are 20|| thin and somewhat transparent. Copier Paper has many different properties that affect the quality of the copies are takes. Their White point - Contrast is a key element between the toner and the paper. The whiter the paper the better the copies will look. Texture- The smoother the paper, the better the toner transfers to it. Smoother paper gives sharper copies and better fills. Smooth paper, however, can sometimes be difficult to feed.

Coating

Copier paper needs some type of clay or dust coating to help the paper separate and feed it. Also, most people ask the question, -Does it matter which side of
the paper is copied first? \( \) And the answer is, \( \) You get the best results when you copy the proper side first. Most copier paper will have some type of indicator as to which side should be copied on. The construction of the copier will determine if the paper has to be placed up or down so the correct side is copied first.

**Gloss Paper**

They are ideal for photographic images, posters and printing of graphic designs with the Matte Paper that are high resolution (300-1440 dpi) bright white coated paper. Ideal for everyday printing is the feature of superior drying properties.

**Picture Paper**

They are water resistant and dry spontaneously for easy handling. This inkjet paper, in the popular 4" x 6" format, is ideal for consumer use.

**Inkjet Paper**

If the task is a simple printing of a document or a print out of an e-mail memo, plain copier paper will work best. If color is important, then coated paper stock is preferred. Coated paper allows colors to be sharper than regular copier paper. A high level of coating allows for a high print resolution from 600 dpi -1440 dpi. There are different types of paper available, but only coated papers are designed specifically for use with inkjet printers. They will help one to create the highest quality output that the printer can produce.
3.5 PAPER INDUSTRY IN TAMIL NADU

Tamilnadu is one of the well developed states in terms of industrial development. It has enjoyed a significant position in India’s geopolitical space and economic progress. It has logistical advantages due to presence of three major seaports, an international airport and several domestic airports. It possess quality human resources, a peaceful industrial climate and a positive work culture have strengthens Tamilnadu's standing in the industrial world. The State's business-friendly policies and proactive initiatives have played a key role in this resurgence.

Tamilnadu continues to be one of the forerunners in the production of paper and paper products. There are 28 paper mills in operation in Tamilnadu. The total paper production was 3.7 lakh tonnes in 2005-06 which accounts for 17.30 per cent share of the national production, next only to Andhra Pradesh. As the country's forest cover is much below the desired level, the Government of Tamilnadu established TNPL in 1979 to manufacture newsprint and paper using bagasse (sugarcane waste) as the primary raw material. This is the largest paper mill in India with an installed capacity of 230,000 TPA (tonnes per annum). In 2005-2006, the company produced 230,079 MTs of newsprint and printing and writing paper.
TABLE NO.3.4
TOTAL PAPER PRODUCTION IN TAMIL NADU

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Paper Production in Tamil Nadu (lakh tonnes)</th>
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</thead>
<tbody>
<tr>
<td>2005 - 2006</td>
<td>3.7</td>
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<tr>
<td>2006 - 2007</td>
<td>4</td>
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<tr>
<td>2007 - 2008</td>
<td>4.4</td>
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<tr>
<td>2008 - 2009</td>
<td>4.8</td>
</tr>
<tr>
<td>2009 - 2010</td>
<td>5.3</td>
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</table>

Source: Indian Pulp & Paper Technical Association Industrial Directory - 2010

Tamil Nadu is engaged in the manufacturing of writing and printing paper (WPP) and news print. It is the 2nd largest producer of WPP in Southern India and has the largest plant of the country in terms of capacity.

Tamilnadu is the largest producer of bagasse-based paper in the world. Especially most of it are manufactured at TNPL.

Some more factors which would add up to benefit the paper sector are: the targeted rise in Exports which anticipates them to go up to 0.7 per cent of global trade, Increased agriculture export which would also benefit the sector in terms of increased demand for packaging material, similar would be the effect of a booming Indian Retail Market & Robust FMCG players.
CURRENT SCENARIO OF PAPER INDUSTRY IN TAMILNADU

Seshasayee Paper & Board Ltd., is one of the South Indian based companies that has been producing Fine Paper since 1960. Now they are commissioning their new pulp production unit with an additional investment of Rs. 3,000 million. They are expected to see in-house pulp production going up to 440-tonnes a day from 240-tonnes a day. They have the customers over the 20 countries with extensive range of products catering the various customers.

Tamil Nadu Newsprint and Papers Limited (TNPL) is owned by the Government of Tamilnadu. It was started on early eighties to produce Newsprint and Printing and Writing Paper. The TNPL has initial capacity of 90,000 tonnes per annum. Gradually the company has increased its production to 2,45,000 tonnes per annum. The company has emerged as the largest bagasse based Paper Mill in the world consuming about one million tones of bagasse every year. In their forthcoming ambitious project, the company has plans to invest Rs. 1000 crore for expanding its production capacity to 4,00,000 lakh tonnes from the present 2,45,000 tonnes per annum.

Newspaper Development Commission

- Newspaper Development Commission was started in 1st September 1982. The commission proposed the establishment of a Newspaper Development Commission (NDC) funded by a newsprint cess (ie specific tax) and an advertisement tax to help the growth of Indian-language, local and other small and medium newspapers.
As well as owning large swathes of Pondicherry, the ashram also employs half its citizens in cottage industries producing goods ranging from perfumes to fabrics. It even runs a number of guesthouses including the Seaside Guest house.

The State once a pioneer in the industry has been virtually wiped out from the country's paper production map Andhra Pradesh Tamilnadu, Gujarat, Punjab, Uttar Pradesh and Orissa are playing an important role for the continuous growth and development of the domestic paper industry.

The Calcutta Paper Traders Association (2008) CPTA has urged the West Bengal Government to take a fresh initiative to revive the State's paper industry. Tamilnadu, Punjab, Uttar Pradesh and Orissa played an important role in the continuous growth and development of the domestic paper industry.

Industries and Finance Secretaries (2004) considered it wiser to spend the money meant for Tamil Nadu News Print Ltd. TNPL on ten minipaper mills to which they have not polluted the rivers and food from improved marine life would have fed a large section of the population.

The paper industry is one example, before 2003 there was no excise duty on the first clearances of paper up to 2500 tonnes Thereafter the rate of duty was 16 per cent. The sales tax levied on paper was about 10 per cent in Tamil Nadu, if you add the incidence of additional sales tax is added.
In order to improve the strength of the paper spray starches were developed. Modified starches were also used in food industries as a thickener. It acted as a binding agent to improve consistency and shelf life of the product.

In 22 colleges in Karnataka, Tamil Nadu, Andhra Pradesh and Kerala the smart card has been introduced and the benefits of this smart move are: The lecturers and students have become technology savvy and there is saving in terms of usage of paper.

The areas of collaboration could be information and communication technology, healthcare biotechnology, life sciences and infrastructure development where India’s strengths lay in the paper and pulp industry.

State Industries Department has recently carried out an exercise to assess the requirements of technically trained manpower in sectors like mainly Paper, Engineering & Auto, Textiles and Chemicals.

A company has launched a Rs 66-crore project for life cycle extension of the first paper machine which was completed by March. Mr. Farooqui, who is the Tamil Nadu Secretary for Industries, said that the company has also embarked on a backward integration.

Selection based on Tamil Nadu Common Admissions (TANCA) test, pulp and paper; food processing; polymer; biotechnology; environmental health and safety industries etc are on selected places.

During this period, newsprint, writing & printing, container board, carton board and others registered growth of 13 per cent, 5 per cent, 11 per cent, 9
per cent and 1 per cent respectively. The Indian Paper Industry accounts for about 1.6 per cent of the world's production of paper and paperboard.

With complete Implementation of the Mill Development plan in all respects, the company has moved from conventional bleaching to Elemental Chlorine Free process. The Paper industry is expected to grow to 10 million tonnes by 2010 and to 15 million tonnes by 2015.