A COMPARATIVE STUDY OF PAPER INDUSTRY IN
TAMIL NADU

CHAPTER - I

INTRODUCTION

1.1. Introduction

Paper was first used in China about 2200 years ago. The origin of paper started in the valley of River Nile. The Egyptians cut the stem of the plant into thin strips and soaked in the water of the Nile. This softened the stem. Then these strips were arranged to form a mat and pounded to form a thin sheet. This sheet was sun dried. The resulting sheet was used to write on and as it was light and was easy to carry around. The Egyptians, Greeks, Romans to record events, write spiritual texts and create works of art used these sheets. The word “paper” is derived from the Latin word “papyrus” and is a substance of fibre interfaced into a compact web which can be macerated into pulp dried and pressed. Paper can be defined as “a sheet or continuous web of material formed by the deposition of vegetable, mineral, animal or synthetic fibres or mixtures with or without the addition of other substances into liquid vapours or gas in such a way that the fibres are intermeshed together. The use of paper spread from China through the Islamic world and entered in Medieval Europe in 13th century where mechanization of paper making began. Paper is a part of our daily life. Paper is used as one of the best medium form of communication. The usage of paper in a country reflects the improvement in the standard of living, educational and intellectual achievements. The growth and development of paper shows the increase in literacy level in the economy. The
policies such as eradication of literacy, free and compulsory education are also related to paper and pulp industry. Paper is more than an industrial product. It is the cultural barometer of the nation. The new millennium would be the millennium of knowledge. Paper is one among the significant discoveries that turned the history of the world around. Paper pervades from all sectors of our activity from book to bullets and from morning newspaper to nuclear technology. Kids to kings, all human beings are using paper either directly or indirectly. The use of paper is measured as a yardstick for the socio and economic development. Paper can be used in various purposes –

1. for representing a value – Paper money, bank note, cheque, vouchers.
2. for storing information – Book, notebooks, magazines, newspapers, letters etc.
3. for packing – Paper bag and envelopes.
4. for cleaning – Toilet paper and Tissue papers.
5. The most common use is for writing and printing.

In the field of agriculture, paper is used for manufacturing sacks, seed packets and animal bedding. In the building and construction industry, paper is used for wall papers, roofing, flooring, flame resistant papers, and decorative laminates for furniture. In the business industry, paper is used for receipts, circulars, catalogues, sales and service manuals, brochures, letter heading. In the field of communication, paper is used for writing pads, envelopes, newspapers, magazines, greeting cards, calendars, diaries, labels, business and passports. In the field of education, paper is used as notebooks, textbooks, exercise books, wall charts and
report cards. In the field of entertainment, paper is used for menu cards, playing cards, paper hats, crackers, wrapping paper, kites.

Thus paper is an amazing product; it is renewable clean and incredibly versatile. It continuously offers new possibilities, application and end-uses. Thus paper can be impregnated, enameled, creped, waterproofed, waxed, glazed, sensitized, bent folded, twisted, crumpled, cut, torn, dissolved, molded and embossed.

1.2. History of paper industry in the world

Paper making can be traced to about 105 A.D. when Tsai Lun, an Official in the imperial court of China created a sheet of paper using mulberry and other bast fibres along with fishnets, old rags and hemp waste. In its slow travel towards the west, the art of paper making reached Samarkand, in Central Asia in 751 A.D. and in 793 A.D. the first paper was made in Baghdad during the time of Harunat-Rashid, with the golden age Islamic culture that brought paper making to the frontiers of Europe. In the 10th century, Arabs substituted linen fibres and bamboo to create finer sheet of paper. By 12th century, paper making reached Europe. Johnnes Gutenberg invented printing machine in 1448 which led to rapid increase in demand for paper. The first successful paper machine was built by JLN Robert in 1798. Thereafter, paper making underwent revolutionary changes. The origin and development of paper industry is segregated in five stages as given in the Table 1.1.
Table 1.1: Paper Industry – Development phases

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period covered</th>
<th>Development process</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>1800-1860</td>
<td>Mechanization – rage preparation, use of filler, pulp beating and paper machine.</td>
</tr>
<tr>
<td>Second</td>
<td>1840-1880</td>
<td>Industrial scale rage substitute. (ground wood/ chemical pulp). Appropriate pulp mills were developed.</td>
</tr>
<tr>
<td>Third</td>
<td>1860-1950</td>
<td>Enlargement of web width 85-770 cm. Increase in production speed. Introduction of electric drive. Machines to produce particular type of paper.</td>
</tr>
<tr>
<td>Fourth</td>
<td>1950-1980</td>
<td>Further increase in web width. Increase in work speed, use of raw materials, use of new sheet etc.</td>
</tr>
</tbody>
</table>

Source: Central Paper and Pulp Research Institute Report.

The Table 1.1 gives the information about the development phases of paper that is from 1800 to till date. Different processes were used in different phases. Now-a-days more of chemical processes are used for the manufacture of paper.

1.3. Raw materials

The raw materials used for the production of paper may be classified into two categories viz. wood based raw materials and non-wood based raw materials.
1.3.1 Wood-based Raw materials

Wood-based raw materials may be again classified into two categories, viz. softwood trees and hardwood trees.

1.3.2 Soft wood Trees

The cellulose fibres in the pulp of coniferous trees species are longer. These trees are called as ‘softwood’ by the paper industry. Coniferous trees such as spruce, pine, balsam from the northern and southern hemispheres of the earth are used for making paper. Cellulose fibres of softwood ranges from about 2mm to 4mm. The longer fibres of the softwood give strength to the paper. The growth of softwood in India is limited to the Himalayas. In the paper industry, the softwood trees are also called as “gymnospermous”.

1.3.3. Hardwood Trees

Deciduous trees or leafy trees are called hardwood by the paper industry. The hardwood trees are mainly maple, oak, gum and birch. These trees are grown in the tropical and sub-tropical areas. Cellulose fibres of hardwood range from about 0.5mm to 1.5mm. The shorter hardwood fibres give a smooth surface. In the paper industry, hardwood trees are also called as “angiospermous”

1.3.4. Bamboo

The paper industry uses bamboo to the extent of 60-70 per cent of the total requirements of cellulosic raw materials. Usually 2.3 to 2.4 tonnes of bamboo is required for producing one tonne of paper. Bamboo has the advantage of the
possessing long fibre, dense stands and quick regeneration. It reaches maturity in 2-3 years and provides continuous flow of renewable source of raw material. However, there is danger of this source of important raw material being depleted if the rate of exploitation exceeds the rate of regeneration. Assam, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Karnataka and Maharashtra are important producers of bamboo.

1.3.5. Eucalyptus Plantation

The eucalyptus tree grows fast and is found most suitable for large-scale plantation. This is the most ideal tree to grow in India, according to the Forest Research Institute in Dehradun. It consumes less water and produces maximum raw materials for paper industry. In India, the planting of eucalyptus was done in Simla and Nilgris Hills at a height of 1500 to 2000 metres. Eucalyptus is one of the species which produces quality pulpwood for paper and newsprint making. Two species namely, Eucalyptus tereticornis and Eucalyptus camaldulensis were planted extensively depending upon the soil, rainfall and temperature prevailing and these two species are very much suitable to Tamil Nadu state. Tamil Nadu Forest Plantation Corporation (TAFCORN) annually used to supply between 750000 and 100000 MT of pulpwood to Tamil Nadu Newsprints and Papers Limited and Seshasayee Paper and Boards Limited.
1.3.6. The Non-wood based Raw materials

The Non-wood based raw materials can fill the deficiency of wood-based raw materials to meet the required levels of demand for paper industry. Treeless raw materials are classified into two categories, namely, Agro waste and Fibre crops.

Agro waste is generated to supply most of the raw materials needs without the use of any trees and expand tree plantations at the expense of natural forests. The agro waste may be classified into two categories, namely, Cereal Straws and Bagasse.

1.3.7. Cereal Straws

The straw as a raw material requires no land and the availability of raw materials is large. Straw is one of the oldest raw materials for paper industry. Cereal straws are primarily available from rice, oats and wheat. Rice and wheat are staple food in India. Rice straw has been successfully been used for making various grades of paper and board. Rice straw has been reported as a suitable raw material for high grade papers. Wheat straw requires more drastic digestion conditions than rice straw. Wheat straw is short-fibred and need to be mixed with long fibred pulp for running on a paper machine. Rice and wheat straws are used in the small and medium mills for producing mainly writing, printing and packing grades of papers. India is the second largest wheat producer in the world after China and accounts for about 12 per cent to the global wheat production. Neatly 80 million tons of wheat is produced in the country. Uttar Pradesh is the major contributor followed by Punjab, Haryana and Madhya Pradesh. Along with wheat an equivalent amount of straw is produced.
Major states where paper mills use wheat straw as fibrous raw materials for paper making are Uttar Pradesh, Punjab and Uttarkhand.

1.3.8. Bagasse

Bagasse is an agricultural residue that is available after the sugarcane is crushed in sugar factories. When the juice with the sucrose content of the sugarcane is crushed what remains as waste is bagasse. It is fibrous and is very good for pulping and making paper. Sugar industry has emerged as an important fibre base for Indian paper industry. Of all the agricultural based residues used by the paper industry, the share of bagasse is the maximum. India is the world’s largest producer of sugarcane with about a present total production of 280 million tons per annum. Cultivation of sugarcane is concentrated in the states of Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu and Uttar Pradesh. A large segment of sugarcane produced in the country is used for making sugar. Also there is a competition from the unorganized sector towards the production of country sugar and jaggery. According to FAO estimates, nearly 89 per cent of the total production of sugar cane is used for making sugar and the rest 11 per cent towards seed, cattle feed and human consumption.

1.3.9. Fibre crops

The fibre crops can be classified into three categories, viz. kenaf and mesta, jute stalks and flax, Hemp and Linseed.

Fibre crops are traditionally used to make paper, cloth and rope. The fibres may be chemically modified, like in viscose. Fibre crops are generally harvestable
for every season in a year as distinct from trees, which are typically grown for many years before being harvested for wood pulp fibre.

Kenaf and Mesta are fast growing crops and the fibre made out of kenaf and Mesta is used for rope making, net, carpet, mats and sacks. In recent years, Kenaf has received increased attention as a source of raw material for paper. Kenaf has certain advantages over the other raw materials such as:

1. It can be grown anywhere in the country, even in the waste and barren lands, poor soils and near the paper mills thus saving the cost of transportation.
2. Tropical climate suits the crop ideally.
3. Yield per acre is five to ten times more than that of the wood.
4. Kenaf is resistant to infection and virus.
5. It does not require huge storage facilities.

1.3.10. Jute

Jute grows mainly in the hot, humid climate of India and Pakistan. Jute plants are usually cultivated during the summer and monsoon months and they require liberal supplies of water, particularly at the time of extraction of fibre. Jute has become an alternative raw material for making paper.

1.3.11. Flax, Hemp and Linseed

For making specialty paper, a special characteristic of fibre is required, i.e. purity and length.
- Flax is grown in cold climates. The walls are thick linear bast fibre of flax is used for producing cigarette, tissue paper with 75 per cent cotton and 25 per cent of linen furnish bank notes, air mail bonds and other types can be made.

- Linseed grows in tropical climates. Linseed straw is produced after thrashing the seeds. Linseed fibre is strong enough to be used for making canvas, rope, twine, cottonized fibre and paper.

- Hemp is a promising source of longer fibre which is in short supply. India is the largest producer of sunn hemp. Sunn Hemp is used to make cigarette tissue paper.

- Rag pulp is generally used for highly specialized paper where strength durability, performance, formation, fine texture and excellent writing and erasure qualities are required. Bleached rag pulp is used for production of specialized paper such as:
  i. Bank notes or security paper.
  ii. Paper for insurance policies.
  iii. Permanent government record paper.
  iv. Legal document paper and similar paper for use where performance is of prime importance.
  v. High grade bond paper.
  vi. Special tissue and stationery paper requiring softness, fine texture and beauty.
  vii. Light weight speciality paper as used for the Bible, Dictionary and carbon paper.
viii. Paper for permanent record, editions of newspapers, journals, magazines and other periodicals.

1.3.12. Sabai Grass

Sabai grass also known as Bhaber or Barb was one of the first major raw materials to be used for paper making, prior to the use of bamboo. In India it grows mainly in the Sub-Himalayan tracts and in recent years, attempts have been made to cultivate it on a commercial scale in Uttar Pradesh and Bihar. The grass requires less chemicals and gives better quality pulp. The extraction of sabai grass is difficult and cumbersome as it is grown in patches in places widely scattered. There are some other grasses that are suitable for paper manufacture, viz, ulla, ponni, spear grass, elephant and bhutang grass. All these grasses are generally found in the Terai area of the Himalayas besides the Assam ranges and the valley of Kerala.

There are certain advantages involved in utilizing the non-wood based raw material in pulp and paper making. They are:

1) The non-wood crops can be cultivated and harvested annually whereas tress require 7-30 years of growth.
2) Fibre crops require much less land than for tree farms.
3) Cultivation of these plants are encouraged and deforestation is discouraged.
4) Due to extensive cultivation, growth of population, rapid urbanization and growing land scarcity, the non-wood crops and their cultivations are highly suggested.
The selection of wood based raw materials or non-wood based raw materials is based on the cost of technology which decides the quality of the paper. Due to the increasing demand for paper and improvements in pulp processing technology, almost any species of tree can be harvested for paper.

1.3.13. Chemicals

Along with the cellulosic raw materials, certain chemicals are also used in the manufacture of pulp, paper and paper boards. The important chemicals are caustic soda, soda ash, sodium sulphate, chlorine, sulphuric acid, sulphur, lime, ferric alumina, ammonium sulphate, resin and clay. A variety of colouring agents are also used. Coal is also an important input in paper industry. Large quantity of soft water is also required.

1.4. Importance of paper

Paper is being used to communicate record history and write down literature. It is helpful in spreading knowledge. Without paper and books, transfer of knowledge from one person to another or from one generation to another is not at all possible. Paper allows us to build upon the knowledge of our ancestors, making science and progress possible. Paper helps in presenting and disseminating human knowledge. Papers marks milestone in life with birth certificates, high school diplomas, mark sheets, marriage registration, licenses, photographs, diaries preserve collective memories for future generations and leave a permanent record of our time in earth. World is educated in paper. Businesses are found on paper. Important news is spread on paper. Paper creates an immediate connection between people and their
past, present and future ambitions. Papers and books were the basic storehouse of man’s knowledge. So paper has an important role to promote education, knowledge and information. The widespread demand for different types of paper products such as book, magazines, newspapers, bags, plates, cups, envelops and other products have further escalated the growth of paper industry. In view of paper industry’s strategic role for the society and also for the overall industrial growth, it is necessary that paper industry performs well.

Paper is a product that is absolutely indispensable during daily life. Paper performs multiple functions in our lives – from when we wake up and read the newspaper in the morning, for materials such as documents, notebooks, paper money and even as toilet paper in the bath room. If paper were not in existence, humankind would be unable to maintain the high cultural level of modern society. Children play with paper dolls, paper masks, paper kites etc. Ticket to a movie is made out of paper. Tickets to train and bus are made out of paper. Paper is an expression of everyday living. Paper is the essential need of today’s world. Paper is needed everywhere from school to office, from bank to court. With the present trend it is almost impossible to think life without paper. Paper is interwoven with human life in hundreds of ways. It is a bio-degradable product and has a benign footprint at the end of its life cycle. Despite the projections that digital age would render paper obsolete, Paper Industry has been growing year after year.

1.5. Pulp and paper manufacturing

After the selection of raw materials, pulp preparation is the next step. Pulp can be produced mechanically by processing wood or other vegetative or non-
vegetative materials to extract cellulose fibres. The pulp may be dried and directly used in the paper making process. The paper making process is given below.

1) Cellulose fibre suspension is prepared by heating in water.
2) Paper stock is filtered on a woven to form a matted sheet fibre.
3) The wet sheet is pressed.
4) It is compacted to squeeze a large portion of water.
5) The excess water is removed by the evaporation.
6) On the basis of requirements, the dry paper sheet is compressed, coater and impregnated.

1.6. Global scenario of Pulp and Paper Industry

The global paper and pulp industry is equally distributed between North America, Europe and Asia. Asia’s important markets are China, Japan, India, Malaysia, Singapore and Thailand. The paper industry has a very dominant role in the World economy. The global paper industry is highly concentrated in United States, Japan, Germany and Canada which together accounted for 60 per cent of the total paper production. The developed countries have made a significant progress in technology with much higher scale of operations and with the advent of new technologies, the countries are reaching goal of economic use of wood supply and therefore less pollution. In the developed or advanced countries, the pulp and paper industry has high growth rate whereas in the developing or backward countries, it has a low growth rate. The paper and pulp industry in developed countries is regarded as most sophisticated and high-tech industries in the world with high speed machines, efficiency and quality control. Continuous efforts are being taken to
minimize man power, optimize quality and improve the efficiency. The technological developments are meant for increased efficiency and improved maintenance. The United States of America is the largest market for paper product and commands high per capita consumption. The main paper and paperboard producing countries in the world are given in Table 1.1.

Table 1.2: Production of paper in 2011

<table>
<thead>
<tr>
<th>Rank (as of 2011)</th>
<th>Countries</th>
<th>Production as of 2011 in thousand tons</th>
<th>Share % as of 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>99300</td>
<td>24.9</td>
</tr>
<tr>
<td>2</td>
<td>U.S</td>
<td>75083</td>
<td>18.8</td>
</tr>
<tr>
<td>3</td>
<td>Japan</td>
<td>26627</td>
<td>6.7</td>
</tr>
<tr>
<td>4</td>
<td>Germany</td>
<td>22698</td>
<td>5.7</td>
</tr>
<tr>
<td>5</td>
<td>Canada</td>
<td>12112</td>
<td>3.0</td>
</tr>
<tr>
<td>6</td>
<td>South Korea</td>
<td>11492</td>
<td>2.9</td>
</tr>
<tr>
<td>7</td>
<td>Finland</td>
<td>11329</td>
<td>2.8</td>
</tr>
<tr>
<td>8</td>
<td>Sweden</td>
<td>11298</td>
<td>2.8</td>
</tr>
<tr>
<td>9</td>
<td>Brazil</td>
<td>10159</td>
<td>2.5</td>
</tr>
<tr>
<td>10</td>
<td>Indonesia</td>
<td>10035</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Source:-RISI – www.risiinfo.com – The leading information provider for the global forest product industry.

The data presented in the Table 1.2 reveals that China is the leading producer of paper and paperboard followed by US, Japan, Germany Canada, South Korea, Finland Sweden, Brazil and Indonesia. China contributes around 25 per cent of the world paper and paperboard production. Asia’s main markets are China, Japan, India, Malaysia, Singapore and Thailand. In 2005, Japan had the highest per capita consumption (247 kg), followed by Singapore (228 kg), Malaysia (106 kg), Taiwan
(51 kg), China (42 kg), Indonesia (22 kg), and Philippines (16 kg). The paper consumption in India is 9.2kgs. The per capita consumption of paper in some of the countries are listed in the Table 1.2.

Table 1.3: Per capita consumption of paper

<table>
<thead>
<tr>
<th>Countries</th>
<th>Per capita consumption in kgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A</td>
<td>312</td>
</tr>
<tr>
<td>Finland</td>
<td>285</td>
</tr>
<tr>
<td>Sweden</td>
<td>253</td>
</tr>
<tr>
<td>Japan</td>
<td>247</td>
</tr>
<tr>
<td>Germany</td>
<td>236</td>
</tr>
<tr>
<td>Canada</td>
<td>223</td>
</tr>
<tr>
<td>Italy</td>
<td>195</td>
</tr>
<tr>
<td>France</td>
<td>183</td>
</tr>
<tr>
<td>Korea</td>
<td>170</td>
</tr>
<tr>
<td>China</td>
<td>64</td>
</tr>
<tr>
<td>Brazil</td>
<td>43</td>
</tr>
<tr>
<td>Indonesia</td>
<td>23</td>
</tr>
<tr>
<td>India</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Source: - Pulp and paper International journal.

Asia accounts for over a third of global paper production. While Europe and North America accounts for about 30 per cent and 26 per cent respectively. Although the developed countries also started with low scale of operation of 50-100 tons per day and have enhanced their efficiency and to achieve better economy and the scale of operation has been tremendously increased even up to 3000 tons per day. Remarkable developments have taken place due to the improvement in the technology.
1.7. The Indian Paper and Pulp Industry

The paper industry in India has been in existence since ancient times, experiencing a paradigm change over the years. The existing paper mills in the country employ diverse technologies—from legacy to advanced methods. The pulp and paper industry is a manufacturing industry among the various types of industries. This is the most important of all the forest based industries. Some people treat it as a chemical industry due to its manufacturing process and because of certain chemicals used for its manufacturing. Still some other includes it in the group of agro-based industries because some of the agricultural products and residuals are used as raw materials. As large portion of the basic raw materials is derived from the forests, it seems logical to treat it as a forest-based industry. The paper industry is one of the most thriving industries in the country.

The Indian paper industry accounts for about 1.6 per cent of the world’s production of paper and paperboard. Paper industry requires low investment and capital saving industry. With rapid growth in the economy, India is going through structural changes with greater urbanization, rise in disposable income, better penetration of education, print and media, changes in consumption pattern, demographics and lifestyle. Indian paper industry is an important source to achieve Government’s National Literacy Mission. The paper industry creates economic wealth in the hands of poor by generating employment. The paper industry in India is highly energy intensive. It is ranked sixth largest energy consumer in the country. It is a capital-intensive, energy-intensive and pollution emitting industry. “Paper industry in India is the 15th largest paper industry in the world. It provides
employment to nearly 1.5 million people and the Government regards the paper industry as one of the high priority industries of the country (DIPP – Annual report 2010-2011). It contributes Rs 2500 crores per annum to the national exchequer by way of excise duty (Planning Commission - 2008). The first paper mill was set up in India more than 100 years ago.

William Carey started a paper mill in 1812 at Sreerampur, West Bengal. The Indian government had given preferential treatment to the indigenous paper production in 1880 to encourage the establishment of paper mills. Thus Machine made paper started its journey over a century and a half. Sreerampur mill was based on grasses and juts as raw materials. This is the principal seat of paper industry even today. Subsequent successful efforts were made at Lucknow in 1879, Titagarh in 1882, Pune in 1887, Raniganj in 1892, Kaukinra in 1892 and Naihati in 1918. Large scale mechanized technology was introduced in making the paper in India in 1905.

Since then the raw materials for the paper industry has undergone a number of changes and over a period of time, besides wood and bamboo, other non-conventional raw materials have been developed for the use in the paper making. The Indian paper industry can be classified into three segments, viz. i) Forest based raw material ii) Agro based raw material iii) Recycled waste paper.

**Forest based raw materials** – Large paper mills use wood/bamboos as raw materials and are equipped with complete recovery and effluent treatment systems.

**Agro-based raw materials** - The medium and small paper mills use straw and bagasse as their raw materials.
**Recycled waste paper** - The medium and small paper mills use waste papers as major raw materials.

The Table 1.4 clearly indicates the percentage use of raw materials by the large, medium and small paper mills in India. In 1970, 84 per cent of the paper mills used forest based raw materials, 7 per cent of the paper mills used recycled raw materials and 9 per cent of the paper mills used agro-based raw materials. In 2000, 39 per cent of the paper mills used forest based raw materials, 30 per cent of the paper mills used recycled raw materials and 31 per cent of the paper mills used agro-based raw materials. In the year 2011, 31 per cent of the paper mills used forest based raw materials, 47 per cent of the paper mills used recycled raw materials and 22 per cent of the paper mills used agro-based raw materials. This shows that there was a reduction in the use of forest based raw materials and sizeable increase in the recycled raw materials and agro-based raw materials in 2000 and reduction in the use of forest based raw materials and increase in the recycled raw materials and agro-based raw materials in 2011.

<table>
<thead>
<tr>
<th>Year</th>
<th>Forest-based raw materials</th>
<th>Recycled raw materials</th>
<th>Agro-based raw materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>84</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>2000</td>
<td>39</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>2011</td>
<td>31</td>
<td>47</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Central Paper and Pulp Research Institute Reports, 2011
The paper and pulp industry in India is dominated by small and medium scale units. The Government of India has completely de-licensed the paper industry with effort from 17th July 1997. Entrepreneurs are required to file an industrial entrepreneur memorandum with the secretariat of industrial assistance for setting up a new paper mill or substantial expansion of the existing mill in permissible location. The Indian paper industry has been granted the status of priority sector for foreign equality participation up to 100 per cent and its entitled to receive automatic approval from Reserve Bank of India. Although it did not receive much FDI, the liberalization championed the cause of prolonged financial shortages of the sector. Various agencies like: The Industrial Development Bank of India (IDBI), Industrial Credit and Corporation of India (ICICI), and the Indian Renewable Energy Development Agency (IREDA) etc. are now willing to advance the long term soft loans to modernise the industry. The demand for paper in India has been increased due to certain factors such as the increase in the size of the population, increase in the size of the service industries, spread of education and literacy, Government’s several initiatives towards education, higher level of industrial activity and corporate spending. The paper and pulp industry in India plays an important role in terms of revenue generation, foreign exchange earnings and employment generation. In spite of the technological changes leading to increased computer operations, paper still has its own existence and has become an essential commodity. The production of printing and writing papers in India are given in the following table 1.5 in metric tonnes.
Table 1.5: Production of printing and writing papers in metric tonnes.

<table>
<thead>
<tr>
<th>Year</th>
<th>Production in metric tons</th>
<th>Growth rate (in percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>0.11</td>
<td>0</td>
</tr>
<tr>
<td>1960-61</td>
<td>0.34</td>
<td>22</td>
</tr>
<tr>
<td>1970-71</td>
<td>0.75</td>
<td>41</td>
</tr>
<tr>
<td>1980-81</td>
<td>1.1</td>
<td>35</td>
</tr>
<tr>
<td>1990-91</td>
<td>2.43</td>
<td>133</td>
</tr>
<tr>
<td>2000-01</td>
<td>4.87</td>
<td>244</td>
</tr>
<tr>
<td>2005-06</td>
<td>6.80</td>
<td>193</td>
</tr>
<tr>
<td>2010-11</td>
<td>10.11</td>
<td>331</td>
</tr>
</tbody>
</table>

Source: - Central Paper and Pulp Research Institute Reports.

It is evident that there is 22 per cent growth between 1950-51 to 1960-61, 41 per cent between 1960-61 to 1970-71, 35 per cent growth between 1970-71 to 1980-81, 133 per cent growth between 1980-81 to 1990-91, 244 per cent growth between 1990-91 to 2000-2001, 193 per cent between 2000-2001 to 2005-2006 and 331 per cent between 2005-2006 to 2020-2011. Overall in the seven decades, there is 1000 per cent growth in the production of paper in India. In India, Assam, Himachal Pradesh, Manipur and Nagaland are the area in which major paper producing industries are well established. India’s production in the year 2010-2011 registered 10.11 million tons in writing and printing papers and helped to move up to become the 11th largest pulp and paper producing country in the world. The Indian paper industry is among the top 12 global players today. There are about 700 manufacturing units of processing and production of paper. In India, newsprint and paperboards which have the annual capacity of 8.3 million tons is likely to be 16 million tons by 2014.
There are few state owned and private players in the emerging paper industry like Hindustan Newsprint Ltd (HNL), Tamil Nadu Newsprint and Papers Ltd (TNPL), Ballarpur Industries Ltd (BILT), Seshasayee Paper and Board Ltd (SPBL), ITC Paper. The strong demand of paper products has pushed the Indian paper industry to a new level it is expanding to meet the growing demands of the people.

Vast changes have taken place in the field of printing paper tissues, newsprint and so forth. Modern management along with latest technological machines is used for the completion of various projects. Nowadays foreign investors are interested in setting up new plants for manufacturing paper to bring forth huge revenue to the paper industry. During the 55 years, the number of paper mills has increased from just 17 mills in 1957 to 666 engaged in the manufacture of paper and paperboard, out of which nearly 568 in operation in 2006. 194 mills under preview of board of industrial and financial reconstruction[BIFR] nearly 60 mills with capacity of 1.3 million tons is closed. The paper industry is planning to widen its horizons with the help of joint ventures with new investors.

The paper industry was predominantly localized in the Hooghly River line. Though sabai grass was the principal raw material which had to be carried over a distance of more than 900 miles form place like Uttar Pradesh, Punjab and Bihar yet the industry was predominantly localized in the Hooghly area. This is because of 1) availability of coal in large quantities 2) proximity of large markets for the finished products. Even now the industry is mainly concentrated in and around Calcutta and Raniganj areas as paper mills enjoys a good market in Calcutta and its suburbs. The Indian paper industry has created sustainable livelihood in rural areas and has helped in generating employment for the local population, especially, the women to earn
their livelihood. The Indian paper industry has emerged as a diversified and specialised industry that produces numerous types of papers that comes in various use such as watermark, filter paper, drawing sheets etc.

With the continuous growth in GDP and improvements in literacy rate and standard of living, the demand for paper and paper product is growing at the annual rate of 7-8 per cent. India's production in the year 2012-13 moved up to 11.7 million tonnes, while the consumption stood at 13.0 million tonnes. This enabled India to maintain its position as the 11th largest producer of paper in the world. The industry, however, is highly fragmented. As per industry sources, there are more than 1000 paper mills in operation in the country. Development Council for Pulp Paper and Allied Industry of Government of India, however, reckons that 759 Mills are in operation, producing nearly 11.70 million tonnes of paper, paper board. The current demand of 12 million tonnes is expected to reach 20 million tonnes by 2020. With the consistent growth in the literacy rate and economy, India is rated as the fastest growing market for paper in the world with a growth rate of 6% per year. Increase of per capita paper consumption by one kg would increase the demand by about 1.25 million tonnes per year.

The growth of machines made paper industry can be divided into two phase such as: Pre-planning period and post planning period.

**Pre planning period**

India’s production of paper at the beginning of the twentieth century was estimated as 19,000 tons. In 1911, the production was 27,200 tons. Their production levels reached to 40,000 tons in 1931 and to 1,10,000 tons by 1945. The Second
World War (1939-1945) provided an impetus for the stabilization and expansion of paper industry in India.

Table 1.6: Paper production in India (1911-1950)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (1000 tons)</th>
<th>Growth rate (per cent) over previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911</td>
<td>27.20</td>
<td>0</td>
</tr>
<tr>
<td>1921</td>
<td>24.70</td>
<td>-0.091</td>
</tr>
<tr>
<td>1931</td>
<td>40.00</td>
<td>0.619</td>
</tr>
<tr>
<td>1941</td>
<td>95.00</td>
<td>1.375</td>
</tr>
<tr>
<td>1945</td>
<td>110.10</td>
<td>0.022</td>
</tr>
<tr>
<td>1951</td>
<td>109.3</td>
<td>0.030</td>
</tr>
</tbody>
</table>


The Table1.6 clearly indicates the growth of paper production in India from 1911 to 1951. There was a decrease in the production during the decade 1911-1921. There was an increase in production in 1921-1931, 1931-1941, 1941-1945 and there was a slight decline in the production during 1945-1951.

**Post-planning period**

The planned development in paper industry in India began only in post-independence period. The growth however slowed down in the sixties owing to the escalation of cost and scarcity of forest based raw material. The Indian paper industry commenced only in the planning era from 1951 onwards with the setting of new mills and modernization and expansion of existing mills under the various Five year plans, the paper industry has showed an impressive development. The
following table shows the plan wise capacity and production of paper industry in India from first plan to Eleventh plan.

There was a continuous increase in production from the first plan to ninth plan from 0.19 to 3.7. There was a slight reduction in the production during the tenth plan and once again the production of paper began to increase.

Table 1.7: Capacity and Production of Paper Industry in India (First Plan to Eleventh Plan)

<table>
<thead>
<tr>
<th>Plan Periods</th>
<th>Year</th>
<th>Capacity</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Target</td>
<td>Actual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quotient (per cent)</td>
<td>Quotient (per cent)</td>
</tr>
<tr>
<td>First Plan</td>
<td>1951-56</td>
<td>0.21</td>
<td>0.21</td>
</tr>
<tr>
<td>Second Plan</td>
<td>1956-61</td>
<td>0.46</td>
<td>0.43</td>
</tr>
<tr>
<td>Third Plan</td>
<td>1961-66</td>
<td>0.83</td>
<td>0.67</td>
</tr>
<tr>
<td>Annual Plan</td>
<td>1966-69</td>
<td>0.75</td>
<td>0.73</td>
</tr>
<tr>
<td>Fourth Plan</td>
<td>1969-74</td>
<td>-</td>
<td>0.99</td>
</tr>
<tr>
<td>Fifth Plan</td>
<td>1974-79</td>
<td>1.3</td>
<td>1.14</td>
</tr>
<tr>
<td>Sixth Plan</td>
<td>1980-85</td>
<td>2.05</td>
<td>2.4</td>
</tr>
<tr>
<td>Seventh Plan</td>
<td>1985-90</td>
<td>2.7</td>
<td>3.04*</td>
</tr>
<tr>
<td>Eighth Plan</td>
<td>1992-97</td>
<td>3.85</td>
<td>4.2</td>
</tr>
<tr>
<td>Ninth Plan</td>
<td>1997-02</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Tenth Plan</td>
<td>2002-07</td>
<td>5.1</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>2002-03</td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>2003-04</td>
<td>5.1</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>2004-05</td>
<td>7.4</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>2005-06</td>
<td>7.6</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>2006-07</td>
<td>7.8</td>
<td>6.1</td>
</tr>
<tr>
<td>Eleventh Plan</td>
<td>2007-12</td>
<td>7.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: Centre for Industrial & Economic research (CIER), 2012

1.8. Newsprint industry

Over the year, the printing industry has grown in all parts of the world making giant strides in recent times in improving the machinery in terms of scope,
technology and speed. The industry is growing systematically and regularly scattered to all over the country majority of which are very small in operations. Today Indian publishing is one of the greatest in the world and the country is counted among the top seven publishing nations. Going forward the booming Indian economy will be backed by the literate population on the rise, increasing consumerism, entry of global brands in the country and opening of the sector to foreign investors would drive the growth in print requirement.

1.9. Structure of Indian Paper Industry

In India, the paper industry may be classified into two categories, viz,

1. Paper and paper boards and
2. Newsprint.

Depending upon the end use, structure, composition, substance etc. paper can be further classified into

- Cultural
- Industrial
- Paper Board and
- Specialty.

The Newsprint is further classified into

- Standard
- Glazed and
- Security.
Cultural paper consists of

1) Writing paper: cream, wove, azurelaid, cream laid, bond, etc.
2) Printing grade: map-litho, offset, parchments, photocopies, covers, duplicating, etc.

Industrial paper is a general term for unbleached paper used for packaging. It has two varieties:

1) Wrapping: Poster, tea yellow manila.
2) Packing: Kraft, media, liner, sack.

It is used for manufacturing of corrugated boxes, paper sacks, paper cones, etc.

Paper boards are made of two or more layers of paper. These boards are used in the packaging industry for manufacturing folding cartons. The important varieties are straw, mill, duplex, file, triplex, pulp, etc.

Specialty paper includes a large variety of paper compromising laminated paper, paper for cards, for computers and business machines, tracing paper, tissue paper, chart and recorder paper, coated magazine paper, glassine paper, roofing paper, wallpaper, toweling paper, toilet tissues cleaning tissue and napkins and cigarette paper.

The leading paper mills in India are Ballarpur paper Industries, ITC Badrachalam Paper mill, Andhra Pradesh paper mills limited, J.K. paper mills, TNPL, Century pulp and paper mill, west Coast paper mills, Abhishek Industries ltd, Orient paper and industries, Emami paper mills ltd., Yash papers and Seshasayee
Paper and Boards. The paper board and Industrial packaging comprises of 45 per cent of the industry followed by printing and writing paper accounting for 35 per cent and newsprint segment with 20 per cent of the domestic paper production.

1.10. Government policy

There is an excellent budget for the paper industry, as the excise cut would give the sector the necessary boost. The cut in excise duty from 12 per cent to 8 per cent will give a big relief to paper industry who were struggling to increase their margins. Excise duty has been fully exempted on paper and paper products, manufactured from non-conventional raw materials up to clearance of 3500 metric tons in a year from a unit. However, this benefit is available only if the unit does not have an attached wood/bamboo pulping unit. They will also be levied only 8 per cent excise duty for production in excess of 3500 metric tons in a year. The government has maintained the effective rate of duty on paper, paperboard and articles at 4 per cent while raising the duty for certain stationary products like folders, letter pads and file covers to 8 per cent. Notebooks and exercise books have also been exempted.

The Indian paper and paperboards industry has potential and also capabilities to service the growing demand in domestic and international market and also to create huge employment avenues in the rural India through agro production, forestry and at mills, provided the competitiveness is encouraged by the government. The Indian paper industry is a booming industry and is expected to grow in the years to come. The usage of paper cannot be ignored and this awareness is bound to bring about changes in the paper industry for the better. Reading a book will remain a
great pleasure into the future and paper with its many uses, will continue to express
themselves by using this most versatile material.

1.11. Paper industry after Economic Reforms

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. Today the concept of globalization, eco-style
compatibility and other environmental issues are being integrated at the planning
level by the major domestic players. Among the above three segment 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 has yet to undertake modernization programs. In the agro based
segment, there are a few mills complying with quality and environmental
requirements. The third segment, recycled fibre, also has a number of small pulp and
papers mills that are based on obsolete technology. One of the major concerns of
these mills is a lack of adequate equipment for processing recycled fibre. As a
consequence the quality of paper products produced from 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. Today there are 759 pulp and
paper mills with an installed capacity of 12.7 million tons producing around 10.11
million tons per annum of paper/paper board and newsprint out of an annual
consumption of around 11.15 tons.
The major players of the Industry are located in Andhra Pradesh, Tamil Nadu, Maharashtra, Punjab, Madhya Pradesh and Gujarat. In terms of numbers, Gujarat tops with 130 units, followed by Uttar Pradesh (115), Maharashtra (112), and Tamil Nadu (88). The liberalization and policy initiatives later lay emphasis on improving overall performance which led to increasing integration of the sector with rest of the world. Paper consumption is poised for a big leap forward in sync with the economic growth and is estimated to touch 13.95 million tonnes by 2015-16. India has undergone considerable economic reforms towards liberalization and is attracting investments which began in early 1990. The process continues to have an all-round impact resulting in appreciable GDP growth over past few years. GDP growth in the ‘2002-07’ period was 8.9 per cent as against 2 per cent in 1950s while population growth slowed down from 2.2 per cent in 1951-1980 periods to 1.5 per cent in 2001-2010 periods. India is now the fourth largest economy and is expected to become the third largest by 2012-14, overtaking Japan.

1.12. Factors favouring investment in Indian paper and pulp industry

Several economic factors and lifestyle changes are driving the growth of paper consumption in India.

- Growth in educational sector – The government has increased its focus on education and there are several Central and State government programs which has brought about a considerable increase in the literacy level. The result has been increased expenditure on textbooks and notebooks providing a good opportunity for paper producers.
Increased corporate activity and lifestyle changes – Economic development and globalization has led to increase in the corporate activity.

Increased commercial activities has spurred the demand for packaged goods.

Growth in press publications – India is the second largest print market in the world. There has been a considerable increase in the number of magazines, newspapers, journals, articles etc.

Increased demand for packaging – As the FMCG (fast moving consumer goods) there has been a remarkable increase in the demand for packaging goods.

Urbanization is also one of the reason for the growth of paper and pulp industry.

Due to the development of agriculture and manufacturing industries, it is supported by ancillary services like banking and insurance from the financial service sector. The growth in the service sector propels demand for office supplies.

1.13. Conclusion

There are a few obstacles and challenges faced by the Indian paper and pulp industry such as raw materials, obsolete technology, finance, high cost of basic inputs, poor profitability, environmental issues, underutilization of capacity, lack of skilled manpower and competition in the global market. Despite this, the Indian paper and paperboards industry is on the growth path.
The literacy level in India which is on the increase is further set to improve the demand for paper in future. The Government of India’s increased allocation of budget for education sector is to expect to further improve the literacy rates in both urban and rural areas. The paper industry in India has become more promising as the domestic demand is on the rise. Increasing population and literacy rate, growth in GDP, improvement in manufacturing sector and lifestyle of individuals are expected to account for the growth in the paper industry of India. Indian paper industry has a huge potential and prospects of growth in coming future. The industry looks extremely positive as the demand for market of paper products like, tissue paper, tea bags, filter paper, light weight online coated paper, medical grade coated paper etc. is growing up with the economy. The robust economic and strong corporate performance would boost the domestic demand for papers in the near future. The paper and pulp industry in India has to spend much on Research and Development so that they shall be on the greater heights.

1.14. Summary

An attempt has been made in this chapter towards a brief introduction about the origin of paper, uses of paper, the sources of raw materials by which papers can be manufactured, the importance of paper and the process by which paper can be manufactured. There was also a discussion about the global scenario of paper and pulp industry, Indian paper and pulp industry, the structure of Indian paper and pulp industry, paper industry after economic reforms, Government policy on paper and pulp industry and the factors that are favouring the investments on paper and pulp industry.
References:


