

AN INDUSTRY ANALYSIS WITH SPECIAL REFERENCE TO INDIAN PAPER INDUSTRY

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ABSTRACT

Paper Industry is one of the ancient industries in India. The present study made a thorough research on the growth and progress of Indian paper industry and revealed some of the interesting facts about the Indian Paper Industry. The study initially starts with the scenario of Indian Paper Industry in pre-liberalization period and then proceeds towards its state in post-liberalization period. The paper has bifurcated into various segments in connection with Indian Paper Industry. The research revealed the reasons for slow growth rate, challenges and problems faced by Indian Paper Industry. Finally, the paper sums up with prospects and a brief SWOT analysis on Indian Paper Industry.

KEYWORDS: Growth, Pre and Post-Liberalization Period, Challenges, Problems, SWOT and Prospects

INTRODUCTION

The word paper is derived from the “Latin” word “Papyrus” and from French “Papier”, Paper is basically composed of vegetable fibers matted together to form into sheets. “Papyrus” is a kind of grass material. Papyrus is an aquatic plant which grew in abundance in the delta of the Nile in Egypt. In an understandable language it means a sheet formed by the composition of vegetable, mineral, animal or synthetic fibers or mixtures with or without the addition of other substances into liquid vapour, or gas so that the fibers are intermeshed together.

Paper consumption is used as basic measure of civilization. Initially writings and carvings were made on stones, clay, copper, brass and palm trees, etc. The art of paper making was first developed in China where it was made from the bark and leaves of the mulberry tree. In 751 A.D. the Arabs took the Chinese as prisoners and from them the art of paper making reached to the Middle East and Europe.

The art of paper making reached India through Arabs who initially learnt from Chinese prisoners. Earlier Aryans used “copper plates”(Tammrapatra), Loha Patra (Iron sheets), Tadapatra (Palm leaves), Bhujapatra (Beech palm) and like material, in order to memorize the huge amount of information. The usage of metals for information sharing and storing has eroded with certain problems, and resulted in invention of paper to ease the human’s everlasting endeavor of information sharing and storing. The usage of lead, copper and bronze as means of communication drastically reduced with the introduction of fiber sheets. In olden days, from Kashmir to Kanyakumari, there were evidences of existence of hand-made paper industries. The paper industry gained its momentum during moghal empire. It was observed as the most common use material throughout India at the close of Akbar’s reign.

As per history, the efforts to mechanize the Indian paper industry were first made by William Carey. He started a paper mill in 1812 at Serampore, West Bengal. He himself set up a steam engine in 1820 and he added first four-drummer type machine in 1832 and paving to the development of mechanized paper mills. The Upper India Couper Paper Mills, Lucknow (1882) and Punalur Paper Mills, Kerala (1883), Titagur Paper Mills, West Bengal (1884), Deccan Paper Mills, Maharashtra (1887), Bengal Paper Mills, West Bengal (1891) and Imperial Paper Mills Corporation, West Bengal (1894) were pioneering units in the early Indian Paper Industry. The then British Government in India had given a preferential

treatment to the indigenous paper production in 1880 to encourage and establishment paper mills. During the course of time the paper industry had been transformed into one of the major and key industry for independent India.

The gross roots of “Paper Industry” in terms of business:

The dictionary meaning of industry is “Diligence”; Habitual employment in useful word; Branch of trade or manufacture.”In our context it means a branch of trade or manufacturing activity of a specific type of goods or service. In a business activity several types of goods and services are manufactured and sold for a consideration which includes profit. Identical business taken up by many individuals or organizations or firms, is collectively called an industry.

Industries are classified into categories like primary industry, extractive industry, genetic industry, construction industry, manufacturing industry etc.

1. Primary Industry:

The activities primarily associated with the human civilization itself are known as primary industry. E.g., hunting, fishing, farming etc.

2. Extractive Industry:

The activities performed to draw, raise or extract various forms of wealth from water, soil air or obtained from beneath the surface of the earth are known as extractive industry.

3. Genetic Industry:

The reproduction or multiplication of certain animals or species of plants with an object of making profits there from, represent genetic industry. E.g., poultry, farming, cattle breeding, seeding plants, plant nurseries etc.

4. Construction Industry:

Construction industry is one of the pioneering industries in the field of infrastructure development. In one way it is an ancillary industry.

5. Manufacturing Industry:

Generally the term “industry” is used to mean manufacturing industry. However, manufacturing industries are those industries which are engaged in the conversion of raw materials or semi finished goods or products into finished products. E.g. Steel, Sugar, Paper, Cement, Textile etc.,

These industries are further sub-divided into:

- a. Analytical
- b. Synthetic
- c. Processing
- d. Assembly Line

As per this methodology Paper Industry as a whole fits into Manufacturing Sector, but its applications are unlimited and it can fit to any or all of the above categories.

Objective & Methodology of the Study

The literature on Paper Industry with respect to any country is quite crucial for varied reasons. Though the literature on paper industry is available through different sources but much of the literature is theme specific like growth, demand or problems etc. In order to provide a concrete and complete data on paper industry at one place for a country like India is quite essential obviously the present study and analysis was undertaken with an objective to provide abreast of knowledge, information and data at one place to cater to the needs of researchers, academicians and other interested parties.

The study is entirely based on secondary sources with an objective of full text of information on one industry at one place, and accordingly the author made his efforts to collect the necessary data from text books, journal articles, web sources and various reports with respect to paper industry in India. The data so generated is thoroughly modified to suit to the requirements of various readers and researchers for further research in the field. The data collected for the study is authentic and valid as the data is secured from authentic sources. Data is majorly secured from INTECOS (Industrial and Technical Economic Services Pvt. Ltd., India Stat. com and CIER (Centre for Industrial and Economic Research).

Review of Literature

The present study relied majorly on the earlier research and substantiated with the up to date information on Paper Industry in India. Some of the contributions that lead to the present study are as follows:

In a research paper by Ahuja, S. P. (1992) discussed various aspects dealing with Paper Industry in India.

Ashok Goel (1993) had given an overview of prospects of Indian Paper Industry.

Banthia, K.M.(1998) discussed the Pains and Pitfalls after globalization on Paper Industry.

Barik k.(2003) mentioned the Production Structure and Productivity growth of Indian Paper Industry.

Mall, I.D (1998) discussed the responses of Indian Paper Industry to challenges posed by globalization.

Martino Pub (2001) submitted historical perspectives of Paper Industry.

Sharma L.C (1988) had given at a glance the overview of Indian Paper Industry.

Subramanian Alka (1987) made a study on Indian Paper Industry.

Rao, Y.A (1989) presented the Status and Prospects of Indian Paper Industry.

Ray,P.R (1999) studied the demand calculation for Paper Industry in India.

Stastical data of INTECOS (Industrial and Technical Economic Services Pvt. Ltd) and CIER (Centre for Industrial and Economic Research) Upto the year 2010.

In addition to these literary works, reports and other material sources of IPMA (Indian Paper Manufacturers Association), CPPRI (Central Pulp & Paper Research Institute) & IPPTA (Indian Pulp and Paper Technical Association), Sharanpur were taken into consideration.

Growth of Paper Industry

The key element of economic development process either in India or West is one invention by human i.e., "Paper". The activities of business got expanded and explored by virtue of paper currency and negotiable instruments.

The Indian paper industry is accorded as "core sector" as per the Industries (Development & Regulation) Act, 1951. The progress of paper industry is inextricably linked to the national priorities and with the changing times, its fortunes fluctuate. It is, therefore, essential to trace the manner in which the paper industry has developed to the present stage. In order to understand clearly the growth of paper industry in India, it is worthwhile to consider it in the following

phases. They are Pre-Protection Period (before 1923), Protection Period, War and post war period, Pre-Planning Period, and Post-Planning Period. Total Production during this period was 3,000 tonnes per year (See Table 1).

Table 1: Growth in Pre-Protection Period (before 1923)

Mills (Loacation)	Year	No. of Machines
Serampore	1870-1905	1 (3 added)
Lucknow	1882	1
Titaghur	1902	3
Rani ganj	1902	1
Naihati	1922	2

Source: Paper Industries in India: Report and Directory, 1980

Protection Period (1924 – 1936)

In 1924 the Government initially granted protection for five years. This was later extended by another seven years. A duty of Rs.45 on imported paper was imposed.

War and post-war period (1938-50):

The world war gave impetus to the paper industry and production doubled. All types of paper and paper board were made during this period. The Government however, kept the prices regulated.

Growth in Pre-Planning Phase

Production of paper at the beginning of 20th century was estimated at 19,000 tonnes in India. The actual production was 27,200 tonnes in 1911. The production rose from 40,000 tonnes in 1931 to 1,10,100 tonnes in 1945. The Second World War period provided ample impetus to the growth of all types of paper and paperboard. The after effects of Second World War gave rise to cessation of imports, made indigenous production rise considerably and the industry attracted sizeable investment. The major raw materials were remaining sabai grass, hemp, rags, jute and wood pulp and the production was stagnant until 1950. However, it made considerable progress during the annual five year plans (See Table 2).

Table 2: Growth in Pre-Planning Period

Year	Production in ‘000 tonnes)	Growth Rate in %
1911	27.20	0
1921	24.70	-0.091
1931	40.00	0.619
1941	95.00	1.375
1945	11.10	0.022
1950	109.3	0.030

Source: Paper Industries in India: Report and Directory, 1980

Growth in Post-Planning Phase

In post planning phase, the Indian paper industry has seen a significant growth in spite of certain setbacks. With establishment of new mills and expansion of existing mills, the paper industry has shown an impressive growth during the post-planning period and especially after 1951 the progress was quite remarkable. In the first planning period the existing 14 units made with an additional capacity produced 58,900 tonnes and 2 new mills helped to achieve another 15,600 tonnes. Table 3 provides a better understanding of progress of Indian paper industry in the post planning period.

Table 3: Growth in Post Planning Period

Capacity and Production of Paper Industry in India							
(First Plan to Eleventh Plan)							
(mn MT)							
Plan periods	Year	Capacity			Production		
		Target	Actuals	Achievement Quotient(%)	Target	Actuals	Achievement Quotient(%)
First Plan	(1951-56)	0.21	0.21	100	0.2	0.19	93.6
Second Plan	(1956-61)	0.46	0.43	94.1	0.36	0.35	98.3
Third Plan	(1961-66)	0.83	0.67	80.3	0.71	0.56	78.5
Annual Plans	(1966-69)	0.75	0.73	97.3	0.64	0.66	103.6
Fourth Plan	(1969-74)	-	0.99	-	0.85	0.83	97.1
Fifth Plan	(1974-79)	1.3	1.14	87.5	1.05	0.9	85.7
Sixth Plan	(1980-85)	2.05	2.4	117.1	1.5	1.36	90.7
Seventh Plan	(1985-90)	2.7	3.04*	112.6*	1.8	2.43*	135
Eighth Plan	(1992-97)	3.85	4.2	109.1	3.2	2.8	87.5
Ninth Plan	(1997-02)	4.9	5.1	104.1	4.2	3.7	88.1
Tenth Plan	(2002-07)						
	2002-03		5.1			3.4	
	2003-04		5.1			5.6	
	2004-05		7.4			5.9	
	2005-06		7.6			5.9	
	2006-07		7.8			6.1	
Eleventh Plan	(2007-12)	7.5					
	2007-08		7.8			6.3*	

Source:

Centre for Industrial & Economic Research (CIER)

Note: * Anticipated

During the fifth planning period, the planning commission appointed a taskforce for the purpose of proposing programmes for the development of paper and pulp industry. During the 6th plan, industry exceeded the targeted capacity by 1.66 lakh tones but the production target was fallen by 0.14 lakh tones. At the end of this period there were 159 mills working with an installed capacity of 18.16 laksh tones. During the seventh plan with an installed capacity of 27 lakh tones a production target of 18 lakh tones were estimated keeping in mind the increased demand in the near future. The 8th plan targeted an installed capacity of 38.5 lakh tones of installed capacity with an expected production of 32 lakh tones.

During 1991 nearly 380 small and big paper mills produced a variety of different paper, paperboard as well as newsprint products. However, the per capita consumption was quite low as compared to other countries.

With respect to various paper products the biggest share in production with 41% (in 1991), followed by Kraftpaper with a share of 27%, paperboard with 17%, newsprint with 12% and specialty paper at 3% (Sharma et al., 1998). Installed production capacity increased substantially from 0.77 million tonnes in 1970-71 to 3.95 million tonnes in 1994-95. Production, however, has not increased accordingly. In 1994-95, only 2.51 million tonnes of paper and paper board were produced. Capacity utilization had decreased from 99% in 1970-71 to a low of 60% in 1992-93 and slightly increased again to 64% in 1994-95.

Table 4 gives a detailed account of paper mills, production and capacity in million tonnes during 1970 to 1995.

With respect to newsprint production, India has shown a remarkable increase since 1980-81. It was over 0.3 million tonnes during 1994-95. Table 4 summarizes the newsprint production and capacity in thousand tones.

Table 4: Newsprint Production and Capacity in mt

Installed Capacity of Pulp and Paper Industry in India					
(1980, 1981, 1986 to 1995 and 1995-1996 to 2008-2009)					
Year	No. of Mills	Installed Capacity (' 000 Metric Tonne)	Average Capacity (Metric Tonne)	Index 1980=100	
				No.	Capacity
1980	121	1538	13000	100	100
1981	138	1656	12000	114	108
1986	271	2655	9000	224	173
1987	288	2760	9000	238	179
1988	297	2867	10000	245	186
1989	305	3014	10000	252	196
1990	311	3049	9803	257	198
1991	327	3284	10000	270	213
1992	334	3418	10234	276	222
1993	340	3551	10444	281	231
1994	350	3670	10486	289	239
1995	350	3670	10486	289	239
1995-96	380	4100	10789	314	267
1996-97	380	4200	11053	314	274
1997-98	380	4350	11447	314	283
1998-99	380	4550	11794	314	296
1999-00	380	4900	12895	314	324
2000-01	380	5100	13421	314	332
2001-02	380	5100	13421	314	332
2002-03	385	5500	14286	318	358
2003-04	380	5100	13421	305	332
2004-05	515	7400	14369	426	481
2005-06	568	7600	13380	469	494
2006-07	600	7800	13000	469	507
2007-08	600	7800	13000	496	507

2008-09	568	7800	13732	469	574
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Source: Centre for Industrial & Economic Research (CIER) (652) (ON141)

Paper Industries grown from 121 in 1981 to 568 in 2009. As per 2009 statistics' there were 568 paper mills of different sizes existing with an installed capacity of about 78 lakh metric tones per annum.

Geographical distribution of Paper Mills in India

The pulp and paper mill sector in India is one of the oldest industries. The first paper manufacturing mill was commissioned in 1812 in the eastern state of West Bengal. The number of paper mills has increased from 17 in 1951 to 600 in 2002 and then fallen to 309 in 2004. The reason has been non-availability of techno economic solution for black liquor recovery/treatment for agro based pulp and paper manufacturing process. Apart from this problem, the regulatory framework also pressed several companies to close their units in the recent past. The state wise distribution of pulp & paper mills is depicted in Table 5.

Table 5: State wise distribution of Pulp & Paper Mills in India

State-wise Distribution of Paper Mills in India as on June 2000	
State/ Union Territory	No. of Paper Mills
Andhra Pradesh	22
Assam	4
Bihar	9
Chandigarh	8
Gujarat	68
Haryana	15
Himachal Pradesh	15
Jammu & Kashmir	1
Keral	7
Karnataka	17
Madhya Pradesh	21
Maharstra	115
Meghalya	1
Delhi	6
Nagaland	1
Orissa	9
Pondicherry	3
Punjab	37
Rajasthan	8
Tamil Nadu	22
Uttar Pradesh	100
West Bengal	26
India	515

Source:

1. IARPM
2. Final report on water conservation in Pulp and Paper Sector, p-6

MANUFACTURING PROCESS OF PAPER

The manufacturing processes within the pulp and paper industry, includes the materials and equipment used, and the process employed. The process describes commonly used production processes, associated raw materials, the products produced, and the materials recycled.

In general, paper is manufactured by applying a liquid suspension of cellulose fibers to a screen, which allows the water to drain, and leaves the fibrous particles behind in a sheet. The liquid fibrous substrate formed into paper sheets is called pulp.

Processes in the manufacture of paper and paperboard can, in general terms, be split into three steps:

- a. Pulp making
- b. Pulp processing
- c. Paper/paper board production

Paperboard sheets are thicker than paper sheets; paperboard is normally thicker than 0.3 mm. normally both these processes are identical. The process starts with a stock of pulp mixture is produced by digesting a material into its fibrous constituents via chemical, mechanical, or a combination of both. In case of wood, the most common pulping material, chemical pulping actions release cellulose fibers by selectively destroying the chemical bonds in the glue-like substance (lignin) that binds the fibers together. After the fibers are separated and impurities have been removed, the pulp may be bleached to improve brightness and processed to a form, suitable for papermaking. Currently, one-fifth of pulp and paper mills practice bleaching. At the papermaking stage, the pulp can be combined with dyes, strength building resins, or texture adding filler materials, depending on its intended end product. Afterwards, the mixture is dewatered, leaving the fibrous constituents and pulp additives on a wire or wire-mesh conveyer. Additional additives may be applied after the sheet making process. The fibers bond tougher as they are carried through a series of presses and heated rollers. The final paper product is usually spooled on large rolls for storage.

PROBLEMS OF PAPER INDUSTRY

The Indian paper industry is not free from problems. The year 1973-74 created a paper crisis due to sharp rise of prices in the country. Thereafter, it has seen a wide verity of problems like raw material constraints, suboptimal use of installed capacity, poor profitability, lack of skilled manpower, sickness, research and development, finance problems, demand and supply factors, pollution and Govt. regulations etc. Brief overviews of these problems are depicted as follows:

a. **Raw material constraints:**

The changes in technological and economic environment and regulatory framework affected the Indian Paper industry. The availability of cellulose raw materials, water, power, bagasse, straw and waste paper has inherent drawbacks of limited and scattered availability of suitable technology for conversion into higher-grade pulp. This results in a sustainable supply of forest based raw materials, which account for 45 percent of raw materials used. The consumption share of forest based materials has been declining over time and is expected to further decrease to 47% by 2000.

Large size paper mills majorly rely on bamboo, hardwood and eucalyptus. These sources are very limited. Instead of these sources, the mills can concentrate on agro waste/residues such as rice straw, wheat straw and bagasse which are relatively short cycled regenerative and abundant.

The overall constraint of raw materials will force the paper industry in future to rely more and more on imports of pulp or final paper products. To overcome the raw material shortage the Government has

liberalized the import of raw materials and given excise concessions for the use of non conventional raw materials.

b. Water shortage:

Paper industry is water intensive industry. Water is one of the major inputs without which it is impossible to produce pulp and paper. Apart from large volume of water that is consumed at each and every process stage of paper manufacturing, water is also required for utility sections like boilers and cogeneration plants to generate steam and power. Off late, water, the most sought out commodity is depleting very fast and already started giving alarming signals in many parts of the country. The demand for water in a specific industry depends on the quality of paper and type of raw material used and the extent of recycling adopted in the mill.

c. Finances:

Being paper industry capital intensive, the internal savings are not adequate to finance various processes and programmes. The increased cost of production and the decline in return on capital employed pressed the industry towards industrial sickness. Apart from these problems undisciplined investment in large mills and small mills is a vivid reminder of the need for strict financial discipline.

d. Industrial sickness.

The low capacity utilization in the industry is due to high incidences of sickness in many small or medium mills and thus most of these are operating either at lower capacity or closed (See Table 6).

Table 6: State-Wise Number of Units Closed

State-wise Number of Closed Paper Mills in India	
Andaman & Nicobar Island	-
Andhra Pradesh	5
Arunachal Pradesh	-
Assam	1
Bihar	1
Chandigarh	-
Chhattisgarh	-
Dadra and Nagar Haveli	-
Daman & Diu	-
Delhi	-
Goa	-
Gujarat	23
Haryana	5
Himachal Pradesh	2
Jammu & Kashmir	-
Jharkhand	-
Karnataka	3
Kerala	2
Lakshadweep	-
Madhya Pradesh	4
Maharashtra	13
Manipur	-
Meghalaya	-
Mizoram	-
Nagaland	1

Orissa	1
Pondicherry	-
Punjab	9
Rajasthan	1
Sikkim	-
Tamil Nadu	5
Tripura	-
Uttar Pradesh	14
Uttaranchal	-
West Bengal	6
India	96

Source: Compiled from the statistics released by : Lok Sabha Unstarred Question No. 4587, dated 08.05.2007.

a. Pollution:

Paper industry is one of the 20 high polluting industries in India. In addition to polluting air, de forestation, it has been one of major water pollutant industry as well. Lot of river waters are being polluted due to paper industries in India. Over and above this, they are incurring rising cost of effluent treatment.

b. Shortage of Human Resources:

The total manpower cost per tonne of product is quite high. The production per man in developed countries is nearly 10 to 15 times than the production per man India. Manpower cost in paper industry in India varies from 8% to 16% of the total production cost. The industry has also the difficulty of obtaining floor-level technicians with technical background. More than 80% of the employment is in production departments, research and development accounting for only 1% of the total taskforce. In terms of educational qualifications, pulp and paper specialists are only 4% of the total employees, 75% of the employees being high school level and engineering graduates accounting for about 8%. One of the main reasons for very low capacity utilization is the acute shortage of skilled manpower (See Table 7).

Table 7: Showing Zonal wise Production, Sales and Earnings

Zone/State-wise Production, Sales, Employment and Earnings of Village Industries (HandMade Paper and Fibre Industries Group) in India (2006-2007)				
(Rs. in Lakh; Employment in Lakh Persons)				
Zone/State/UTs	Production	Sales	Employment	Earnings
North Zone				
Chandigarh (U.T.)	78.93	148.44	*	47.49
Delhi	280.98	308.5	0.01	121.42
Haryana	2146.28	3099.77	0.06	1048.01
Himachal Pradesh	1580.4	1733.26	0.06	639.38
Jammu & Kashmir	1372.5	1196.65	0.05	548.87
Punjab	2566.16	3907.04	0.1	1291.89
Rajasthan	5268.62	7082.76	0.12	2491.33
Total – I	13293.87	17476.42	0.4	6188.39
East zone				
Andaman & Nicobar Islands	46.78	56.03	*	24.18
Bihar	117.03	145.17	0.12	273.35
Jharkhand	118.28	146.79	*	79.76
Orissa	1329.62	1457.34	0.16	580.07
West Bengal	3985.63	4898.23	0.43	1953.45
Total – II	5597.34	6703.56	0.71	2910.81
North East Zone				
Arunachal Pradesh	99.04	126.24	*	51.11

Zone/State/UTs	Production	Sales	Employment	Earnings
Assam	949.95	1184.25	0.13	520.33
Manipur	442.14	483.22	0.04	185.93
Meghalaya	184.27	239.49	0.01	100.3
Mizoram	551.97	689.18	0.03	262.07
Nagaland	280.85	363.17	0.01	133.15
Sikkim	116.73	210.5	0.01	90.67
Tripura	212.24	186.76	0.02	146.51
Total – III	2837.19	3482.81	0.25	1490.07
South Zone				
Andhra Pradesh	3535.49	4638.03	0.29	6183.8
Karnataka	4936.7	5569.59	0.12	0.6
Kerala	3172.57	3592.47	0.22	0
Lakshadweep	3.68	1.24	*	97.01
Pondicherry	33.92	69.77	*	515.68
Tamil Nadu	5296.84	6928.15	1.17	2224.07
Total – IV	16979.2	20799.25	1.8	2837.36
West Zone				
Dadra & Nagar Haveli	0.15	0	*	288.3
Daman & Diu	0	0	0	959.97
Goa	164.44	238.96	0.01	559.21
Gujarat	2502.28	3843.81	0.03	2990.81
Maharashtra	7446.39	8958.76	0.23	4798.29
Total – V	10113.26	13041.53	0.27	24413.72
Central Zone				
Chhattisgarh	524.31	652.93	0.01	288.3
Madhya Pradesh	2502.13	4574.89	0.1	959.97
Uttarakhand	1108.73	747.83	0.03	559.21
Uttar Pradesh	7062.38	9815.45	0.64	2990.81
Total – VI	11197.55	15791.1	78	4798.29
India	60018.41	77294.67	4.21	24413.72

Note: * < 500 persons, Source: Khadi and Village Industries Commission, GOI

e. Per Capita Consumption of Paper

Paper is an essential item of consumption and its increased use reflects the living standards of the country. The developed countries consumption per capita of paper is much higher as compared to the developing countries. Per capital consumption depends upon developments in the industrial production, national income, literacy and growth of population. Presently, the India's per capita consumption of paper is around 5kg, in comparison to Asian 18kg, USA 320kg and World average of 47.7kg. The consumption of paper in different years is exhibited in Table 8.

Table 8: Per capita consumption of paper in India

Year	Consumption (In kgs.)
1951	0.46
1961	0.87
1970	1.40
1975	1.39
1980	1.76
1985	1.89
1990	2.20
1995	3.40
1999	3.80
2000	5.00
2005	6.50

Source:

- i. Indian Pulp & Paper Technical Association (IPPTA), Conventional Issue, December 1998, p.36

- ii. Alka Subramanian, "Small is not Beautiful – A Study of the Paper Industry", Economic and Political Weekly, August 29, 1987, p M-87.
- iii. Alka Subramanian, "The Paper Industry – Consumption Trends and Projections up to 2000" Economic and Political Weekly, May 28, 1998, p.M.47

f. Power shortage:

The growth of paper industry is largely affected by the shortage of energy i.e, coal and power. The industry is highly energy intensive. In the total manufacturing costs of the industry, power and fuel and constitutes 25 per cent.

Future of Paper Industry

The Indian paper industry is one of the traditional industries of India consisting of over 500 units with an installed capacity (excluding newsprint) of over 7.5 mn tone per annum. The capacity utilization in the industry has remained low at approximately 60% but has lately picked up. This was owing to partly to some 200 mills being small and many of which were sick. Effectively, only 321 mills are operational. Out of these, 172 mills make up for 54% of the market, with the top ten claiming a share of over 28%. The large segment consists of 21 large mills. The incidence of sickness is high in mills with less than 15,000 tpa capacity. Demand for paper and paper products will steadily rise in the future at decreasing rates. The demand projection for future paper can be determined with a host of factors like:

- a. Level of national income
- b. Level of industrial production
- c. Level of literacy and education
- d. Size of population
- e. Price of paper, and
- f. Other factors

In order to visualize a summary of demand and supply projections of paper up to the year 2015 go through Table 9.

Table 9: Demand and Supply Projections up to 2015

Year	Demand (mill. Tones)	Production (mill. Tones)	Shortfall (mill. Tones)
2000	4.11	2.56	1.55
2005	5.04	2.76	2.28
2010	6.30	3.15	3.14
2015	7.98	3.32	4.66

Source: Srivastava (1998)

Prospects of Paper

There are lot of doubts about the existence and survival of paper in the years to come. Paper in one way is extractive industry as long as there is an availability of wood there can be life to wood based paper industry. However, it cannot be ignored the emergence of certain substitutes to Paper like e-paper. With the growing corporate civic behavior "save paper and save a tree" people around the world are searching for veracious alternatives. Keeping in mind all these issues the demand for paper since 1990 to 2020 is depicted in Table 10.

Table 10: Past and Future of Paper Industry

Demand : Past & Future	
Year	mn MT
1990-91	2.5
1991-92	2.65
1996-97	3.8
1997-98	4.12
1998-99	4.33
1999-00	4.64
2000-01	4.94
2001-02	5.06
2002-03	5.39
2003-04	5.8
2004-05	5.99
2005-06	6.18
2006-07	6.52
2007-08	6.92
2008-09	7.38
2009-10	7.92
2010-11	8.55
2011-12	9.2
2012-13	9.82
2013-14	10.49
2014-15	11.21
2019-20	16

Source: Intecos – CIER

Market Expectations from Paper Industry

There are lot of expectations from Paper Industry from various stakeholders ie. society, investors and the general public. Expectations like environmental friendly, less input utilization and more recyclability etc. In order to meet these expectations the industry has to undergo significant modernization and expansion process. Small recycled fibre-based mills are more likely to sustain market forces in adopting measures to cut production costs by importing waste paper or pulp. The existence of these mills depends on the overall development of international market price for these materials. Large mills in order to sustain they have to focus on recycled fibers, purchased pulp and dedicated forest management. The other expectation is survival and growth of the industry revolving around various challenges posed by the economic environment. The Indian Paper Industry has certain giant players. In one way these units are serving the country's major paper requirements (See Table 11).

Table 11: Lead Players in Indian Paper Industry

Lead Players
Company
Ballarpur Inds (BILT)
ITC Bhadrachalam
JK Paper
T N Newsprint
Hindustan Paper Corp
West Coast Paper
A P Paper Mills

Lead Players
Century Textiles
Seshasayee Paper
Orient Paper & Inds.
Chadha Papers
Sirpur Paper Mills
Star Paper Mills

Source: Intecos – CIER

Types of Paper

Paper is often characterized by weight. The weight assigned to a paper is the weight of a ream (500 sheets) of varying “basic sizes” before the paper is cut into the size it is sold to end customers.

1. Bank Paper:

This is a kind of strong writing paper of less than 50g/m and is commonly used for typewriting and correspondence.

2. Bond Paper:

Bond paper is a high quality durable writing paper similar to bank paper but having a weight greater than 50 g/m. It is used for letterheads and other stationery and as paper for electronic printers. Widely employed for graphic work involving pencil, pen and felt-tip marker. It is largely made from rag pulp which produces a stronger paper than wood pulp.

3. Construction Paper/Sugar Paper:

Construction paper or sugar paper, is a type of coarse colored paper typically available in large sheets. The texture is slightly rough, and the surface is unfinished. Due to the nature of the source material from which the paper is manufactured, small particles are visible on the paper’s surface.

4. Cotton Paper:

Cotton paper is made from 100% cotton fibers. Cotton paper is superior in both strength and durability to wood pulp-based papers, which may contain high concentrations of acids. It is also be known as cotton rag or ragged paper.

Cotton fiber paper is known to last several hundred years without fading, discoloring, or deteriorating; so often used for important documents such as the archival copies of dissertation or thesis. As a rule of thumb, each percentage point of cotton fiber, a user may expect one year of resisting deterioration by use (the handling to which paper may be subjected). Legal document paper typically may contain 25% cotton. Cotton paper is also used in banknotes.

5. Electronic Paper:

Electronic paper is a display technology designed to mimic the appearance of ordinary ink on paper. Electronic paper reflects light like ordinary paper and is capable of holding text and images indefinitely without drawing electricity, while allowing the image to be changed later. E-paper can be crumpled or bent like traditional paper. Pixels on e-paper are image stable, or bistable, so that the state of each pixel can be maintained without a constant supply of power.

6. Fish Paper:

It is a strong, flexible, fibrous paper. It resists moderate heat and mechanical injury, and is often used for wrapping coils and insulating stove-top parts. It is hygroscopic and must be treated with paraffin for use in moist environments. Some fish papers incorporate mica layers to increase the dielectric and mechanical strength.

7. Ink jet Paper:

Inkjet paper is paper designed for inkjet printers, typically classified by its weight, brightness and smoothness, and sometimes by its capacity.

8. Kraft Paper:

Kraft paper is paper produced by the Kraft process from wood pulp. It is strong and relatively coarse. Kraft paper is usually a brown colour but can be bleached to produce white paper. It is used for paper grocery bags, multiwall sacks, envelopes and other packaging.

9. Laid Paper:

Laid paper is a type of paper having a ribbed texture imparted by the manufacturing process. Laid paper is still commonly used by artists as a support for charcoal drawings.

10. Leather Paper:

It is a translucent paper that is delicate and versatile. The surface is flecked with tiny bits of organic material that gives the paper a leather texture. They are available in an array of colors and weights. Indian Leather Paper has revolutionized the market by supplying a vast array of reasonably priced, traditional oriental styles that can be used in many different creative processes.

11. Mummy Paper:

Mummy paper is paper that is claimed to be made from the linen wrappings and other fibers (e.g. papyrus) from Egyptian mummies imported to America circa 1855. However, the existence of this paper is not conclusively confirmed.

12. Tyvek Paper:

It is made up of high-density polyethylene fibers, a synthetic material. The material is very strong, it is difficult to tear but can easily be cut with scissors or a knife.

13. Wall Paper:

Wall paper is material is used to cover and decorate the interior walls of homes, offices, and other buildings; it is one aspect of interior decoration. Wallpapers are usually sold in rolls and are put onto a wallpaper paste. Wallpapers can come either plain so it can painted or with patterned graphics. Wallpaper printing techniques include surface printing, gravure printing, silk screen-printing, and rotary printing. "Wallpaper" is also a term for computer wallpaper.

14. Washi:

Washi or Wagami is a type of paper made in Japan. Washi is commonly made using fibers from the bark of the gampi tree, the mitsumata shrub (*Edgeworthia papyrifera*), or the paper mulberry, but also can be made using bamboo, hemp, rice and wheat. Washi comes from wa meaning Japanese and Shi meaning paper, and the term is used to describe paper made by hand in the traditional manner. Washi is generally tougher than ordinary paper made from wood pulp, and is used in many traditional arts.

15. Wax Paper:

Wax paper (also called waxed paper) is a kind of paper that is made moisture proof through the application of wax. The practice of oiling parchment or paper in order to make it semi-translucent or moisture-proof goes back at least to medieval times. Thomas Edison claimed to have invented wax paper in 1872, but what he really invented was a cheap and efficient means to manufacture such paper. Wax paper is commonly used in cooking, for its non-stick properties, and wrapping food for storage, as it keeps water out or in. It is also used in arts and crafts.

15. Wove Paper:

Wove paper is a writing paper with a uniform surface, not ribbed or watermarked.

16. Coated Paper:

Coated paper is a paper which has been coated by an inorganic compound to impart certain qualities to the paper, including weight and surface gloss, smoothness or ink absorbency. Kaolinite is the compound most often used for coating papers used in commercial printing. One function of coating is to protect against ultraviolet radiation.

A SWOT Analysis to Indian Paper Industry

SWOT basically refers to Strengths, Weaknesses, Opportunities and Threats analysis. SWOT is an indispensable analysis for any industry. The present research depicted the following results through its analysis.

STRENGTHS

1. Increased Demand
2. Production of wide variety of Paper
3. High Employability
4. Recyclability of Waste Paper

WEAKNESSES

1. Low Capacity Utilization
2. More water requirement
3. Highly pollute
4. Decrements in forest lands
5. Highly Capital Intensive
6. Industrial sickness

OPPORTUNITIES

1. Huge growth potential
2. Lead to socio economic development
3. Output recyclability
4. Huge product demand
5. Innovative new product creations
6. Emergence of ancillary industries ie. packaging

THREATS

1. Increased Raw Material Costs
2. Competition
3. Changing Governmental Policies
4. Technological obsolescence
5. Degradation of Environment
6. Entry of substitutes like e-paper, plastic and other products

CONCLUSIONS

With the help of the above mentioned analysis it can be concluded, that even though Paper Industry is one of the ancient industries, this industry is suffering from certain setbacks. If these setbacks are properly identified and controlled it has ample scope and growth to become an eco-friendly industry leading to the economic prosperity and wealth of the nation.

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