

# A SHORT TREATISE

On

## **Global and Indian Paper Industry**



***Central Pulp & Paper Research  
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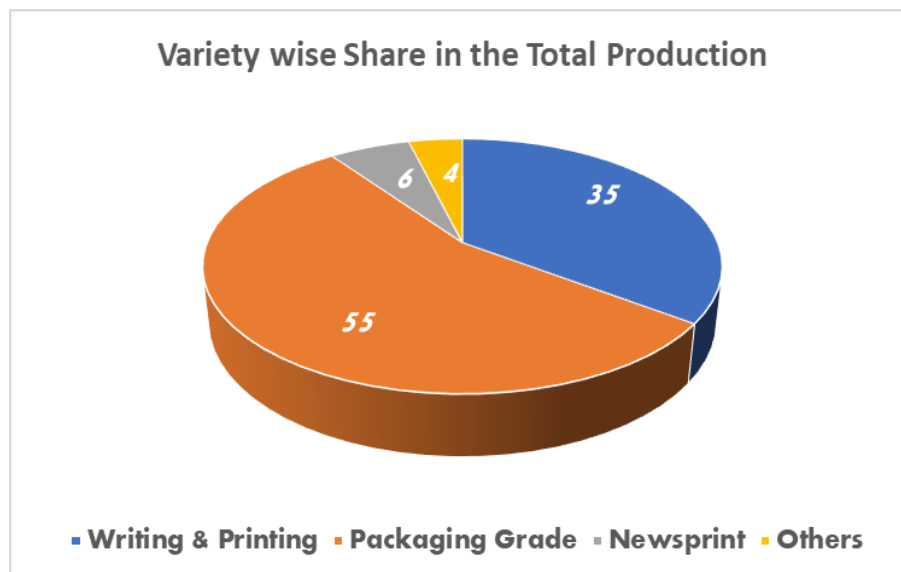
## SNAPSHOT OF INDIAN PAPER INDUSTRY

No. of Mills		861	
Total Installed Capacity, million tons		27.15	
Operating Installed Capacity, million tons		21.90	
Production of Paper, Paperboard, and Newsprint, million tons		19.36	
Capacity Utilization, %		~89	
No. of Running units		500	
No. of Mills Closed		361	
Idle installed capacity, million tons		4.80	
Import (in Million tons)		3.25	
Export (in million tons)		1.91	
Consumption (in million tons)		20.70	
Per capita Consumption (kgs)		15.75	
Global Share		4.72%	
Contribution from Different Segments (million tons)			
Segment wise Production	Wood-Based	Agro-Based	RCF Mills
Production in Million tons	4.20	1.66	13.50

## INTRODUCTION

In the present era of digitization, with penetration of internet in almost all walks of life, digital communication has become the prime medium of information dissemination. News and text travel much faster over the net than printed media. While in the west and far East, increasing internet penetration and consequent digitization has led to shrinkage of paper demand, the demand of paper and printed media is still prevailing in India along with nationwide digital revolution.

In order to meet the demand, the Indian paper industry registered impressive growth of 76% in the last decade, in spite of major challenges such as scarcity of raw materials, threat from increasing cheap imports under various free trade agreements, predatory trading practices followed by countries of import for certain niche varieties etc. Paper industry exhibited shift in production from 10.99 million tons in 2010 to about 19.36 million tons in 2019. A knowledge-based economy fueling the education sector proved to be a major demand driver besides other factors such as change in lifestyle, a fast-growing middle-class group, strong growth in fast-moving consumer goods (FMCG) segment, pharmaceuticals, cosmetics, and organized retailing.



*(Source: CPPRI Statistical Cell)*

Broadly, the Indian paper industry consists of four basic segment of product category viz. Writing & Printing, Packaging Paper & Board, Newsprint & Specialty papers.

As on date *Packaging Papers & Boards* have a share of around 55% in the total production, accounting for around 10.65 million tons. This can be attributed to demand for folding & corrugated boxes by the manufacturing and goods marketing sector. This segment is rising mainly because of development of the country's logistics sector, rising urbanization, increasing penetration of organized online retail leading to higher growth in FMCG, pharmaceutical and processed food industries.



The Printing & Writing (P&W) paper segment forms around 35% of the market. In 2018-19 domestic production for P&W paper touched 6.78 million tons. Share of Newsprint is about 6%, with about 1.16 million tons production. Rest of the market share is accounted for tissue and other specialty papers segment.

Primarily, all the above varieties are manufactured in India to account for the domestic demand. However, some amount of Writing & Printing paper is being imported in the specialty segment (cheque paper, security paper etc.). Lately, however, major concerns have been raised by the Industry due to rapid increase in imports of copier and coated paper. Some attribute this to Free Trade Agreements (typically ASEAN and Korea) while others see predatory marketing strategies of overseas players (particularly for Newsprint).

The consumption of Printing & Writing (P&W) segment is propelled by rising literacy rate (74.4%), universalization of education and synergistic contributions from flagship schemes of the government. (Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Mahila Samakhyia Programme, Sarva Shiksha Abhiyan (SSA), Beti Bachao Beti Padhao, Strengthening for Providing Quality Education in Madrassas (SPQEM), Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Saakshar Bharat (Adult Education) and Central & State Government Scholarship & Education Loan Scheme etc. to name a few). The sector has also benefitted from implementation of Goods & Service Tax (GST), the launch of E-way bill, improved procedures for Ease of Doing Business and the Make In India program.

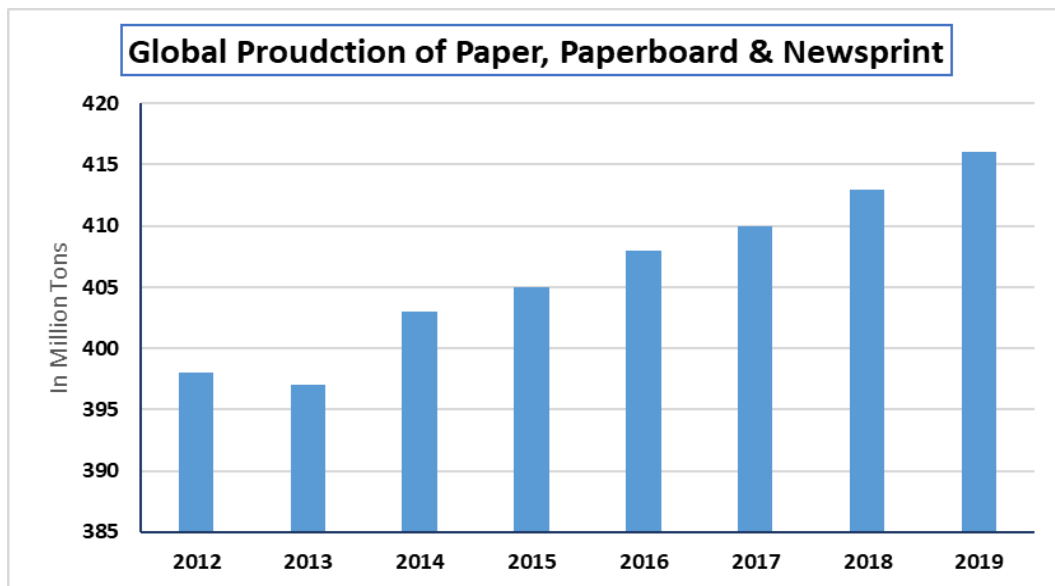
The Newsprint segment comprises only 6% of the total demand and in the last decade this segment has registered a negative CAGR growth of production (-0.12%). Nearly, half of the domestic demand of the newsprint is being met by the imports. Newsprint was allowed to be imported duty free subject to actual user condition. The same has been removed in the budget 2019-20 and now the Newsprint attracts a basic duty of 10%. It is expected that this move will provide a somewhat level playing field to indigenous newsprint manufacturers.

The specialty papers & others constitute the smallest segment, accounting for less than 4% of the market. Such papers are mostly used for packaging gift items, grocery bags and hygiene purpose etc. Within this segment, tissue paper/tissue products have registered impressive growth rate even though the volume in total are low.

## GLOBAL TRENDS

The global market of paper, paper board and newsprint is affected by various international factors. The increasing penetration of quality internet is the single largest factor affecting the global fortunes of the paper sector. Thus, amongst different varieties of paper, only packaging grade has registered a steady growth accounting for about half of the total production.

The figure below gives the growth trends of International production of paper, paperboard and newsprint. As can be seen, paper production has exhibited a positive trend since 2014. However, the CAGR has fallen to about 3%. This can be attributed to increasing net penetration and use of digital media for information dissemination.



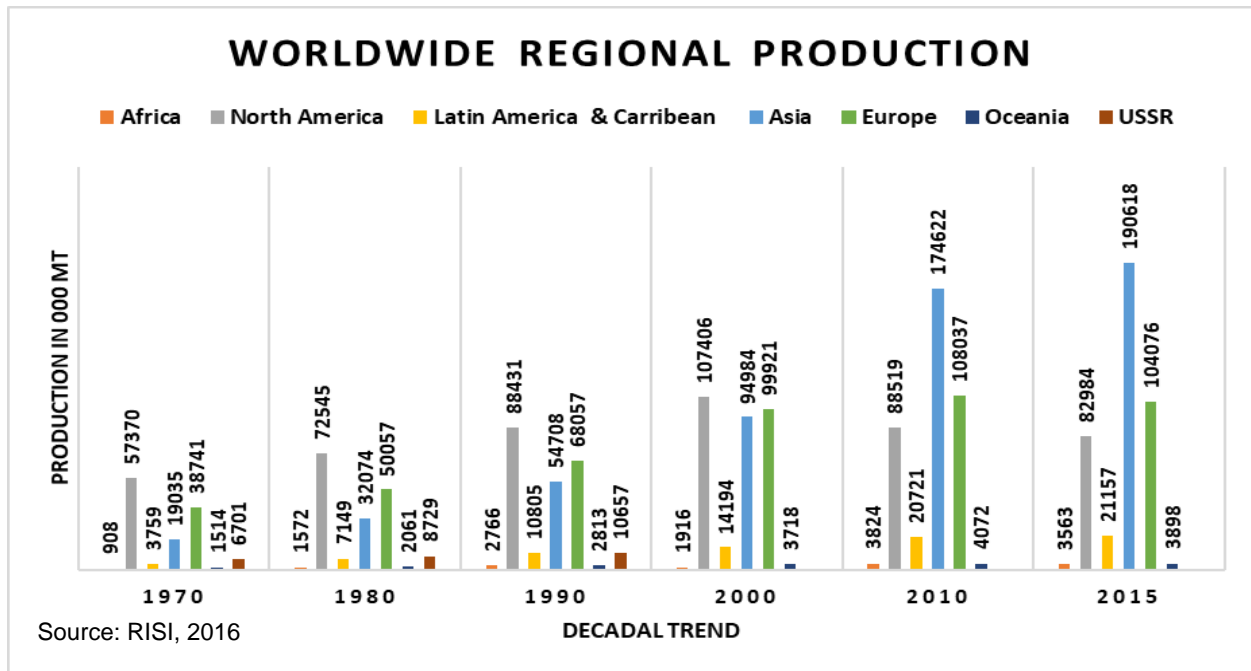
(Source: <https://www.statista.com/>)

Thus, out of the various global markets, only Asian & Indian markets have registered the CAGR figures in the range of about 5%. Many western economies have actually exhibited negative growth rates.

## REGIONAL PRODUCTION TRENDS

The figure hereunder depicts the regional production trends of paper in the world. As expected, maximum increase of around 6% in production growth is seen in the Asia-Pacific region. The corresponding figures for North America and Europe are 4% and 1%, respectively. The production for 2016 in Asia stood at 196 million tons which accounts for about 48% of the total world production. European countries accounted for 26% of the global production i.e. 104 million tons, whereas Northern America contributed 82 million tons contributing 20% to the word production.

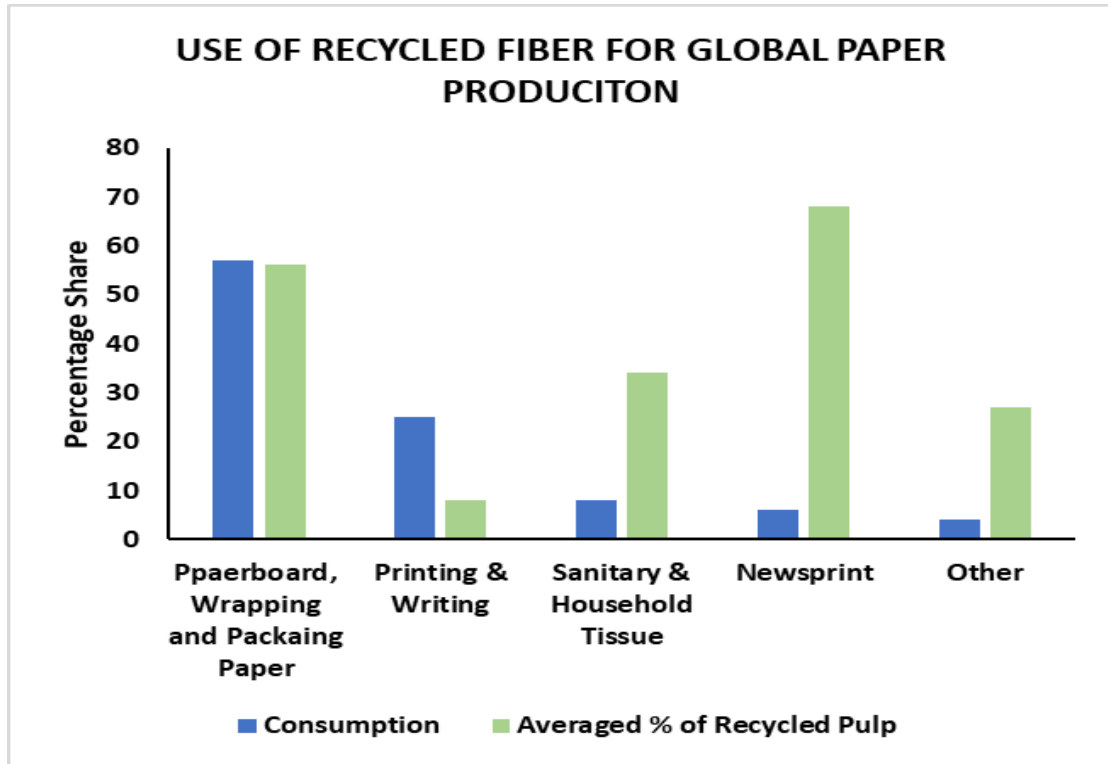




## USE OF RECYCLED FIBER FOR GLOBAL PAPER PRODUCTION

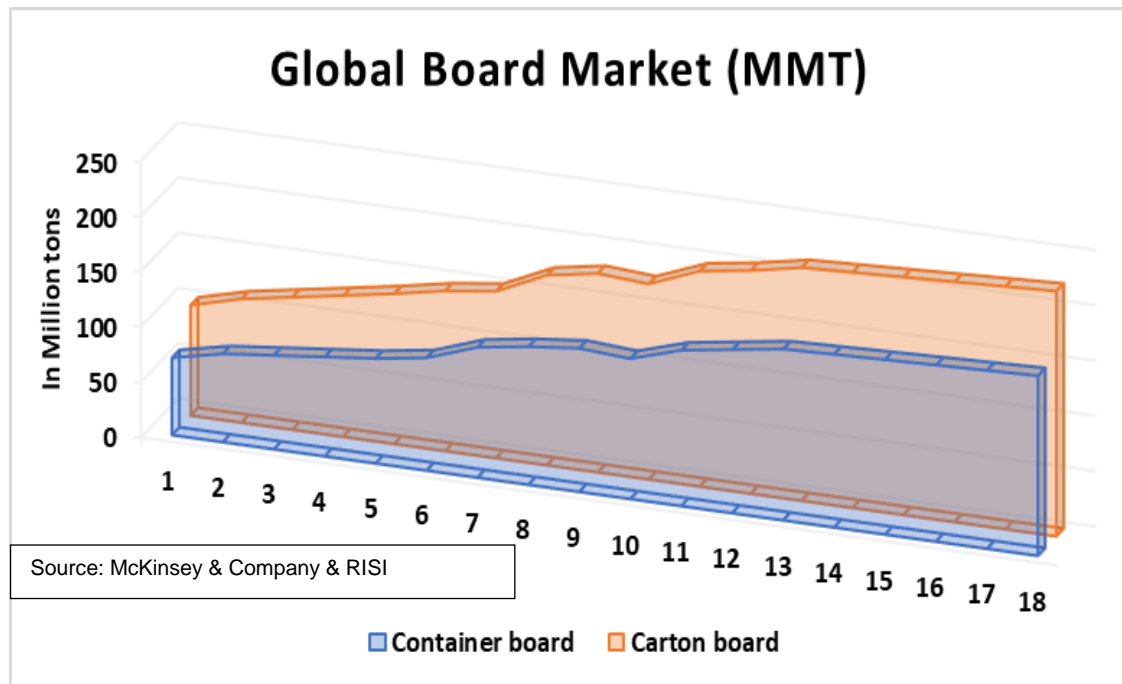
Wood is the primary source of cellulosic fiber for paper making. Many countries in the West have effective forestry programs that ensure adequate supply of wood to the forest-based sectors. However, there is immense scope to re-use post consumer waste paper for paper making. This not only reduces the carbon footprint of the sector, it also contributes to optimal utilization of resources. Many countries have legislations in place which stipulate the use of a mandated amount of recycled fiber in paper making. The figure below gives out the percent of recycled fiber used for production of various varieties of paper.

It can be seen that nearly 70% of Newsprint being made the world over is from recycled fiber. About 55% of Paperboard, wrapping and packaging paper produced is based on waste paper. As a contrast, about 50% of writing and printing papers are made from virgin pulp. However, increasing use of waste paper is liable to translate into supply issues and waste paper prices may harden in the future.

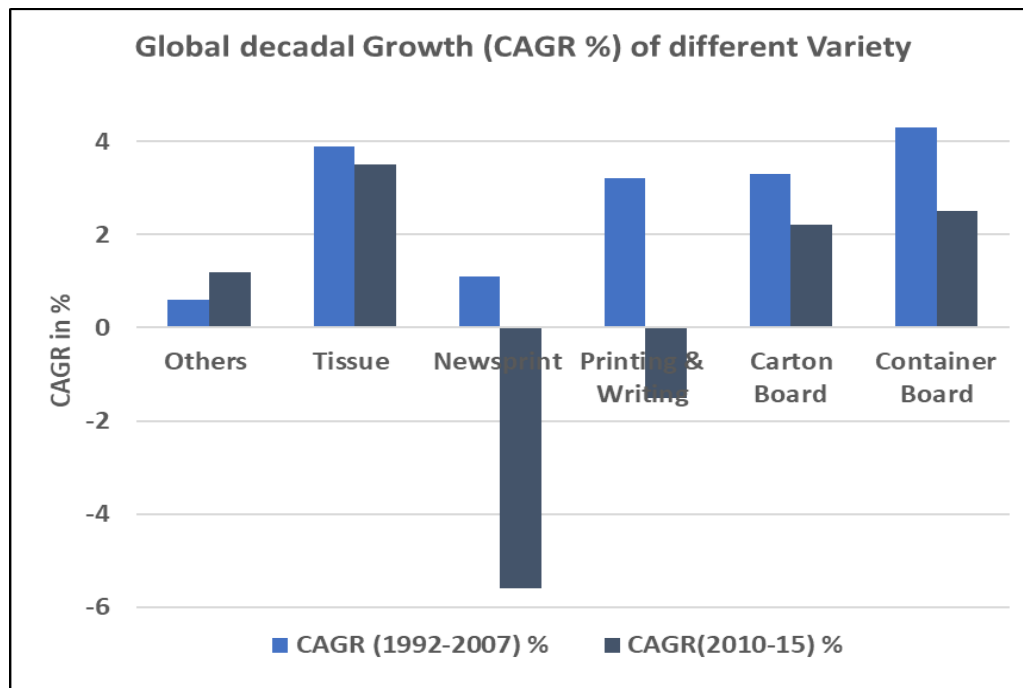


## GLOBAL BOARD MARKET

Boards are primarily used in the packaging sector. In a time series context, the global board market seems to be achieving a plateau with the passage of time. (figure placed below). This is true for container boards as well as carton boards, where the latter has a larger market share.



## DECADAL GROWTH STORY OF DIFFERENT VARIETIES



(Source: RISI, 2016)

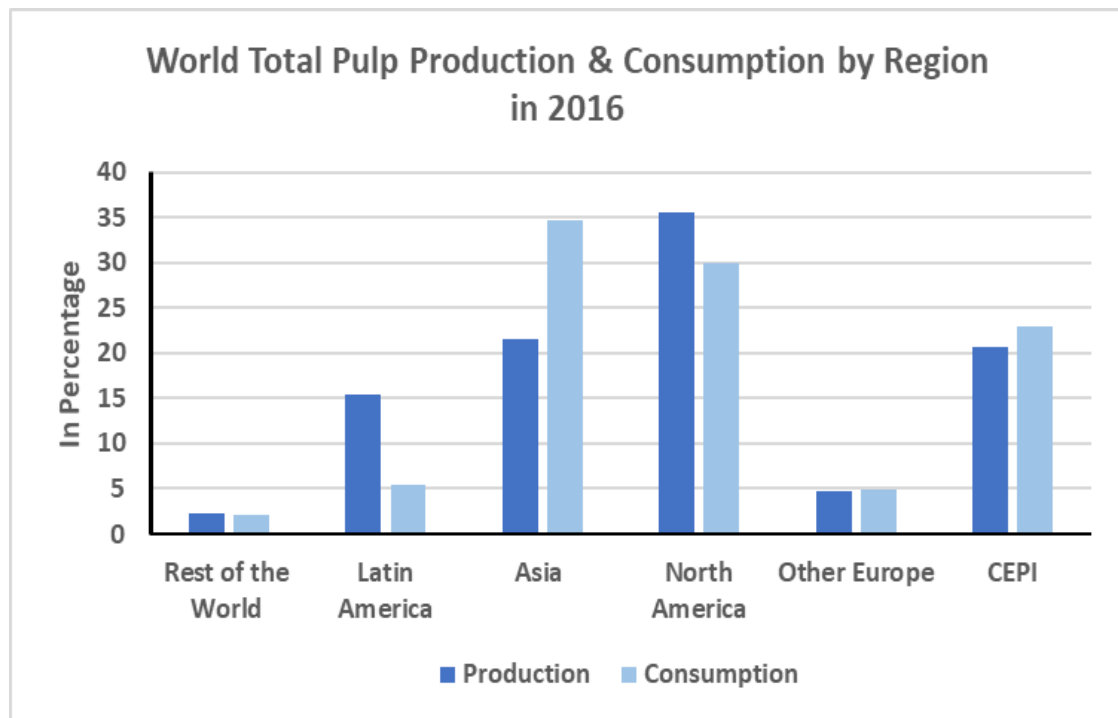
The figure above gives the growth story of the different varieties of paper segment. CAGR figures from 1992 to 2007 indicate that the growth is topped by containerboard (4.3 %) followed by tissue segment (3.9 %). Printing & Writing and Carton board had registered almost the same growth, i.e. 3.2 & 3.33%, respectively.

CAGR of Newsprint sector indicated only 1% growth during this period. Technological intervention and digitization of texts are the factors accounting for the sluggish growth of this sector.

During 2010 to 2015, growth pattern for Newsprint and Writing & Printing sector turned negative. Newsprint sector registered 1% CAGR growth from 1992 to 2007 but after recession in 2010 this sector declined towards the negative side and from 2010 to 2015 a negative (-5.6%) CAGR was registered. Not only newsprint and writing & Printing, but also other categories have registered lower growth compared to the previous decade.

We expect demand for cultural paper to remain on a down trend over the next decade. This will be further impacted by increasing internet penetration, globalization and rapid urbanization in the developing countries.

## WORLD TOTAL PULP PRODUCTION & CONSUMPTION BY REGION



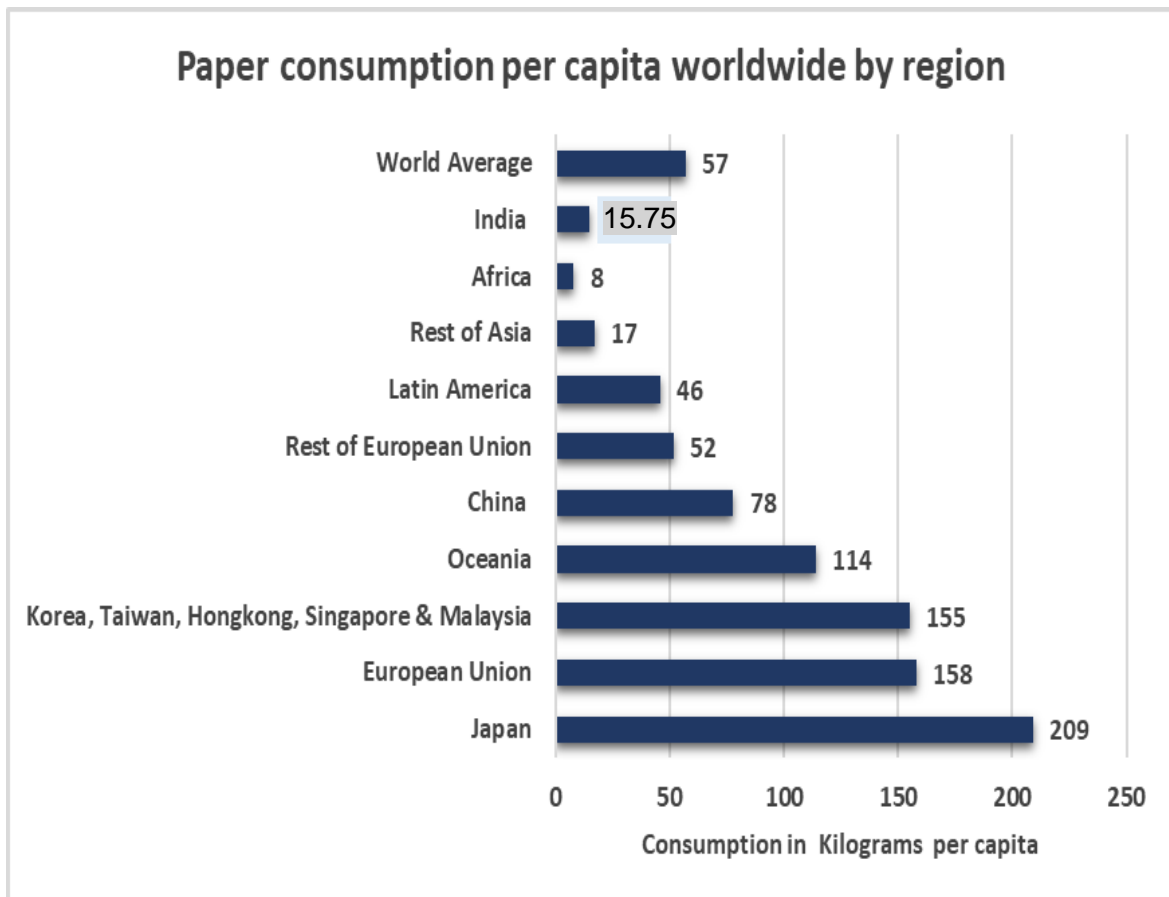
(Source: CEPI<sup>1</sup> report 2017 & RISI Total pulp production is 180.6 million tons)

Unlike in India, pulp is traded freely the world over. In fact pulp trade is also a major market. Some amount of pulp is also imported in to India to cater to the raw material shortfall in the country. Latin and North America have the largest surplus of pulp as compared to their consumption which is traded the world over. Asia, as expected is the largest consumer of pulp as the industry exhibits the best production growth rates in this region.

## PER CAPITA CONSUMPTION

The per capita consumption of paper is benchmark of country's social status and yardstick of its economic development. The leading economies of the world use over 200 kgs of paper per person. Even South East Asian economies exhibit a per capita consumption of 155 kgs. In India the per capita consumption is about 15 kgs, which is lower than that of rest of Asia which stands at 17 kgs. This illustrates that there is tremendous headroom for growth of paper sector in India when compared with the Asian as well as world average.

<sup>1</sup> Confederation of European Paper Industry: Austria, Belgium, Czech Republic, Finland, France, Germany, Hungary, Italy, The Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden & United Kingdom.



(Source: <https://www.statista.com/> Indian figure by CPPRI Statistical Cell)

## SEGMENT WISE GROWTH PROSPECTS

The figure below presents segmental growth prospects proposed for the time frame of 5 years from 2016-21 by McKinsey, depicted in coloured blocks. The dark blue blocks indicate less than zero growth, while the light blue blocks indicate more than 2% CAGR prospects. The report clearly shows that Newsprint will fare poorly in all the major economic regions. Other graphic papers are shown to perform better in China & Asia excluding Japan. Packaging papers on the other hand are shown as the major contributor to world production.

As regards the pulp consumption, it is expected that Asia and South East Asian economies will act as pulp markets to meet their growing demands.

2016-21	Major product groups	Japan	Western Group	North America	China	Other Asia	Eastern Europe	Latin America
Tissue	Tissue							
Graphic Papers	Mechanical							
	Newsprint							
	Wood Free							
Packaging Papers	Kraft Paper & specialty							
	Carton board							
	Containerboard							
Hardwood Pulp	Market BHKP2							
Softwood Pulp	Market BSKP3							
				CAGR >2%	CAGR 0-2%	CAGR <0%		

(Source: McKinsey & Company, 2016)

## INDIAN PAPER INDUSTRY- A JOURNEY OF GROWTH

The Indian paper industry is the fifth largest producer in the world at the present production volume of 19.36 million tons (2018-19). Paper is considered as an important contributor in national manufacturing sector and therefore, 7% of weightage has been given to it while calculating the National Manufacturing Growth. Even with all its challenges, the sector has exhibited a CAGR of 5.83%. This growth has been aided by FDI of 197.6 & 71.2 Million USD in 2017 and 2018, respectively. Further, with optimistic expectations of growth rate in double digits over the foreseeable future, the consumption and hence the production of paper is projected to double by the year 2030.

Writing & printing paper accounts for approximately 35% of the total paper produced in India. On account of its being eco-friendly and biodegradable, paper is the natural choice for packaging, and therefore accounts for 55% of the total paper production in the country. Packaging is also the fastest growing segment of the Indian industry. Newsprint accounts for 5 to 7% of the paper produced in the country. It is expected that the domestic newsprint production will increase with the recent imposition of 10% custom duty on imported newsprint. Other varieties produced in the country include tissue paper/hygiene paper, insulation, filter paper, grease-proof paper, absorbent paper for laminates, etc.

Today there are more than 861 paper mills spread across the country. The total operating installed capacity is 21.90 million tonnes per annum and combined production is 19.36 million tonnes per annum. Table in the next page presents a snapshot of the Indian paper sector.

The Indian paper industry has registered a CAGR of about 6% on consumption and 5% in production (based on 8 years data points). Nationally, paper manufacturing sector provides direct employment to more than 0.33 million people. Nearly 2 million persons find indirect employment in the sector.

At the national level, this sector contributes Rs. 8000 crores to the National exchequer with a turnover of 67000 crores. The progress of the paper industry is inextricably linked to National Priority of a knowledge-based economy. The sector is likely to contribute significantly to the Government's target of achieving an overall growth of 8% in manufacturing.

## INDIAN PAPER INDUSTRY-KEY STATISTICS

No. of Mills	861
Total Installed Capacity, million tons	27.15
Operating Installed Capacity, million tons	21.90
Production of Paper, Paperboard, and Newsprint, million tons	19.36
Capacity Utilization, %	~89
No. of Running units	500
No. of Mills Closed	361
Idle installed capacity, million tons	4.80
Import (in Million tons)	3.25
Export (in million tons)	1.91
Consumption (in million tons)	20.70
Per capita Consumption (kgs)	15.75
Global Share	4.72%
Contribution from Different Segments (million tons)	
Segment wise Production	Wood-Based      Agro-Based      RCF Mills
Production in Million tons	4.20      1.66      13.50

(Source: Statistical Cell, CPPRI. IMPEX data taken from DGFT data base)

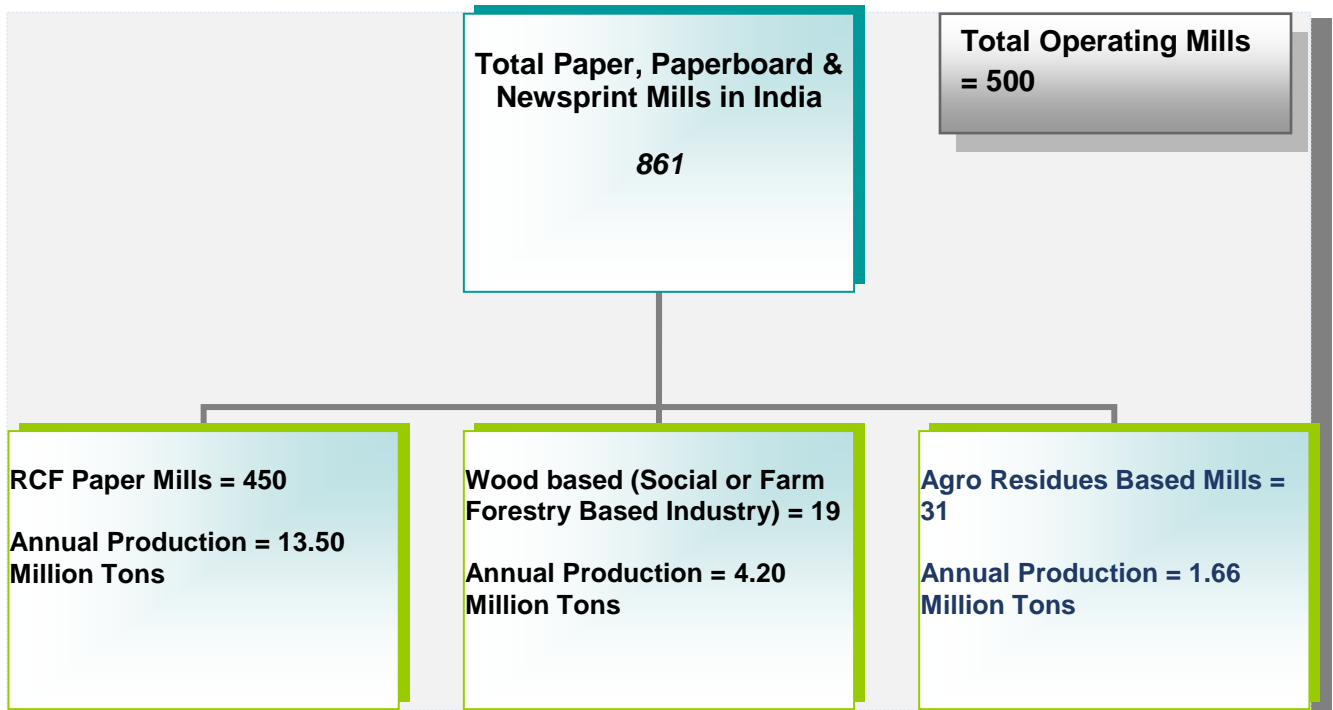
Unfortunately, the rising cost of raw material and its sustained availability is a big challenge facing the industry. However, the sales and production ratio have improved in the recent past in some cases. Yet, productivity issues remain within small/medium units, that needs to be addressed.

## STATISTICAL AND FINANCIAL PARAMETERS OF INDIAN PAPER INDUSTRY

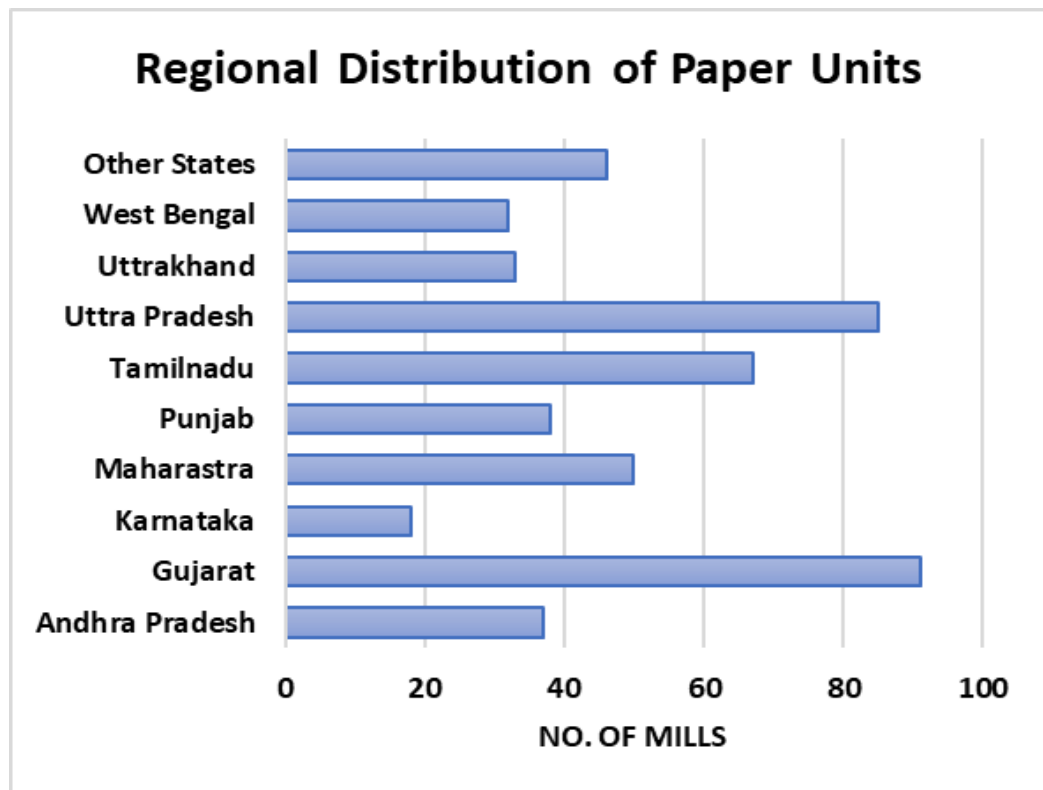
Even as 361 units lie idle, the Industry reported a production of 19.36 million tons in 2018-19. A major share in production is contributed from RCF based mills. The distribution of production in the various sub-sectors of the paper sector is placed in the figure below.



## Production Statistics (in million tons)



## REGIONAL DISTRIBUTION OF INDIAN PAPER INDUSTRY



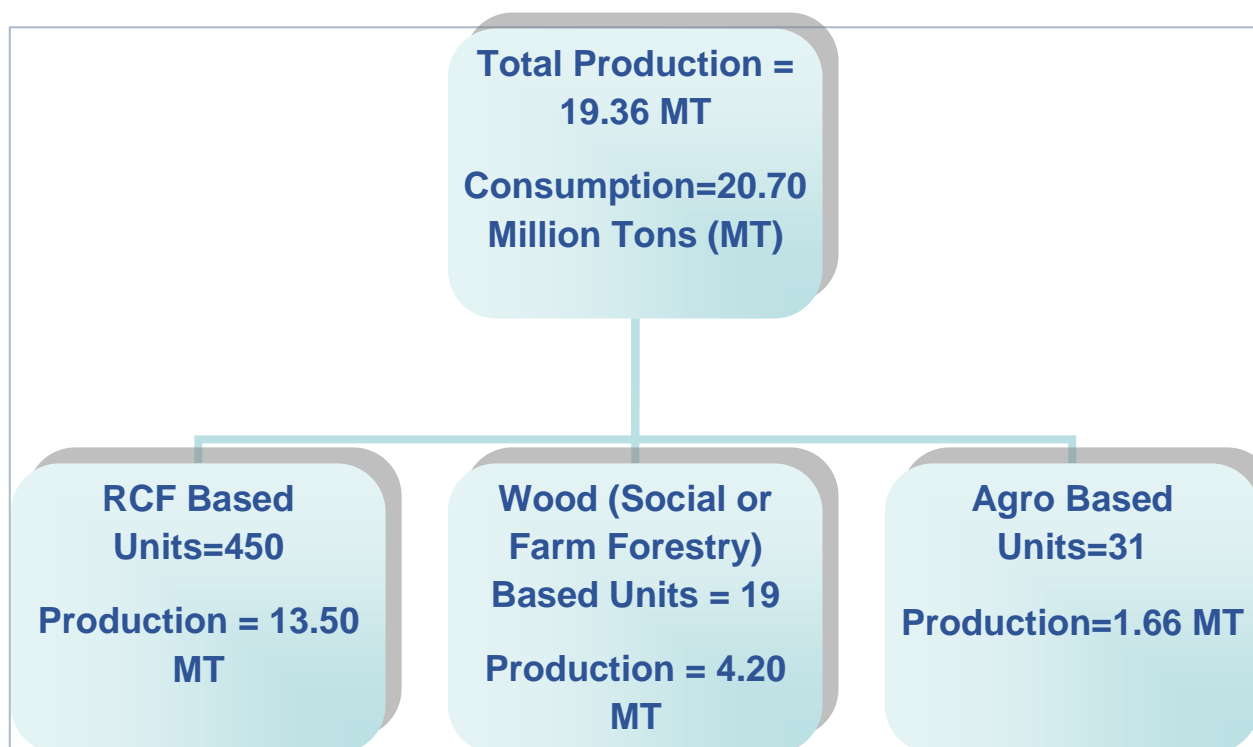
(Source: CPPRI Statistical Cell)

If the numbers alone are considered, then Gujarat has the maximum paper making units. However, most of these units are recycle fibre based. The state of UP has the second largest number of paper mills. These include one or two

large mills but most of these are located in the Muzaffar Nagar and Meerut areas. Most of the large mills are located in Tamilnadu, Andhra Pradesh and Maharashtra. The major pulp and paper mills clusters are located in and around Vapi, Muzaffarnagar, Kashipur, Coimbatore, and Ahmedabad.

## STRUCTURE OF INDIAN PAPER SECTOR

The Indian paper industry has a highly fragmented structure consisting of small, medium and large-scale paper mills having capacities ranging from 5 to 1650 ton per day employing wood, agro-residues and recycled fiber (RCF) as major raw materials. At present 73% of the production is coming from the RCF sector. In the face of pollution problems, many small/medium agro-based mills which could not afford chemical recovery switched to using RCF for paper making. Consequently, RCF based production has increased at the expense of agro based segment. On the other hand, the Wood segment is consistently giving its expected output supported by aggressive farm /social forestry programs. At present, 3.46 million tons of paper demand is met out from the wood segment. The third category is agro-based and 9% to 10 % of the demand is fulfilled by the agro-based paper. The distribution of figures is depicted in following figure.



## RAW MATERIAL REQUIREMENT

One of the important question that needs to be addressed is the raw material requirement for production of paper in the country. As of now, this figure can at best be estimated based on the present sector production levels. The table below give one such calculation for raw material requirement in the country. This is a detailed table that gives out the distribution of variety wise production coming from various raw materials. Thus, it can be seen that all newsprint is being produced by recycled fiber only.

Variety	Production Million tons (2018-19)	Raw Material	Production Distribution, Million tons (2018-19)	Share %
Writing Printing Grade	6.78	Wood Based	2.78	35%
		Agro Based	0.61	
		Recycled Fibre Based	3.39	
Packaging Grade	10.65	Wood Based	0.85	55%
		Agro Based	1.28	
		Recycled Fibre Based	8.52	
Newsprint		Wood Based	Nil	6%
	1.16	Agro Based	Nil	
		Recycled Fibre Based	1.16	
Others	0.77		0.77	4%
<b>TOTAL</b>	<b>19.36</b>		<b>19.36</b>	

(Source: CPPRI Census Survey of Indian Paper Industry)

In terms of volume, the highest contribution to the domestic paper production comes from the packing sector followed by writing and printing paper and Newsprint sectors. Out of the total production of 19.36 million tons of paper, paper board and newsprint, writing & printing paper constitutes 35 %, packaging paper 55% and newsprint around 6%. Other varieties of paper account for 4% of production.

The writing and printing grade of paper comprises mainly of uncoated varieties viz. cream wove, maplitho; copier/cut size paper and is mainly produced from wood-based raw materials with a little share from Agro and Recycled fiber, whereas the industrial paper, classified into Kraft paper, whiteboard, Machine glazed (MG) poster, duplex board, and greyboard, is mainly produced by the recycled fiber and agro based mills. However, some varieties such as Flexible Box Board (FBB) is made by large players such as ITC & JK.

The total requirement of raw material for various segments is as below: -

Raw material type	Raw Material Requirement at mill gate (Oven Dried) (million tons/year)
Wood based	8.72
Agricultural residue based	7.25
RCF	18.71
Others (mixed raw materials)	1.50
<b>Total</b>	<b>36.18</b>

Thus, about 36 million tons of raw material is required for the production of 19.36 million tons of paper. It may be pointed out that this figure is the requirement at the mill gate (free of moisture). If the moisture and losses during raw material harvesting is taken into account and calculated at the natural moisture present in the substrate, this figure will be about 2.5 times of its value as an approximation.

## TOTAL SUPPLY POSITIONS

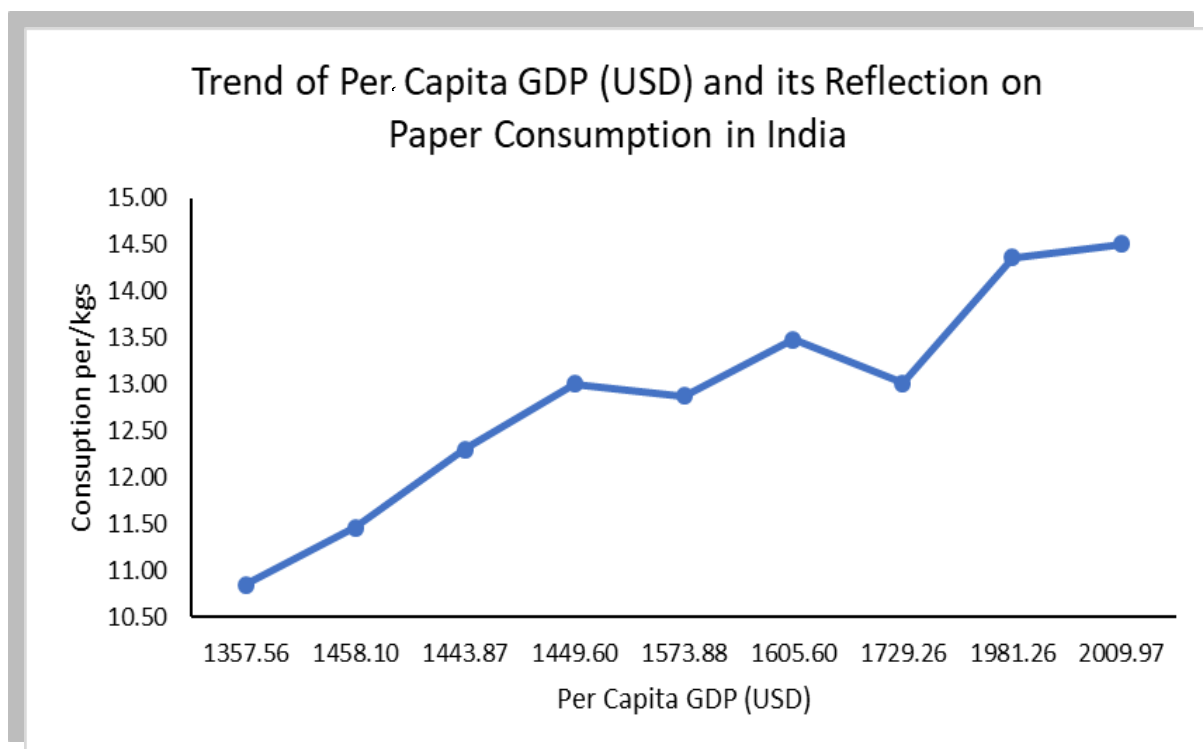
The figures for the total supply of different varieties of paper are given in the table below. As can be seen, most of the supply is met from domestic production, with the sole exception of newsprint. It is expected that with the recent withdrawal of Actual User Condition and imposition of a BCD of 10% will result in appropriate level playing field to domestic newsprint sector, thereby decreasing import dependence.

TOTAL SUPPLY POSITION (MILLION TONS)				
Paper Grade	Domestic Production	Import of Paper**	Export**	Actual Supply
<i>Packaging Grade</i>	10.65	1.71	0.78	11.14
<i>Writing &amp; Printing</i>	6.78	0.35	0.52	6.45
<i>Newsprint Paper</i>	1.16	1.45	0.01	2.81
<i>Others</i>	0.77	0.07	0.01	0.77
<b>Total</b>	<b>19.36</b>	<b>3.58</b>	<b>1.32</b>	<b>21.16</b>

**\*\* FIGURES BASED ON 2017-18 IMPORT & EXPORT DATA.**

*(Source: DoC Data bank for IMPEX data. Other data from CPPRI Statistical Cell)*

## RELATION BETWEEN GDP AND PAPER CONSUMPTION



*(Source CPPRI Statistical Cell for per capita consumption of paper and Govt. Data for GDP)*

The figure above depicts the effect of GDP on per capita consumption of paper. This data also shows that the paper sector responded well to the challenges posed by GST and demonetization.

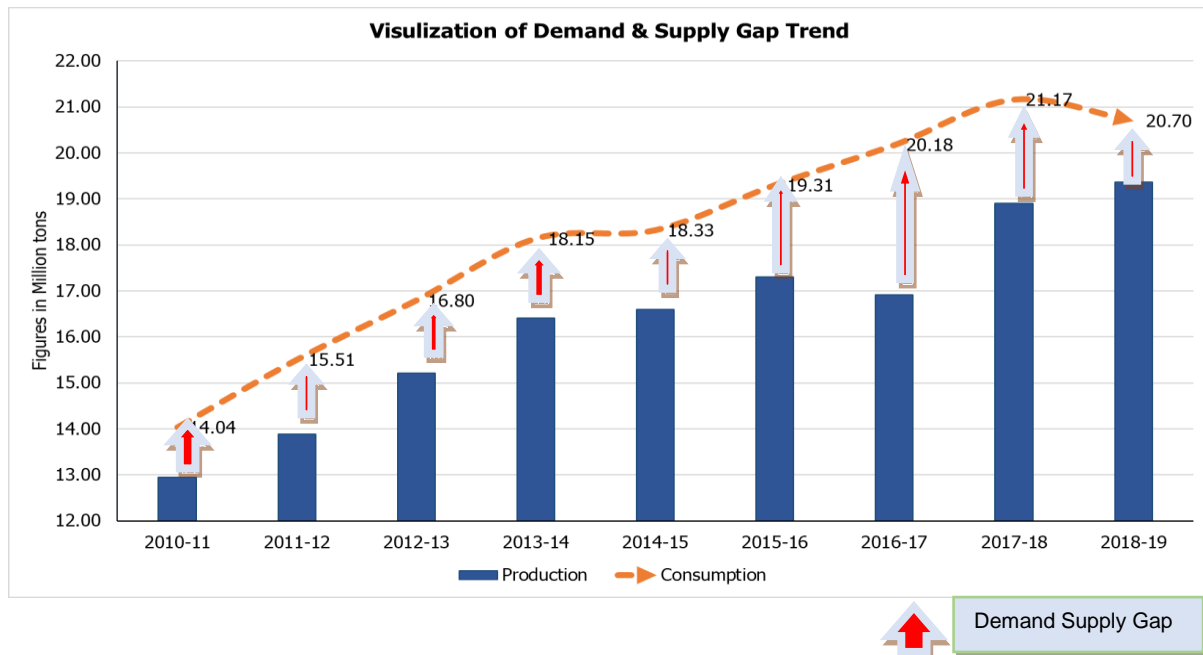
## THE GROWTH OF INDIAN PAPER INDUSTRY

Out of 410 MMT of paper consumed globally, India consumes 20.70 MMT of paper and paper board annually, putting the national paper demand at 4.72% of the global demand. With steady growth in the country's economy since the early 1990s, India has witnessed a steady rise in the consumption of paper. The consumption of paper in India increased from 13.96 MMT in 2010-11 to 20.70 MMT in 2018-19. During this period India's paper consumption registered CAGR of 6% compared to the global growth of 3% making India one of the largest growing paper markets in the world. Relevant figures are placed in the table below.

Year	Production Capacity	Production	Import	Export	Consumption
2010-11	14.71	12.95	2.010	0.921	13.960
2011-12	15.59	13.89	2.392	0.770	15.282
2012-13	17.17	15.21	2.391	0.799	16.601
2013-14	18.17	16.41	2.569	0.834	17.979
2014-15	19.72	16.59	2.694	0.956	18.284
2015-16	20.41	17.60	2.983	0.973	19.583
2016-17	20.65	16.91	4.310	1.040	20.220
2017-18	22.11	18.91	3.579	1.323	21.166
2018-19	21.90	19.36	3.250	1.910	20.700

(Source: CPPRI & Import Export Data Bank, MoC, GoI)

## TREND OF DEMAND AND SUPPLY GAP



(Source: CPPRI Statistical Data Cell)

The figure above indicates the trend of production and consumption of paper, paperboard and newsprint. Consumption trend is depicted by the line and the gap of demand and supply has been marked out by the arrow. Data goes to indicate a steady rise in consumption trends even when production shows a slow down in any given year. The deficit supply, shown by the arrow is met out from imports. As may be expected, any increase in domestic production lowers the import volumes. Therefore it becomes very important to take all measures to boost national production of paper. Data goes to indicate that paper sector could adopt to challenges posed by demonetization and switch to GST with relative ease and attained the nominal time series production trends within just one year. A corresponding increase in imports is also seen.

## EXPOSURE TO OVERSEAS TRADE

Table below presents the Import and Export of various grades of paper, paperboard and Newsprint from 2010-11 to 2018-19.

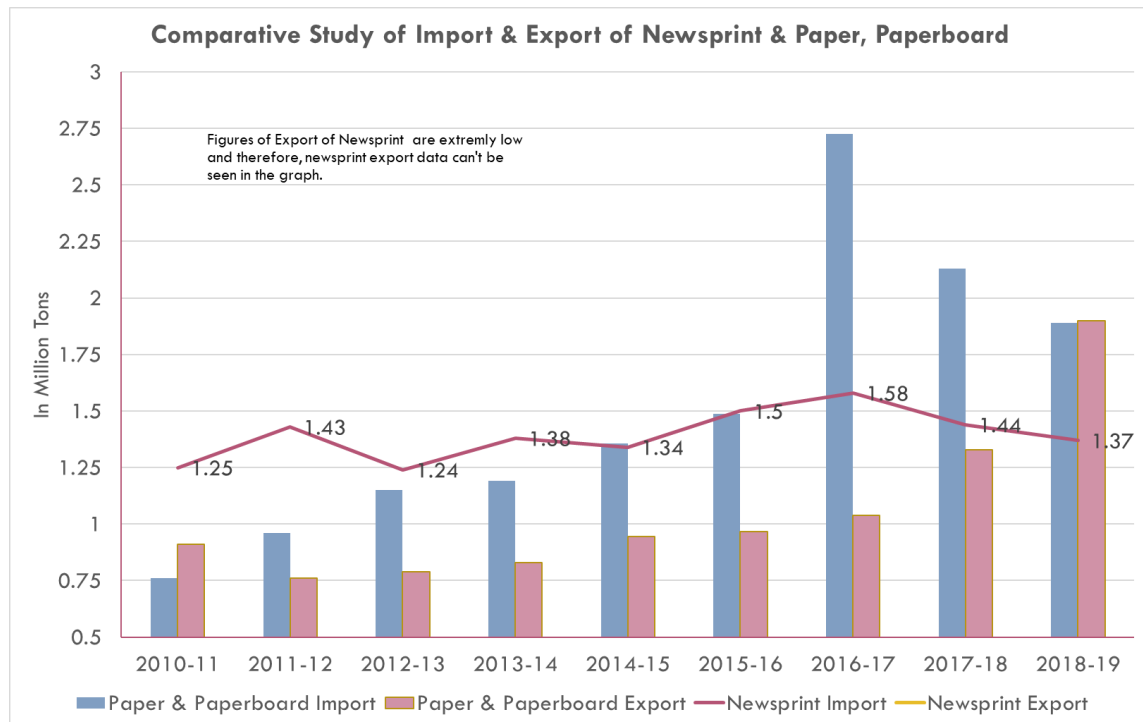
Year	Export Market (Million tons)			Import Market (Million tons)		
	Newsprint	Paper & Paperboard	Total	Newsprint	Paper & Paperboard	Total
2010-11	0.011	0.910	0.921	1.25	0.760	2.010
2011-12	0.010	0.760	0.770	1.43	0.960	2.390
2012-13	0.009	0.790	0.799	1.24	1.150	2.390
2013-14	0.004	0.830	0.834	1.38	1.190	2.570
2014-15	0.010	0.946	0.956	1.34	1.358	2.698
2015-16	0.005	0.968	0.973	1.50	1.486	2.986
2016-17	0.00042	1.040	1.040	1.58	2.726	4.306
2017-18	0.0068	1.329	1.336	1.44	2.131	3.571
2018-19	0.0127	1.898	1.910	1.37	1.889	3.255

(Source: Import Export Data Bank of Govt. of India)

As can be observed, the trend of import of paper, paperboard and newsprint is continuously increasing. Almost 21% growth can be seen in the year 2016-17. However, last two consequent years (2017-18 & 2018-19) have depicted a decreasing trend in the import of paper, paperboard and newsprint and one factor contributing to this drop seems to be the removal of actual user condition and the consequent imposition of basic custom duty of 10% on newsprint. This is important because newsprint import has a major impact on the balance of trade. Traditionally the sector was known for its balance of trade, excluding newsprint. However, this began to change from 2012-13, when import of paper started increasing and export started to lag behind. The situation has improved in last 2 years, when exports have exhibited an upward trend. As regards exports, the volumes are lower than that of imports. However, there has been an increase in Y-O-Y export growth. This is a positive step for the paper sector. CPPRI studies have found a link between ban on import of wastepaper by China and increase in our exports. It seems that China resorted to importing paper from India to balance its supply chain which was affected by the ban. While this may be good news for trade, it has ecological ramifications. China banned imports of waste paper to deal with garbage/contraries which ended up in dumps. In case India follows suit, then we envisage operational problems for the RCF based mills in the near future. Further the export consignment of some mills that were shipped to China were returned due to quality rejections. Therefore, it is expected that the windfall of exports of paper to China may not last long and export figures may exhibit a drop.



## IMPORTS AND EXPORTS-COMPARISON BY VOLUME



(Source: Import Export Data Bank of Govt. of India)

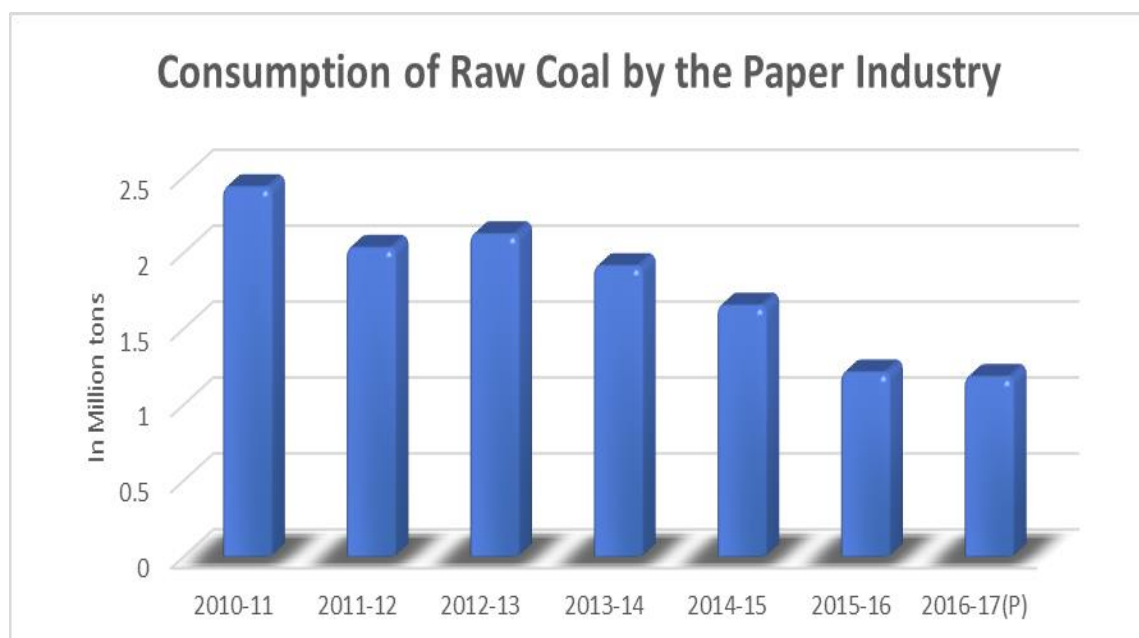
The graph above shows the imports and exports of paper and newsprint to illustrate the time series growth trends by volumes (million tons). Import of newsprint does exhibit an increasing trend but fluctuates between 1-1.5 million tons range. The import rates may vary YoY basis, but a positive growth indicates an increasing demand. In fact, India is one of the few economies which exhibit positive demand for newsprint.

The story of import of paper is different. The import was fairly reasonable till 2015-16, almost achieving a balance in trade. This changed suddenly in 2016-17 when the import shot up by almost 2 times. Import figures remained high even in 2017-18 even as a trade correction took place. Industry sources attribute this to the abnormal increase in imports of coated and writing/printing paper. The imports have also been said to increase due to the various free trade agreements, particularly that with ASEAN and South Korea.

## STATUS OF ENERGY CONSUMPTION OF THE SECTOR

Paper sector is considered as an energy intensive sector. Industry requires electricity and steam for production. While large and medium mills generate steam and electricity for their production from coal or biomass in the Captive Power Plants (CPP), the small and some medium mills purchase electricity from grid. The energy consumption varies depending on the raw material used, product and the layout of the mill.

Energy cost component is high in Indian mills due to low scale of operation, use of multiple machines of lower capacities on account of variety of raw materials and use of relatively obsolete technology. However, the study of the energy consumption over the past decade has shown remarkable improvement in energy consumption to meet the cost competitiveness by the industry. Over the years, the sector has shown steady decrease in use of coal for an increasing production volume and this presents a very commendable story. In a period of past six years consumption of raw coal by paper sector has been cut to almost half. The success story of the Perform Achieve & Trade (PAT) scheme of Bureau of Energy Efficiency, Ministry of Power, translates the efforts made by the sector to reduce their energy consumption during PAT-1 cycle (2013-16). The use of coal is slated to go down further in the PAT-2 cycle (2016-19), as more mills are declared as designated consumers of energy in paper sector.



*(Source: Statistical Report of Energy, 2018 – Ministry of Power)*

## ENVIRONMENTAL CONCERNS

Environmental sustainability is a key issue before Indian Pulp and Paper Industry in context with increasing environmental awareness, stricter environmental norms, emphasis on reducing water consumption and waste water discharge as well increasing reuse / recycle of treated effluent in view of declining availability of ground water. Further the formulation of Charter for Water Recycling & Pollution Prevention in Pulp and Paper industries of Ganga River Basin by Central Pollution Control Board (CPCB) brought into force stricter environmental norms ( more stringent than the national norms) for fresh water consumption and waste water discharge for different categories of pulp and paper mills in Uttarakhand and Uttar Pradesh in Ganga River Basin.

Pulp and paper industry largely employ conventional technologies in the manufacturing process and consequently is highly intensive in terms of consumption of raw material, chemicals, energy and water thereby generating significant environmental load.

There have been concerted efforts by industry, CPCB and Ministry of Environment, Forests & Climate Change (MoEF&CC) towards addressing the problems of high levels of environmentally undesirable components in effluents. Industry voluntarily evolved norms for water usage, quality of effluents discharged and energy usage under the Corporate Responsibility for Environmental Protection (CREP). To achieve the set norms, the industry deployed improved and new technologies in the manufacturing process. There has been a renewed effort from CPCB to tighten the norms for amount of water used per ton of paper, quality of treated wastewater discharged and usage of energy. Implementation of such stricter norms would be a challenge and calls for infusion of new technology including cleaner and greener technologies, as well as research efforts to develop cost effective solutions that could be adopted by smaller units for sustainability of industry.

## DISCHARGE NORMS FOR WASTE WATER DISCHARGE

The Central Pollution Control Board (CPCB) had promulgated waste water discharge norms for the pulp and paper sector initially.

Parameter	Discharge Standards		
	General Standards	CPCB – Pulp & Paper Mills	
		Small Scale	Large Scale
Volume, m <sup>3</sup> /t	-	Agro based :200 (150)* Waste Paper: 75 (50)*	Writing & Printing: 200 (100)* Rayon grade/ News print: 150
pH	5.5-9.0	5.5 –9.0	7.0 - 8.5
BOD <sub>5</sub> at 20°C mg/l	30 (Inland surface water) 350 (Public Sewer on land discharge) 100 (Land for irrigation ) 100 (Marine / Coastal areas)	30 (inland discharge) 100 (on land discharge)	30
COD, mg/l	250 (inland surface water ) - (Public Sewer on land discharge) - ( Land for irrigation ) 250 (Marine / Coastal areas )	Not specified	250
SS, mg/l	100 (inland surface water) 600 (Public Sewer on land discharge) 200 (Land for irrigation)	100	50
TOCl, kg/t <sub>paper</sub>	-	Not specified	2.0
AOX	-	2.0	1.0
SAR	-	26	-

\*Under Revision

The above norms are currently being considered for a major revision. The revised norms are likely to be notified shortly. These norms shall be markedly strict than the existing norms.

Most of the paper mills have taken steps in order to meet the above norms. For achieving the environmental compliance, the ETP units need to be adequate to handle the effluent volume and reduce the pollution load. Many a mills are now adopting dissolved air floatation, save all, sedicell, poly disc-filter for improved fiber recovery leading to resource conservation and reduction in pollution load going to ETP.

## DICHARGE NORMS UNDER CHARGER FOR WATER AND WASTE WATER DISCHARGE FOR PAPER MILLS IN THE GANGA RIVER BASIN

In recent times, there have been efforts to put a discharge limit of waste water along with limiting the fresh water consumption by the paper industry. The revised Norms have been drawn up under the Charter for Water Recycling & Pollution Prevention in Pulp and Paper industries of Ganga River Basin by Central Pollution Control Board. Table Below presents the norms for different categories of pulp and paper sector located in the Ganga River Basin.

Category	Fresh Water Consumption, m3/t		Waste Water Discharge, m3/t paper	
	Short Term March 2016	Long Term March 2017	Short Term March 2016	Long Term March 2017
A1 - Wood based pulp and paper mills producing bleached grades of chemical pulps, papers, paperboards and newsprint	60	50	50	40
A2- Wood based pulp and paper mills producing unbleached grades of chemical pulps, papers, paperboards and newsprint	40	25	30	20
B1 - Agro based pulp and paper mills producing bleached grades of chemical pulps, papers, paperboards and newsprint	60	50	50	40
B2 -Agro based pulp and paper mills producing unbleached grades of paper and paper boards	40	25	30	20
C1- RCF and Market pulp-based paper mills producing bleached grades of papers, paperboards & newsprint	20	15	15	10
C2 - RCF and Market pulp-based paper mills producing unbleached grades of papers, paperboards & newsprint	15	10	10	06
D - RCF & Market pulp based speciality paper mills	60	50	50	40

It can be seen that the norms for discharge characterization for mills in the Ganga River Basin are very stringent as compared to the existing norms.

In addition, there are specific emission norms for characterizing the quality of the liquid effluent generated from the mills. The same are placed in the table below.

Parameter	Integrated Pulp and Paper Mills Manufacturing Chemical Pulp	RCF and Market Pulp Based Paper Mills
<b>pH</b>	6.5-8.5	6.5-8.5
<b>TSS, mg/L</b>	30	30
<b>BOD mg/L</b>	20	20
<b>COD mg/L</b>	200	150
<b>TDS mg/L</b>	1800	1600
<b>Color, PCU</b>	250	150
<b>AOX, mg/L</b>	8	-
<b>SAR</b>	10	8

## AIR POLLUTION MANAGEMENT

While the mills with boiler steam generation capacity < 15 tph usually employ cyclone / multi cyclone to control the particulate matter (SPM) , for the boilers with steam generation capacity > 15 tph usually Electro Static Precipitator is used by the mills. ( ESP)

The revised air emission parameters as applicable to the pulp and paper sector have been notified and are as indicated in the table below. (S.O. NO. 3305(E) dated 7/12/2015. These norms are same as that applicable for thermal power plants. However, the deadline for compliance has been extended to 2022.

mg/Nm <sup>3</sup>	Plant Size	Existing Standards	Installed before 31/12/2003	Installed between 1st Jan 2004 to 31st December 2016	Installed after 1st January 2017
<b>PM</b>	All	150-350	100	50	30
<b>SO<sub>2</sub></b>	< 500 MW	None	600	600	100
	>500 MW	None	200	200	100
<b>NO<sub>x</sub></b>	All	None	600	300	100
<b>Hg</b>	All	None	0.03 (>500 MW)	0.03	0.03

Under CREP the control of odorous emissions (mercaptans or non-condensable gases (NCG)) from large pulp and paper mills was also focused upon as a result recently a number of large pulp and paper mills have installed NCG collection and incineration system.

## SOLID WASTE MANAGEMENT

The major solid waste generated in pulp and paper mills are both inorganic (lime sludge and fly ash) as well as organic (ETP sludge). While the lime sludge generated in large mills during recausticising stage of chemical recovery system is incinerated in lime kiln to recover lime and is reused again for causticisation, fly ash from coal fired boilers is either sold to cement units by some mills under contract agreement or used for brick making at mill site itself or sold to contractors. Primary ETP sludge being fibrous in nature is dewatered and is sold to board making or egg tray making units or burnt in multi fuel boilers. Biosludge from the secondary treatment is being used for land applications.

## CONCLUSIONS

The Indian paper sector has performed fairly over the years even though it was faced with various challenges, both internal to the sector as well as due to externalities. The sector, however, has unutilized capacity primarily due to acute fiber shortage in the country. Another reason for low capacity utilization has been the ever-increasing input costs particularly for energy inputs (both coal and non-coal).

The sector is very capital intensive –the ROI in its case is five to seven years. This fact has been reflected over the decades that almost all capacity addition have occurred through brownfield expansions. Further, most of these expansions have been in the waste paper based segment and due to de-bottlenecking measures taken by individual units, as low investment options. There have been virtually no green field project in the sector for about a decade now. Capital intensiveness has also had its ramifications on the technology levels in the sector, where many units still employ nearly obsolete technologies for production. The cumulative effect of all this can be seen in the increasing gap between the production and consumption of paper, paperboard and newsprint.

Even in the above scenario, the Indian paper sector has taken notable steps in order to maintain smooth operations and remain competitive to the maximum extent possible in the post globalization era. The work carried out in the area of raw material augmentation and its utilization by the sector is very commendable. Nearly all wood-based paper mills have robust plantations programs in place wherein they are able to source the major volumes of the required raw material. The agro based segments has mastered the art of paper making from what are known as short fiber and inferior raw materials. India is one of the few countries that produce writing/printing paper from bagasse and wheat straw.

Time is now ripe for the Industry to look beyond the medium term and invest in R&D for long term sustainability. There is an urgent need to invest the CSR funds into R&D which not only helps the sector but also impacts the communities that are directly or indirectly involved with the paper sector.

There is a pressing need to ensure a sustained availability of quality lignocellulosic raw material for paper making in the country. In this reference the proposal for leasing of degraded forest lands for pulpwood plantations needs to be fast tracked by the Ministry of Environment, Forests and Climate Change (MoEF&CC). If the industry is sure of availability of quality raw material



well into the future, it can plan investments and expansions with a long-term vision.

Also, urgent interventions are needed from the Department for Promotion of Industry and Internal Trade (DPIIT) for revising the ITC-HS codes for pulp (Chapter 47) and paper (Chapter 48) at the eight figure level in order to reflect the needs of the current trade of paper in India.

Energy is clearly the most important parameter that needs to be monitored after the raw material availability. The industry needs to shift to energy efficient technologies, but it needs funds for the same which are difficult to be available on commercial terms. Whereas the Bureau of Energy Efficiency has made some efforts to help the industry move towards energy efficiency under the National Motor Replacement Program (NMRP) through its subsidiary, Energy Efficiency Services Ltd. (EESL), direct funding may have to be planned for inducing energy efficient unit operations in the pulp and paper sector.

Currently, the paper sector is operating in the era of new opportunities beacon by introduction of biorefinery approach and possible ban on Single Use Plastic. These new opportunities will open new avenues for utilization of all possible unique products from the constituents of ligno-cellulosic raw materials produced in a biorefinery. This would have the potential to change the face of the Industry. The sector may well look into the future where pulp and paper would actually be the by-product of the biorefinery operations and the other value-added eco-friendly products will become the main stream products contributing substantially to the bottom line.