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FIBER CONSERVATION AND COST REDUCTIONS THROUGH EFFECTIVE AND CONSERVED USAGE OF WOOD AND RECYCLED FIBER

Abstract

Fiber whether Virgin or Recycled is the key and biggest cost component in paper manufacturing process. Any inefficiency at any level will lead to cost escalation beyond imagination, any cost saving and improved efficiency on this account results into tremendous savings. In spite of the known importance of this component of paper manufacturing, very little has been done towards Supply Chain efficiency to ensure its availability in right quantity at the right place with right quality. Government too has neglected this sector since advent of National Forest Policy 1988. With this demand always exceeded supply and whenever for a brief period, supply exceeded demand, Industries failed to protect farmer's interest, couldn't protect sustained supply of wood making further shortfall in wood availability, leading to unmanageable and non viable cost escalations resulting in compromise in all fronts of efficiency and cost control. Whatever wood is available is being fed to chippers whether it meets the norms or not, ultimately leading to inefficient chipper operation with pulp yield getting impacted adversely.

Similarly, recycled fiber continued to get imported in India where recovery percentage is only about 27% at the same time. While global average is about 54% and few developed economies have achieved even 85% and above.

With all of the above adverse conditions, resource conservation with special reference to fiber becomes a prime concern

Keywords: Supply Chain efficiency, National Forest policy 1988

INTRODUCTION

Over all wood demand in India is about 21 million¹ MT / annum which includes Pulp, Paper, Poles and even Ply and MDF, which is expected to reach about 23 million¹ MT per annum in next 4-5 years as per the capacity announcements, speculating the demand in growth as well envisaging the improvement in the efficiency of the mills. Market dynamics for the finished products is still unfavorable and with global melt down continues show no signs of improvement, recently China devaluating its currency may result in further cheaper imports in India, future of Indian Paper industry still is a cause of concern. With the prevailing circumstances continuous improvements in efficiencies and reduction in costs is the only answer for survival and to remain competitive in the market.

HISTORICAL AND FUTURE PERSPECTIVE

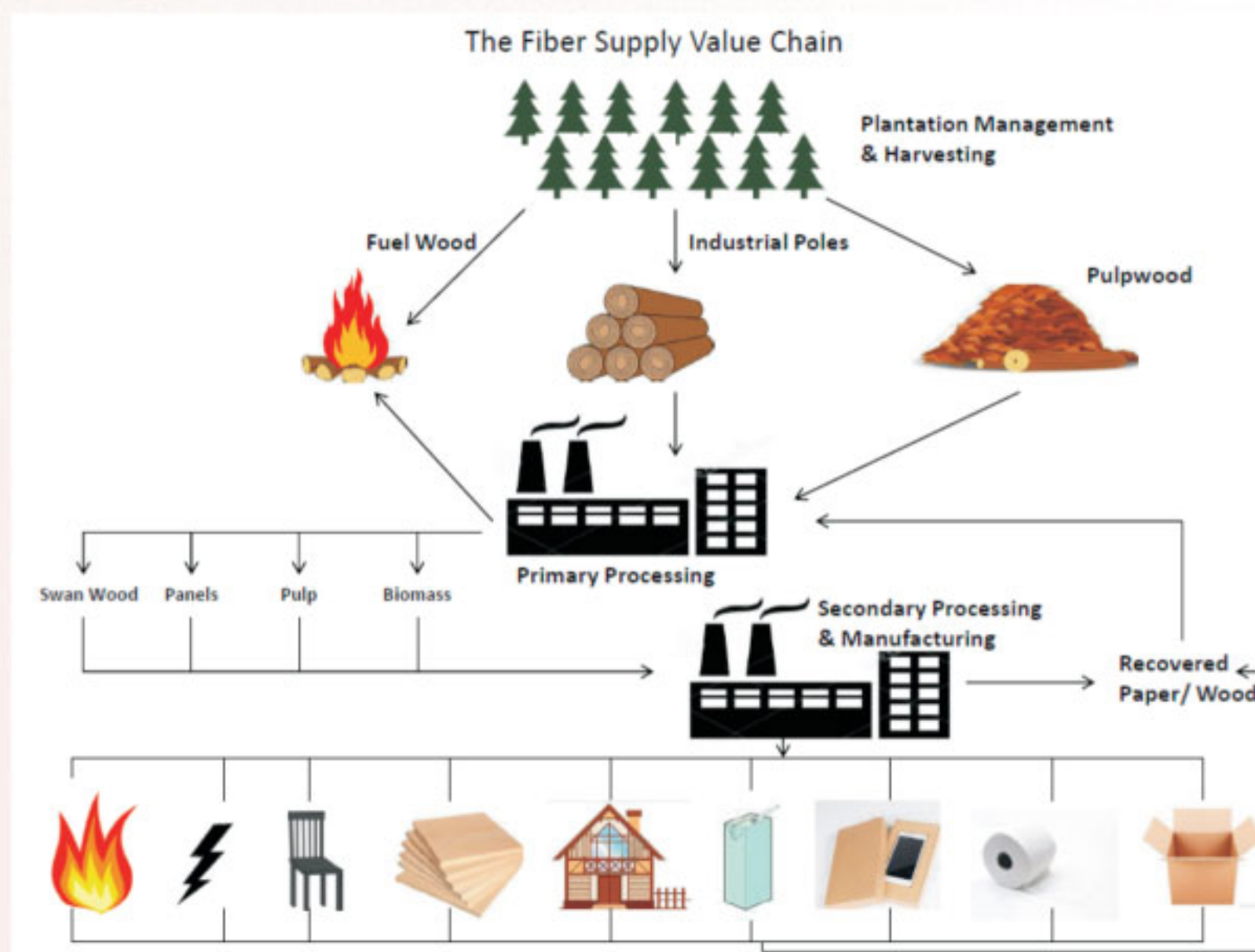
Paper has evolved a lot from "Papyrus" to the current form of high strength and high brightness paper and focus has shifted from supplier's market to buyer's market. From usage of Bamboo and Hard wood in India has been shifted to usage of Eucalyptus, Poplar, Casuarina and Subabul as wood raw material, which has indirectly resulted in savings in Chemical consumption and improved quality of pulp and paper. All these happened consciously by the mills and as well as by compulsion, when Bamboo gradually became scarce and hard wood availability too reduced, Govt transit rules became more stringent and conservation of forests took the driving seat.

With the passage of evolution and conscious efforts of the mills, Water consumption, Energy conservation and Fiber loss per Ton of paper too has reduced significantly ensuring industry remains competitive and survive.

Current Paper demand in India is about 12 Million² MT / Annum expected to be doubled to about 25 Million² MT by 2025, it's an ambitious forecast in a country where wood prices are maximum in the world, recycled fiber (RCF) collection efficiency is only about 27-28%³ and with no support from the Government a very relevant question remain unanswered, can Indian Paper industry sustain / survive in India with the cyclic nature of our Industry? Answer lies only in the sincere efforts of the Industry that how we are able to sustain ourselves with improved efficiencies and how best we conserve our resources and move on. Pulp and Paper industry has faced similar situation many times and always came out successfully every time but future is altogether different a ball game with Global economy showing signs of further slowdown, their domestic demands diminishing they all are looking to greener pastures like India where average per capita paper consumption is 10.1 kg⁴ which is too low to match global per capita average demand of 56.9 Kg⁴. With their very efficient technologies and low wood cost it is very difficult for Indian Paper industry to compete with them. Any quantum saved is as good as the quantum gained.

With all the above challenges, equally lie the opportunities too, thus answer lies in exploiting these opportunities and in competing with them by improving our efficiencies with conservation of resources and reduction in costs.

Wood Fiber supply chain

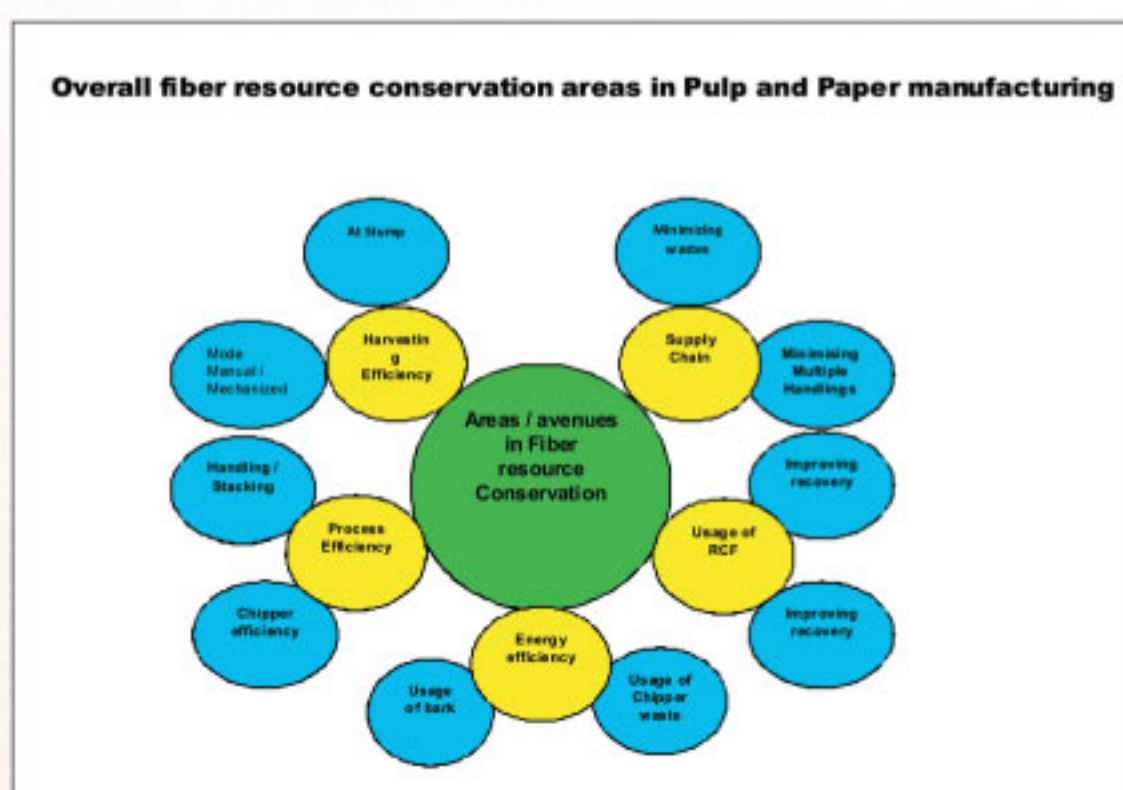


Wood is a biological product and contains moisture. It is available on fields, which are grown and maintained by the farmers. Regarding its harvesting, handling and transport farmer has to depend on the agent who deals with it and has sufficient skilled labor force and the medium to transport the same.

From farmer's field till the wood reaches mills or to other market like poles, timber or fuel wood, multiple handlings take place mainly on account of its constraints in logistic and bulky nature. From its destination of manufacturing or conversions it goes to various markets in its desired forms like Paper, Board, Timber, Furniture, Power plants, Packaging and even for burning. It is being found that all these components have various levels of wastages and inefficiencies, have the potential to curb those and to improve efficiencies so as to conserve the precious fiber and indirectly reduce costs in other words better utilization of inputs like wood and reuse of by products/ wastes is one of the important key factor which controls the economies of pulp and paper manufacturing.

COMPONENTS / AREAS RELEVANT TO COST REDUCTIONS

There exist multiple opportunities with following components / areas involved specially related with "Fiber supply chain" with its related conservation and effective cost reductions for Pulp and Paper sector or even for other wood fiber dependent sector to set focus on to ensure improvements, which will lead to tremendous cost reductions with improvement in sustainability and profitability of the pulp and paper sector.



Pictorial representation of Components / Areas of Fiber supply chain

1. Supply Chain efficiency

a. Raw Material Handling. (Minimizing wastes / reducing multiple handlings)

Paper industry is a continuous process industry and sustained supply of wood is mandatory for efficient running of paper mills. Wood being a natural resource and availability is seasonal needs very good inventory planning for smooth running of mills, to attain this, wood is stacked in mills wood yard and depots at strategic and even remote locations where ever feasible, considering availability and cost effectiveness. Ageing and lifting of wood, wood gets wasted on account of handling and multiple handling, this need to be minimized.

Case Study:

Cost of the wood: Rs.3,500/- per MT (assumption)

Paper Mill wood Consumption: 10 lacs MT / Annum

Warehouse / depot handling: 30 % of the total wood consumption ie 3,00,000 MT / annum

Wood quantity lost on account of mis/multiple handlings: 10 lacs X 30% X 0.15%^a

Value loss: Rs.3500/- per MT X 450 = Rs.15.75 lacs (potential to save / conserve).

b. Proximity / logistics (haulage) :

Logistic / wood haulage cost varies between Rs.350/- per MT to Rs.1,500/-MT depending on the distance between the mills and the resource. For a cost effective supply Chain and procurement the sourcing should be as close as possible to the mills. For a mill with consumption of 10 lacs MT / Annum (as suggested above in case study) sourcing distance of about 150 – 400 Kms can be considered viable which can save Rs355/- per MT or even more. With the above mentioned consumption the mill will have a potential to save Rs.35.50 crores. (**Annexure-1**).

2. Harvesting / debarking efficiency.

a. At stumpage

Harvesting of wood in India is mostly manual and mainly done through axe. Harvesting loss is another area of concern at the plantation site. Due to lack of worker's knowledge and poor supervision almost 4-6" inches of vertical height from ground is lost (Photo 1 & 2) of the desired felling point and cross cut of axe. On an average height of matured Eucalyptus tree will be about 20-25 feet. Each Eucalyptus tree will weigh about 40 Kgs* on an average (40 MT / acre yield with 1000 trees stocking). This will result in wastage of about 1.3-1.5% of precious wood including wastage on account of inefficient and crude axe cutting. For a mill of annual consumption of 10 lacs will be equivalent to about 13,000 to 15,000 MT of wood could be equivalent to Rs.4.5 to 5.2 Crores.

b. Mode of harvesting : Manual / Mechanization

Most of the harvesting in India is done manually with axe. Lately, handsaw use is growing. Mechanized harvesting is yet to pick up, with Indian context where farmer's plantations and land holdings are of smaller sizes, its cost effectiveness in relation to investment involved including fuel cost is yet to be established.



Photo1: Harvested stumps left wasted 4-6" more than what Silvicultural prescription suggests.



Photo 2: Tree harvested carelessly with Axe and wood chips being wasted all around the stump.

3. Process efficiency

a. Handling / stacking in mills

b. Chipper efficiency.

i. Quality of wood.

ii. Minimizing wastes / recovery wastes and re feeding / re using

Wood a largest quantum in paper cost and any miniscule saving even of 0.8%⁸ of total over all wood consumed (including losses in Mill yard or at chippers are recovered and fed to the Chippers) will be a huge savings.eg mill consumes 10 lacs MT of wood annually @ 0.8%⁸ means about 8000 MT of wood will drain as wastage as losses in process resulting lower yield by about 0.2%. If it is controlled that will ensure a cost reduction of 2% directly and that too with 2% enhanced efficiency and better capacity utilization of pulp mill with no extra inputs and secondly the recovered fiber for which company has already paid will result in direct savings towards fiber purchase of about Rs. 2.80 Crores (wood purchase rate of Rs. 3500/-MT) which is equivalent to about Rs.112/-MT of pulp.

With the better quality of wood fed to the chippers, chipper efficiency goes up drastically, by way of lesser jamming and lesser stoppages resulting in higher and better quality pulp production. If this is to the tune of only about 5%⁸ improvment will result in over all savings of about Rs1200/-MT of pulp.

Case Study - Improving Chipper productivity on account of better quality wood:

S.No	Particulars	Quantum (units)	Remarks (if any)
1.	Cost of wood	Rs.3500/- per MT	Assumption
2.	Paper mill annual wood consumption	10,00,000 MT	Assumption
3.	Lesser jamming and lesser break downs	5%	As per experience
4.	Existing Chipper productivity	2940 MT / day	340 days operations
5.	After 5% improvement in productivity	3087 MT/day	340 days operations
6.	Net enhanced chipping per day (5-4)	147 MT/day	
7.	Existing pulp produced / day (2940 MT/4)	735 MT pulp / day	4 MT GMT / MT of pulp
8.	After improvement pulp produced (3087 MT/4)	772 MT pulp / day	4 MT GMT / MT of pulp
9.	Net additional pulp produced (8-7)	37 MT pulp / day	
10.	Additional cost @ Rs 3500/-per MT of wood	Rs.5,14,500/-	147 MT X Rs 3500/-
11.	Assumed cost per MT of pulp	Rs.25,000/-	
12.	Existing total cost of pulp produced / day	Rs. 1,83,75,000/-	735 MT X Rs.25000/-
13.	Revised cost of pulp with enhanced production	Rs. 1,88,89,500/-	Rs.3500/-/MT X 147 MT
14.	Reduced pulp cost / MT (Rs1,88,89,500/772 MT)	Rs.24,468/-per MT	
15.	Net savings / MT of pulp (11-14)	Rs. 532 /- per MT	
16.	Over all savings / annum (2,62,580 MT pulp)	Rs.13.97 Crores	(262580 X Rs.532/- MT

4. Minimizing bark in the system with reduction in unplanned downtime:

a. Minimizing consumption of bark.

b. Usage of bark.

c. Usage of Chipper waste.

Paper mills would prefer to use single species to be efficient in process and better quality production. But due to lack of availability of sufficient quantity at single area for the company for its consumption, Mills are forced to use multiple species to keep their mills working.

Bark is one of the major obstacle to get process efficiency. Subabul has 5-7%⁵ bark where as Eucalyptus has 15-18%⁶ bark. Entry of bark in the system causes multiple inefficiencies and cost escalation in pulp production, Calcium content

in Eucalyptus bark is high as even 38900 ppm⁷, with even a small disturbance in PH balance, Calcium gets precipitated as Calcium Sulphate (CaSO₄) as scaling in various stages in pulp mill resulting in higher down time, low process efficiency, high cost of pulp production with high cost of maintenance too. Bark specially of Eucalyptus to be avoided in process.

Eucalyptus bark and as well as non pulpable Chipper waste can be used as fuel in boilers supplementing other fuel and helping in reduction in carbon emissions as well as cost of energy per MT of Paper produced

Supposedly with 50% reduction in bark consumption, efficiency will improve by about 7% resulting in additional production resulting into cost reduction equivalent to about Rs.1744/-/MT of pulp. (ref. waterfall graph).

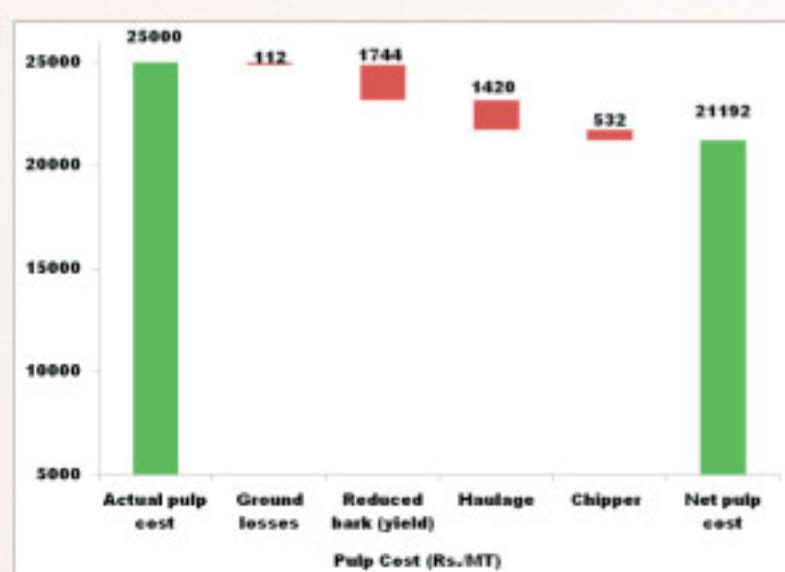


5. Improving usage / reusage of RCF.

Paper can be recycled and reused practically 7 times post its production from virgin wood. More the paper is recycled effectively and efficiently more savings of Virgin wood or plantations will happen. In 2010, 28.5% of the 227 million tonnes of municipal waste generated in US was paper and Paper board⁹ like wise similar potential though lesser than US in over all quantum is available in India. The proportion of virgin fiber that to be added at each stage of type and quality of recycled paper quality production will determine the stages of recycled paper produced. Currently we know 7 lives of virgin and recycled paper produced.

As already mentioned Recycle fiber recovery in India is as low as as only 27% this provides a tremendous opportunity to recover this wastepaper, this will involve sorting and separating paper products from other waste. Efforts and additional percentage in enhanced waste paper recovery will have higher impact on the overall footprint of the paper industry and that too if recovery of the paper happens with reduction in travel distance will not only result in lower cost of paper production and will add to long term sustainability of the mills.

Envisaged* cost reductions only on account of fiber conservation in Pulp and Paper manufacturing



Conclusion :

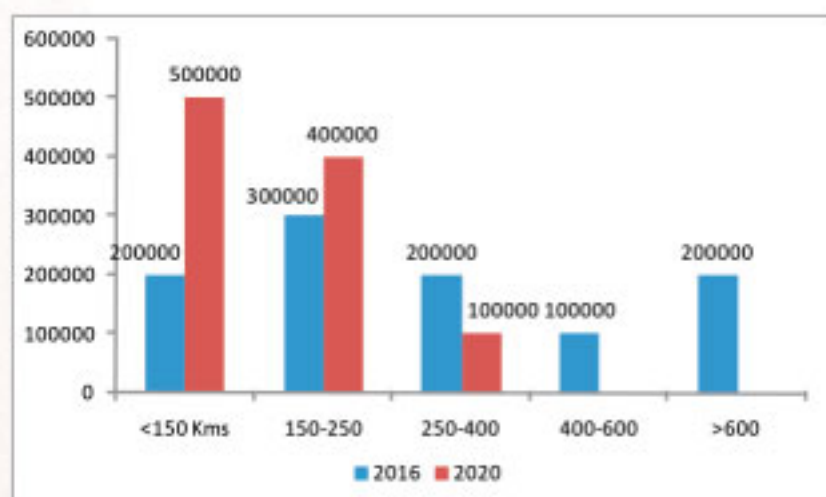
Whatever has been mentioned doesn't mean that mills are not on their desired path. This paper provides a direction to Supply chain value system highlighting the value that can be further unlocked. Water fall graph mentioned above provides a approximate quantified value towards effectiveness in achieving desired reduction in cost of about 15.23%. There are still additional reduction which will happen automatically in terms of reduction in chemical consumption, reduction in down time, better pulp quality produced and with that better quality paper finally produced, will surely fetch better price in the market. Thus savings, Cost reductions and additional realisation will surely lead to better sustainability of the Paper industry.

Annexure -1

Cost effective supply chain - Wood availability nearer to Mills

Quantity - MT

Tentative calculation for understanding the advantage



Distance	Quantity (GMT)	Freight (Rs/ GMT)	Quantum (Rs.)	Quantity (GMT)	Freight (Rs/ GMT)	Quantum (Rs.)
< 150 km	200,000	350	70000000	500000	350	175000000
150-250	300,000	500	150000000	400000	500	200000000
250-400	200,000	900	180000000	100000	900	90000000
400-600	100,000	1,200	120000000			0
>600	200,000	1,500	300000000			0
Total - Tonnage	1,000,000	820	820,000,000	1,000,000	465	465,000,000
2016 weighted Average Cost (Rs./GMT)						820
2020 Weighted Average Cost (Rs./GMT)						465
Net savings /GMT - 2020						355
Total savings (Rs.)-2019						355,000,000

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