

Paper and Pulp Industry in India : Raw Material Problems and Unutilized Global Potential

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INTRODUCTION

Wood is one of the most ubiquitous materials used by humans ever since, if not earlier, they learnt the use of fire, Apart from its use as fuel in tropical developing countries, structural material, pulp and paper manufacture are the most prominent commercial uses of wood. Unlike other wood based products, paper has a special significance as its consumption is taken as an important indicator of economic and educational development of a society or nation. The art of paper making was originally discovered by the chinese in 2nd century BC. It slowly travelled westward and reached west Asia in 8th century A.D. and then to Europe by 12th Century A.D. The significance of paper industry in the world economy can be gauged from the fact that not only it is the largest industrial user of wood in the world, it is also one of the largest global industries in the world ranking fourth in value of output and seventh in terms of employment (Stat. Yearbook. UN, NY 1993).

This paper takes a look at the raw material strangle hold that has not inhibited the growth of this important industry in India and analyses the strategies that have been followed in India (and have failed) to meet the requirements of wood based industries forcing the country to go in for expensive imports.

PAPER AND PULP: GLOBAL SCENARIO

Though paper is consumed by all societies on earth, its production and consumption is not evenly distributed among all countries of the modern world. Europe and North America are the main producers and consumers of paper/paper board, though Brazil and Portugal have only recently emerged as significant players in global pulp/paper market. Europe

which has 9.4% of world's population on its land account for 67.5% of world's paper production. Put together, North America and Europe account for 85.5% global pulp exports. The dominance of Europe and North America in production and global trade of paper/pulp is derived from the fact that these countries have had a high domestic demand for paper and allied products. This high level of demand was not only sufficient to support large scale units but also has been instrumental on its own in the development of the paper industry. Apart from high levels of indigenous demand abundant availability of wood as a raw material for paper production is also of equal importance.

Countries in Asia (with the exception of Japan) and Africa present a contrast to the scenario in the Western Europe and North America. The annual per capita consumption of paper in Asia is 18Kg compared to the global average of 45Kg. This has kept the total market size in individual countries at modest levels. Even within Asia, there are considerable variations with low consumption countries like India (3.2 Kg./capita/annum) coexisting with high consumption countries like Japan (222 kg/capita/year). Apart from a low domestic consumption level which has pushed paper industry into a low priority category in the eyes of planners of most asian economies, critical shortage of wood and other ligno-cellulosic raw material is the most important bottleneck in development of paper/pulp and other wood based industries in tropical regions of the world. Due to low consumption and low production of paper products, Asia's share in global pulp exports was a paltry 0.5% in 1991 (table-1).

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Table-1**Regional shares in global market pulp trade (1993)**

Country	Production	Consumption	Imports	Exports	% Export Market
Europe	12,185	15,461	11,424	8,148	33.54
France	781	2,263	1,883	401	1.6
Germany, FR	278	3,868	3,782	192	0.8
Portugal	1,315	235	62	1,142	4.7
Spain	744	530	410	624	2.6
Finland	1,575	332	106	1,249	5.5
Norway	597	76	45	566	2.3
Sweden	3,371	716	180	2,835	11.6
Other W. Europe	904	4,848	4,560	646	2.7
E. Europe	2,620	2,623	396	393	1.6
N. America	15,771	6,200	3,087	12,658	52.0
Canada	7,789	759	197	7,227	29.7
United States	7,982	5,441	2,890	5,431	22.3
Asia	1,802	7,792	6,116	127	0.54
China	220	891	672	1	0.0
Indonesia	0	0	0	0	0.0
Japan	954	3,873	2,930	11	0.0
Korea	165	1,435	1,270	0	0.0
Taiwan	320	817	575	78	0.3
Others	463	776	669	37	0.2
Australasia	591	0	9	648	2.7
Latin America	2,779	862	123	2,040	8.4
Brazil	2,039	760	96	1,375	5.6
Chile	740	75	0	665	2.7
Others	0	27	27	0	0.0
Africa	766	154	120	732	3.0
World Total	33,894	30,469	20,879	24,353	100.0

Source: Adapted from Matussek et al, 1993²²**Table-2****Average growth rates (mean annual increments (MAI) Achieved in plantations**

Country	Species	Rotation (yrs)	MAI(m/ha/yr)
Brazil Amazonia	Gmelina arborea	10	35
	Pinus caribaea	16	27
Brazil Central	Eucalyptus spp	--	25
Costa Rica	Pinus caribaea	8	40
Chile	Pinus radiata	25	22
New Zealand	Pinus radiata	18	25
Swaziland	Pinus Patula	15	19
Malawi	Pinus patula	16	18
Cambia/Senegal	Gmelina spp	10	15
Philippines	Albizia falcataria	10	28
South USA	Pinus taeda	30	12
NW USA	Pseudotsuga menziesii	30	13
Scandinavia	Picea abies	40	5
Canada (average)		50	1
Sweden (average)		60-100	3
Tropical high forest (managed)		--	0.5-7

Source: Compiled from data in Evans (1982) and Sedjo (1984)

The per capita demand of paper/paper products is linked to literacy/educational standards and economic development of any particular country. It is for these reasons that demand consumption of paper/paper products in most Asian countries has continued to be low despite high population levels. However, following decades of low economic growth Asia has lately emerged as the new focus of global economic activity. Economic liberalization and inflow of direct foreign investment have triggered industrial development at unprecedented rates. Apart from the thrust in industrial development, most Asian governments have come to recognize literacy, general health and poverty eradication as major action areas with increased commitment of budgetary resources. Both these developments have important implications for the historically low pulp/paper consumption levels in Asia which have shown a marked upward trend in several countries in the past decade. It is now recognized that East Asia (from India through China, Japan and down to Indonesia) with a population of 2.5 Billion (growing at 1.7%) has a huge potential market for paper. At current rates of population growth, China and India alone will be adding 30 million new consumers every year. Even according to conservative estimates, by year 2000 AD, paper consumption in Asia would have grown by 30 Million tonnes due to the combined impact of a rise in population and economic/ educational development. The forecasts of increased demand for pulp and paper are of special significance for Asian countries as they, in business as usual approach, may have no option but to import a large share of their rapidly rising paper/pulp requirements.

Globally the main input for pulp/paper industry is pulpable wood, a commodity which is in severe short supply in Asia. The shortage of wood for industrial use is primarily due to two reasons. Firstly, most of the wood harvested in the tropics is used for meeting rural and urban energy needs, a use that shall continue to get priority over industrial needs in foreseeable future. Secondly, most Asian countries have not been able to develop dedicated industrial plantations to sufficient extent, due to official policies that are based on a lack of appreciation of the role of intensive tree plantations to augment wood production for economic and environmental benefit as well as the strong linkages that exist between

WBIs and rural development. The scenario as portrayed above appears ironic in light of the fact that the climatic/edaphic conditions in most Asian countries are excellently suited to wood production than those in colder temperate areas. So much so, that MAI in tropical plantations can be as much as 35 times of the same in temperate/boreal regions. Higher wood productivity and other factors like low cost of labour and other factors of production give Asian countries a natural competitive edge in this important industrial sector. Many Asian countries have realized their natural comparative advantage in paper production with countries like China, Indonesia, Malaysia taking steps to harness this latent potential through promotion of dedicated industrial tree plantations. Despite being the second largest country in the world in terms of population with the longest history of scientific forest management in the region, India is yet to take any worthwhile steps in this direction.

PULP AND PAPER: INDIAN SCENARIO

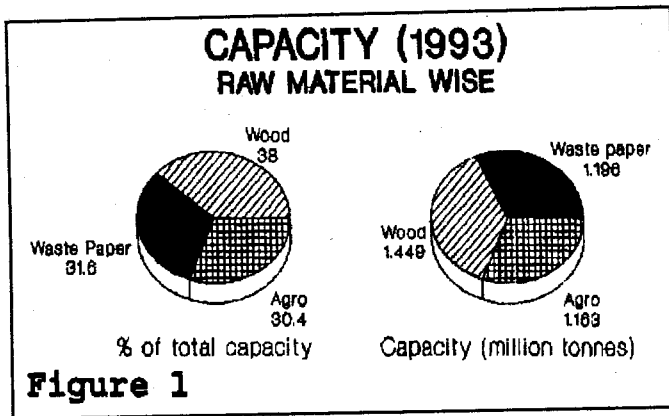
Paper and pulp industry in India is now more than 150 years old. Since independence the annual production of various grades of paper has grown from 100,000 tonnes to 2.4 million tonnes. Despite this 24 fold increase, India accounts for less than 1% of global paper/paperboard consumption spread over 16% of world's population. With its demand for paper growing at the rate 4.7% annually, India lags behind all major Asian economies like Indonesia (19.5%), Malaysia (12%), China (6.5%) only to name a few. The current per capita consumption of paper in India is 3.2 kg. per annum which is also one of the lowest in the world.

Low consumption levels in the past notwithstanding, the projections for paper consumption in India show a significant break from the past trend. Per capita paper consumption in India is expected to double itself by the turn of the century requiring 5 million tonnes of paper annually which is double the current level of production. The option of import to bridge the gap between demand and indigenous supply is bound to be a tremendous drain on national resources, especially in light of recent trends in international pulp prices which have registered a sharp increase from US\$ 400 to US\$ 850/tonne within the short period between January to December 1994.

The biggest impediment in increasing domestic production of pulp and paper is critical shortage of lignocellulosic raw material supplies. These shortages have acquired threatening proportions not because of any technological or resource constraint but the official policies, especially those relating to forests and land ownership, that the country has pursued since independence.

Till well after independence, wood supplies obtained from regulated fellings in natural forest areas provided for a significant part of the requirements of wood based industries (WBIs). It is for this reason industry is most often charged with the responsibility for depletion of forest cover. However it has been officially documented and accepted at more than one place that 90% of wood removals in India are for meeting energy needs i.e. fuelwood (total demand for industrial wood is 27.2 million m³ as compared to 235 million m³ for firewood). But the argument here is not about who is responsible (and who is not) for depletion in forest cover. The ground truth is that industry and the nation can no longer look a forest areas for meeting its lignocellulosic raw material requirements as there is practically no wood to go around after taking care of fuelwood needs of dependent rural populations.

Paper, pulp and many other wood based products are national requirements used by all sections of the society and for this reason problems WBIs cannot be ignored as an industry specific problems to be resolved by the industry in question on its own. The possible and viable solutions to wood shortage for industrial use lie beyond the decision making domain of WBIs. Moreover, the growth prospects of WBI's have been further dimmed by the fact that instead of taking pragmatic steps to increase wood production through development of dedicated plantations on under utilized lands (as is done in most industrialized and several developing countries) credence has been given to the "theory" that the so called "alternative" raw materials, mainly bagasse, agro residues and waste paper, can substitute for wood in pulp/paper production at the global scale of operations and to meet the requirements of a country as large as India. In addition to emphasis on "alternative" Farm Forestry has also been promoted as an alternative to dedicated plantations to produce sufficient quantities of wood for harnessing the full



potential of growth of WBI's in India. However, in both these strategies the results have hardly been proportionate to the raw material shortfall as well as efforts put into their implementation.

NON CONVENTIONAL (ALTERNATIVE) RAW MATERIALS

The existing installed capacity of the Indian paper industry is 3.55 million tonnes per annum. Of the total installed capacity wood based, agro based and waste paper based units account for 41% (1.45 million tonnes), 33.5% (1.19 million tonnes) and 25.8% (.917 million tonnes) respectively. Of a total 380 mills, 21 are large integrated mills (wood based) and 359 small units (non-conventional raw material based). From the point of view of raw material requirements, there are 28 wood based units, 111 agro based, and 241 waste paper based units (Fig.1). Due to limited supply of feedstock raw material all agro based and waste paper based units fall in the category of small units.

In theory, alternative raw materials offer many advantages over use of wood for manufacture of pulp/paper. However, in practice these alternative raw materials have serious problems that strongly impair their economic viability over the long run (despite fiscal incentives enjoyed by these units) as is borne out by the statistics available on capacity utilization and incidence of sickness in agro/waste-paper based units. Performance statistics for agro based units indicate a capacity utilization of 69% of installed capacity. The situation is even more grim in case of waste paper based units where due to a sharp rise in price of imported waste paper, capacity utilization is as low as 46% with more than 33%

of the total no. of units lying closed. Some of the prominent drawbacks faced by bagasse/agro-waste based pulp/paper units are:

- a) **Seasonal availability:-** The availability of agro-residue is seasonal due to its very nature and unlike wood, their storage also poses several problems. For instance, Bagasse, the main agro raw material for paper production is highly susceptible to fungal attack and fermentation because of high sugar content making bulk storage highly expensive and non-viable.
- b) **Competing Uses:-** Agro-residue based paper units compete with several other alternative industries which require agro residues as raw material. Bagasse is widely used in meeting energy requirements of sugar mills. Current emphasis on co-generation of power may make availability itself an issue of serious concern. Similarly, bran/husk is used for extraction of oil. These alternative uses make agro raw materials subject to frequent and sharp price fluctuations with serious consequences for agro based paper units which have to compete with large scale domestic and foreign production units.
- c) **Limited/Uncertain availability:-** Productivity of agricultural sector in India is by and large a function of extent and distribution of monsoonal rains. This links the supply of agro based raw materials to agricultural production levels which cannot be taken for granted in most parts of India except to a limited extent in irrigated north-western areas.
- d) **Low Conversion ratio:-** On the production side, because of their low density as compared agro raw materials have an average conversion ratio of 8:1 against 2.5:1 for wood. This makes the cost their final product highly uncompetitive compared to the same from large wood based integrated units.

Due to high capital requirements, globally the viability of paper/pulp production is linked to a great extent to installed capacity of individual units. Due to lack of adequate raw material supplies, the average mill size in India is less than 10,000 tonnes

compared to 85,000 tonnes in Asia Pacific and 50,000 tonnes in south east Asia. The average mill size in Europe and North America is a million tonnes/per annum. Uneconomic size of production units makes absorption of new technology impossible/non-viable because of inability of the industry to spread capital costs over large production volumes. This is one more reason why the agrobased route cannot be a long term arrangement for a country like India to meet its domestic needs as well as to exploit its full potential in production and export of wood based products to capture a reasonable share of the global trade in these products. This again brings back the question of availability of wood for pulp and paper production how its production and supply can be increased to the national advantage.

Unlike several other plantation crops like tea, coffee, rubber, etc. tree plantations outside the public sector have been denied the benefit of exemption from land ceiling laws. Entrenched political and economic interests have also till now successfully stalled policy changes enabling the leasing of degraded/under productive lands for raising industrial plantations in the organized/cooperative sector. The National Forest Policy (1988) instead lays great emphasis on farm forestry, an arrangement where industry enters into a direct arrangement with the farmer to meet its raw material demand. Without prejudice to the importance of farm forestry in rural development as well as its potential as a source of rural wood supplies, it can be demonstrated that from an industrial viewpoint farm forestry has inherent weaknesses which limit its suitability to meet industrial wood requirements at the required scale of operations due to reasons given below:

a) **Small land holding size:-** On an average the individual land holdings in India are small and scattered. This makes it difficult for individual units to implement large scale farm forestry projects to have assured raw material supplies. Small landholding size also restricts the ability of farmers to set aside land for tree farming where returns accrue only after a 6 year time lag. The procurement/ management costs of wood are also significantly higher when plantations are raised in scattered patches over a large area rather than in intensively managed, viable size compact blocks.

b) **Unsure arrangement:-** In the absence of a long term arrangement that assures of a minimum flow of wood supplies, it is not possible for the industry to make required investments in technological interventions to increase wood yields from tree plantations. Quality and yield of wood available from farm forestry programs thus becomes totally contingent on the ability and/ or inclination of the land owner to go in for yield enhancing technical/management interventions which does little to optimize return to both sides.

c) **Price Fluctuations:-** Cost of wood from farm forestry schemes is subject to market fluctuations not linked to economics of industrial users, a situation which may not be affordable to long term bulk users like paper industry where price of the final product is determined by global trends and not by local input costs. This phenomenon can only to be expected to become more pronounced with implementation of GATT proposals gradual withdrawal of fiscal protective cover.

The above mentioned drawbacks of agro/wastepaper and farm forestry options for meeting industrial needs of ligno-cellulosic raw material make it essential to search for strategies to produce wood in quantity and quality needed for viable scale of operations in production of wood based products especially pulp and paper.

DEDICATED INDUSTRIAL TREE PLANTATIONS: BROADER RATIONALE

India is a vast country with excellent climatic and edaphic conditions suitable for tree growth. Land resources of the country are far from being utilized to their full productive potential, a situation that warrants immediate action. Knowing the level of budgetary allocations for environment, forestry, wasteland development and allied areas, it will be indeed naive to expect the government alone to stem the process of land degradation in the vast expanse of waste/degraded lands. However, this is no reason why these lands should not be put under productive tree cover, to the extent possible, in a fruitful partnership with the private sector to grow wood that is commercially remunerative in plantations that

provide environmental and economic benefits to all parties involved including governments (taxes, foreign exchange savings) and local people (employment, fuel/fodder and improvement of environmental conditions). There is a variety of institutional arrangements that can stimulate investment into the revitalization of these lands while safeguarding concerns regarding equity of resource ownership and local requirements of fuel and fodder. It will be a myopic policy against national interests to see the wood using industry as the only beneficiary of these plantations as wood is only but one of the several outputs from a growing tree. Apart from cost effective production of industrial wood, industrial plantations also have following positive contributions to society at large that should not be ignored:

- a) **Increase in area under tree cover:-** As the lands sought are degraded forest/revenue wastelands, plantations are a net addition to area under tree cover and not a loss of any natural vegetation.
- b) **Rural Employment:-** Each hectare of tree plantation can provide, on an average, 200 man days of employment in the year of planting itself. Studies done in U.P. and Haryana indicate that the direct wage component in total cost of raising plantations is 70% of planting costs and 30% of harvesting costs. This is apart from secondary employment opportunities that arise parallel to direct employment.
- c) **Enhanced fuelwood/fodder supplies for rural people:-** The plantations can be modelled to meet a predetermined quantity of fuelwood and fodder to be supplied to local people through village institutions. Since proportion of wood utilizable by industry is not more than 60% of harvested biomass, a part of the rest can go for meeting local needs of fuel and fodder in an organized manner.
- d) **Checking soil degradation:-** Nearly 2/3rd of India's land surface is affected by soil erosion due to want of adequate vegetal cover. Plantations on surplus lands will help stem this irreversible loss to the nation.
- e) **Prevention of encroachment:-** Due to lack of any productive use, revenue/forest wastelands are increasingly coming under encroach-

ment which become permanent over time due to political considerations. This phenomenon will stop once these lands are put under productive use and continual supervision.

India has 28 million ha. of plantable degraded forest and other wastelands. The benefits dedicated plantations as discussed above, if seen in their totality far exceed the value of wood that the industry is going to get from these plantations in order to meet growing national requirements of paper, pulp etc. Several countries in different parts of the world have recognized the benefits of industrial plantations and taken timely steps to realize the same. For instance, in Indonesia, government grants plantation rights to industry for establishing pulpwood plantations on long term leases and even provides interest free loans for the purpose from the specially created Reforestation Fund. In Chile, government subsidises 75% of the cost of plantation with major tax exemptions. As a result exports of forest products from Chile have risen from US\$ 40 million in 1972 to US\$ 900 million in 1990 with expectations of reaching the US\$ 2 billion mark in year 2000

CONCLUSIONS

India today is faced with the challenge of meeting its rising paper/pulp with the demand supply gap increasing with each passing year. Considering the fact that domestic cost of production for pulp/paper double of the same in major producer countries, the impending implementation of provisions of GATT might seriously jeopardies the viability of India's paper/pulp industry as it exists today. The country also cannot realistically afford a perpetual dependence on import of huge and rising quantities of pulp/paper as the international prices of have risen steeply in recent years.

The primary bottleneck in development of wood based industrial sector in India is a paucity of ligno-cellulosic raw material. Due to supply side/technical inadequacies of alternative raw materials and problems attached to farm forestry as the main source of industrial wood, dedicated tree plantations is the only option in the long run for a globally competitive pulp/paper industry. Apart from meeting industrial raw material needs these plantations and downstream industrial units can be catalysts of growth in rural areas and also act has a buffer between fast

depleting natural forests and rural needs of fuelwood and fodder that inevitably spill over to forest areas causing further deforestation.

While Indian conditions and resources are ideally suited to establishment of dedicated industrial plantations as well as the industries that utilize the resultant wood production, it has not been possible to capitalise on this natural advantage. The cause for this can be traced to denial on part of planners for access to required land resources due to opposition from vested political and economic interests. There are several examples in different parts of tropical belt especially Brazil, Chile and Indonesia etc. where state policy has actually promoted WBIs to let these countries become (from net importers) important exporters of wood products adding to their self reliance and economic prosperity. Indian planners ought to recognize this potential in proper long term perspective before it is too late.

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