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THE FUTURE OF CULTURAL PAPERS IN INDIA

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Abstract

The growth of population, the increase in literacy, the growing trend of higher ratios of professional and technical jobs in the work force and the greater economic activity would raise the consumption of cultural varieties of paper in the country. This would be evident from the increasingly higher demands of cultural varieties of paper and more particularly of the newsprint sector.

Domestic suppliers were unable to meet the demand of writing and printing paper and newspring during the 70's and early 80's. The domestic production of newsprint is far below the demand and the country imports 44% of its total demand.

For production of writing and printing paper, the traditional raw materials were bamboo, rags and cotton linters and lately tropical hardwoods. The shortages of these raw materials, created primarily by the neglect of forest by the Industry, Government and the People has led to a critical situation in matters of availability of supply of forest based raw materials. The recent government legislation not to allow felling of trees for industrial use would compel the industry to look for alternative raw materials such as straw, bagasse, grasses and other fibrous raw materials available in the country suitable for paper making.

For newsprint manufacture, traditionally softwood mechanical pulp constitute the major pulp component in the newsprint furnish. Due to limited availability as well as high extraction cost of softwood in India, tropical hardwoods such as Eucalyptus from plantation forest have been utilised for production of mechanical pulp. More recently, bagasse has been utilised in newsprint manufacture. The paper discusses the operational and product quality problems associated with the utilisation of hardwood and bagasse for mechanical pulp production. It briefly gives a novel method of making newsprint from bagasse chemical pulp and hardwood chemi-mechanical pulp. The process suggested would result in lowering the cost of production and in an acceptable newsprint quality.

The paper discusses the possible competition between the newspaper industry and the emerging information technology beyond the end of the century. It points out the cost competitiveness of the electronic information delivery to home vis-a-vis newspaper in the future and guesses the impact of electronic home information service on newspring consumption in future.

The paper and newsprint are basic and essential commodities in our daily life — our means of information, communication and recording. The present demand for the paper and board is around 20 lakh tonnes per annum against the total production of 18 lakh tonnes. The per capita consumption of paper, paperboard and newsprint is 3.3 kg. at present. This is one of the lowest in Aisa even lower than countries like Sri Lanka, Pakistan, Indonesia and China as shown in Table-1. The production in various years is shown in diagram-I.

The growth of population, the increase in literacy, the growing trend of higher ratios of professional and technical jobs in the work force and the growing economic activities in the country are bound to raise the consumption rate of cultural varieties of paper.

Domestic suppliers were unable to meet the demand of writing and printing paper and newsprint during the Seventies and the early Eighties. The domestic production of newsprint is always far below the demand and the country imports nearly 44% of the total demand. Table-2 gives the indigenous proeduction, demand and import of newsprint. As would be seen, the imported newsprint constitutes over 50% of the demand. This trend is likely to continue for a long time. The same table shows demand forecast both by Development Council for paper, pulp and Allied Industries and by National Productivity Council (NPC). In the past, actual consumption of newsprint had exceeded the estimated figures made by the planning commission. It is now estimated that the newsprint demand would grow at a compound rate of 9.5% - 10.0% per annum between 1990 to 2000 A.D., while the demand for paper would increase at the rate of 3.4% during 1990-95 and 126% during 1995-2000 A.D. (NPC-Study of Technology Forecasting).

Information and Communication Technology

There is an apprehension in the mind of many people that the introduction of TV and its influence on our habits of reading will overtake the newspaper industry in future. Instead of reading a newspaper one could hook to a TV. We are entering into the electronic era and shall experience far reaching changes in information communication systems. To appreciate the truth and correctness of the above statement and to evaluate the relative merits of each, we should know the advances in the field of information and communication technology world wide and their application and relative limitations.

The application of electronic technology originated in England. In 1974 BBC (British Broadcasting Corporation) began broadcasting the news and information on the unused lines of a TV screen. It was a one-way system. Viewers could receive information but could not communicate with it. A few years later, the British Post-Offices began offering a 2-way communication system called the Prestal. With this the TV-viewers could call a computer data base with a special adoptor and could get pages of continuously updated information.

The French were the next in Videotex arena. The Canadians also developed 'Telidon' system which gives a higher resolution of images, greater technical flexibility; it can use either telephone or cable and offers the possibility of terminal communication. West Germany and Japan have their own version of Videotex.

The recent development in computer technology gives the choice of transmission of information; it would be either by telephone lines or by TV-cable and this problem will be resolved by combination of cost, geogrphical (terrain) and governmental regulation factors.

The computer technology, data processing computers, disc drives, etc. are traditional technologies. Between the computer and the communication technology, the distributed data processing and message switching has developed. Between computer and office technology, has developed the calculator (adding machine and a computer) and the word processor (a typewriter and a computer).

Between office technology and communication technology, we have dial dictation or fascimile copiers are teleconferencing. We have videotex, which combines computer communication technology with office technology. Videotex is a 2-way communication link connecting the user and the information source. It can receive and transmit information. It is voluntary. A student at home can get a map of Australia on the TV screen. It is a two-way link between a computer and a TV. We have also Teletex. A cycle of pages is constantly transmitted on a TV screen, pages are selected by the user and

displayed on the screen. Applications of videotex are immense. Electronic mail is its earliest application, ensuring instantaneous delivery. Use of videotex is in four major applications — business transactions, home surveillance, entertainment and information retrieval. The French have introduced Antiope to provide country's telephone subscribers with a continuously updated directory.

Recent developments in Chip technology and fibre optics promise to make home information system more and more economical. Use of light flexible cable which uses sophisticated interphase electronics that can enable the transmission of a large amount of data with very little distortion and low loss of the signal is a very big development in fibre optics.

Areas of application of videotex are unlimited as indicated here. One can interact and function quickly, leisurely and smoothly.

Application of Videotex/Teletex Information Systems:

Community	Law
Consumer	Leisure Time Activity
Education	Library
Finance	News
Government & Public Services	Personal
Health	Real Estate
Insurance	Travel & Transportation
Investments	

Community: Child care, baby sitting, carpool, recreations, directories of doctors and dentists, marriage, birth and death announcements.

Consumer: Consumer enquiry or purchase catalogue shopping, flash sales, gift suggestions, price lists, consumer reports, buyers guides, credit card information, consumer law, complaints.

Education: Computer aided learning, computer tutors, registration for continuing education, Journals, class and meeting cancellations, school bulletins.

Finance: Personal budgeting, tax information, mortgages.

Government & Public Services: Activity in parliament, access to new legislation, postage and telephone rates.

Health: Medicines, health centres, emergency services, medicare information.

Insurance: General information.

Investments: Tips from brokers; purchases and sales of bonds and shares.

Law: Guide to legal services, traffic acts, small claims.

Leisure: Restaurant and bar guide, reservations, reviews, sports, wine guides, hobbies.

Library: Access to any library, delivery of material from libraries, bibliographic references.

News: National, locals and international news, sports, weather, correct time.

Personal: Computer messaging system to send letters back and forth rather than typing them.

Travel: Tour planning travel schedule, car rental, flight and train timings.

Comparison Between Videotex and Newspaper:

Newspaper displays information, Videotex displays information as well as enables the viewer to interact with it. You can look at a flight schedule and book your flight using the system. It is a **two-way communication link** between the user and the information source. You can get access to any library, request delivery of material from the library or get bibliographic references. You can both receive and transmit information. You could be a student working at home on your home work where you are drawing a map of India for a class project. There is unlimited capacity of videotex which the user can choose.

The **'Portability'** of newspaper is good. You can carry it with you and read leisurely when you have time and inclination. It is accessible any time; it operates 24 hours a day and it costs less. Videotex on the other hand is not yet portable.

'Browseability' or the facility for scanning a newspaper is good. You can open a newspaper, glace through the page or column you desire. Videotex is not so good in this regard.

Newspaper **holds the interest of the reader.** It approaches news with a point of view. the newspaper generates thus a affinity and loyalty with its readers because of its reporting news with a view. Videotex is impersonal.

Timeliness: Newspaper can have a definite number of editions. With Videotex, it is unlimited. There is a gap between news and print and newspaper. With Videotex, you can get more timely and updated information.

A newspaper can store details easily and **cheaply.** It can hold a lot of information in a small space while although it is possible to store information with Videotex, it is more costly. In fact, the limitations of storage of information is decided by the cost of technology.

With regard to graphs and advertisements both are good. Newspaper have an edge over Videotex in focussing and displaying a specific area of information.

TELIDON Technology, which is based on the Videotex system, could deliver beautiful and detailed coloured graphics, which has been stored in a computer. The TELIDON uses the Alpha-geometric technology where a picture is transmitted by using a computer encoded description by linking the points together. It can send the description down the line and the image is constructed locally.

In other systems, information is stored in a computer using a set of instruction to build a image on the screen with small squares — a mosaic of small squares. This technology is called Alpha Mosaic.

There are no doubt limittions of the Videotex system such as Portability, Browseability and its impersonal character. Althoughj cost factor is now in favour of the newspaper, Videotex would in future be more economical.

In spite of some of the attractive features, the emerging communication and information technology would probably very gradually replace newspaper in advertisements arena. Due to rapid development in the fibre optics and micro electronic technology, the costs of the communication systems are likely to be drastically reduced while the cost of newspaper would gradually increase. The levelling of cost difference between the two would of course take time.

The newsprint in future therefore:

1. must have more printing surface per tonne;
2. must contain less fibres per tonne;
3. must produce at a higher speed;
4. Must have larger diameter rolls with a fewer pasters and hence less roll handling;
5. must be more uniform in quality with less wastes;
6. must need less energy per tonne;
7. must be produced using electronic computer controls.

There are many other technological developments coming in the printing of newspaper. They are :

1. Full pagination by computer.
2. Reporting and dictating to computers for reducing time gap between information and printing.
3. Use of laser scanner to have higher quality of reproduction.

In short by taking advantage of the electronic technology now available it can be more productive at lower costs. It has ability to absorb changes in operating costs without seriously affecting profitability.

Profitability of newspaper comes primarily from the advertiser and less from the subscriber. In U.S.A. the ratio of income from advertiser to subscriber is 80:20. A study carried out in U.S.A. on the pattern of advertisement expenditure (Diagram-2) shows that the share of newspaper would be nearly the same towards the end of the century. The total expenditure of advertisement would grow rapidly but the share of newspaper will remain more or less same. In other words, only the pie will grow bigger and the slice remains the same.

The newspaper and TV could complement each other. Thus for e.g. the newspaper confirms and expands the news on the TV. So we do not have to bother about future of the print media for the coming 15-20 years.

With regard to the availability of newsprint from other countries, Canada, U.S.A. and Scandinavia would continue to be sources of supply. The world supply and demand postition and the share of each major newsprint producing country is shown in Diagram-3.

Future strategy to meet the demand:

How do we achieve this level of production? What should be the choice of raw materials? What should be the technology selection? How should the mills be located? What would be the pattern of entrepreneurship —public or private; big industrial houses or small and middle level industrial units? These are some of the questions which every person interested in or connected with the paper and newsprint industry asks himself.

Locational Distribution of the Industry:

It is interesting to know how the paper and newsprint industry is distributed in the country. Diagram-4 shows the region-wise locational distribution of paper mills —big and small in the country. The big mills are predominantly located in the eastern and southern regions, while the smaller mills are more in the western and the northern regions. There are less in the south (20.7%) and only a few in the eastern egion. The big mills are forest based, while the smaller units agrobased. Fortunately, the combined capacity distribution of both large and small mills is more or less uniformly distributed throughout the country.

Diagram-5 shows the production and apparent consumption of newsprint on a regional basis. Of the 5 newsprint producing mills, 4 are located in south and 1 in western region. While the major production centres are in the south, the consumption is distbituted all throughout. The eastern sector's share of demand is very low (13.1%) as compared to the south (32%). There are no newsprint mills in the northern and eastern regions of the country. The demand of these region is met partly from the indigenous production from the south and partly from the imported newsprint. Movement of newspring from the southern mills involves not only the additional burden on the national transport system but also additional freight cost.

Availability of Raw Materials:

Although most of the pulp, paper and newsprint mills are based on wood, the industry can use many and varied fibrous raw materials.

Forest based Raw Materials:

Bamboo still continues to be the mainstay as the pulping raw material for the large mills. Although the annual consumption of bamboo by the pulp and paper industry is now 17 lakh tonnes, the demand would increase to 40 lakh tonnes in 10 years with the present pattern of raw material consumption (60% bamboo and 40% hardwood). The total sustained annual availability of bamboo would be 50 lakh tonnes in 1990, out of which only 50% would be to the share of pulp and paper industry. Thus there would be a shortfall of 15 lakh tonnes annually.

Bamboo forests in our country, except a few pockets, have been more or less fully exploited. The few pockets of bamboo forests not yet fully tapped are the North eastern hill states and the Baster region in the Central India. According to the report of the Preinvestment Survey of Forest Resources of India, the annual sustained availability of bamboo in the north eastern region covering an area of 1250 lakh hectares under forest could be about 25 lakh tonnes. The two giant mills of Hindustan Paper Corpn. Ltd. (HPC) at Nowgong and Cachar, when fully operational, would need annually 10 lakh tonnes of green bamboo (5 lakh tonnes a.d.). However, this region lacks infrastructural facilities, both physical and industrial; extraction of bamboo from these region is difficult and expensive. Besides, it may create social problems. Development of forests in this region has been hampered as large areas are owned by village and district councils and Anchal Samitees, over which the State Governments have little control. While the average of reserve forests area is 48% of the total forest area in the country. The corresponding percentage of the north eastern region is only 33%.

In view of the limited availability of bamboo, the Indian paper industry has been using inceasingly large percentage of hardwoods, which are locally availabel or have been planted. The utilisation of hardwoods started in India in 1963 and they are being used more and more. Many large mills have been using even upto 50% and above. In view of the limited availability of bamboo and its high cost of plantation and low annual yield, the future projections of wood and bamboo demand for the pulp and paper industry are based on a furnish composition of 70% wood and 30% bamboo pulps, leaving aside 30% of the total production from agri-residues and waste paper. The hardwood resources, which were hitherto not regarded as suitable fibrous raw materials for the paper industry because of shorter fibre length, have become a handy resource. Recent progress in paper making technology as well in machinery development and the recent experience in TNPL (it uses only short fibred raw materials like bagasse and hardwoods for writing and

printing paper) create confidence in the use of hardwood and the Indian paper industry would naturally follow the pioneering efforts of hardwood usage in Australia, Japan and Brazil, where the pattern of hardwood consumption is as folows:

Japan — 65%

Australia —61%

Brazil —100%

Studies on raw material demand projection for paper, pulp and newsprint show the wide gap between demand and possible resources. The shortfall of pulp wood and bamboo would be 48 lakhs and 5 lakhs respectively towards the end of this century.

The fuels for the rural India are wood, charcoal, animal wastes and crop residues. Fuels used for cooking in developing countries exceeds that used for developed countries not only in total percentage but also in per capita consumption. Fire wood is still widely used for cooking in rural India. The costs of fire wood have risen to a point where it competes with poduction of food and other cash crops on land.

The annual present consumption of wood in India (1985-86) is as follows:

Fuel wood	1414	89.5
Timber	195	7.5
Pulp wood	48	3.0
Total	1657	100.0

It would be interesting to note that the demand of pulpwood is only 3% of the total demand. Its percentage would increase to 6% in 2000 A.D.

Table-3 gives the data on the per capita forest land and agricultural land of various countries. India has the least per capita area for both forest and agricultural land — even much lower than China. The same table gives also the pattern of land use in India. India with its low land-to-man ratio is facing acute problems of limited forest area. In fact, recent survey puts the productive forest land area at hardly 11% of total geographical area.

A UN Study indicated that India would need to create every year 4 million hectares of additional forests for the next 15 years to meet its wood demand. This is several times greater than the present planning efforts. It has neither the capital nor the forestry man power to carry out the task.

Any economic activity puts a stress on the biosphere. Upto a certain period, economy was progressing in a way independent of general ecological indicators. Each natural region has its definite maximum allowable level of exploitation. These levels are determined by the potential of nature, i.e. what nature can give without serious loss to itself. Deforestation has been the result of exploding population, which needs wood for cooking, shelter, and of indirect demands of paper and pulp industry. Economic and ecological goals move in different directions. While economic interests may predominate, few would suggest that material goals must be persued to the detriment of ecological and social objectives.

We are in a vicious circle of inceasing consumtion on the one side and the fast depleting forest cover on the other side. Our forest cover is depleting at the rate of 15 lakh hectares a year.

Forest based raw materials, particularly wood is best raw material for the paper industry. It is probably the cheapest raw material if we take into account the operational cost of making pulp in a big mill. The Forest Act, however, draconian in character it may be, must be followed and the people's verdict respected. We all know that it has been a very unwise step not to allow man made plantation in the forest land.

In the eyes of the Government, the ecological and environmental considerations are dominant. It is against the man-made plantations in forest land for industrial exploitation. A new forest bill is under consideration in parliament. It provides imprisonment for offenders of the Forest Act. There are competing demands for forest based raw materials for fuel, fodder, shelter and even food. The industry will be always a second choice.

In the above background it is imperative and prudent to prepare ourselves for the contingency of not being able to meet our forest demands. We must therefore plan and prepare ourselves to use as much other cellulosic raw materials available in the country.

Bagasse

India has become the largest producer of sugar and sugarcane. Leaving aside 55% for Khandsari and Gur industry and 12% for the seeds, nearly 33% of cane goes to the sugar mills. The annual commercial bagasse production in 1983 was 260 lakhs and will be 400 lakhs in 2000 A.D. All the bagasse cannot be made available for uses outside the sugar mills. Bagasse is a captive and convenient fuel for the sugar mills. Although it is an excellent raw material for pulp and paper making, its availability is limited by poor state of health of the sugar industry and its backwardness. Well run sugar mills generate 10% surplus bagasse, while old mills are satisfied at 5%. If sugar mills can modernise themselves and use innovative methods of heat recovery and bagasse drying, a lot more can be available. Even assuming 10% surplus bagasse available for the paper industry, we can procure 40 lakh tonnes of wet bagasse a year in 2000 A.D. equivalent to 7 lakh tonnes of paper.

Cereal Straw

India ranks second in the world rice production even though the yield per unit area is very low even compared to Burma, Indonesia and China. japan has a yield figure three times of that of India. Table-4 gives the comparative data on production of paddy and wheat and the yield per hectare for a few asian countries. Assuming grain to straw ratio of 1:0.8, rice straw yield would be 720 lakh tonnes. Similarly, wheat straw yield would be 590 lakh tonnes and the total straw production would e 1310 lakh tonnes. Based on an annual growth of 4% a year in grain production, rice and wheat straw production together would be 2000 lakh tonnes in the year 2000 A.D., taking into account crop failures and unfavourable grain/straw ratio due to spread of high yield cereals.

Most of our straws are used as animal fodder, roofing, packaging, fuel and manuring. It has been estimated that at least 20% of the total straw equivalent to 400 lakh tonnes could be made available for the paper industry. In States like Punjab, Haryana, Western U.P. and the eastern coastal belt, where land is fertile irrigation facilities available and yield productivity is high, surplus straw are available for industrial use. In fact, some of the paper mills located in these states are very successful in spite of their small size. In spite of inferior pulping characteristics of straws, particularly paddy straw, small mills based on paddy straw and waste paper have been financially viable. If Government subsidies are at par with bagasse, they will be more attractive and successful.

Technological problems of bulk handling, transporation, pulp washing, recovery of pulping chemicals and cheaper pollution abatement methods are in sight. One should expect a 100 TPD straw pulp mill with chemical recovery and effluent treatment plant within 5 years. Even a 50 TPD plant can have a recovery unit.

There are many other raw materials such as Jute sticks, Cotton stalks, Cotton linters, kenaf and even Jute, which are suitable materials for pulp and paper making. Jute, Kenaf and cotton linters can replace imported kraft pulp and paper for making better grades of paper.

The major potential fibrous materials suitable for paper industry are:

	AVAILABILITY LAKH TONS/YEAR		EQUIVALENT PAPER PRODUCTION LAKH TPA
	POTENTIAL	PRACTICAL	
RICE STRAW	1000	200	50.0
WHEAT STRAW	1000	200	50.0
BAGASSE	400	40	07.0
JUTE STICKS	25		
			107.0

In spite of such huge resources of non-wood fibrous materials available, why is the paper industry shy of utilising them? What are the fears and problems?

One is the general reluctance to change from the existing practices and systems. The second is the sustained and assured availability of these resources. Agricultural crop failures are not easily predictable. The third is the cost of procurement i.e. collection, transportation and storage. The fourth is the technological gaps which still persist and the inferior nature of these fibres with regards to strength. The last is the small size of such mills.

Selection of Pulping Technology

Paper

Bagasse has long been accepted as a suitable raw material for manufacture of cultural papers. Mills world-wide have enough experience in processing bagasse from fibre line to recovery.

Straw and particularly paddy straw is inferior to bagasse. However, it is gaining its ground slowly in China, India and a few European countries.

For bagasse pulping, Sulphate or Soda method is popular, while Soda process with or without AQ is usually pactised with straw.

Agro residues have short and sensitive fibres, easily damaged during pulping and refining. They generate more fines, contributing to slow drainge character and poor bonding and consolidating power.

By mixing with hardwood pulp, these pulp can yield excellent paper for bond, book paper and normal writing and printing papers.

It is interesting to know the advantages of mixing hardwood pulps with bagasse and straw pulps.

It is known that bagasse and straw pulps have high fines content even before beating. Although the average fibre length of bagasse pulp is higher than that of hardwood pulp fibre, the zero span tensile strength is higher for hardwood, indicating stronger fibres. The number of fibres per gram is higher, which gives higher tear and fold endurance for hardwood pulp. Table 5 gives the comparitive data.

Another interesting feature of hardwood pulp is its favourable fibre length distribution. Diagram 6 shows that Eucalypt fibre length distribution frequency centres around its average length i.e., fibres are more uniform in length. On other hand bagasse pulp fibres are distributed. Uniformity in fibre length attributes to better formation and hence mixture of bagasse or straw pulp and Eucalypt pulp gives better paper making properties. Hence superior grades of cultural paper can be made out of a mixture of bagasse or straw pulp and hardwood pulp.

Newsprint

Newsprint manufacture is no longer from a two-component pulp mixture of pre-dominantly stone ground mechanical pulp and a little rein-forcing long fibre chemical pulp. It may consist of any combination of pulp types or raw materials. Thus for e.g. in our country, Tamil Nadu Newsprint and Papers Limited (TNPL) makes newsprint from three types of fibrous raw materials viz. bagasse, hardwood and softwood (Imported pulp). It has captive pulp plants consisting of four different streets viz. Hardwood chemical pulp, Bagasse chemical pulp, Bagasse TMP and CTMP streets. A newsprint mill in Indonesia (P.T. Kertas, Letjes) has three different pulping streets viz. CTMP and Semi-chemical pulp (SCP) from bagasse and SCP from straw and it uses in addition imported softwood kraft pulp.

It is no longer true that only mechanical pulp imparts opacity, surface strength, surface porosity and ink absorption, formation and printability while chemical pulp imparts stength and hence runnability and releasibility. One could get the desired properties of newsprint (wet and dry web strength, fibre bonding, opacity, brightness and substance) by combination of pulp obtained through different pulping methods and sometimes through use of fillers.

We all know that mechanical pulps invariably show high opacity due to better light scattering and better formation due to shortness of fibres and good bonding due to generated fines. Giertz* had investigated the best possibilities of making newsprint out of bagasse.

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* *Non-wood Plant Fibre Pulping, Report 10(1979)95.*

Table-6 shows some of the properties of spruce groundwood and bagasse RMP. The fines of the groundwood pulp have been generated during the grinding process. They are formed by "delamination" process from the fibres. In the case of bagasse the generated fines (Schleim stoff) passing through 200 mesh are less. The light scattering and tensile strength of the bagasse fines are much lower than those of spruce groundwood indicating poor consolidation of fibres and fines.

It is interesting to see the relationship and comparative levels of tensile strengths and light scattering properties of various types of pulps made from different raw materials and pulping processes.

Diagram-7 gives comparative levels of tensile index and light scattering coefficient relationship of softwood kraft, softwood groundwood pulp, hardwood CMP and bagasse TMP, CMP and Chemical Pulp (CP). It would be seen that bagasse TMP has good tensile strength but poor light scattering coefficient but is low in tensile strength. Bagasse CP has good tensile strength but poor light scattering coefficient. Similarly hardwood CMP has good light scattering and not so good tensile strength.

Earlier attempt for manufacturing mechanical pulps from bagasse made by various companies and research institutes did not prove successful. recent trials by ENSO-BAUER in Finland for newsprint manufacture from bagasse did not select either the TMP or the CTMP processes in the INDU-PERU poject but decided to adopt the CMP process by soda pocess. In order to obtain higher strength of newsprint they prefered to use either Eucalyptus kraft pulp or softwood kraft pulp in the pulp furnish.

TNPL Story:

The TNPL mill had aimed to have a 50% bagasse mechanical pulp in the pulp furnish to make newsprint. The mechanical fibre line consists of TMP and CTMP streets in ratio of approximately 50:50. The depithed bagasse is pressure refined and then fractionated by means of screens and centricleaners into two fractions. The longer and coarser fibre fraction of the TMP is sent to the CTMP street where a mixture of sodium hydroxide and sodium sulphite is used. The acceptable portion is further refined in disc refiners under atmospheric pressure. The mixture pulp from both the lines is bleached with hydrogen peroxide. the idea was to achieve a bleached mechanical pulp yield of 61% at a brightness level of 58%. It is reported that TNPL is still solving the difficulties in the TMP line (Cleaning of bagasse, optimisation of the TMP refining operation such as disc life, design and material). It also appears that they might convert the TMP line to CTMP i.e. one mechanical pulping street. In short the production of pure mechanical pulp from bagasse has not been satisfactory as could be evident from the information on statistics of imported mechanical pulp by the mill. They have depended on imported mechanical pulp to a great extent during the past few years of their existence.

New Concept:

Based on the research work of Prof. Giertz of Norway, HPC proposed a furnish of 60% Bagasse Chemical Pulp and 40% Eucalypt CMP to make newsprint of acceptable quality. With this furnish composition and with addition of a little filler (3-4%), the opacity, tensile strength and other printing qualities were comparable to the newspring quality of HNL.

Advantages of the New Concept (60% CP Bagasse = 40% CMP Eucalyptus):

1. The pulping processes are well proven. Manufacture of CMP from Eucalyptus has been established in HNL and has been working very satisfactorily for the last 6-7 years. Newsprint made from 75% Eucalypt CMP and 25% Bamboo and Reed are of acceptable quality.
2. In the new proposal there are only two pulping streets — One for bagasse and the other for wood. In TNPL there are four different pulping lines- TMP and CTMP for bagasse; CP for bagasse and CP for wood. Therefore the capital cost of a project incorporating the new concept with two pulping streets would be lower than that with four pulping streets as adopted in TNPL.
3. The overall fibrous raw materials requirement of the new proposal would be lower than that of TNPL. Also the cost of raw materials would be lower.
4. The cost of production as shown in Table-7 would be lower primarily due to lower cost of fibrous raw materials and lower cost of bleaching chemicals. Use of peroxide as a bleaching chemical for TMP and CTMP process C-E-H for bagasse CP and H-H for Eucalypt CMP are more economical than the peroxide bleaching.

RAW MATERIALS REQUIREMENT

Cultural Papers — Writing and Printing:

As per estimation of the NPC, the likely demand of paper excluding paper-board would be 39.29 lakh tonnes in the year 2000 A.D. Assume 50% of this for cultural papers i.e. 20 lakh tonnes.

Present production of cultural papers is 10 lakh tonnes;
Hence, additional production - 10 lakh tonnes.

Out of this
One-third would be superior grades;
Two-third would be writing and printing papers.
Thus, 3.3 lakh tonnes superior grades;
6.7 lakh tonnes normal grades.

For superior grades, the pulp furnish should be 50% agro residues and 50% hardwood pulp. For normal grades, the furnish would consist of 80% agro residues and 20% hardwood pulp.

To produce one tonne of pulp, 4 tonnes of A.D. straw, 6 tonnes of wet baggasse or 2.8 tonnes of A.D. wood are required.

Of the agro based pulp demand, assume one-third is bagasse based and two-third is straw based. Then our raw materials demand for the additional production would be —

A.D. Hardwood ..... - 08.4 tonnes

A.D. Straw ..... - 08.8 tonnes

Wet Bagasse ..... - 14.0 tonnes.

It is assumed that all available waste papers from the indigenous sources would be used for manufacture of boards. Hence they are not considered for use in manufacture of cultural varieties of paper.

Newsprint:

As per NPC estimate, the demand on newsprint in the year 2000 A.D. would e 13.9 lakh tonnes (equivalent to 14 lakh tonnes). Assuming 50% of the total demand is met by import, the total production to be achieved is 7 lakh tonnes.

Present production - 3 lakh tonnes;
Extra production needed - 4 lakh tonnes.

Adopting the technology based on HPC-Defibrator concept (60% bagasse CP and 40% Eucalyptus CMP), requirement per tonne of newsprint would be —

Wood - 0.55 tonnes
Wet bagasse - 3.17 tonnes

Hence for additional production of 4 lakh tonnes newsprint demand for —

Bagasse - 12.68 lakh tonnes
Wood - 02.2 lakh tonnes.

Hence the overall demand both for cultural varieties of paper and newsprint would be as follows:

(Figures in Lakh tonnes)

	PAPER	NEWSPRINT	TOTAL
WOOD A.D.	8.4	2.2	10.6
BAGASSE	14.0	12.68	26.7
STRAW A.D.	18.8	--	18.8

This pattern would probably be more favourable for making raw materials available from social forestry, waste land farming, etc., sugar mills and agricultural farmers without straining any of the sectors of sources of supply. We thus drift away from the 70% forest dependency towards much more reduced levels of forest dependency during the coming 15-20 years.

In the meantime, the country must increase the forest cover by utilisation of waste land and forest productivity through time honoured good forest practices such as protection from fire and cattle grazing, thinning, fertilisation, genetic improvements, control of vegetative and competitive trees, etc., Clonal plantation must be introduced in the country for higher productivity of tree crops, at least for fuel wood demand.

Conclusions

1. Studies conducted in U.S.A. predict larger levels of advertisement expenditure in future. Share of newsprint in advertisement expenditure in next 10 to 15 years will remain the same.

   The pie will grow bigger, and the slice remains the same.

2. The growth of consumption of paper in India will grow at a rate of 12% in 1995 to 2000 A.D. The growth of newsprint consumption will be at a rate of 10% per year.

3. Limited forest, land, sluggish forestry planning and its implementation, draconial forest act compel wood based industries to look for alternate raw materials.

4. Potential resources of paper making cellulosic fibrous raw materials are huge. Straw and bagasse would form the bulk of the raw material source. The paper industry must divert its attention from forest to agriculture for raw material procurement.

5. All agricultural residues and annual plant suitable for use by the paper industry must receive the same encouragement and protection in the form of fiscal incentives. Potential availability of straw is colossal and its use must be encouraged.

6. Wood is the most economical raw material for paper making. India has no choice but to plant fast growing wood spcies using new technology in future.

7. The cost factors are paramount in choice of selection of any technology for manufacture of newsprint.

TABLE - 1

Per Capita Consumption of Paper and Board

COUNTRY	Kg.
INDIA	2.8
PAKISTAN	3.1
INDONESIA	4.4
SRI LANKA	6.2
CHINA	10.34
JAPAN	173.2
WEST GERMANY	184.8
U.S.A.	290.1

TABLE - 2

DOMESTIC PRODUCTION, IMPORT AND TOTAL DEMAND OF NEWSPRINT IN INDIA
(Selected Years)

LAKH TONNES NEWSPRINT

YEAR	PRODUCTION	IMPORT	TOTAL	DOMESTIC PRODUCTION %
1980-81	0.50	3.20	3.70	13.5
1982-83	1.50	2.10	3.60	41.7
1984-85	2.00	1.85	3.85	51.9
1986-87	2.85	1.89	4.74	60.1
1987-88	2.87	2.20	5.07	56.6

SOURCE: DEPTT. OF INDUSTRIAL DEVELOPMENT, MINISTRY OF INDUSTRY.

FORECAST OF NEWSPRINT DEMAND IN INDIA

YEAR	DEVELOPMENT COUNCIL	NATIONAL PRODUCTI-VITY COUNCIL
1990	5.49	5.58
1995	7.02	8.74
2000	8.90	13.90

SOURCE: DEVELOPMENT COUNCIL FOR PAPER, PULP AND ALLIED INDUSTRIES; NATIONAL PRODUCTIVITY COUNCIL - STUDY ON TECHNOLOGY FORECASTING, (1986), BANGALORE.

TABLE-3

FOREST AND CULTIVABLE LAND AREA PER CAPITA

COUNTRY	FOREST LAND/WOOD LAND HECTARES PER CAPITA	CULTIVABLE LAND HECTARES PER CAPITA
INDIA	0.09	0.24
U.S.A.	1.121	1.82
BRAZIL	4.28	1.80
AUSTRALIA	6.839	31.72
CHINA	0.124	0.37

SOURCE: FAO PRODUCTION YEAR BOOK, 1984

PATTERN OF LAND USE IN INDIA

	1982-83
AREA UNDER FOREST	22.1
AGRICULTURAL LAND	46.6
AREA UNDER NON-AGRICULTURAL USES	6.4
PERMANENT PASTURES AND GRAZING LAND	3.9
MISCELLANEOUS TREE CROPS	1.2
CULTURABLE WASTE LAND	5.4
FALLOW LAND	7.8
BARREN AND UNCULTIVABLE LAND	6.6
	100

SOURCE: INDIAN AGRICULTURE IN BRIEF, 21st EDITION, DIRECTORAE OF ECONOMICS STATISTICS, MINISTRY OF AGRICULTURE, NEW DELHI.

TABLE - 4
PRODUCTION OF CEREALS - 1986

COUNTRY	YIELD Kg/HA	PRODUCTION X 1000 MT
WHEAT		
INDIA	2032	46,885
PAKISTAN	1881	13,923
CHINA	2997	89,002
PADDY		
INDIA	2195	90,000
BURMA	3125	–
INDONESIA	3979	39,275
CHINA	5372	177,000
JAPAN	6322	–

TABLE-5

DIFFERENCES BETWEEN BAGASSE AND EUCALYPTUS PULPS

	BLEACHED BAGASSE SODA	BLEACHED EUCALYPT KRAFT
FIBRE LENGTH, mm (WEIGHTED AVERAGE)	.98	0.65
NO. OF FIBRES/gm	4.4×10^6	19.7×10^6
FINES, % (-- 200 mesh)	13.0	7.7
ZERO SPAN TENSILE INDEX, Nm/g	73	139

LOWER FINES IN EUCALYPT CHEMCIAL PULP.
INDIVIDUAL EUCALYPT PULP FIBRES ARE STRONGER.
HIGHER NUMBER OF EUCALYPT FIBRES PER GRAM.

TABLE-6

COMPARISON BETWEEN BAGASSE REFINER MECHANICAL PULP (RMP) AND STONE-GROUNDWOOD PULP (SGW)

	WHOLE PULP	PULP FRACTION	
		+100	--200
BAGASSE RMP:			
PERCENTAGE	100	37	31
TENSILE INDEX, Nm/g	12	1.5	8.8
LIGHT SCATTER COEFF., m^2/kg	51	39	60
DENSITY, Kg/m^3	274	202	292
SPRUCE SGW:			
PERCENTAGE	100	55	34
TENSILE INDEX, Nm/g	23	8	14
LIGHT SCATTER COEFF., m^2/kg	68	40	100
DENSITY, kg/m^3	373	267	397

BAGASSE RMP:

HIGH PERCENTAGE OF FINES: SHEET DENSITY AND TENSILE STRENGTH ARE LOW - POOR CONSOLIDATION OF FIBRES - FINES HAVE LOW DENSITY & LOW TENSILE STRENGTH - POOR FINES CONSOLIDATION.

SOURCE: H.W. GIERTZ, ASPECTS OF PROBLEM CF PRODUCING NEWSPRINT BAGASSE, TAPPI NON-WOOD PLANT FIBRE PULPING, NO.10 (1979) 91.

TABLE-7

COMPARISON OF OPERATING COST PER TONNE OF NEWSPRINT

	FIGURES IN RUPEESE PER TONNE		
	BELOIT SPB	HPC DEFIBRATOR	DIFFERENCE
1. RAW MATERIALS	1703	1383	+320
2. COOKING CHEMICALS	198	266	--68
3. BLEACHING CHEMICALS	460	215	+245
4. OTHER CHEMICALS	200	200	--
5. ENERGY	1041	1091	--50
6. CONSUMABLES	101	101	--
TOTAL OF 1 TO 6	3703	3256	
5 % CONTINGENCY	185	163	
TOTAL	3888	3419	+469

1985 - PRICES

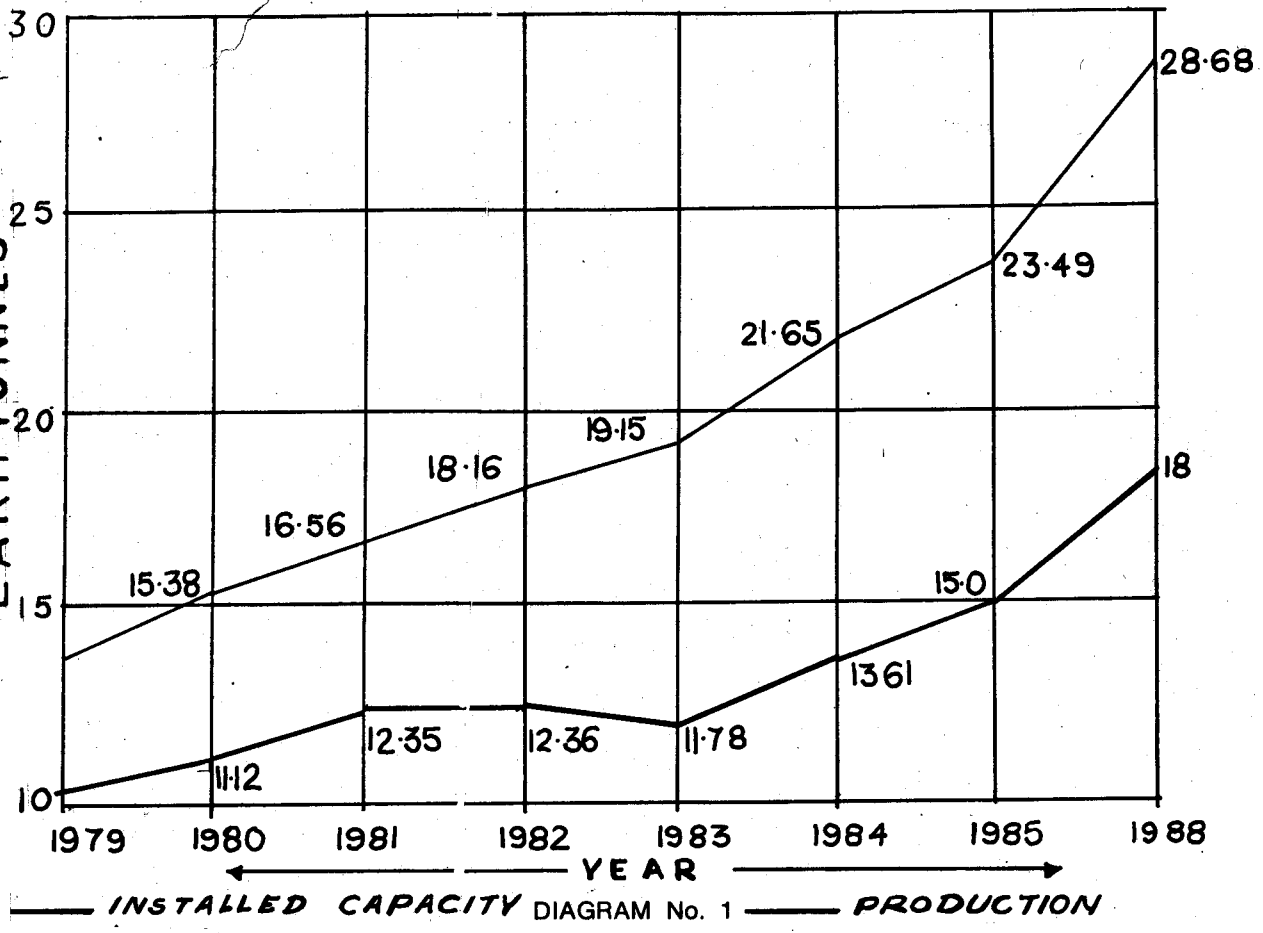
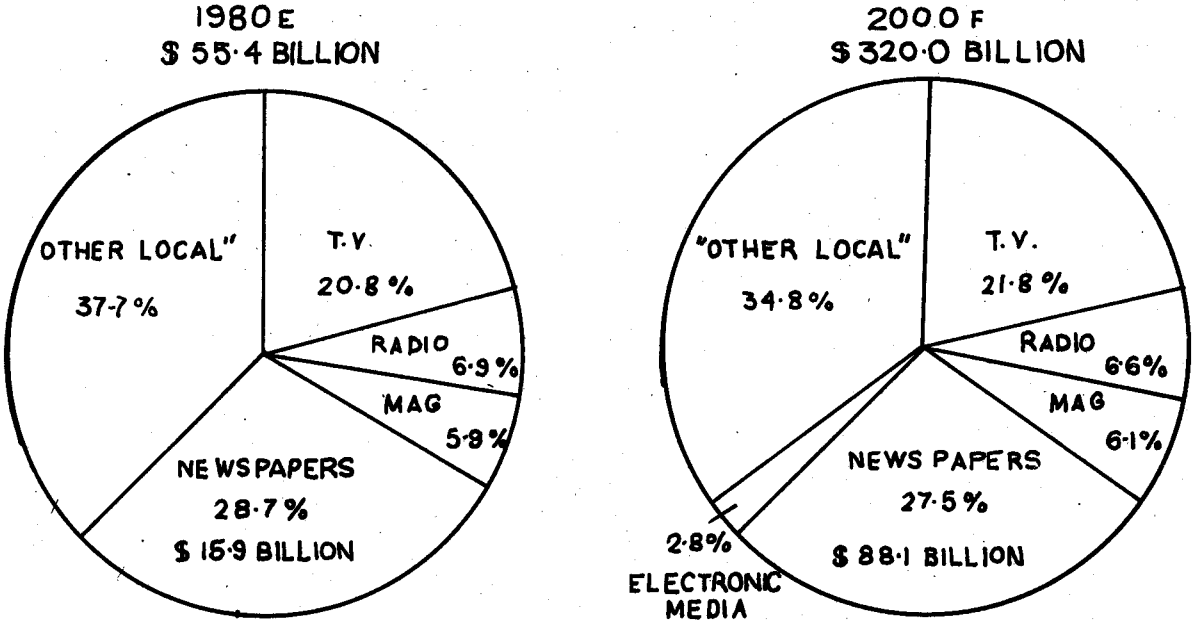

30
25
20
15
10
LAKH TONNES
28·68
23·49
21·65
19·15
18·16
16·56
15·38
18
15·0
13·61
12·35
12·36
11·78
11·12
1979
1980
1981
1982
1983
1984
1985
1988
YEAR
INSTALLED CAPACITY
PRODUCTION

DIAGRAM No. 1

U.S.
PROJECTED GROWTH IN ADVERTISING EXPENDITURE



SOURCE : MCEANN-ERICKSON, INC.

DIAGRAM No. 2

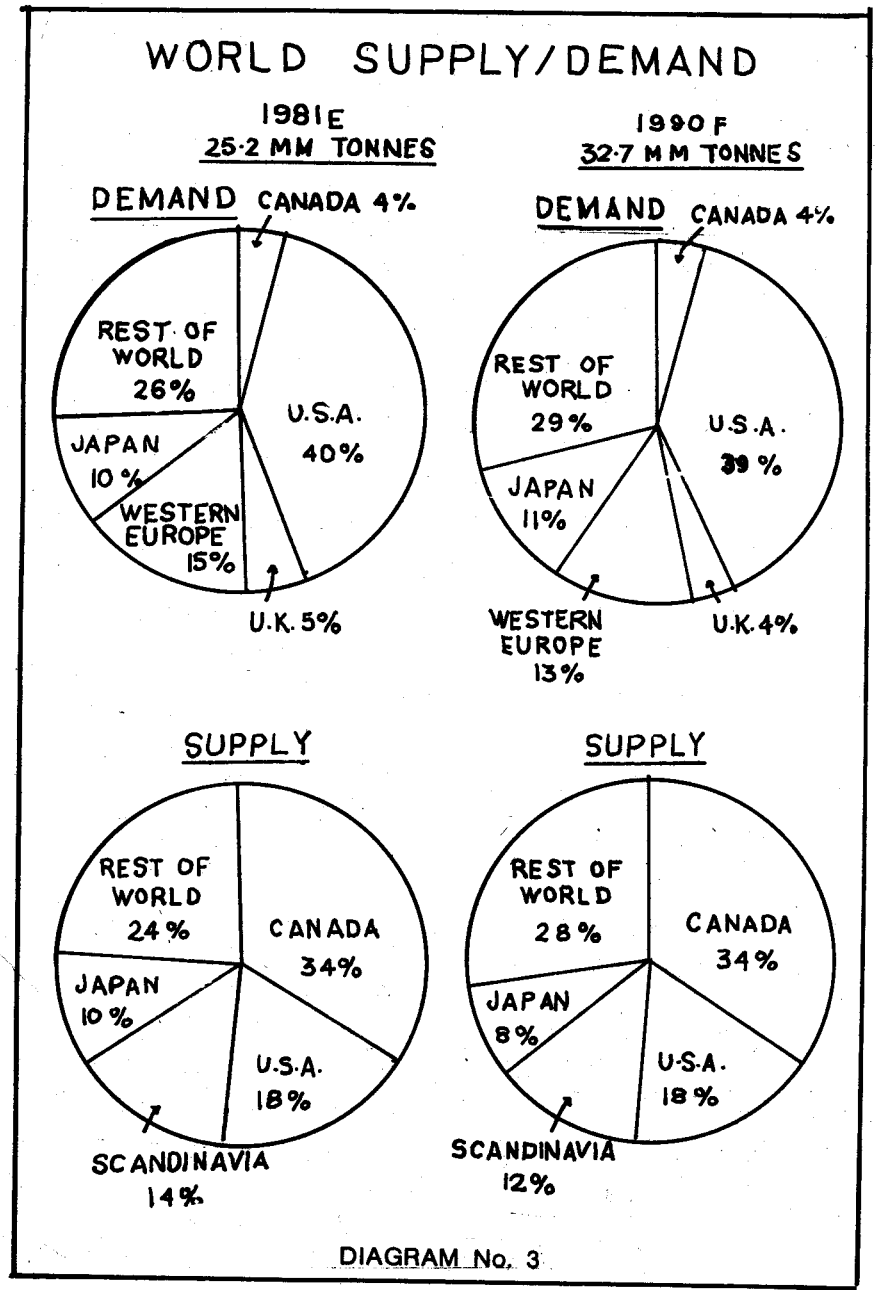

WORLD SUPPLY/DEMAND
1981E
25·2 MM TONNES
DEMAND
CANADA 4%
REST OF WORLD 26%
U.S.A. 40%
JAPAN 10%
WESTERN EUROPE 15%
U.K. 5%
1990F
32·7 M M TONNES
DEMAND
CANADA 4%
REST OF WORLD 29%
U.S.A. 39%
JAPAN 11%
WESTERN EUROPE 13%
U.K. 4%
SUPPLY
REST OF WORLD 24%
CANADA 34%
JAPAN 10%
U.S.A. 18%
SCANDINAVIA 14%
SUPPLY
REST OF WORLD 28%
CANADA 34%
JAPAN 8%
U.S.A. 18%
SCANDINAVIA 12%

DIAGRAM No. 3

REGION-WISE DISTRIBUTION OF PAPER MILLS IN COUNTRY

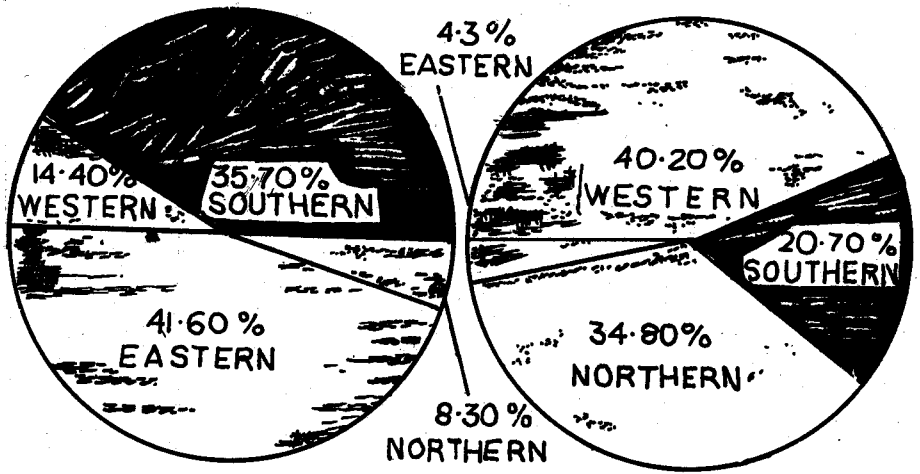
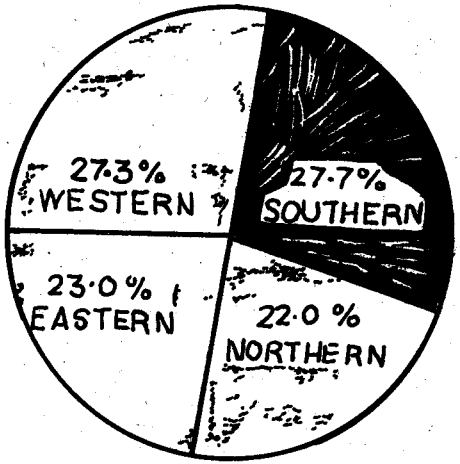


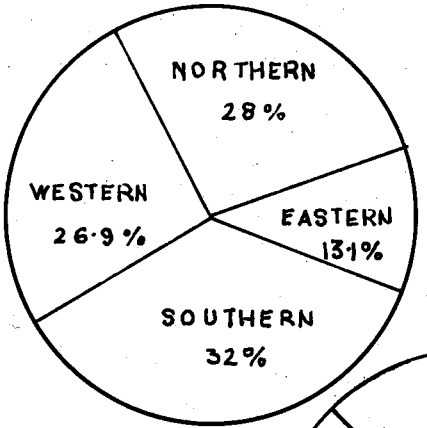
DIAGRAM No. 4



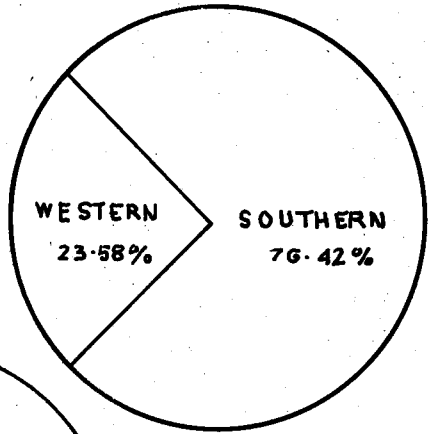
TOTAL MILLS

DIAGRAM No. 4

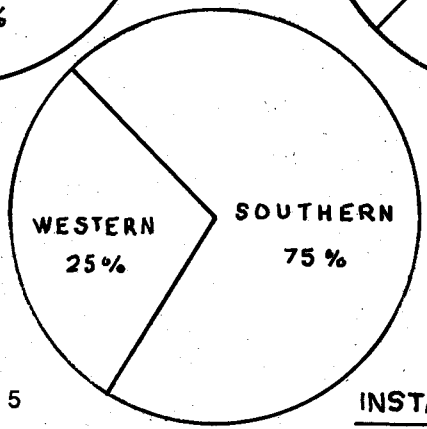
REGIONWISE CONSUMPTION PRODUCTION AND INSTALLED CAPACITY OF NEWSPRINT IN INDIA.



CONSUMPTION



PRODUCTION



INSTALLED CAPACITY

DIAGRAM No. 5

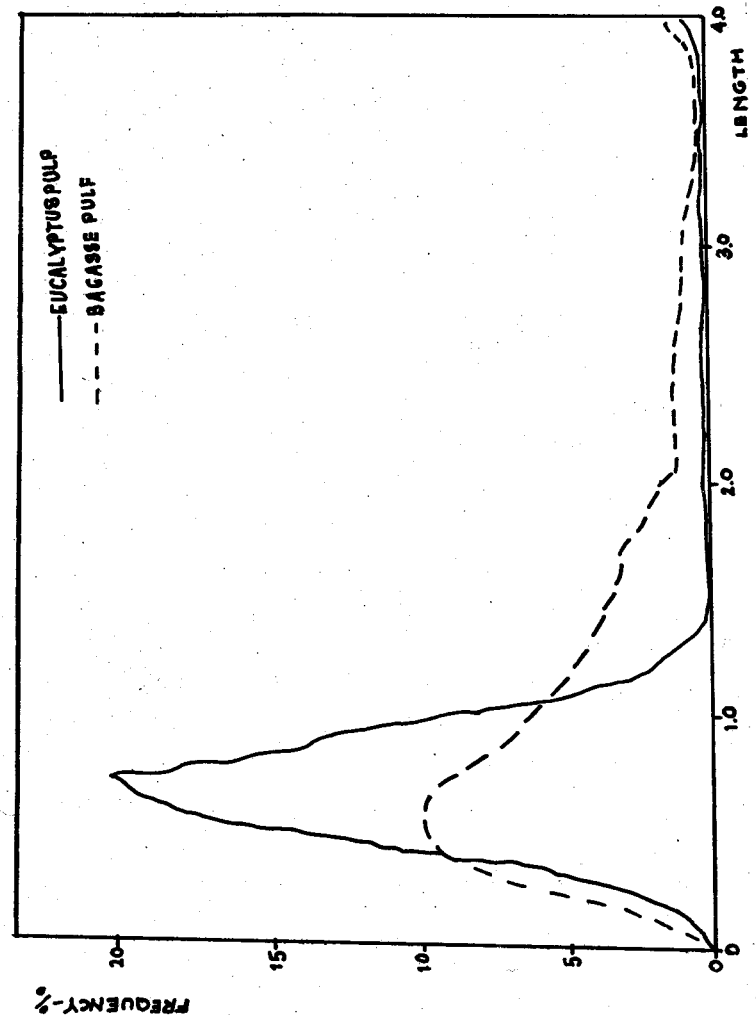

EUCALYPTUS PULP
BAGASSE PULF
FREQUENCY-%
0
5
10
15
20
1.0
2.0
3.0
4.0
LENGTH

DIAGRAM No. 6

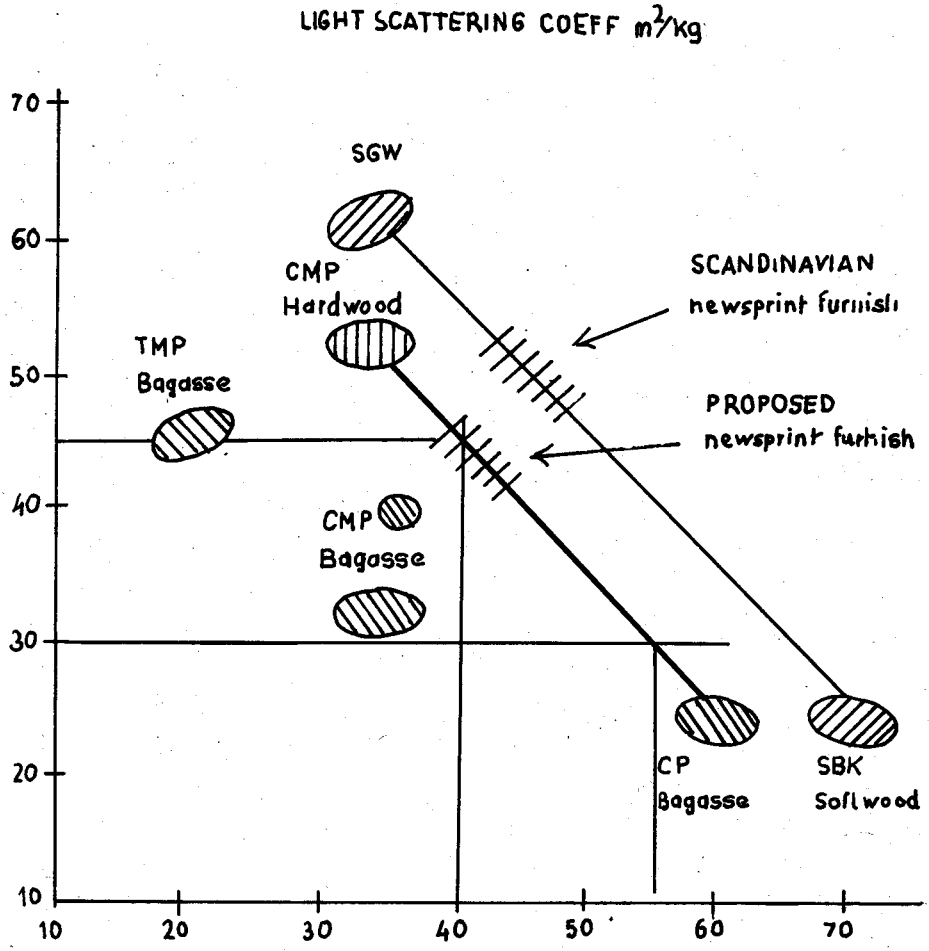

LIGHT SCATTERING COEFF m²/kg
70
60
50
40
30
20
10
10
20
30
40
50
60
70
SGW
CMP
Hardwood
TMP
Bagasse
CMP
Bagasse
SCANDINAVIAN
newsprint furnish
PROPOSED
newsprint furnish
CP
Bagasse
SBK
Softwood

DIAGRAM No. 7