Emerging Scenario in Indian Paper Industry: Responding to the Challenges of Globalisation

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INTRODUCTION

Globalisation is no longer an obstruction but a stark reality that virtually all industries large and small face. The interactions of external forces which drive the pulp and paper industry to-day are dynamic, variate and differ from those of many years ago and obvious forces affecting paper demand tend to be global developments, social trends, electronic media, economic factors, environmental presevations, changing technologies and substitutions [1]. The pulp and paper markets continue to be of serious concern to all pulp and paper manufacturers in the world. The inventory being below the benchmark level of 1.5 million tonnes [2]. India is no exception to this phenomenon. An increasing turbulent environment poses new challenge to paper industry. With recent economic reforms in the country, the paper industry has been exposed to severe competition from the global players. With the globalisation of Indian economy, the Indian paper industry is in pursuit of its modernisation and upgradation to improve quality and productivity. There is need for inducting cost effective manufacturing process in Indian pulpe and paper industry to make competitive in the international market. Environmental issues have also emerged as a key theme during recent years. With the discovery of the dioxin and furans in pulp and paper mill effluent, there has been widespread concern over the adverse impact of AOX and during last decades much of the concern from the traditional parameters of BOD, TSS and colour over effluent emission has shifted to chlorinated organic compounds and AOX.

The Indian paper industry is posed to enter an interesting phase, but the challenges that lie in hand are varied, multidimensional and complex. Indian paper industry needs to upgrade its technology to boost production with sustainable forest management and production, cleaner technologies, more energy efficient processes, higher resource recovery and recycling and improved capital effectiveness to become globally competitive. The present paper highlights the profile of Indian paper industry, emerging scenario of Indian paper industries, Major challenges, issues, shortcomings and steps to be taken for meeting the challenge posed due to economic reforms and globalisation.

PROFILE OF INDIAN PULP AND PAPER INDUSTRY

With merely. 17 units in 1950 with production of 0.11 million tonnes paper, presently we have about 380 mills with a total installed capacity of around 3.8 million tonnes of which 43 % is dependent on forest based raw materials, 28 % on agrobased raw materials and remaining 29% on other materials, including secondary fibre (3) Indian paper industry has a turnover of 1700 crore and providing employment to more than 12 lakh people. The industry is facing problem due to market recession and with earlier annual growth rate of about 7-10 %, it is now struggling to touch even 4 % (4) Profile of Indian paper industry is given in Fig 1.

Per capita consumption of paper in India is a meagre 3.2 kg against Asian and world average of 18 kg. and 47.7 kg respectively. Per capita

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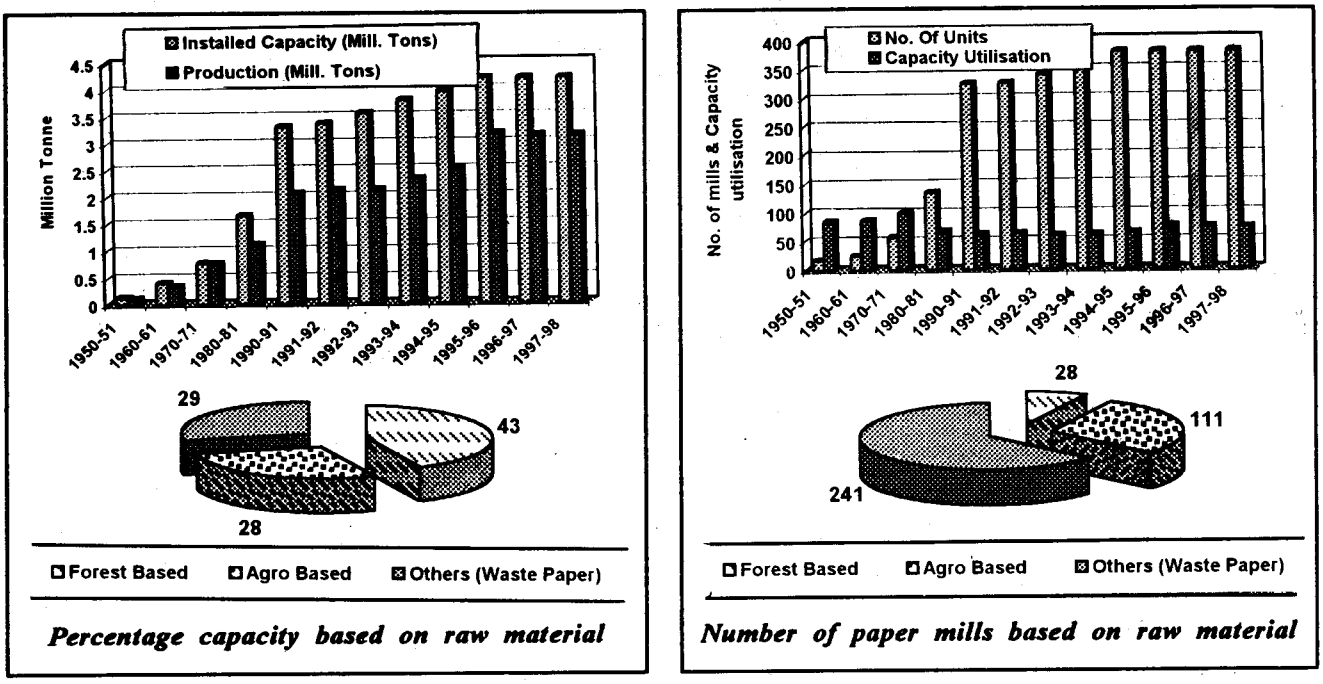

Fig-1 : Profile of Indian Paper Industry

consumption of paper in different parts of world is given in Fig. 1 (3). Demand of paper & board is projected to be 4.5, 5.0 and 7.5 million tonnes by 2000, 2005 and 2010 AD respectively. Major raw materials in India are wood, bamboo, bagasse, wastewater and agricultural residue like wheat straw, rice straw, jute sticks etc. Potential availability of agricultural based raw materials by year 2000 is estimated at about 35 million tonnes (5). Capacity utilization in Indian paper industry has been invariable low after seventies. Per capita consumption of newsprint is 600 grams as compared to Asian average of 1.9 kg and world average of 6 kg. The per capita consumption is expected to grow to 800 gram by 2010 AD. (6) Present installed capacity of Newsprint has increased from 68,000 tonnes in 1980-81 to about 0.5 million tonnes. The present production and consumption of newsprint is about 0.365 million tonnes and 0.714 million tonnes (7).

MAJOR CHALLENGES AND SHORTCOMINGS

Paper industry is passing through bad times due to market recession. Steep hike in the cost of almost all the inputs of paper industry is posing serious threat to very existence of paper mills. With recent

Table 1 : Present Import Duty Structure and Future Demand of Paper Industry

	Prior to Budget	Present Policy after Budget	Industry Demand
Custom duty on paper and paper board	20 %	30 %	40%
Special custom duty	Nil	4 %	
Newsprint	5 %	Nil	40%
LWC (70 GSM)	20 %	Nil for magazine publisher	40%

Table 2 : Comparison of Energy, Chemical and Raw material Consumption Norm of Paper Mills in India and Abroad

Performance / Performance norm	Mills in India	Mills abroad
Steam consumption per tonne of paper (tonnes)	11 to 14	6.5 to 8.5
Electrical energy consumption per tonne of paper (kWH)	1500 to 1700	1150 to 1250
Water Consumption per tonne of paper (m^3)	270 to 350	130 to 140
Chemical consumption per tonne of paper (tonne)	0.56 to 1.05	0.36 to 0.70
Chemical recovery (%)	80 to 88	95 to 98
Raw material consumption per tonne of paper (tonnes)	2.0 to 2.4	1.8 to 2.0

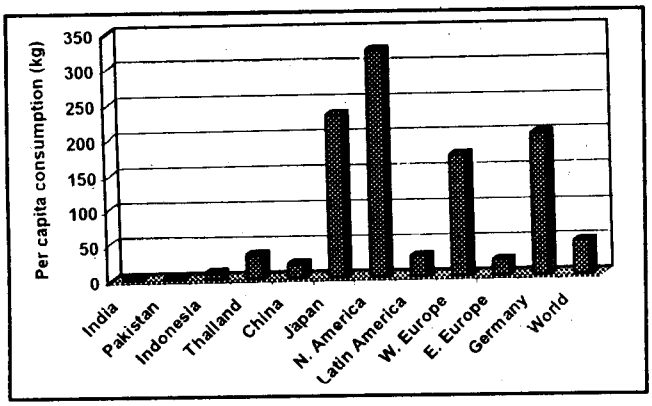

Fig.-2 : Per Capita Consumption of Paper in Different Part of World

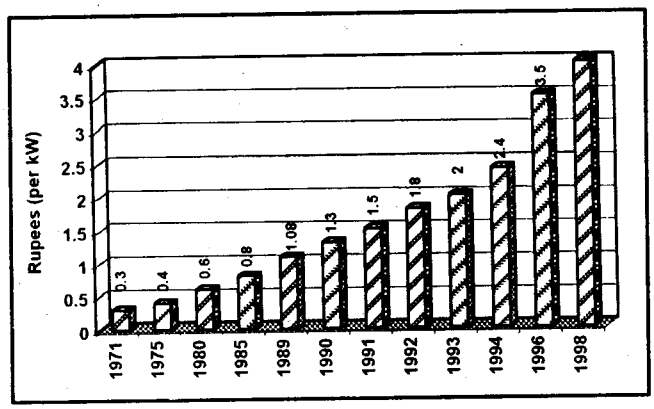

Fig.-3 : Trend in Rise of Electricity

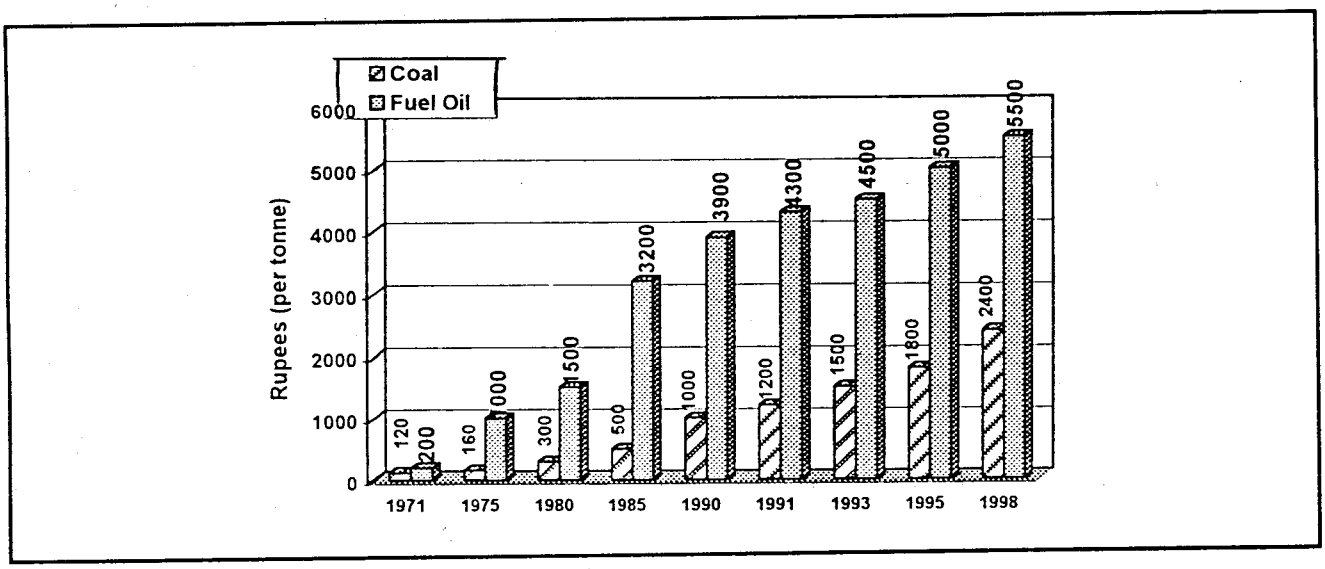

Fig.-4 : Trend in Rise in Cost of Coal and Fuel Oil

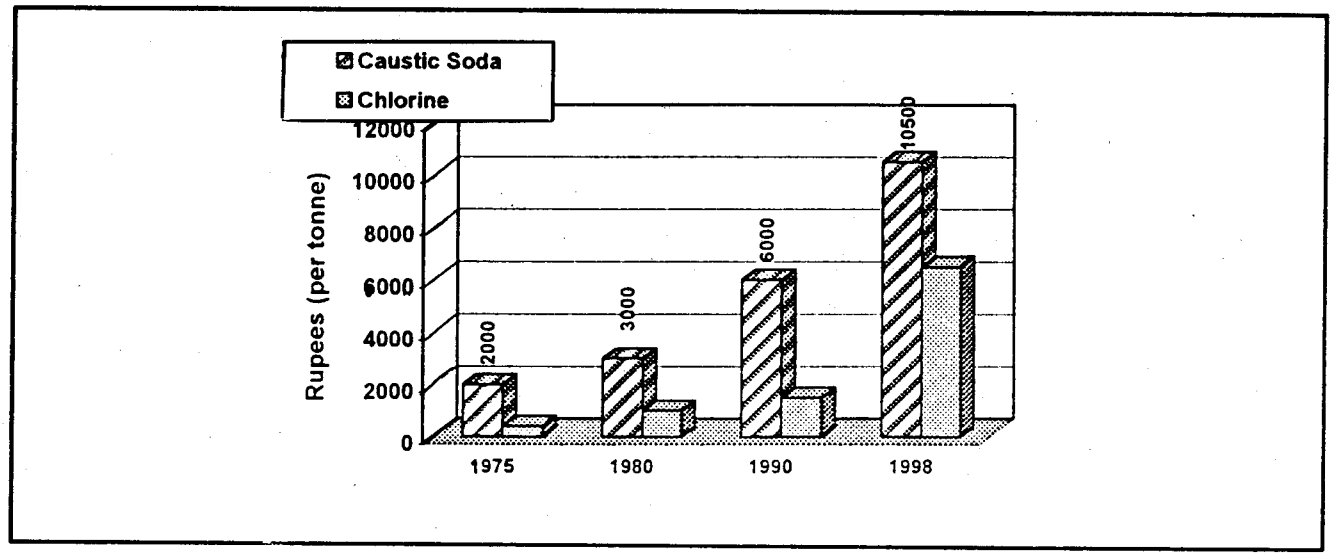

Fig.-5 : Trend in Rise in Cost of Caustic Soda and Chlorine

stringent environmental regulation especially with discovery of dioxins, have posed another major challenge to paper industry. Decline in availability of forest raw material has further added to the problem. Rising cost of inputs, stringent environmental regulations, poor infrastructure to paper industry. Decline in availability of forest raw material has further added to the problem. Rising cost of inputs, stringent environmental regulations, poor infrastructure facilities have resulted in closure of many paper mills. Drastic reduction in the coustom duty on paper and paper boards from 140% to 20% (Presently 30%) during recent years has resulted in low annual growth rate of paper industry and it is now faced with problems of clandestine imports (4)

Custom duty structure on paper & board and newsprint prior to budget, present policy and industry demand is given in Table 1 (4) Energy, chemical and raw material cost in Indian paper industry quite high as compared to the paper mills in developed countries (8). There has been also steep rise in the cost of cellulosic raw materials cost also. Comparison of energy, chemical and raw material consumption norms in paper mills in Indian and abroad is given in Table 2 (8). Trends in rise of cost of electricity, coal, fuel oil, caustic soda and chlorine is given in Fig. 3, 4, 5. Average capacity if India paper mills is low as compares to paper mills in developed countries as well as Asia pacific region. As of 1995 average size of paper mill in India was 10,400 tonnes/year compared with 85,000 tonnes/year in Asia and Pacific and 300,000 tonnes in Europe and north America (7). Comparison of energy, chemical and raw material consumption norms in paper mills in India and abroad is given in Table 2 (8) Some of the major problems which are responsible for poor growth of paper industries are :

- Poor infrastructure
- Too many administrative hurdles, tedious bureaucratic methods
- Poor to non-existent commitment to innovation
- High cost of normal method of financing, recent setback from raising capital through equity for new companies/developing projects.
- Rising cost of inputs : fibrous raw materials, chemical, labour, energy.
- Uneconomic size and obsolete technology in many mills.
- High cost of production.
- Poor productivity.
- Poor instrumentation.
- Low availability of forest raw materials and poor forest management.

- Poor recycling of waste paper.
- Recovery of chemicals from agro-based black liquor.
- Decolourisation and detoxification.
- Air pollution problem.
- High energy consumption.

DEPLETION OF FOREST RAW MATERIAL

India has landmass of 3.29 million square kilometers and 0.629 million sq km of forest i.e. nearly 2.5% of world's geographical area, only 1% of the forest area supporting 16% of world populations. Indian forestry is at a cross road, and actually only 12% land area has good forest cover against the official figure of 19 % (9). With fast depletion of forest raw material, large integrated mill which accounts for about 38 % of the total production are facing serious challenge and hardly there is any scope utilisation. There is need to evolve a comprehensive policy relating to the raw material requirement to ensure the industry's healthy growth. The policy should aim at allocation of forest land to industry where feasible, promotion of bagasse and other agriculture residues for paper and newsprint through incentives. There is need for sustainable forest development.

RECYCLING OF WASTE PAPER

Global activities and interest in paper recycling has grown rapidly world recovered paper consumption has increased from about 50 million tonnes in 1982 to about 110 million tonnes in 1994 and is expected to grow to almost 200 million tonnes by the year 2010 (10). Since 1990, the consumption of recovered fibre in Asian contouries has increased from 15 million tonnes to 22 million tonnes. To meet the global demand of fibre which is projected to increase to 420 million tonnes, 85-95 million tonnes of waste paper will be needed to satisfy the projected demand for paper (11).

The waste paper recovery world averages at about 35% with Japan having highest recyling of paper (about 55%). Generation of waste paper within India estimated at about 0.5 million tonnes, the recovery rate working to about 20% (12). Recovery of waste paper is expected to go up to 25% by the year 2005 and 30% by the year 2025 which is quite low as compared to other developed countries (12). There is lot of scope in improving in the recycling of waste paper in India through effective collection mechanism, public awareness of waste paper as raw material resource and require legislation pressure to improve recycling.

AGRO BASED PAPER MILLS AND RECOVERY OF CHEMICALS FROM AGRICULTURAL RESIDUE

Small and medium mills based on agro-based accounts for nearly 31% of India's production. With depleting forest raw material, agricultural residues like basgasse wheat straw, rice straw, jute, grass etc. are likely to play important role in meeting the future demand of raw material for paper industry. The potential availability of agricultural based raw material by 2000 AD is estimated at about 35 million tonnes (Wheat straw : 16 million tonnes, Rice straw : 4 million tonnes bagasse 2.5 million tonnes and other 2.5 million tonnes).

Presently only about 2.3 million tonnes is being used by Indian paper industry. Some of this specific problems associated with use of non wood fibres are:

(i) seasonal supply (ii) high, handling, storage and transportation cost due to their bulky nature (iii) heterogeneous nature and low fibre content (iv) difficulties in brownstock washing, slow drainage and poor runnability (v) high silica content and problem related to chemical recovery (vi) low paper making potential as compared to wood and bamboo (vii) reduced paper strength at higher brightness. Washing efficiency in case of agricultural residue pulp is also poor due to slow drainage. Poor washing of pulp in the conventional rotary drum filter can be substantially improved by the use of double wire press washing system.

Due to high silica content of the agricultural residues recovery of chemical from agro-based mills have caused major concern in Indian paper mills. Black liquor from cooking agricultural residues has high silica content and cannot be concentrated to high solid contents to enable its burning in conventional recovery systems. Although, technologies are available and being practiced in many mills in other part of world; however, due to poor infrastructure still recovery of chemicals is not being practiced by majority of mills in Indian posing serious environmental pollution problems. Pollution load in

agrobased small mills having no chemical recovery is alomost three times to that of pollution load large integrated mills (3).

Some of the currently accepted technologies for recovery of chemicals for agro-based black liquor are : Rotary roaster, Roaster cum smelter, Broby smelter, Dry pyrolysis Process, Wet air oxidation process, Copeland reactor. Some of the emerging technologies are Wet cracking process, Chemsec process, Thermochemical conversion reactor system, Super critical wet oxidation process, Direct causticization process, ABC process, Direct alkali recovery system (DARS) or Ferrite process (14). Shreyans paper mill has installed fluidized bed soda recovery system where the weak black liquor containing high silica content being concentrated to about 45% concentration in multiple effect evaporator, venturi scrubber and cyclone system and is sprayed in the fluidised bed combustion system. It is hoped that other mills will also come forward for recovery system.

Most of the small paper mill with short fibre are prone to press picking and problem of poor runnability which can be improved by a draw free compact press configuration which results in easier handling, smooth web transfer and improve dryness resulting in higher productivity with reduced energy consumption (15).

UPGRADING OF PULPING & BELEACHING PROCESSES FOR REDUCING TOXICITY

Environmental pressure and stringent regulatory parameters and discovery of dioxin has resulted in continuous improvement in washing pulping and bleach processes and chemical pulp bleaching have undergone unpreceedented changes in the past few years.

Oxygen delignification and chlorine dioxide bleaching has become intergral parts of many paper mills in developed countries and conventional bleaching sequence of CEHH, CEH, has been replaced with ECF or TCF using oxygen, chlorine dioxide, peroxide bleaching in various sequences. Worldwide production of pulp from ECF & TCF has increased substantially during recent years. Oxygen delignification reduces operating costs, discharged of organic matter and chlorinated organic matter with lower kappa number, high yield, saving in bleaching chemical, reduced effluent load and facilitate bleach plant closure (16). Worldwide production capactity of oxygen delignified pulp is given in Fig 6. Worldwide

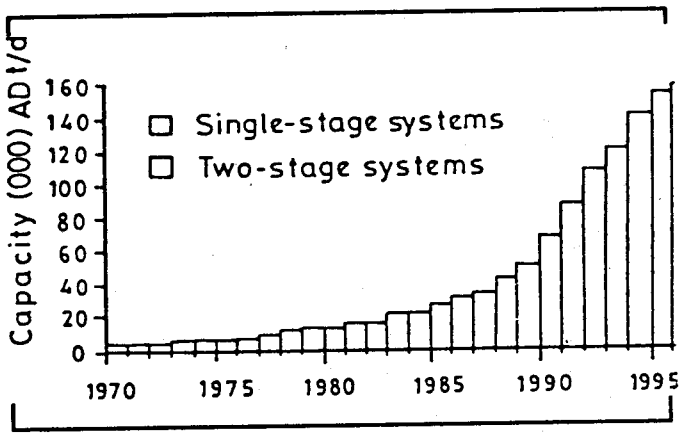

Fig.-6 : Worldwide Production Capacity of Oxygen Delignified Pulp

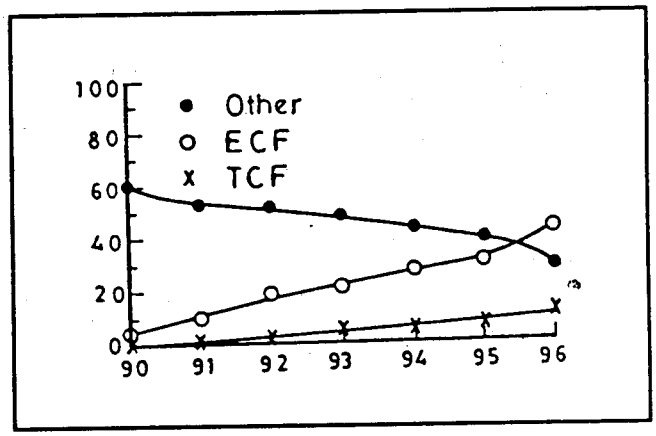

Fig.-7 : Worldwide ECF and TCF Production

production of bleached pulp from ECF and TCF is given in Fig 7 (16, 17). However, these technologies are yet to be adopted by many paper mills in India. Oxygen bleaching and chlorine dioxide bleaching are being used by only few mills in India.

Technological development in the area of pulping are extended delignification using poly sulfide, anthraquinone, oxygen, Super batch, Rapid displacement heating, Enerbatch, Modified continuous cooking, Extended modified continuous cooking, Isothermal cooking, Black liquor impregnation isothermal cooking, Organosolv pulping, steam explosion pulping, Biopulping, Explosion pulping etc. Although anthaquinone and polysulfide pulping has been tested at laboratory as well plant level, however, because of economic reason it is not in common use in India.

Increasing concern over the toxicity of bleach plant effluent, especially presence of furan and dioxin has led to concept of element chlorine free (ECF)

and total chlorine free (TCF) bleaching in majority of pulp mill in developed countries and now the trend is towards total effluent free bleaching process. However, Indian paper industries has yet to give serious thought this regard.

WASTE WATER GENERATION AND DECOLOURISATION

Paper industry is highly water intensive and water consumption and waste water generation in Indian paper industries is considerable higher than their counterpart in developed countries. Peper industry discharges large amount of wastewater containing high pH, colour, suspended solid BOD, COD, chlorinated organic compound, dioxin, furan etc. Many of the paper mills especially small paper mills are not well equipped with full-fledged effluent treatment process. There is considerable scope in Indian paper industry to reduce water consumption. During the last four decades, the effluent volume and colour discharged has been brought down from 350 mg/l (18). Looking to the Indian condition, one can realize that there is lot of scope for reducing the volume of the effluent discharged and colour concentration in the effluent. Decolourisation of pulp mill effluent has been cause of major concern due to poor biodegradability of lignin and its derivatives and needs immediate attention especially at Indian condition where conventional pulping and bleaching processes are being used.

ENERGY SCENARIO

The general energy scenario is quite disquieting and depressing. The growth and productivity is largely being affected due to inadequate availability of energy resorces. Overall inadequate energy scenario and rising cost of energy has also affected the overall growth of paper industry. Energy costs in India are far higher than the international norms.

Paper industry is energy intensive and large consumer of energy both electrical, as steam and of direct fossil fuel. Present energy consumption in Indian pulp and paper industry ranged from 31 to 55 GJ per tonne of product, which is roughly twice as much as what is in developed (7). This may be attributed to smaller Size of plant, low capacity utilisation, poor energy management programme, old equipments, low capacity equipments. There has been steep rise in cost of various sources of energy. Comparison of energy chemical and raw material consumption norms, paper mills in India and abroad is given in Table.

The average cost of electric power is at least 50-60 % higher than in advance countries which has direct impact on cost of production. Mill wide energy information system will help in minimising fuel and electricity costs and facilitate identification of fuel and electricity cost reduction investment opportunities. Both energy consumption and losses should be monitored and cost responsibility accounting system should be introduced and which should provide incentives for operation to minimise energy cost. Energy consumption can be achieved by :

(i) Reduction in energy consumption together with improved energy reuse and recovery

(ii) Use of high capacity and high efficiency chipper

(iii) Use of high energy efficient pulping processes.

(iv) Improvement in brown stock washing efficiency for increasing the solid content of black liquor for better steam economy in the evaporator and reducing losses.

(v) Improvement in steam economy by increasing the number of effects and use of falling film evaporator and vapour compression cycle.

(vi) Installation of high efficiency pumps and vacuum pumps.

(vii) Improved co generation of electric power and improving the boiler efficiency, installation of fluidized bed combustion system.

(viii) Increase in the amount of energy generation from waste even.

(ix) Modernisation or replacement of old recovery system to improve recovery.

(x) Good house keeping and better energy management process integration for improving energy efficiency.

(xi) Installation of recovery system in agrobased paper mills.

RESPONDING TO THE CHALLANGES OF GLOBAL MARKETS

Managerial performance and effectiveness is one of the important issue in view of globalisation. Competition is also intensifying, as globalisation

changes. The boundaries of competition and new sources of competition emerge. In striving to develop a strategy that will make it more competitive, paper industry must grapple with four interrelated challenges of global marketing strategy change, complexity, competition and conscience (19). The rapid pace of change implies that development marketing strategies must be continuously monitored and adapted to take into account new economic, technological, political and social realities over the next 10 years. The first major challenge for the industry due to globalisation and reforms is the cut in the import duties, which resulted in dumping and have become a pernicious evil foretelling doom and disaster for a range of products. Paper industry and especially small paper mills are worst affected with this phenomenon. For survival and healthy growth of paper industry, it is essential that import duty on various types of paper including newsprint be raised. Environmental demands and regulation will continue to be single most important factor influencing technological change in pulp and paper industry. Pulp and paper market are also driving the development of pulp bleaching technology and environmentally friendly grade. Indian paper industry has to go for modernization and upgradation of the plant equipment and technologies for reducing energy consumption, waste water generation, colour discharge, toxicity and improving quality of product.

CONCLUSIONS

An increasing turbulent environment posses new challenges to Indian paper industry. Paper industry is facing and will continue to face serious competition and pressure and also squeeze on its profits in the changed economic scenario created by liberalisation and globalisation. Although paper industry is passing through difficult times. but let us remember that without the cold and cruel winds of winter, spring brings no sense of renewal. Paper industry will have to go for structural changes and sustainable development to meet the challenges due to globalisation and must progress and grow rapidly to meet the demand of society through upgrading raw materials, upgradation of technology and equipments in pulping and bleaching, washing screening, paper making; recovery of chemicals especially agro-based mills; better process control and instrumentation, better forest management plan, upgrading product quality, product diversification, improved recycling, better energy and environmental strategies. Mill wide energy and environmental information system will play significant role in minimizing cost. Paper industry will have to operate in harmony with the environment

Let us enter the 21st century with confidence, enthusiasm, commitment and full steam and planned and act for sustainable development of paper industry with clear vision and perception of future demand; vision without action and action without vision will be disaster.

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