CHAPTER VI
SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

INTRODUCTION:
India has become one of the fastest growing economies in the world. Growth of GDP proves its strength and power. Indian paper mills play a pivotal role in contributing to industrial production. However, the Indian paper industry is not free from problems. It has faced a wide variety of problems like raw material constraints, sub-optimal use of installed capacity, poor profitability, lack of skilled manpower, sickness, research and development, finance problems, demand and supply factors, pollution and Govt. regulations etc. Global meltdown has hurt the paper industry also. In these circumstances, it is the right time to reduce the costs within the doors of the company without spoiling the quality of the products. Hence an attempt has been made to study the cost and operational analysis of a paper mills in order to improve productivity and profitability.

RESEARCH FINDINGS:
According to the objectives of the study, various analysis and statistical tools were used for the cost and operational analysis of the selected paper mills, the following are to be taken as the findings of the study.

COST AND PROFIT PATTERN ANALYSIS:
The following are the findings related to the cost and profit pattern of the paper mills:

- **Raw Material pattern**: The lowest raw material cost on sales ratio is possessed by TNPL whereas the highest belongs to WCPM.

- **Employee cost pattern**: The lowest employee cost on sales ratio is possessed by SPB whereas the highest belongs to SPM.
Manufacturing expenses pattern: The lowest manufacturing cost on sales ratio is possessed by WCPM whereas the highest belongs to TNPL.

Depreciation cost pattern: The lowest Depreciation cost on sales ratio is possessed by SPB whereas the highest belongs to TNPL.

Selling and administration cost pattern: The lowest selling and administration cost on sales ratio is possessed by WCPM whereas the highest belongs to TNPL.

Total cost pattern: The lowest total cost on sales ratio is possessed by WCPM whereas the highest belongs to SPM.

Profit pattern: The lowest profit on sales ratio is possessed by SPM whereas the highest belongs to TNPL.

Hence the overall low cost maker on the basis of total cost to sales ratio is WCPM and the overall highest profit maker is TNPL.

One way ANOVA used to find the significant differences in the mean cost and profit pattern of the paper mills shows that there are significant differences among the paper mills.

Kruskal-Wallis test used to test the significant differences in the median cost and profit pattern of the paper mills shows that there are significant differences among the paper mills.

OPERATIONAL EFFICIENCY ANALYSIS:

The following are the finds related to the operational efficiency analysis:

Measuring efficiency by ratio analysis:

The average working capital Index, asset leverage, total asset turnover ratio of SPB, and combined leverage of TNPL are better when compared with all other paper mills. The working capital index, working
capital turnover, combined leverage, asset leverage and total assets turnover ratio of SPM is lower when compared with other paper mills.

From the profitability side - Operating profit ratio and profit margin ratio of TNPL ROCE ratio and earnings power ratio of SPB are better when compared with other paper mills. The operating profit, Earnings power, profit margin ratio and ROCE of SPM are lower and it shows poor performance.

From the solvency side - The Short term solvency position of SPM and health ratio and credit strength of SPB are comparatively higher. The current ratio and long term solvency and Equity multiplier of WCPM are better when compared with other paper mills. The current ratio health ratio is lower for SPM. Debt-Equity ratio, credit strength ratio and equity multiplier ratio of APPM is lower when compared with other paper mills.

Taking all these ratios it is concluded that SPB, WCPM and TNPL are higher positioned when compared with others and the lower positioned company is SPM.

- **Probabilistic Neural Network Classifier**: This analysis is used to classify the homogeneous group of companies. That is the companies belonging to the same character based groups are indicated after the analysis. From the analysis it is concluded that the TNPL and SPB are classified as homogeneous group. All other companies’ are classified as heterogeneous group.

- **Data Envelopment Analysis (DEA)**: DEA technique is used to determine the relative efficiency of the companies and its organizational units. The results of the DEA analysis by taking the inputs as costs and output as production quantity, sales revenue per tonne, profit per tonne and sales quantity in tonnes shows the efficiency scores. The paper mills WCPM (Score 2.598), SPM (1.154) and APPM (1.007) are good scorers. Hence the most-efficient paper mill is WCPM.
Canonical Correlations Analysis: It is used to find the significant correlation between the two sets of variables-First set Costs and Second Set –profit and sales. The analysis confirms that there is a significant correlation between the two sets of variables in respect of all the five paper mills.

COBB DOUGLAS PRODUCTION FUNCTION:

The result of analysis shows that there is a significant association between the dependent variable cost per tonne and the independent variables- raw material cost employee cost manufacturing expenses, depreciation cost and selling and distribution expenses per tonne in respect of all the five paper mills.

The co-efficient of the regression equation indicates that manufacturing cost per tonne is greater for SPB (0.366335), TNPL (0.475517), SPM (0.379173) and APPM (0.386372) of which the highest belongs to TNPL. Hence, the impact on cost will be greater. The co-efficient of material cost per tonne is greater for WCPM (0.457531) its impact on cost will be greater.

Table 6.1
SUMMARY OF CONSTANTS AND COST CO-EFFICIENTS

<table>
<thead>
<tr>
<th>Company</th>
<th>Constant</th>
<th>Depreciation</th>
<th>Employee Cost</th>
<th>Manufacturing Cost</th>
<th>Material Cost</th>
<th>Selling &amp; Admn</th>
<th>Maximum Cost Co-efficient</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPB</td>
<td>1.615</td>
<td>0.06717</td>
<td>0.08258</td>
<td>0.366335</td>
<td>0.3578</td>
<td>0.10021</td>
<td>0.36634</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>TNPL</td>
<td>1.462</td>
<td>0.11247</td>
<td>0.09736</td>
<td>0.475517</td>
<td>0.1861</td>
<td>0.12256</td>
<td>0.47552</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>WCPM</td>
<td>1.549</td>
<td>0.08865</td>
<td>0.25064</td>
<td>0.145516</td>
<td>0.4575</td>
<td>0.05819</td>
<td>0.45753</td>
<td>Material</td>
</tr>
<tr>
<td>SPM</td>
<td>1.621</td>
<td>0.08415</td>
<td>0.1422</td>
<td>0.379173</td>
<td>0.3279</td>
<td>0.04018</td>
<td>0.37917</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>APPM</td>
<td>1.512</td>
<td>0.08319</td>
<td>0.11478</td>
<td>0.386372</td>
<td>0.3232</td>
<td>0.08003</td>
<td>0.38637</td>
<td>Manufacturing</td>
</tr>
</tbody>
</table>

The study shows that maximum concentration should be focused on the manufacturing cost in respect of TNPL, APPM, SPM and SPB whereas WCPM needs complete care on material cost.
OTHER FINDINGS

- **Raw material constraints:**
  The changes in technological and economic environment and regulatory frame work affected the Indian Paper industry. The availability of cellulose raw materials, water, power, bagasse, straw and waste paper has inherent drawbacks of limited and scattered availability of suitable technology for conversion into higher-grade pulp. This results in a sustainable supply of forest based raw materials, which account for 45 percent of raw materials used. The consumption share of forest based materials has been declining overtime and is expected to further decrease to 47% in recent years.

  Large size paper mills majorly relyon bamboo, hard wood and eucalyptus. These sources are very limited. Instead of these sources, the mills can concentrate on a growaste/residues such as rice straw, wheat straw and bagasse which are relatively short cycled regenerative and abundant. The overall constraint of raw materials will force the paper industry in future to rely more and more on imports of pulp or final paper products.

- **Water shortage:**
  Paper industry is water intensive industry. Water is one of the major inputs without which it is impossible to produce pulp and paper. Apart from large volume of water that is consumed at each and every process stage of paper manufacturing, water is also required for utility sections like boilers and cogeneration plants to generate steam and power. Off late, water, the most sought out commodity is depleting very fast and already started giving alarming signals in many parts of the country. The demand for water in a specific industry depends on the quality of paper and type of raw material used and the extent or recycling adopted in the mill.

- **Finances:**
  Being paper industry capital intensive, the internal savings are not adequate to finance various processes and progrmmes. The increased cost
of production and the decline in return on capital employed pressed the industry towards industrial sickness. Apart from these problems undisciplined investment in large mills and small mills is a vivid reminder of the need for strict financial discipline.

- **Industrial sickness:**
  
The low capacity utilization in the industry is due to high incidences of sickness in many small or medium mills and thus most of these are operating either at lower capacity or closed.

- **Pollution Vs Go-Green initiatives:**
  
Paper industry is one of the 20 high polluting industries in India. In addition to polluting air, deforestation, it has been one of major water pollutant industry as well. Lot of river water is being polluted due to paper industries in India. Over and above all, they incur rising cost of effluent treatment. Rising de-forestation and go-green policies of the Govt. are in one way poses a real threat to the existence of paper industry.

- **Shortage of Human Resources:**

  The total man power cost per tonne of product is quite high. The production per man in developed countries is nearly 10 to 15 times than the production per man India. Man power cost in paper industry in India varies from 8% to 16% of the total production cost. The industry has also the difficulty of obtaining floor-level technicians with technical back ground. More than 80% of the employment is in production departments, research and development accounting for only 1% of the total task force. In terms of educational qualifications, pulp and paper specialists are only 4% of the total employees, 75% of the employees are high school level and engineering graduates accounting for about 8%. One of the main reasons for very low capacity utilization is the acute shortage of skilled man power.

- **Per Capita Consumption of Paper:**
  
Paper is an essential item of consumption and its increased use reflects the living standards of the country. The developed countries
consumption per capita of paper is higher when compared to the developing countries. Per capita consumption depends upon developments in the industrial production, national income, literacy and growth of population. Presently, the India’s per capita consumption of paper is around 5 kg, in comparison to Asian 18 kg, USA 320 kg and World average of 47.7 kg.

➢ Power shortage:

The growth of paper industry is largely affected by the shortage of energy i.e., coal and power. The industry is highly energy intensive. In the total manufacturing costs of the industry, power and fuel and constitutes 25 percent.

➢ Obsolescence of technology:

The mechanized paper production started using bamboo in 1852 and the industry has not kept pace with the developments. Most of the paper mills operating in India are very old using out dated technology including plant and machinery. Machineries in some of the mills are more than 50 years old which lack modern process automation. Modernization of entire machines and process requires huge investment and mobilizing the financial resources is one of the major problems before the industry. Except a few mills, most of the paper mills in India operate on technologies which are more than 30 years old when compared to average mills in Europe.

➢ Non availability of good quality fibrous raw materials:

At present about 64% of paper production is based on non conventional raw materials such as agro residues and recycled fiber and only 36% paper production comes from good quality of cellulosic raw material i.e., forest resource. Sustained availability of low cost and good quality of cellulosic raw materials is one of the major factors in habiting the growth of paper industry. The major part of Indian fibrous raw material i.e. bagasse and straw have shorter fiber length, fiber width, excessive amount of primary fines and low drain ability when compared to wood fibers. In spite of these, reasonably good quality of paper is made by Indian mills. In term of recycled paper, India’s domestic collections are
insufficient to meet the needs, and therefore it imports almost half of its recycled paper, mainly from US. In total India imports nearly 4,00,000 tonnes of pulp, 20,000 tonnes of recycled paper and about 2,500 tonnes of finished paper annually.

➢ **High cost of basic inputs:**

Steep hike in the cost of basic inputs viz. Energy, Chemicals and Raw materials is posing a serious threat to the very existence of paper mills. The energy cost of paper production has raised appreciably from 13% in 1975 to 30% in 2003. There is a need for benchmarking the performance of various operations for different category of mills with respect to energy consumption and environmental compliance including efficient process technology for improved economics and environmental advantage.

➢ **Environmental issues:**

The Indian industry recognizes that it is a polluter. The paper industry releases chlorinated compounds, dioxins and furans, waste water are known to carry high levels of BOD, COD and suspended solids. On the atmospheric side, the industry faces the daunting task of tackling the emission of non-condensable gases. The problem of solid waste disposal is also a major concern to the industry in the face of local environmental pressures.

➢ **Competition in global market:**

Quality products at competitive price are necessary for effective global competition. The Indian paper mills face quality problems due to lack of good quality cellulosic raw materials available in the country. The industry will have to ensure that it stays in open market competition by maintaining quality standards of product at competitive price. The Indian paper industry as a growth potential, but it cannot meet the growing demand unless the major constraints are over.
SUGGESTIONS

This empirical study used many statistical tools for analyzing the data. Various fruitful findings have been extracted. The following suggestions are arrived for the improvement of the operational efficiency and profitability of the selected paper mills:

- The study shows that the most of the paper mills cost of manufacturing is comparatively greater and improvement in productivity should be initiated. To increase the all-round productivity every processing department’s productivity has to be improved and monitored. There is a good scope to increase the overall production per tonne by improving the machine efficiency.

- The study also shows that material cost increases the cost of production. Hence, the paper mills should try to reduce the material cost by adopting appropriate material management techniques. Any reduction in material cost would have direct impact on profit.

- Cost in every processing department should be measured and monitored in every stage. Department wise cost control would reduce the cost of operation and ultimately increase the overall profitability. The Activity Based Costing technique can be used to identify activities, measure them and cut the unwanted and unproductive expenditures.

- Deciding the best product mix would increase the profitability of the paper mills. A minor miscalculation could lead a major loss to the concern. Budgeting is another major source of problems in a production industry. Therefore to enhance the profitability, the paper mill has to take into account the product rankings and cost comparisons. Controlling the cost of production at an optimum level is one of the essential requirements for the paper mills to compete successfully in the market. Hence, the mills have to take suitable measures like:
- Profitable product mix ascertainment,
- High productivity / production per tonne ascertainment and
- Use of Modern machines and innovative technologies.

- By improving the machinery maintenance practices, the papermill performance can be improved. Towards increasing the machine efficiency, the mill should ensure that unnecessary stoppages of machines should be avoided.

- By improving the employee productivity would also enhance the operational efficiency and profitability.

- While processing a raw material into finished goods the loss is inevitable. Monitoring of losses and reduction in wastes effectively would reduce the operating cost.

- Using six sigma Technique on the operation side would increase the productivity as it correct the variations in the production and gives good quality products.

- The monthly production schedule based on the production mix selected and the arranging the machine, labour allocation etc., to achieve the targets, monitoring of production and waste would improve the productivity.

- Due to go green revolution and also for sending and using of soft copies the demand for paper is gets reduced. This happens as a part of saving tree programme. Hence, a paper company has to find the alternate means of inputs at a cheaper cost and also to concentrates better paper product-mixes to have sustainable profitability.

- Grabbing foreign orders and establishing contacts need to satisfy their requirements so as to do the business effectively. Flexibility for Quick Response systems, JIT (Just in Time) delivery systems, extensive use of
EDI (Electronic Data Interchange) and EPOS (Electronic Point of Sale), faster merchandise turnaround times, and shorter lead times are some of the demands of international retailers. These are to be satisfied to have permanent relationship with the foreign retailers.

➢ Use of Total Cost Management Tools may improve the productivity and profitability. The following are some of the total cost management tools suggested:

- **Every process** has to be carefully re-engineered to find the wasteful movements and costs. This would reduce the product cycle time as well as the cost of each process. There would be a chance of reducing the wastes and to increase the yield.

- **Monitoring of processes** enhances the quality of the products in each process improves all round productivity. Knowing of every day production, stocks and profit made, cash and funds movement is possible by the Business Intelligence Soft wares.

- **Activity based costing** may be introduced to quicken the production time and reduce the wasteful movements and cost. This method provides a basis for arriving accurate cost of production by allocating the overheads as per the activities undertaken. This rework on cost of manufacturing guides a company to take valuable decisions.

- **Target costing**: Design of Experiment may be made to find the cost of manufacturing of new type of paper variety production. This scientific method of arriving the cost may be taken as a basis for improving productivity and profitability.

- **Balanced scorecards**: Profitability drilldown from the organization profitability as a whole to department wise /product wise would make vital decisions in time to maximize the profitability or to minimize losses.
- **Lean six sigma:** These two are very powerful tool to improve productivity, quality and efficiency. By using this technique in the process, the production cycle time can be reduced and at the same time variations and wastes are reduced. Lean Six Sigma takes care about both waste and speed issues in the processes. Integrating Lean tools into Six Sigma process map leads to many benefits.

- Use of financial leverage tool may reduce the interest burden. Opt timely leveraging would magnify the profit. Long-term funds in the form of issue of bonds for specific period and short term funds like commercial papers may be planned in addition to the other sources of finding funds so as to get optimal capital-mix.

- Business Intelligence: It is a process through which the performance of an organization is monitored with KPI’s (Key Performance Indicators) and reported for immediate action and follow up. It is a “Measure- Monitor-Manage- Analyze-Plan system. Business Dash boards provide multiple scorecards with visual indicators with traffic signals - red, green and yellow. Alerts and work flow corrections are also indicated by the Business Intelligent Software. Close watch over the financial leverage, asset leverage, Cash flow management and working capital shall make a concern to reduce the interest burden and at the same time enjoy the benefit of zooming profit.
OTHER SUGGESTIONS

Raw material issues:

Indian Pulp and Paper Industry uses diverse raw materials from forest resources, agriculture residues and waste paper. Wood being one of the preferred raw materials for paper making, there is a trend towards increased use of mixed hard woods in Indian paper industry from natural forests and eucalyptus from both farmers as well as from plantations. The JPC study recommended that small percentage (about 5%) of degraded lands should be converted as "production forests" by having corporate involvement in the plantations.

The waste paper used by the industry comes from both domestic and imported sources. Government provides incentives for local recycled fibre paper producers in order to support them. This will definitely ease the woes of the Industry based on recycled fibre. Studies have been initiated for clonal propagation of plant species to ensure high yield & improved quality of cellulosic raw materials for the industry and satellite mapping of the wood resources.

Technological issues:

Most of the paper mills operating in India are very old using out dated technology including plant and machinery. Modernization of entire industry calls for huge investment and mobilizing the financial resources is one of the major problems before the industry. In view of this a focused and time bound technology upgradation funds scheme (TUFS) has been proposed to provide impetus to modernization effort by technology upgradation in the industry. The objective of the TUFS is to provide funds for upgradation to improve competitiveness of the industry through;
• Acquisition of proven technology of foreign or indigenous origin/design and drawing
• Acquisition / license of patent rights
• Acquisition of capital goods for transfer of process technology Contractual R&D activities leading to technology upgradation of the unit within 2 years.
• Technical support on production planning, quality management, inspection and testing including ISO certification etc.

The upgradation should lead to emergence of core competencies in critical areas including quantifiable increase in productivity, quality improvement with reduced cost, improvement in energy efficiency norms and better compliance with environmental protection legislations, safeguards for eco-sustainability of products as also compliance with legislation relating to patent etc. as per the WTO regime.

**Financing:**

Under the liberalization policies, 100% Foreign Direct Investment (FDI) to paper industry has been allowed by the Govt. various agencies like IDBI, ICICI, and IREDA etc., are willing to support and finance the Industry through long term loans at nominal cost for the Industry to upgrade their technology.

**Environmental policy:**

Government is intervening to form uniform policy as regards to non-biodegradable materials (e.g. ban of plastic bags in certain states). Also Eco labelling scheme based on sustainable raw material base (wood/ waste paper/ agro) and environmentally friendly processes is being encouraged.

**Research and Development:**

The Government has set up the most advanced R & D facilities at Central Pulp and Paper Research Institute, Saharanpur (CPPRI) to aid the paper industry in applied research related to pulping, paper making, chemical recovery, energy and environmental issues.
Human Resource Development:

Human Resource Development programs are also being undertaken at CPPRI. Industry is encouraged to exploit the R & D and HRD facilities at CPPRI. Indian Institute of Technology, Roorkee (IIT, R) also provide assistance to the industry by producing technically skilled manpower in the area of pulping and paper making.

Strengthening of capabilities for indigenous machinery manufacturing facilities:

One of the barriers for growth of the industry is the need for high investments at very low rates of return. The cost of expansion and setting up of new units is very high because of the high cost of imported technologies. The major technology suppliers are located in Europe, Japan and China, and the cost of acquiring such machinery, after the addition of substantial custom duties, is very high. Therefore leading companies in machinery manufacture should be encouraged to set up plants in India. Indigenous machinery manufacturers also require support for developing suitable equipment’s. Requisite financial and technical support should be provided for such ventures.

Strengthening of R&D support:

The possibility of adoption of modern technologies, which have significant effect on cost and quality of products, needs to be explored keeping in view their long term sustainability. For addressing the energy and environmental issues there is a need to strengthen R&D institutions like CPPRI with additional infrastructure and manpower through adequate financial support under 12th Five year plan. Further there is a need for a greater synergy between industry, technology suppliers and R&D institutes to develop indigenous technologies suitable to the Indian context.
CONCLUSION

Paper mills have been instrumental in initiating a number of entrepreneurial activities in India. Indian paper industry can be a global leader provided it comes out of vicious cycle of shortage of raw materials and ever increasing production cost.

There is a considerable scope for further reduction in the cost of production of paper products with the composition of material consumption from use of conventional to non-conventional raw materials like agro based and recycled fiber based materials, and expansion of capacity on the unit size, adoption of modern technology, innovation employment of skilled manpower and R and D support are important developments and would lead to substantial improvements in the productivity and thereby India a cost effective producer of paper in the world.

In the current scenario of paper production technology upgradation would lead to emergence of core competence in critical areas including improvement in energy efficiency norms and better compliance with environmental protection legislations and safeguards for eco-sustainability of paper products.

If there is more liberalization in this sector India has the potency to become one among world’s the biggest producer of paper. Among the five paper mills TNPL performs better than the other mills. The other mills must solve the various problems and improve productivity to become a world class manufacturer and global leader to meet the global competition.